

# **E-Series Networked Display**

## Reference Manual

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# Important Information

## Intended use

The display units detailed in this handbook may form part of marine navigational radar system or GPS system intended for use on (non-IMO/SOLAS class) leisure vessels or small workboats.

This handbook contains important information on the operation and maintenance of your E-Series Display. To get the best results in operation and performance, please take the time to read this handbook thoroughly.

For full details of installation and system integration, please refer to the E-Series Installation Guide supplied with the display.

## Safety notices



### **WARNING:Navigation Aid**

**This device is intended to be used as an aid to navigation. Its accuracy can be affected by many factors, including equipment failure or defects, environmental conditions and incorrect handling or use. It is the user's responsibility to exercise common prudence and navigational judgement. This device should not be relied upon as a substitute for such prudence and judgement.**



### **WARNING:Product installation**

**This equipment must be installed in accordance with the instructions in the E-Series System Installation Guide. Failure to do so could result in poor product performance, personal injury and/or damage to the vessel.**



### **WARNING:High voltage**

**The display unit and scanner unit contain high voltages. Adjustments require specialized service procedures and tools only available to qualified service technicians - there are no user serviceable parts or adjustments. The operator should never remove the display unit cover or attempt to service the equipment.**



### **WARNING:Electromagnetic energy**

**The radar scanner transmits electromagnetic energy. Ensure that the scanner has been installed according to the recommendations given in the relevant scanner handbook. Avoid looking directly at the antenna.**

**WARNING: Fishfinder sounder module**

Removing the transducer cable from the rear of the fishfinder sounder module whilst it is switched on can cause sparks. Only remove the transducer cable after power has been switched off. Ensure that the sounder module is mounted where it is well ventilated and in an area free from flammable vapors.

**CAUTION: Water Ingress**

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

**CAUTION: CompactFlash Cards**

- Removing the CompactFlash card whilst information is being written to or read from it may cause damage to the card and loss of all data. Use the proper procedure detailed on page 20 to remove the card.
- Only one CompactFlash card per display can be used at any one time.
- Do not save data (waypoints, routes etc.) to a Navionics card as the charts may be overwritten. When archiving use a different CompactFlash card.
- DO NOT use a metallic instrument such as a screwdriver or pliers to help you remove a card, as doing this can cause irreparable damage.

**CAUTION: Global Positioning System Antenna**

Do not connect or disconnect the GPS antenna from the display unit whilst power is switched on. Doing this may result in irreparable damage.

**CAUTION: UV Light**

To provide protection against the damaging effects of UV light, it is advisable to replace the sun cover provided when the display is not in use.

**CAUTION: Cleaning the display**

Take care when cleaning the display, to avoid damaging it:

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

## Disclaimers

This product is intended to serve only as an aid to navigation. Use of specific features such as AIS overlay, radar, and various cartographic aids are meant only to aid safety and decision-making. These features cannot be relied upon as complete or accurate as their use and availability may vary locally. It is your responsibility to use caution, sound judgement, official government charts, notices to mariners and proper navigational skill when using this or any other electronic device.

Electronic charts are an aid to navigation designed to facilitate the use of authorized government charts, not to replace them. Only official government charts and notices to mariners contain the current information needed for safe navigation. The Captain is responsible for their prudent use. The E-Series and its charts do not therefore exclude the user from carrying the required official charts and documents.

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.

**Weather services**

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## About this manual

This manual describes how to operate your E-Series display in conjunction with Navionics cartography. It assumes that all peripheral equipment to be operated with it is compatible and has been correctly installed.

This manual is intended for users of varying marine abilities, but assumes a general level of knowledge of display use, nautical terminology and practices.

Raymarine does not necessarily support all the features in particular Navionics cartography.

### Technical accuracy

To the best of our knowledge, the technical information contained within this handbook, was correct at the time of printing. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain.

In addition, Raymarine's 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 handbook.

Raymarine does not support after-sales or technical support for Navionics chart cards. If you wish to file a report of an error or omission on a Navionics chart, please provide the information to the Navionics web site at the link below:

<http://www.navionics.com/DiscrepancyReports.asp>

## EMC conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment. Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised. For more information regarding Raymarine's EMC conformance please refer to our website at [www.raymarine.com](http://www.raymarine.com).

## Multi-media chart cards

### Navionics support

In addition to Gold and Platinum, the E-Series now supports the following Navionics cartography:

- Silver
- Gold Plus
- HotMaps USA
- HotMaps Premium
- Fish 'N Chip

For more information on Navionics charts, see [www.navionics.com](http://www.navionics.com).

To use your E-Series Display as a navigation aid, charts with the appropriate level of detail for the geographic area you wish to navigate are required. The charts are available in electronic format on Navionics Chart cards.

A chart card provides an appropriate level of detail and scale for a given geographic area. Up to 6 Gold or 2 Platinum chart cards can be used in an E-Series Networked system. The maximum capacity Navionics card is 16Gb.

To check the current availability of Navionics® chart card types and the latest feature sets, visit **[www.navionics.com](http://www.navionics.com)** or **[www.navionics.it](http://www.navionics.it)**.

To obtain Navionics cards, contact your local dealer or visit the Navionics web site.

Alternatively, anywhere in North America call Navionics toll-free on **1-800-848-5896**.

Outside of North America, contact your local dealer or Navionics SpA on **Phone: (+39) 0584 961696** or **Fax: (+39) 0584 961309**

When archiving data, Raymarine recommends that you only use SanDisk CF memory cards. Other brands of CF memory card may not work in your E-Series Display.

## Disposal

### **Waste Electrical and Electronic Equipment (WEEE) Directive**



The WEEE Directive requires the recycling of waste electrical and electronic equipment. Whilst the WEEE Directive does not apply to some of Raymarine's products, we support its requirements as part of our environmental policy and we ask you to be aware of how you should dispose of this product.

The crossed-out wheeled bin symbol found on our products signifies that it should not be disposed of in general waste or landfill.

Please contact your local dealer, national distributor or Raymarine Technical Services for information on product disposal.

## Warranty

To register your new Raymarine product, please fill out the warranty card included in the box or go to: [www.raymarine.com](http://www.raymarine.com)

It is important that you complete the owner information and return the card to receive full warranty benefits, including notification of software updates if they are required.

## Certified Installation

Raymarine recommends certified installation by a Raymarine approved installer. A certified installation qualifies for enhanced warranty benefits. Contact your Raymarine dealer for further details and refer to the separate warranty card packed with your product.

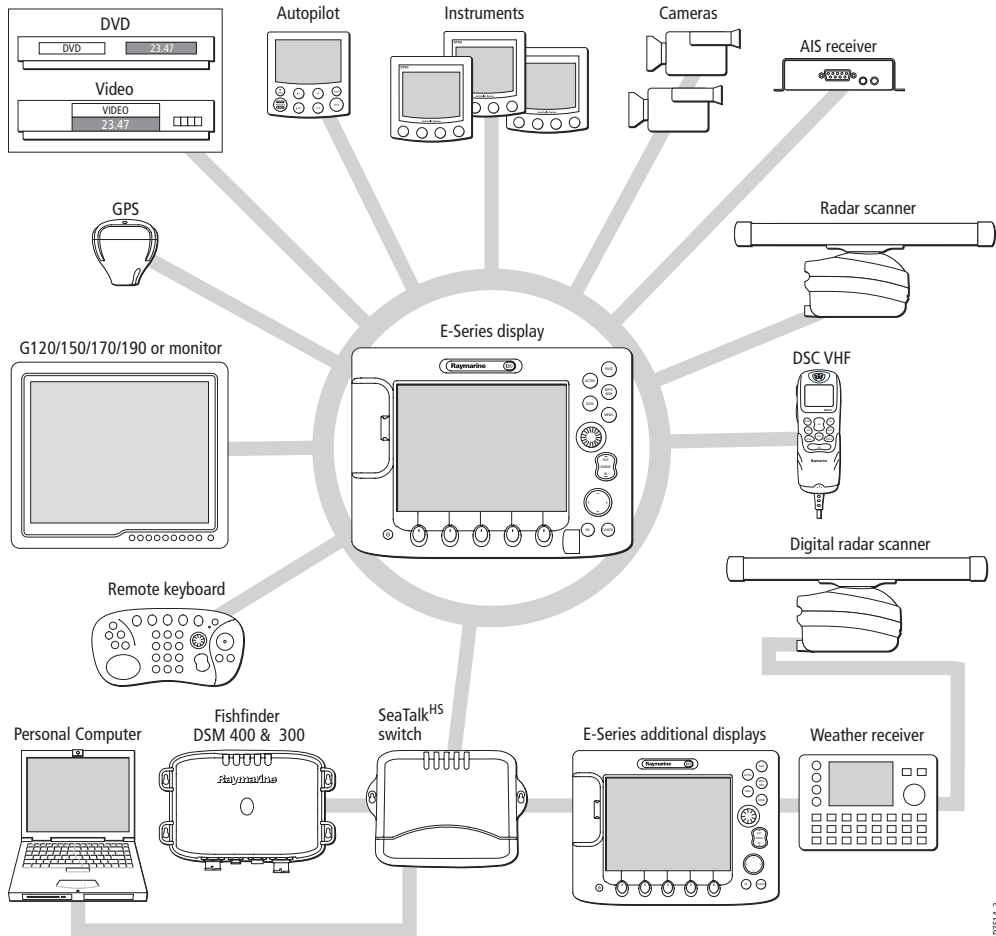




# Chapter 1: Overview

This chapter gives an overview of the E-Series display system and its features.

## 1.1 What will my E-Series integrate with?

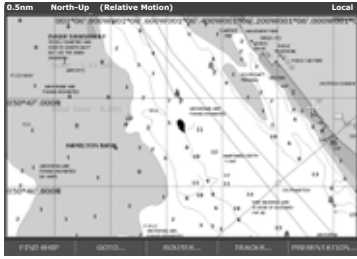


When used as part of a SeaTalk system it will display information from other SeaTalk and NMEA instruments. It can also be networked with other E-Series displays by way of Raymarine's SeaTalk High Speed switch. Information from the E-Series display can be transferred between application *Appendix 1s* and to other SeaTalk instruments within the system. For more detail on system integration, please refer to the Installation Guide.

## 1.2 What can the E-Series Display do?

With the appropriate equipment connected to your system and the necessary data available, your E-Series display combines the following applications which are used to:

### Chart (Chapter 4)




- Locate where you are.
- Interpret your surroundings.
- Monitor where you are going.
- Record where you have been.
- Navigate to a specified position (waypoint).
- Build and navigate routes.
- View details of nearby features & services.
- View details of boats equipped with AIS.
- Distinguish between fixed and moving objects.
- Measure distances and bearings.

D7363\_2

You will need a chart card, and position/heading data, for the chart application to be fully functional.

### 3-D Chart (Chapter 5)

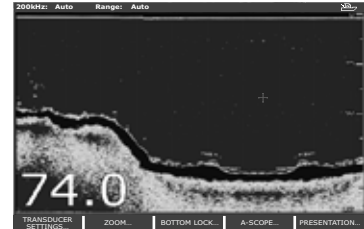


- Display a 3D view of land, sea & features.
- Locate where you are.
- Interpret your surroundings.
- Monitor where you are going.
- Go to an existing waypoint.
- Navigate a route.
- Synchronize with the 2D chart.
- Identify fishing spots

D8702\_1

You will need a chart card and accurate heading and position data for your 3D chart application to be fully functional.

### Fishfinder (Chapter 6)

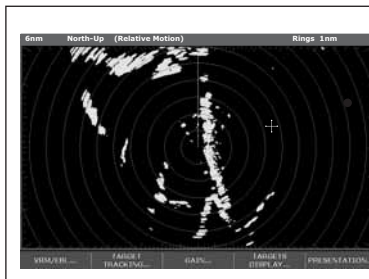


- Build a picture of what is below your vessel.
- Locate & distinguish underwater objects & targets.
- Distinguish the seabed and its texture.
- Obtain information about water depth, temperature.
- Mark a point of interest, fishing spot etc.
- Determine depths and distances of targets.

D1377-1

You will need position data, in addition to a DSM300/400, for your fishfinder to be fully functional.

## Radar (Chapter 7) Digital Radar (Chapter 8)



- Detect landmasses & navigation markers.
- Detect and measure the range and distance of other vessels.
- Acquire targets and track them for collision avoidance.
- Navigate to a specified position (waypoint).
- View details of boats equipped with AIS.

D7375-2

You will need position and heading data, in addition to a compatible scanner, for your radar application to be fully functional.

## Data (Chapter 9)

Ves Pos 25°45'.940N 089°09'.710W	GOTO CURSOR 220°T 1.28nm	TTC --h--m--s	VWG Wgt --kt
Depth 78.8ft	Cig Sig 286°T 0.0kt	Heading 293°T	Speed 0.0kt
Set Drift 355°T 0.0kt	WTR 0.00nm Steer >	Trp 0.00nm	Local Time 01:42:12

- View data generated by the system or by instruments available on NMEA 0183, NMEA 2000 and SeaTalk or SeaTalk<sup>2</sup>.

D7376-1

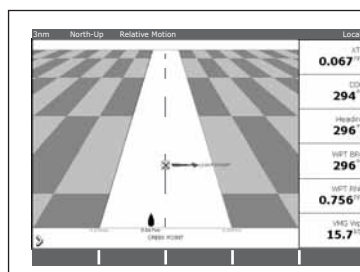
## Video (Chapter 11)



- View video images from on-board CCTV cameras, DVD or video player.

D7378-1

## Course Deviation Indicator (Chapter 12)

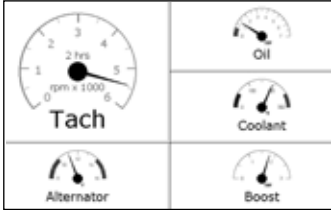


- View real-time display of your vessel on a 'rolling road' in 3D perspective.
- Give details of any correction required to steer your vessel along a given course.
- View data about the distance and time to go until you reach a specified point.

D7379-1

You will need accurate heading and position data for your CDI application to be fully functional.

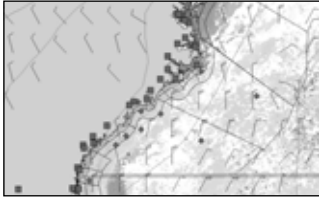
## Engine Monitor (Chapter 13)



- View engine data e.g. engine temperature, oil pressure, fuel level etc from up to three engines on a compatible engine system.

D7497-1

## Weather (Chapter 14)




- Only available for the US.
- Superimpose historical and forecasted weather graphics on a world map.
- Determine conditions in your vicinity or at a particular location.
- View weather reports.

D8701-1

You will need accurate position data and be connected to a Sirius weather receiver (which is supplying the appropriate data) for your Weather application to be fully functional.

## Navtex (Chapter 16)

Major areas of NAVTEX coverage include the Mediterranean Sea, the North Sea, coastal areas around Japan and areas around the North American continent.



- Automatic broadcast of localised Maritime Safety Information (MSI)
- Receive navigational and meteorological warnings, and search and rescue information.

D8728-1

You will need a Navtex receiver connected to your system via NMEA, in order to receive this data.

## Waypoints (Chapter 3), AIS (Chapter 17), Pilot Control (Chapter 10) & Sirius audio (Chapter 15)

Whilst not applications in their own right, waypoints, AIS, Pilot control & Sirius Audio are handled at system level and are covered in separate chapters.

## 1.3 The Simulator

The E-Series Display includes a simulator mode, which allows you to practice operating your display without data from a GPS antenna, radar scanner, fishfinder or an AIS receiver. The simulator mode is switched on/off in the System Setup Menu (see *page 285*). Once enabled, you can use the simulator:

- **Before installation** - Simply connect the display to a 12V DC power supply, fused at 1 amp by attaching the red core from the power lead to positive (+) and the black core to negative (-).
- **After installation** - Whilst in a marina or at anchor.

Please note that system settings made whilst in simulator mode, are not transmitted via SeaTalk to other equipment.

**Important:** Incoming AIS safety messages cannot be displayed while the simulator is switched on.



# Chapter 2: General Operation

## 2.1 Introduction

This chapter gives details of the general operation of the E-Series display, and covers the following subjects:

- Powering the display on/off.
- Using the controls.
- Application display.
- Displaying and editing additional information.
- Adjusting the display lighting.
- Initial setup procedures.
- Using CompactFlash cards.
- Managing data.
- Operating a networked E-Series Display.
- Emergencies and warnings.

## 2.2 Powering the display ON/OFF

### Power ON



Press the **POWER** button until the introductory logo is displayed. The keys light up and after a few seconds an application page and a navigation warning and weather data disclaimer is displayed. Read this information and then press **OK** to remove it.

At this time the radar scanner (if fitted and powered) is checked for compatibility with the display. An error message is displayed if the scanner is incompatible.

### Power OFF

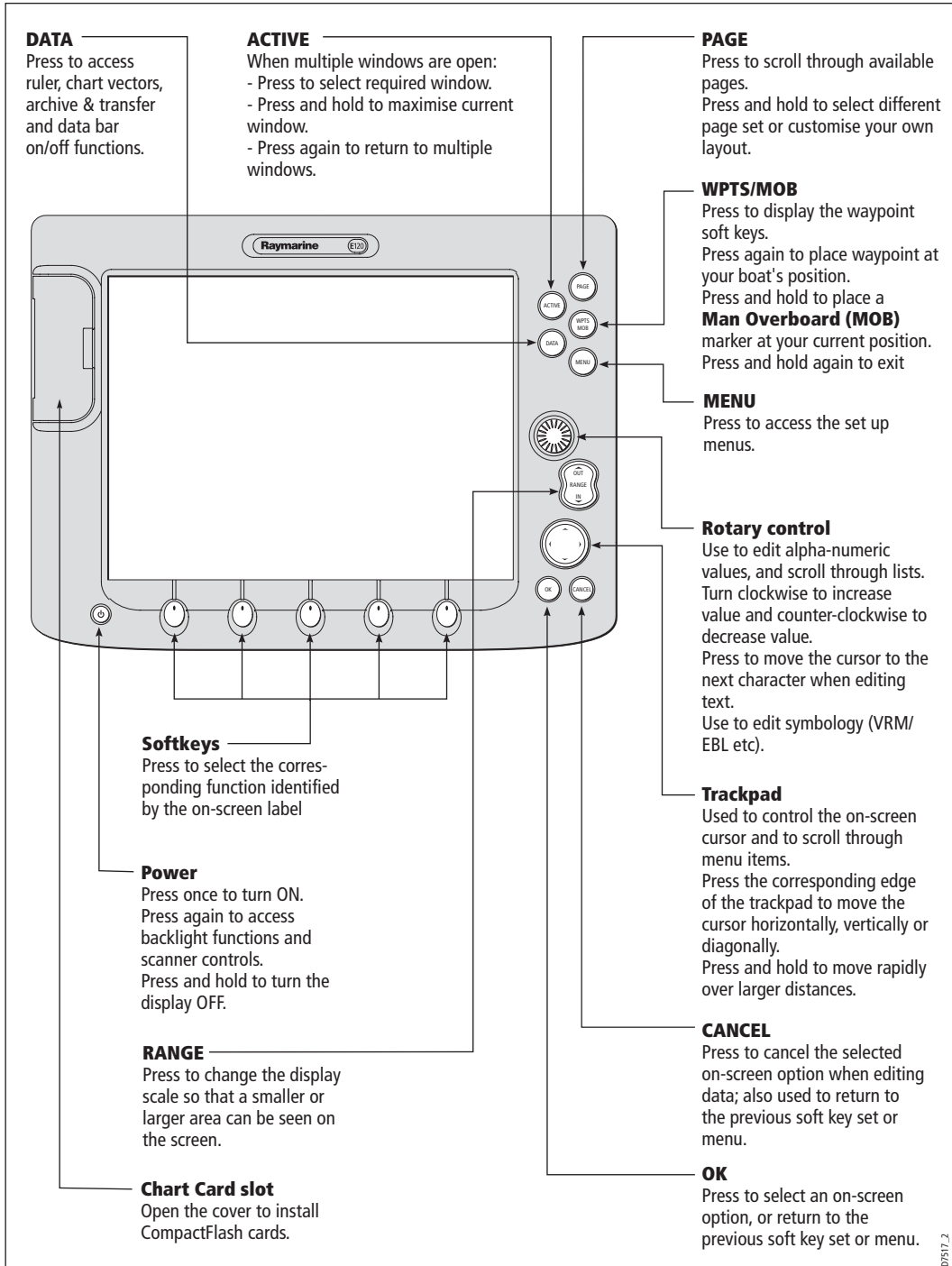


Press and hold the **POWER** button until the power down count reaches zero. If the **POWER** button is released within the countdown period, power off is cancelled.

Remember to replace the suncover to protect the display.

## 2.3 Using the controls

### The control panel



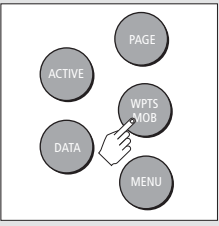


## Buttons and soft keys

To navigate to the required function you will need to press a series of buttons and/or soft keys:

**Buttons**

- Access system functions or change what you see on-screen.
- Within the text of this document they are written in bold capitals e.g. **WPTS/MOB**.
- Press and hold to access short cuts.



↓

**Soft keys**

- They change depending on application or function being performed.
- Press the corresponding key (below the screen) to select. Further soft keys may be displayed.
- If a key has several options, each press will highlight the next option.
- If a key displays a single value or a slider above, use the rotary control to adjust.
- Within the text of this document they are written in capitals e.g. SORT LIST.

WAYPOINT AT CURSOR	WAYPOINT AT VESSEL	WAYPOINT AT LAT/LONG...	GO TO WAYPOINT OPTIONS...	REVIEW AND EDIT WAYPOINTS
●	●	●	●	● (hand pointing)

↓

ERASE WAYPOINT	SORT LIST	SET DEFAULT SYM & GROUP...	WAYPOINT GROUPS...	VIEW AND EDIT DETAILS...
●	●	● (hand pointing)	●	●

↓

		SET UP DEFAULT SYMB GROUP		EDIT DEFAULT
●	●	● (hand pointing)	●	●

**Example:**  
The example above shows the series of button and soft key presses required to change the waypoint default symbol or group.

D7384-2

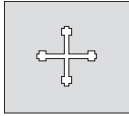
This process of pressing buttons and soft keys to navigate to the required function is simplified in this manual and represented by a strip e.g.



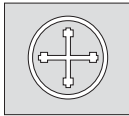
*Note: The key beep that you hear whenever a button or soft key is pressed, can be switched off and the soft keys automatically hidden if required. For more details, please refer to the Display Setup Menu on page 293.*

## The cursor

When you are using the chart and radar applications, the cursor is used to move around the screen:



The cursor appears on the screen as a white cross.



If the cursor has not been moved for a short period of time, it changes to a circle with a cross in it, to make it easier to locate on the screen.

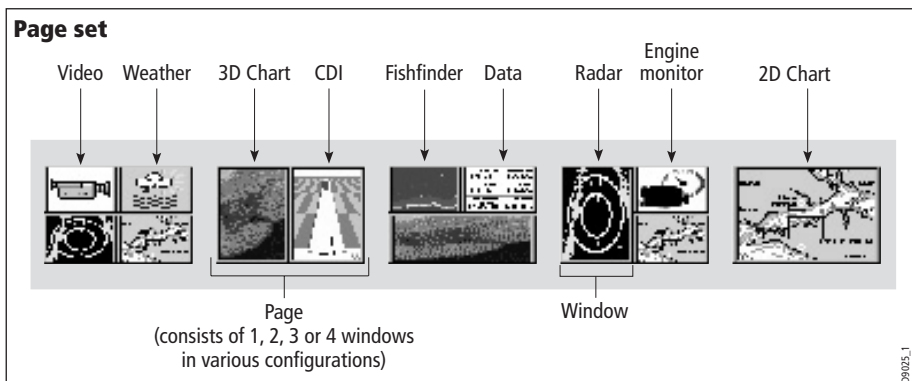


The cursor is context-sensitive - when it is placed over an object e.g. a waypoint or chart feature, it changes color and a label or information associated with the object is displayed. When you place the cursor over certain items, the soft keys change to enable you to access related operations.

- Notes:** (1) *For a full list of cursor labels and their meanings, please see Appendix C*
- (2) *For details of how to temporarily hide the cursor, please see page 293.*

## 2.4 Displaying applications

The various applications that make up your E-Series system are displayed in a series of screens known as *page sets*. There are 4 pre-configured and one empty page set to choose from. Each page set contains 5 *pages*. These pages are made up of 1, 2, 3 or 4 *windows* combined in various formats. Each window can display an application e.g.



If necessary, you can change the combination and layout of these page sets to meet your particular needs (see *page 276*).

*Note: For details of how to select page sets, pages and windows, please refer to page 17.*

## 2.5 Additional screen information

Information is displayed on the screen using a variety of methods:

The screenshot shows a marine display interface with several callout boxes explaining different UI elements:

- Status bar**
  - Gives information specific to each application.
  - Cannot be edited or moved.
- Data bar**
  - Gives information associated with your boat or the environment.
  - Customisable content\*
  - Vertical or horizontal format\*
  - Display or hide\*.
  - Normal or large size\*.
- Status icons**
  - Confirm status of DSM, GPS, AIS, Autopilot and scanner.
- Data base lists**
  - Contain information you have added to the display's memory e.g. waypoints.
  - Highlight an entry using trackpad or rotary control to display related information.
  - Editable using soft keys.
- Pop-up messages**
  - Alert you to a situation e.g. alarm, function not available.
  - Not editable.
  - May require a response e.g. press ACKNOWLEDGE to silence alarms.
- Dialog boxes**
  - Enable data to be edited or entered into a store/list e.g. editing a waypoint.
- Menus** (see next page)
  - Used to configure system to your particular needs.

The interface itself shows a status bar with 'COG 008 °T', 'SOG 17.9 kts', 'Ves 50°50'.524N', 'Pos 001°06'.493W', 'Csr 50°50'.514N', 'Pos 001°06'.498W', 'Brg 197 °T', 'Rng 0.011 nm'. Below this is a 'Waypoint List' dialog box with fields for Name, Group, Position, and Rng/Brg. An 'Edit Waypoint' dialog box is also visible, with a 'MARPA ALARM' pop-up message stating 'Target lost (on screen)'. At the bottom, there is an 'ACKNOWLEDGE' button.

\* For details of how to adjust and edit the data bar, please see *page 278*

*Note: To change the size of the text on screen, please see page 293.*

DP56\_3

## Menus



Menus enable you to configure your system to your particular needs. Whenever the **MENU** button is pressed, the Setup menu is displayed containing a list of all the menus available for the active application together with system wide menus e.g.

Setup	
Menus for the active application	Radar Setup ...
External equipment/instruments	GPS Status... Compass Setup... AIS Layer Status...
System-wide menus	System Setup... Alarm Setup... Display Setup... Databar Set... Select Page Setup... System Diagnostics... Remove CF Card

D730\_2

For details of application menus, please refer to the appropriate chapter. For all other settings, please refer to *Chapter 18: System setup and customizing*.

To access a menu:

1. Select the appropriate menu and setting:

**MENU**

⇒

Setup	
Chart Setup...	
Cartography Setup...	
GPS Status...	
Compass Setup...	

⇒

Cartography Setup Menu	
Chart Display	Detailed
Chart Grid	On
Chart Text	On
Chart Boundaries	ON
Spot Soundings	ON

1. Highlight item, using:
  - Trackpad (up/down) or Rotary control
2. Select item, using:
  - Trackpad (right)

D8500\_1

2. To change the setting:

Cartography Setup Menu	
Chart Display	Detailed
Chart Grid	On
Chart Text	On
Chart Boundary	ON
Spot Soundings	ON
Safety Contour	66ft
Depth Contour	ALL
Nav. Marks	ON

Highlight or change value to new setting, using:

- Trackpad (up/down) or Rotary control

OFF
7ft
10ft
16ft
20ft
33ft
66ft

⇒ **OK**

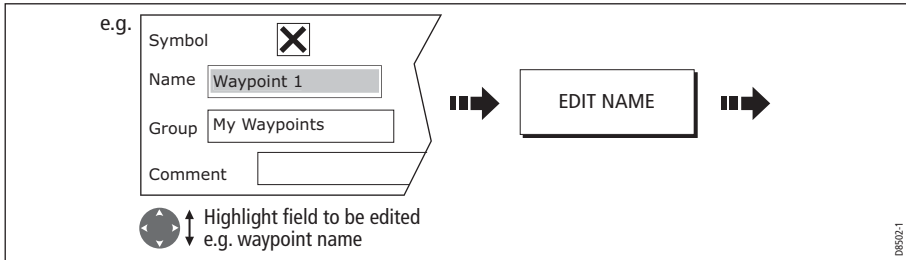
D8500\_1

### Editing the dialog box information

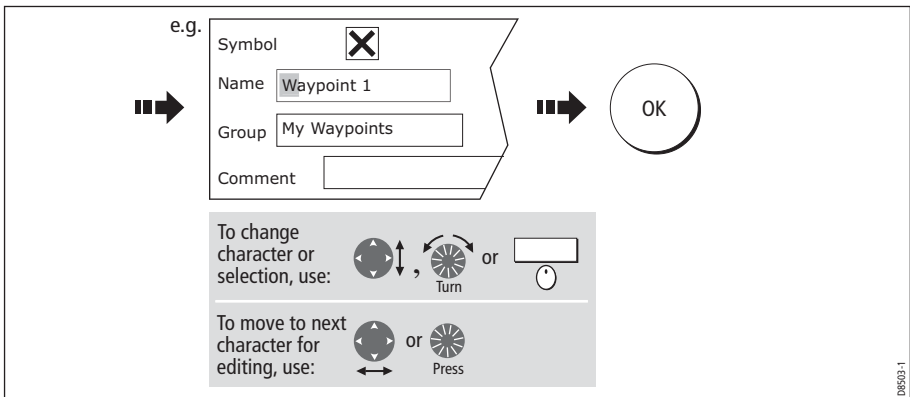
Dialog boxes enable data to be edited or entered into a list e.g. Edit Waypoint screen.

To edit/enter data into a dialog box:

1. Select the field for editing:



2. Edit/enter data and save:

















3. Repeat Steps 1 and 2 if necessary.

- Notes:** (1) Character text can be entered in upper or lower case. (although the system is not case sensitive e.g. WAYPOINT 1, Waypoint 1 are considered to be the same name).
- (2) If you need to use special or accented characters (e.g. ~ ` `), the Extended Character Set should be switched to ON in the System Setup Menu (see page 285).

## Status icons

The status icons on the data bar confirm whether the appropriate connections to your E-Series system have been made:

Status icon	Description
 <p>(animated icon) <small>D6892.3</small></p>	<p>The boat and fish icon indicates the current status of your fishfinder:  <b>Icon animated</b> - connection to a DSM has been successful.  <b>Icon static</b> - the DSM is connected but not transmitting.  <b>Icon greyed-out</b> - no DSM is connected.</p>
 <p>(static icon) <small>D6892.2</small></p>	<p>The satellite icon indicates the current status of your GPS:  <b>FIX</b> - your unit is successfully connected to a GPS receiver.  <b>NO FIX</b> - your unit has been unable to connect to a suitable GPS receiver.</p>
 <p>(static icon) <small>D6894.2</small></p>	<p>The scanner icon indicates the current status of your radar scanner:  <b>Icon rotates</b> - the scanner is transmitting (TRANSMIT/TX mode).  <b>Icon static</b> - the scanner is powered on but is not currently transmitting (STANDBY mode).  <b>Icon greyed out</b> - this indicates that the scanner is currently powered off (OFF mode).  <b>Icon rotates and is then static</b> - a power save mode in which the scanner powers on/off intermittently (TIMED TRANSMIT mode).</p>

Status icon	Description
	The Auto pilot is in Standby mode.
	The autopilot is in Track mode.
	The Autopilot is in Auto mode.
	No autopilot detected.
	An autopilot alarm is active.
	The Auto pilot is in Power Steer mode.
	The Autopilot is in Wind Vane mode.
The AIS icon indicates the current status of the AIS function:	
	AIS unit not available i.e. not connected or off.
	AIS unit is switched on and operating.
	AIS unit on with active alarms.
	AIS unit switched on and operating but dangerous and lost alarm disabled.

*Note: These icons will also appear when you are in simulator mode.*

## 2.6 Initial setup procedures

When you first use your E-Series Display after it has been commissioned (see Installation Guide), we recommend that you carry out the following:

- Selecting the data master (Networked E-Series Displays only).
- Set the language, the date and time format and preferred units of measurement.
- Select a page set.
- Select an application page/window.
- Adjust the display lighting.

*Note: For full details of all System Setup options, please refer to Chapter 18: System set-up and customizing. For application specific set up options, please refer to the appropriate chapter.*

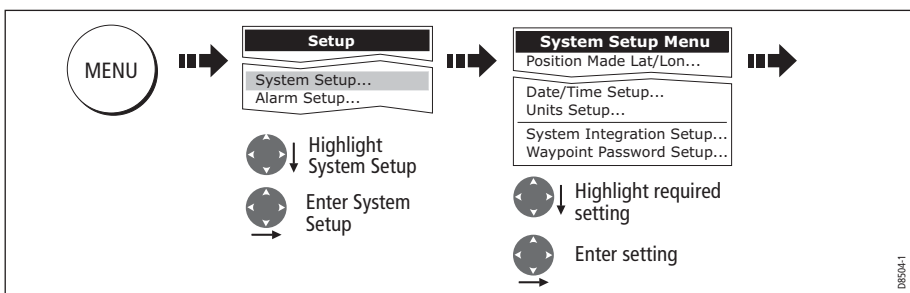
### Selecting the data master (Networked E-Series only)

When a Networked E-Series system is powered on for the first time, an alarm will sound and you will be asked to nominate which display is to be the data master. For details of how to change the data master, please see *page 30*.

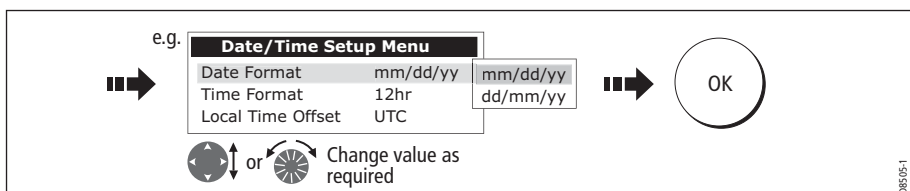
### Setting the language, date/time format and units of measurement

To adjust the language, date/time format and units of measurement to your preferred settings:

1. Select the setting:



2. Adjust the setting:

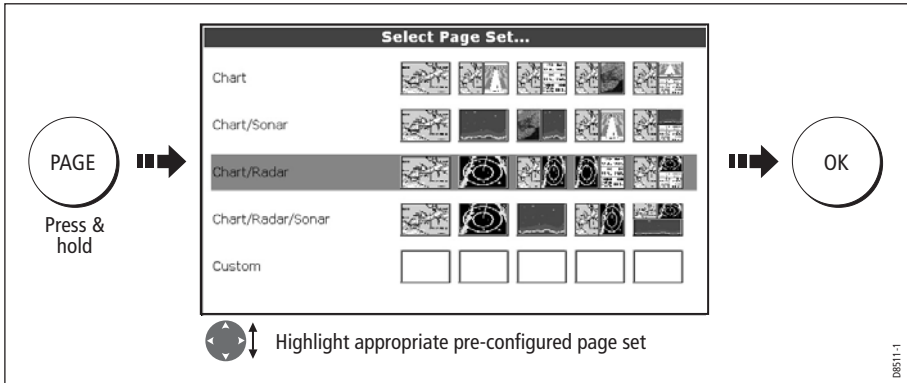


3. Repeat this process until you have changed all of these settings.



## Selecting a page set

Your Display has four pre-configured page sets and one empty set for you to choose from. The applications configured in a page set is a local setting and will therefore only affect the individual display on which you are working.

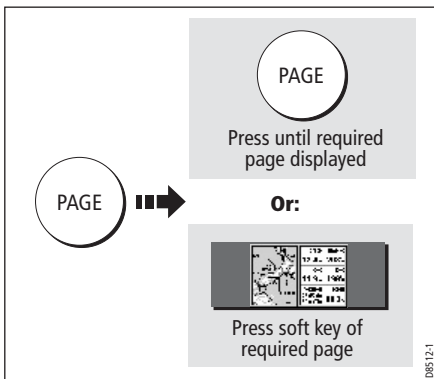


*Note: Alternatively, you can access the Select Page Set screen via MENU.*

If none of the pre-configured page sets meet your particular requirements and/or you intend to use the engine monitor, weather or video application, refer to the Setup and Customizing chapter for details of how to customize both the layout and the application appearing in each window.

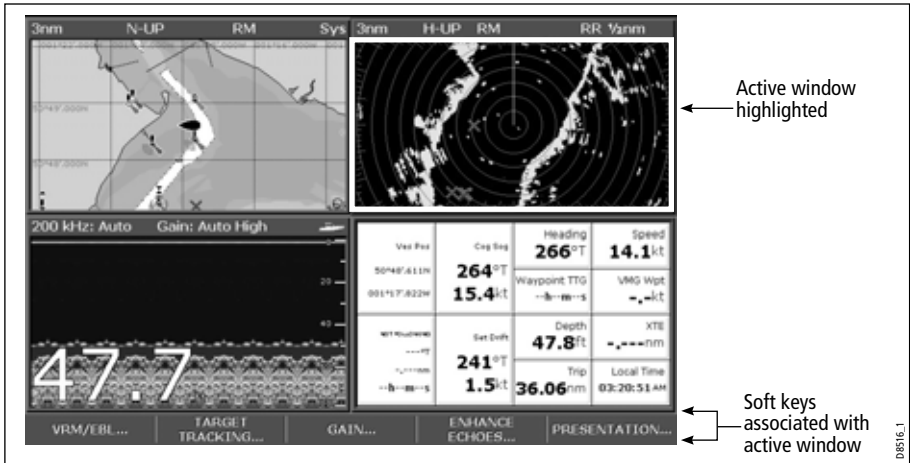
## Selecting an application page

Once you have selected the appropriate page set (see previous section), choose the application page that you wish to use:



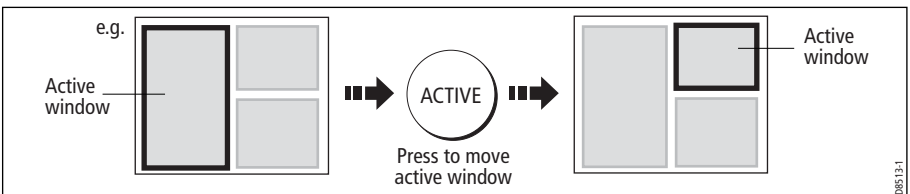
## Selecting an application window

When the selected page has more than one window, the window that is currently active will be bordered in red e.g.



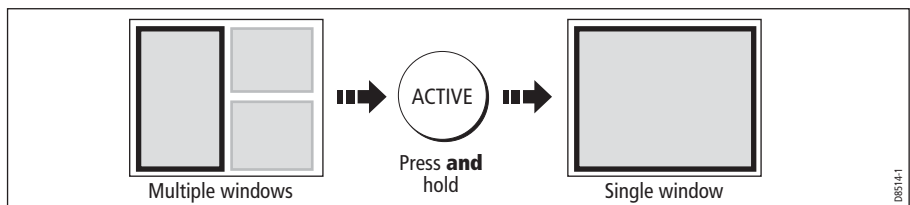
## Changing the active window

To change the active highlight to other windows on the page and display the associated soft keys:



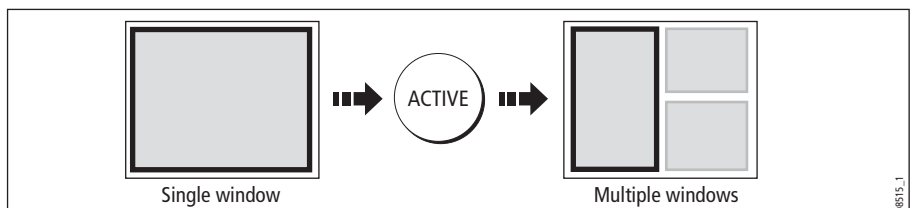
## Multiple to single window

To make the active window full-screen when multiple windows are being displayed:



## Single to multiple windows

To return to multiple windows:



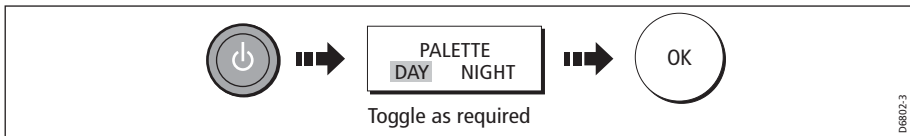
## Adjusting the display lighting

The display has two distinct color palettes, for day and night operation. You can also manually adjust the backlight level.

*Note: The display lighting is a local setting and will therefore only affect the individual display on which you are working.*

### Day/night operation

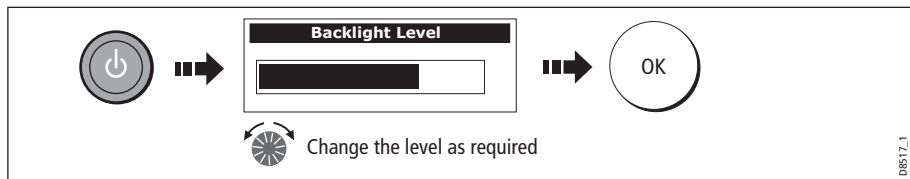
To select the day/night mode of operation:



The display saves the current palette when the unit is powered off. If the palette was set to NIGHT when it was last used, and you then power on in bright sunlight, it may be difficult to see the screen. Reset the palette to DAY to return to normal daytime lighting.

### Backlight level

To adjust the backlight level when in day or night operation mode:



*Note: The backlight level window will autohide after 3 seconds if no buttons are pressed.*

## 2.7 Using CompactFlash cards

### Cautions

**CAUTION: CompactFlash Card Installation**

When installing CompactFlash cards ensure that the card is fitted the correct way around. **DO NOT** try to force the card into position as this may result in irreparable damage to the card.

**CAUTION: Water Ingress**

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

**CAUTION: Card Removal**

**DO NOT** use a metallic instrument such as a screwdriver or pliers to help you remove a card, as doing this can cause irreparable damage.

**CAUTION: Card writing**

CompactFlash cards can be damaged if they are removed from the unit during either a read or write operation. A warning is displayed during write operations. The unit is continually reading the card. It is therefore essential that before removing the card you follow the correct procedure to stop access to the card.

### What are CompactFlash cards used for?

CompactFlash cards enable you to get the most from your display. Their uses include:

- **Detailed cartographic information**

Obtain detailed cartographic information of the area that you navigate using Navionics® chart cards. To check the current availability of Navionics chart card types, please visit [www.navionics.com](http://www.navionics.com) or [www.navionics.it](http://www.navionics.it).

The amount of cartographic detail shown varies for different areas and for different scales. The chart scale in use is indicated in the status bar - the number represents the distance in nautical miles from the top of the chart window to the bottom of the chart window.

- **Archiving**

To archive waypoints, routes and tracks.

- **Saving**

To save waypoint, route and track data for use by other equipment e.g. a PC.

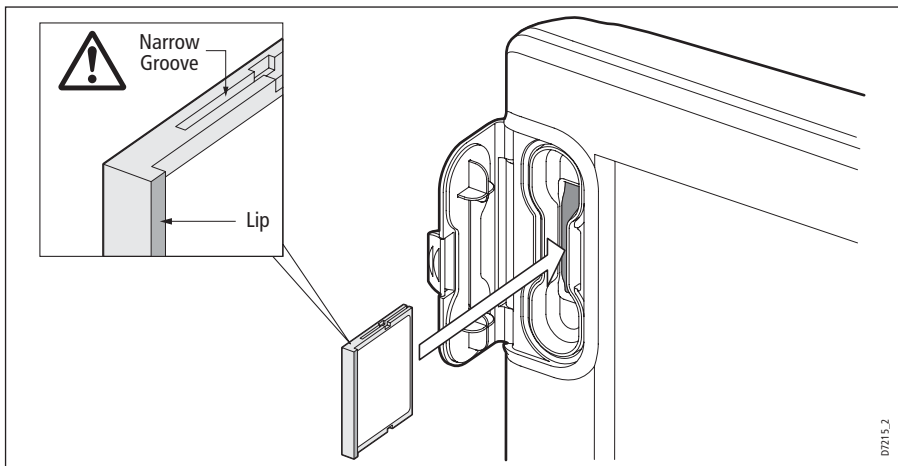
You can remove and insert cards while a chart is displayed provided that you follow the correct procedure (see *page 21*). The chart information is retained on-screen until the chartplotter redraws the screen; for example, when you pan outside the current area, or use the **RANGE** button to change the chart scale.

*Note: In a networked system, cartographic data is available to any E-Series display connected on the SeaTalk High Speed network. However, the ARCHIVE and TRANSFER functions only operate with the card inserted in the display at which you are working.*

## Inserting a card

To insert a card, refer to the illustration and:

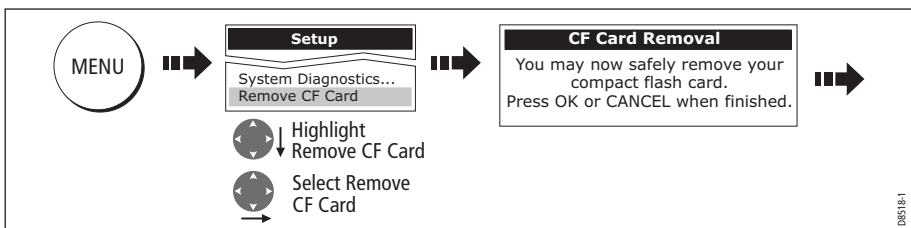
1. Check that you are using the correct type of card (see *Important Information*, at the beginning of this manual).
2. Open the chart card door, located on the front left of the display.
3. Insert the card as shown, with the lip of the card facing inwards. It should position easily. If it does not, DO NOT force it, check the direction in which the lip is facing.
4. Gently press the card home.
5. To prevent the ingress of water and consequent damage, close the chart card door and press firmly until a click is heard.



## Removing a card

...with the unit powered on

1. Select the CF Card Removal function:



### IMPORTANT:

If you try to remove a card without accessing the setup menu, a blue screen and warning message is displayed and the unit must be restarted. In an E-series networked system, where any display may be accessing the card, this message

appears on all displays in the network. All displays will therefore need to be restarted individually.

You must only remove the card while the CF Card Removal message is displayed. Once the message is closed, the card should no longer be removed.

2. Open the chart card door.
3. Grip the card and pull to remove it from its slot.
4. To prevent the ingress of water and consequent damage, close the chart card door and press firmly until a click is heard.
5. Press **OK**.

### **...with the unit powered down**

1. Open the chart card door.
2. Grip the card and pull to remove it from its slot.
3. To prevent the ingress of water and consequent damage, close the chart card door and press firmly until a click is heard.

## **2.8 Managing data**

This section explains how you can manage the data contained in your E-Series and includes the following:

- Writing/retrieving to a CF card.
- Erasing information from a card.
- Erasing information from your system.
- Transferring information to/from a PC.
- Password protection.

### **Writing/retrieving data to a CompactFlash card**

Your display can save up to 1,200 waypoints, 150 routes and 10 tracks in data base lists. Once this number is reached you will need to archive data to a CompactFlash card for safe-keeping or retrieval at a later date. Alternatively, you can transfer data to another instrument or PC using SeaTalk<sup>hs</sup> or NMEA. When navigation is active, you can also receive waypoints, routes and tracks from a PC, other SeaTalk<sup>hs</sup>, SeaTalk and NMEA instruments (see *page 26*).

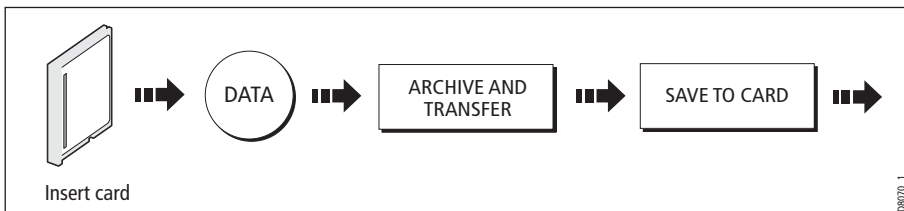
*Note: In a networked E-Series system, you archive to and retrieve data from the CompactFlash card in the display on which you are working.*

## Saving information to a card

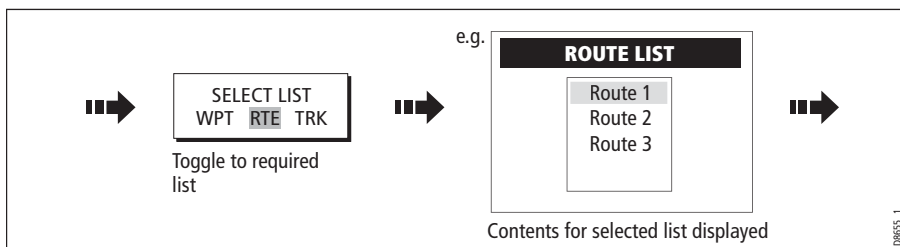
### Important:

Raymarine strongly recommend that you save data to a separate CompactFlash card and not to a Navionics card containing cartography.

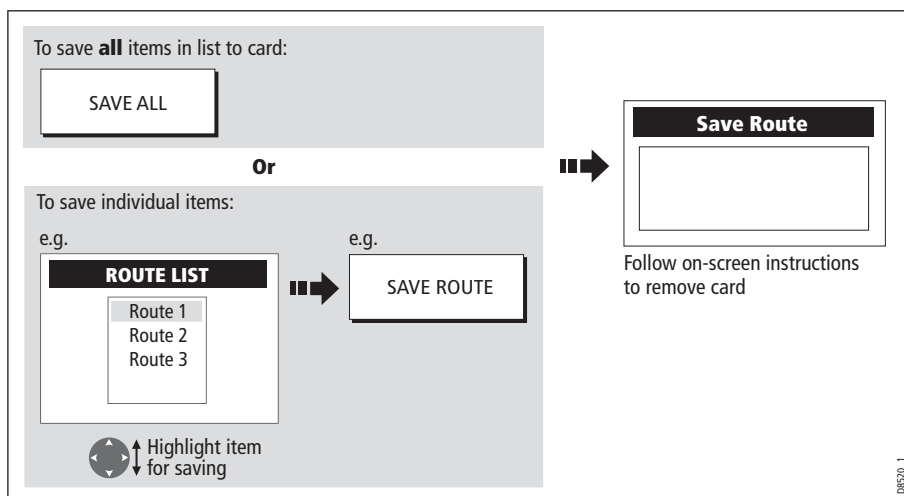
1. Insert card and select the SAVE TO CARD function:



2. Select list containing data for saving:



3. Define data for saving

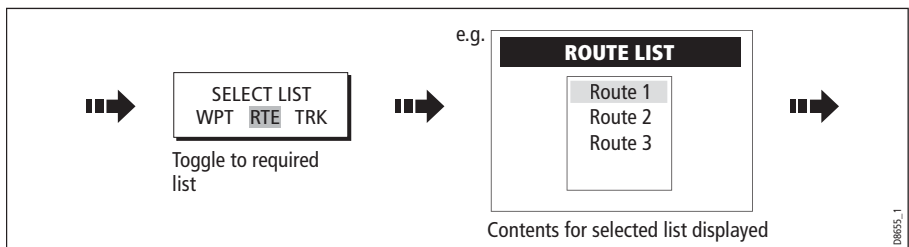


## Retrieving information from a card

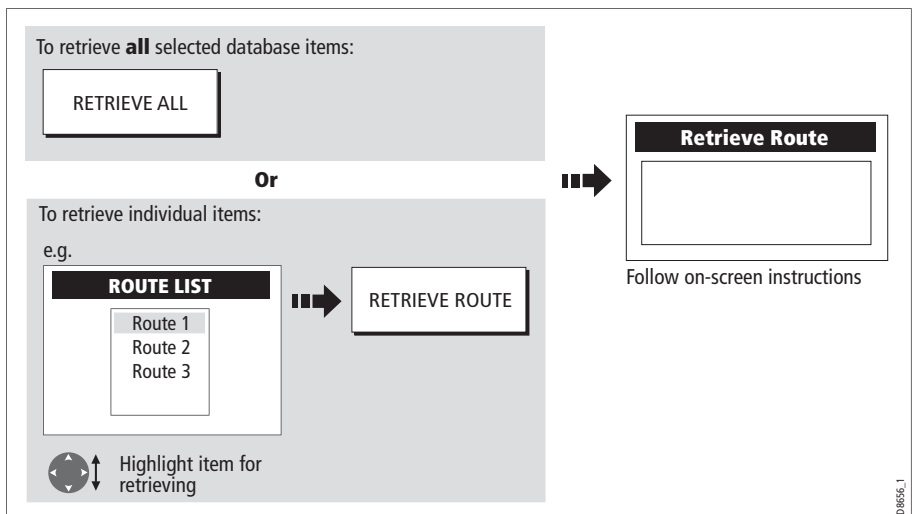
1. Insert card and select the RETRIEVE FROM CARD function:



2. Select required list:



3. Define data to be retrieved:



If whilst retrieving information a selection is already found to exist on the system, a warning message will appear.

The soft keys will change to give you the options of retrieving as new, replacing or cancelling the retrieving process



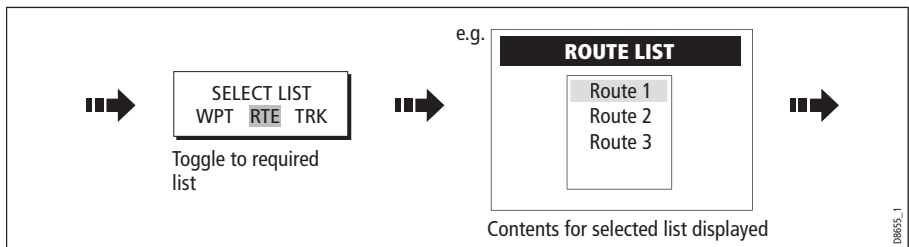
## Erasing information from a card

If you wish to remove information from a card, for example you no longer need it, or the card is full, it can be erased by using the ERASE FROM CARD soft keys. A message will be displayed on screen asking you to confirm that you want to delete the item(s), before it takes place.

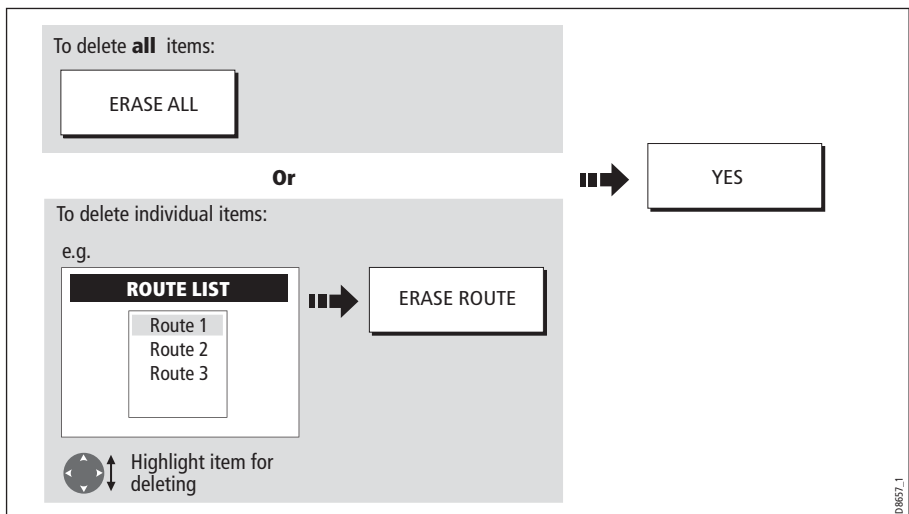
1. Insert the card and select the ERASE FROM CARD function:



2. Select the required list:



3. Define data to be deleted:



## Sending and receiving information using a PC

You can transfer and retrieve waypoints or routes to and from another instrument or PC using NMEA or SeaTalk<sup>hs</sup>.

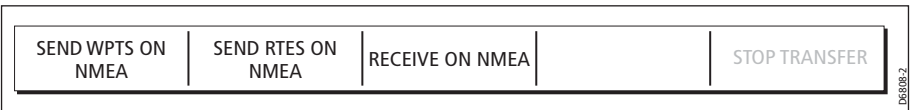
With a RayTech 6.0's planner you can transfer waypoints and routes via a CF memory card. Such transfers require that the PC be connected to the display's NMEA port via a serial data cable. RayTech 6.0 (or later version) will transfer waypoints and routes via SeaTalk<sup>hs</sup>.

To transfer or receive information:

1. Select the transfer on NMEA option:



2. Press the appropriate soft key to send or receive NMEA:



*Note: If you wish to stop the transfer at any point, press STOP TRANSFER.*

3. When transfer is complete, STOP TRANSFER greys out and the soft keys reappear.

## Password protecting your waypoints

If required, you can prevent access to, modification and sight of your waypoint and route databases and functions by means of a password.

### Password confirmation

When Password Protection is enabled and you are attempting to access a password protected function for the first time during a power-cycle, the system will request confirmation of your password before you can:

- Access WPTS key functions. This does not affect the operation of the MOB function.
- Access ROUTES soft key functions.
- Create a route from a track. All other track functions are unaffected.
- Archive or transfer any waypoints.
- Enter the Waypoint Password Setup menu.

**Note:** *Once you have provided a password to the system, it must be entered to access the Password Setup sub-menu, regardless of the whether Password Protection is set to ON or OFF.*

### Disabled data/functions

When Password Protection is ON and you have not entered a password you will be unable to:

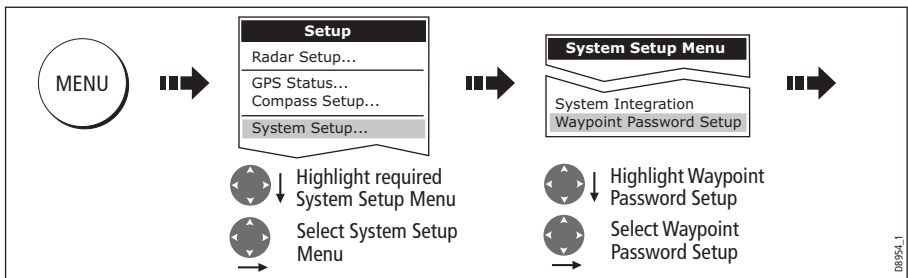
- View details of waypoint and route databases.
- Edit waypoints or routes.
- Goto an existing waypoint.
- Follow a route.
- View waypoints on screen (even when the SHOW/HIDE status is set to SHOW).
- View waypoint names on screen (even when WAYPOINT NAME is set to ON).

All other options including GOTO CURSOR are unaffected.

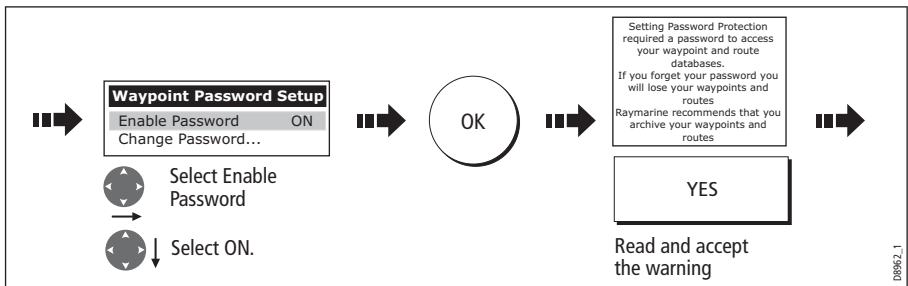
### Setting up a password

To setup a password:

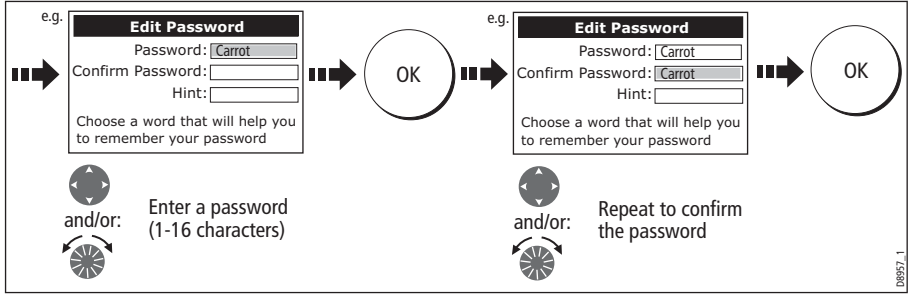
1. Select Waypoint Password Setup:



2. Change the Enable Password status to ON, read and accept the warning:

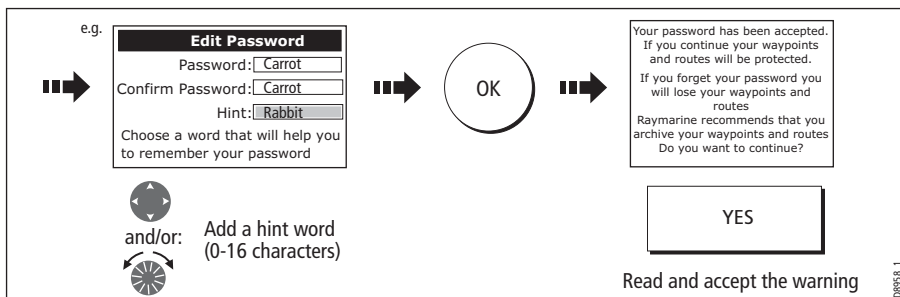


3. Enter a password and confirm it:



**Note:** *The password is case sensitive.*

4. Add a hint, to help you to remember your password (optional):



The password is now set and protection enabled although access to the waypoint and route functions remains available until you restart your system.

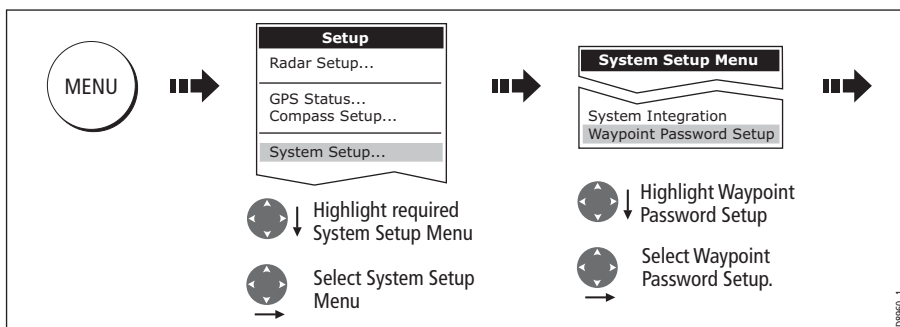
**Note:** If required, this password can be changed by selecting the Change Password option on the Waypoint Password Setup Menu.

### Enabling/disabling password protection

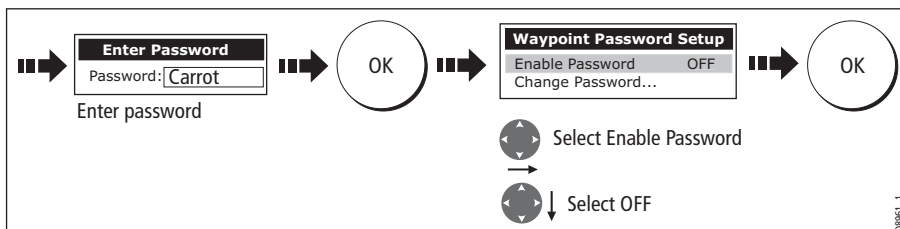
Once you have set up a password on your system (see previous section) you will need to key in this password whenever you want to change the status of the password protection feature.

To enable/disable password protection:

1. Select Waypoint Password Setup:



2. Enter your password ensuring that the appropriate upper or lower case characters are used and then enable/disable the password protection, as required.



**Important:** If you enter an invalid password more than twice within one power cycle the system shall display the hint. There is no limit to the number of attempts to enter a valid password but if you forget your password, you will need to perform a Settings

and Data Reset (see *page 286*) which will erase all waypoints in the unit's memory. Raymarine strongly recommend therefore that you regularly back-up your waypoints, routes and tracks to a CF memory card.

## 2.9 Operating a networked E-Series Display

### What does a networked system do?

If you have connected two or more E-Series Displays (via either a crossover coupler or SeaTalk High Speed Network Switch), data is transferred across the network enabling you to input, view and maintain applications and data across all your Displays irrespective of the Display from which the data originated (excepting Video Input).

To ensure that the latest data i.e. SeaTalk data and waypoints, routes and tracks databases is available at all displays, the system needs one display to be designated as the data master.

### Controlling a network

System data including user-created databases are managed by the data master. The display that has been installed and nominated as the master, should always be switched on (preferably first). The master display will copy its database to all other Displays that are switched on, each time it detects a change.

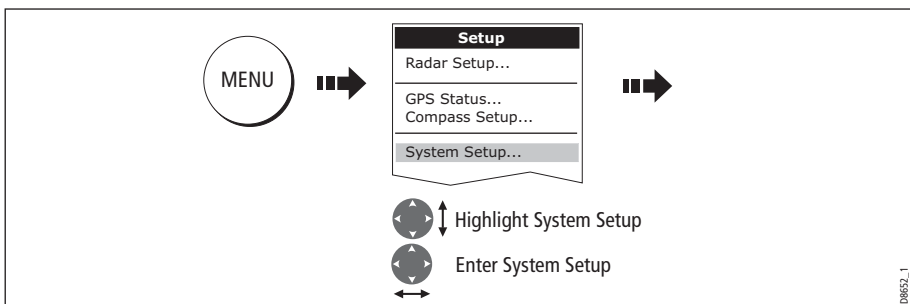
If the system does not detect a master, either because it is not switched on or because a master has not been selected, an alarm will sound and you will be prompted to select a master display.

*Note: The data master copies its database to all other displays in the system. To prevent loss of data when adding displays, or changing the master, ensure that you select the appropriate display as the master. You can archive the database onto a Compact-Flash card and retrieve it later.*

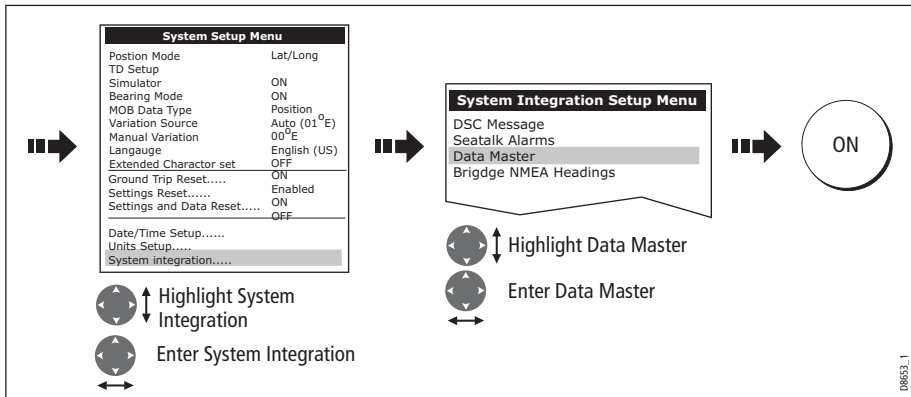
### Changing the master display

On the display that you wish to nominate as the master:

1. Display the System Setup menu:



2. Select the System Integration then Data Master option:



Any such changes that you make to the nominated master will be saved when you power off.

## Functions only affecting the display in use

The majority of functions, settings, additions and changes that you perform on a single Display are 'seen' by all other Displays connected to your network. There are however some local settings that will only affect the individual display on which you are working.

These local settings are summarized as follows:

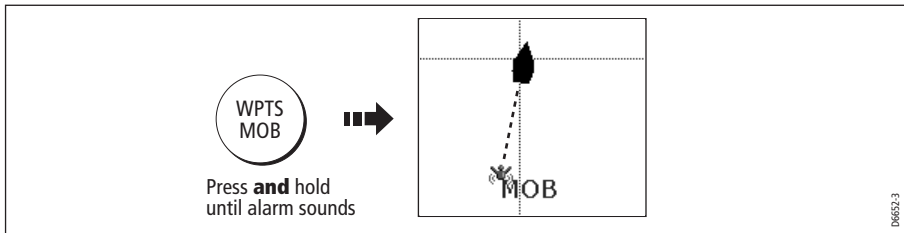
- Page set - selecting a set, name and applications configuration.
- Power on/off key (including Day/night setting).
- The **ACTIVE** window.
- The displayed panel in the digital data or engine monitoring application.
- Radar and Fishfinder presentation settings.
- Radar VRMs, EBLs and Wakes.
- Chart presentation settings when the Chart View is set to LOCAL.
- Show/hide waypoints, routes or tracks.
- Fishfinder Setup Menu options (top half of menu only).
- Video, Databar and Display Setup Menus.
- Databar on/off and configuration.
- Ruler settings.

## 2.10 Emergencies and warnings

You can use your E-Series display to mark the position of a man overboard or to sound an alarm when a particular situation occurs e.g when a depth limit is reached, a specified period of time has elapsed etc.


### Man Overboard (MOB)

#### Marking a MOB



If you lose a person or object overboard, and need to return to the location, you should use the Man Overboard (MOB) function **immediately**. The MOB function can be used whilst any application is in use and is activated by either pressing and holding the **WPTS/MOB** key for three seconds, or by a MOB message being received from other equipment on the SeaTalk system.

When a MOB is activated the following is initiated **automatically**:

- **Alarm** - the MOB alarm is triggered (Morse --- every 30 seconds)
- **Waypoint** - a MOB waypoint is placed at your current position. 
- **Positional information** - the bearing, range and vessel position are displayed in the data bar. These are calculated according to the MOB data type set in the System SetUp (see *page 285*). Assuming that your boat and the MOB are subject to the same tide and wind effects, dead reckoning normally gives a more accurate course.
- **Radar range change** - if radar is transmitting, the system changes the radar range to  $1/8$  nm.
- **Active navigation is suspended** - Navigation to any active waypoint is suspended and any existing navigation function is cancelled. No further GOTO or route functions are selectable whilst the MOB function is active. If autopilot control is in use the pilot must be physically put into standby via a pop-up box.
- **Autorange motion mode** - If radar/chart synchronization is set to OFF (see *page 90*), the chart application changes the motion mode to Autorange. This displays the largest possible scale of chart that will include both the target waypoint (MOB symbol) and your on-screen vessel.
- **Other equipment** - other Raymarine equipment acknowledges the MOB.
- **Current position to MOB position** - as your vessel moves away from the MOB position, a dotted line is displayed from your current position to the MOB position.



*Note: To obtain a MOB position, you need either position data from a GPS (or equivalent device) or heading and speed data.*

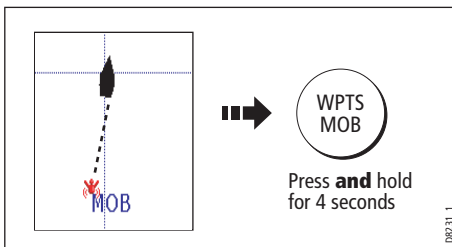
## Silencing a MOB

To temporarily silence the alarm from a MOB, press any key on any instrument on the SeaTalk system. After approximately 10 seconds the alarm will sound once more if the state of MOB is still active.

Silencing an alarm **will not** deactivate or clear the MOB state.

## Clearing a MOB

To clear a MOB and its data:



Once cleared, your chart and radar applications will return to the motion mode that applied prior to the MOB alarm and the GOTO and route functions will once more be available.

*Note: Alternately if you have a MOB keypad fitted, press and hold the MOB key.*

## Alarms

You get warning of a hazard or a particular situation via in-built alarms which are generated for the system as a whole or for individual applications. When an alarm sounds, a message box is displayed explaining the cause of the alarm.

You can specify what alarms will operate and the parameters within which they will sound, via the Alarm Setup Menu (see *page 289*).

## Cancelling alarms

### Display alarms

By pressing the ACKNOWLEDGE soft key, the alarm is silenced and any message box is cleared. If the alarm has been generated by the chartplotter, the appropriate action is taken. For example, following an arrival alarm, the next route leg is activated.

Please note:

- Although you can change the configuration of the arrival alarm, it cannot be turned off.
- To cancel a MOB alarm, press and hold the **WPTS/MOB** until the MOB symbol disappears from the screen.
- If an anchor alarm is silenced, but the alarm condition persists, the alarm is repeated every 30 seconds

**External alarms**

If an instrument that is connected to the display on SeaTalk generates alarms, these will sound on your E-Series display accompanied by a pop-up message box. You can cancel these alarms by pressing the ACKNOWLEDGE soft key. The alarm will be silenced, but no other action will be taken by the E-Series display.

## Chapter 3: Working with Waypoints

This chapter gives details of how to place, edit, manage and navigate to a waypoint.

### 3.1 What is a waypoint?

A waypoint is a position marked on a chart, radar or fishfinder window to indicate a site (for fishing, diving etc.) or as a place to navigate to. By default, all waypoints are indicated on screen by a waypoint symbol - **X**. This symbol can however be changed if you wish. You can also select an alternative symbol to be used as the default for newly created waypoints.



**Note:** For details of how to change the symbol, please refer to page 41.

Waypoints are a core feature of the E-series display. They can be created in any application and are displayed on the radar, chart and fishfinder windows. A series of waypoints can be combined together to form a route. If you have networked several E-Series Displays, any waypoints that are created on one display are 'seen' by all the other displays.

The details of all waypoints, irrespective of the application they were created in, are stored in a dedicated waypoint list which will hold up to 1200 waypoints. All waypoints are by default, placed in the MY WAYPOINTS group. If required, you can create new groups and change the default group. If necessary, waypoints can be archived to a CompactFlash card or transferred to another NMEA compatible instrument. If the system receives an active waypoint over SeaTalk or NMEA, it is displayed but cannot be edited.

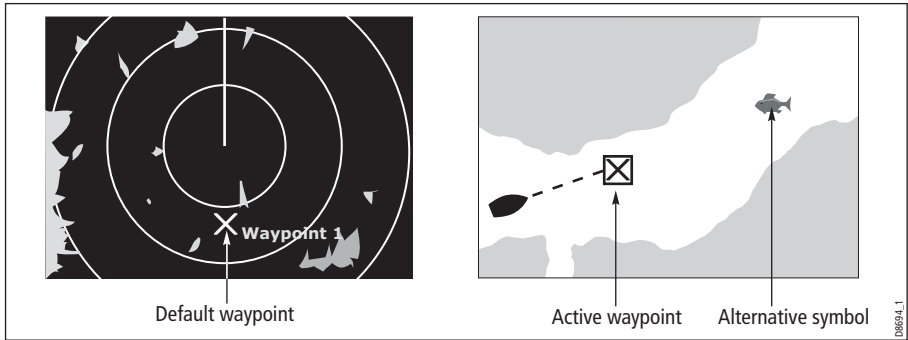
If required, you can prevent access to, modification and sight of your waypoint and route databases and functions by means of a password. For more information see page 26.

**Note:** You can only archive and transfer waypoints to a CompactFlash card/NMEA link installed at the display on which you are working.

### 3.2 How are waypoints represented?

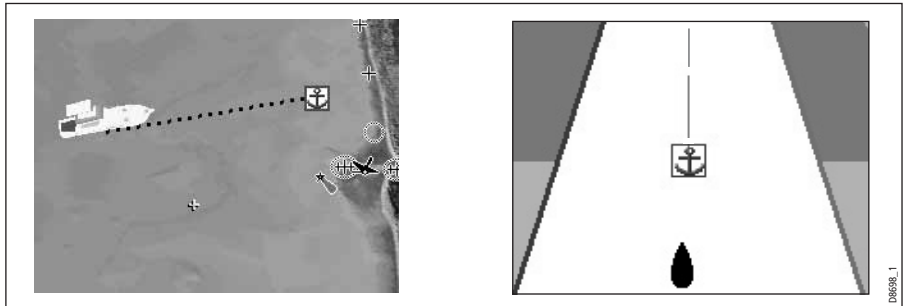
#### Waypoints on 2D Chart and Radar windows

On 2D chart and radar windows, a waypoint is represented when it is both active (displayed in a box) and inactive (no box) i.e.



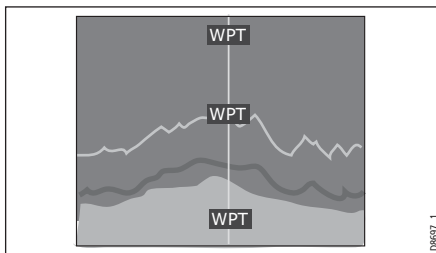
#### Waypoints on 3D Chart and CDI windows

On 3D chart and CDI windows, a waypoint is represented only when it is active (displayed in a box).



#### Waypoints on Fishfinder windows

When a waypoint is created it is represented on fishfinder windows, by a vertical line labelled **WPT**. This symbology cannot be changed.



**Note:** A waypoint can be placed when a Weather application window is active but it will not be seen in the weather window.

### 3.3 Placing a waypoint

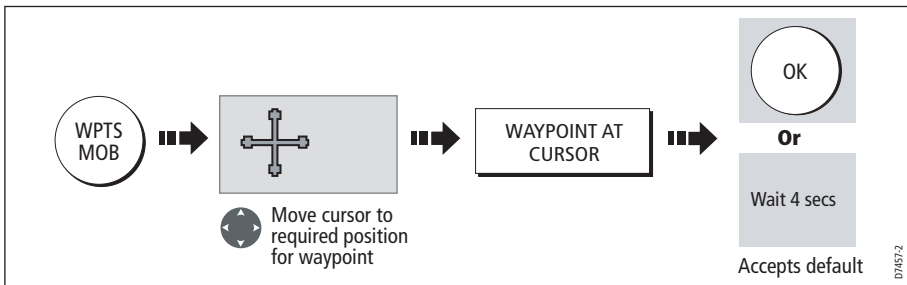
A waypoint can be placed at:

- The cursor position.
- Your vessel's position.
- At a position of your choosing (using lat/lon or Loran TD coordinates between 80° N/S).

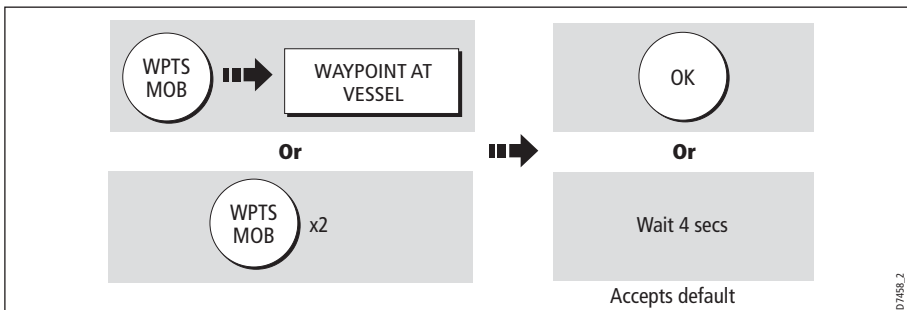
When you are placing a waypoint, you can either accept the default or customize its details. For more information see *page 40*.

Once a waypoint has been placed, you can view its details and edit them (if necessary). For more information, see *page 39* and *page 40*.

#### ... at the cursor

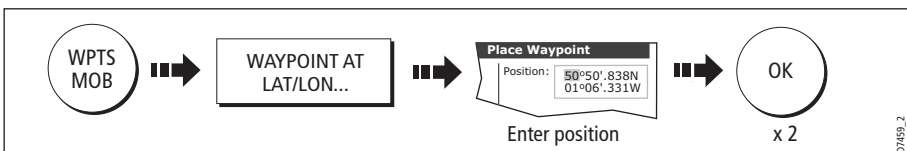


#### ... at your vessel's position



If the system cannot determine your position, a warning is displayed and the waypoint is not placed.

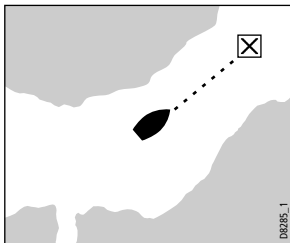
#### ... at a known position



### 3.4 Navigating to a waypoint

This section explains how to start and stop navigating to a waypoint. When you navigate to a waypoint or to the cursor position, the data is sent on NMEA 0183 and SeaTalk and can be used by an autopilot, if connected. For more information on navigation, see *page 70*.

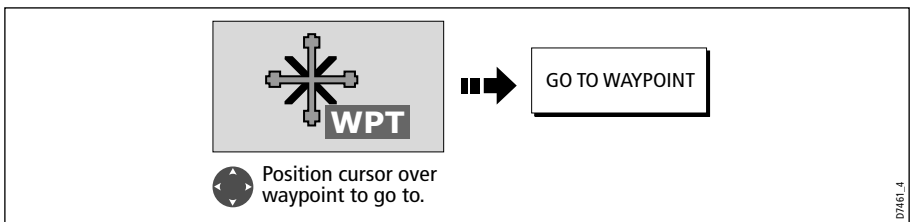
#### Start navigating to a waypoint



You can navigate to a waypoint using the cursor, via the **WPTS MOB** button or by selecting the **GOTO** option. Once navigation is active, the waypoint symbol is surrounded by a box and a dashed line appears between your boat and the waypoint.  
If required you can display navigation details for the active waypoint in the data bar (see *page 287*).

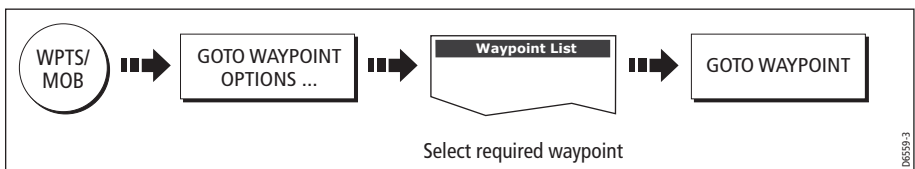
#### ...using the cursor

To navigate to a waypoint using the cursor, when a chart or radar application is active:



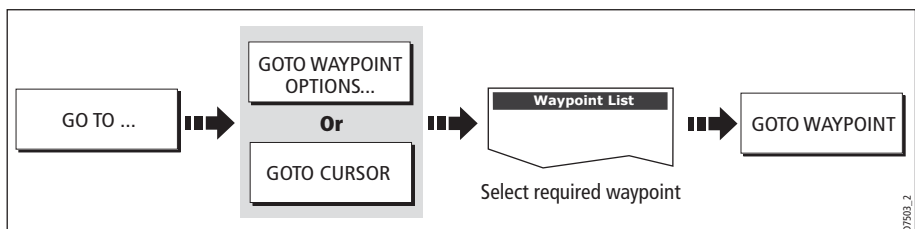
#### ...via the WPTS MOB button

To navigate to a waypoint using the WPTS/MOB button when any application is active:



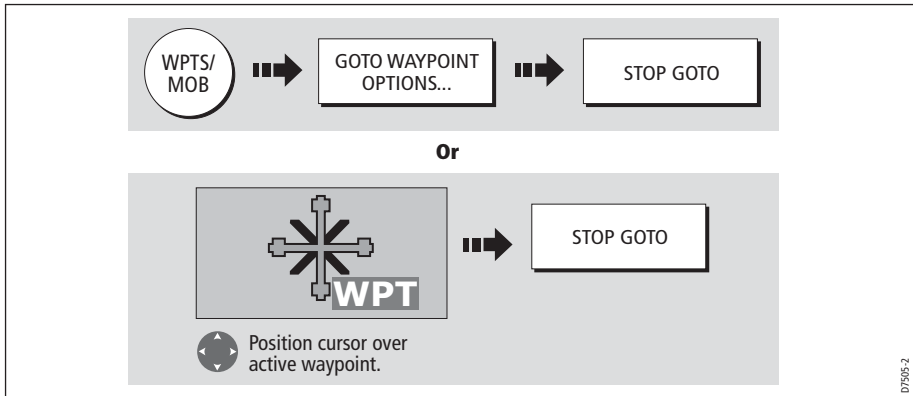
#### ... by selecting the GOTO option

You can navigate to a waypoint using the GOTO option when a 2D or 3D chart application is active and the top level chart soft keys are displayed:



## Stop navigating to a waypoint

If at any time you wish to stop navigating towards the selected waypoint:



Once navigation is no longer active, the waypoint symbol returns to its normal unboxed state and the dashed line between your boat and the waypoint is removed.

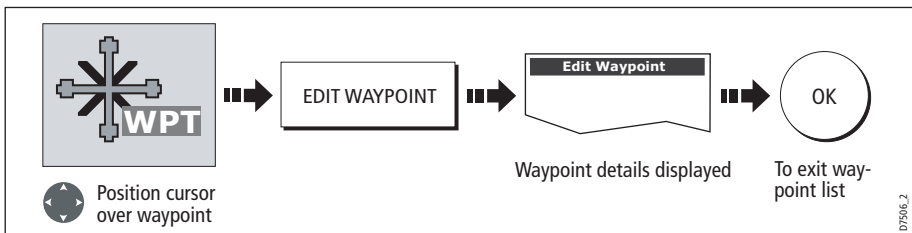
## 3.5 Viewing waypoint information

You can view the details of any waypoint that you have placed, by either selecting it with the cursor (in radar and chart windows) or by selecting it on the waypoint list. Once you are viewing a waypoint's details, a variety of editing and managing options are available.

You can also display navigation details for the active waypoint in the data bar (see page 281).

### ...using the cursor

To view the details of a waypoint that is **not** active.

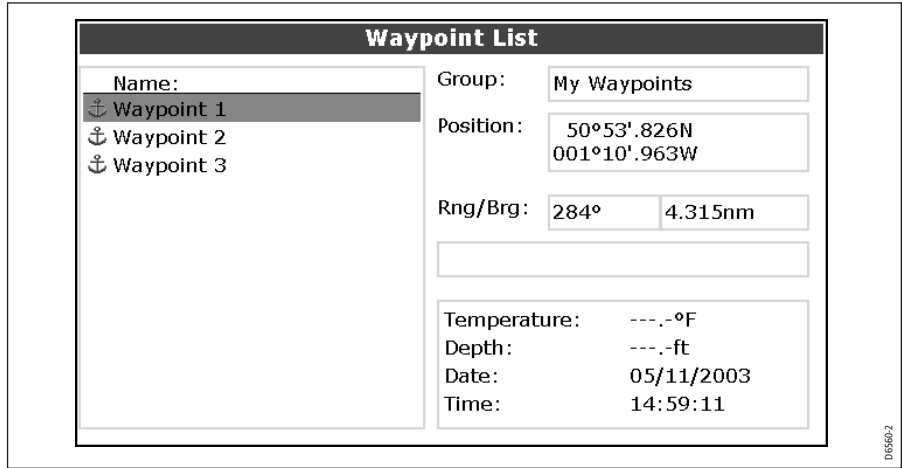


**Note:** Details of the waypoint that you are currently navigating to, can be accessed via the waypoint list as described below.

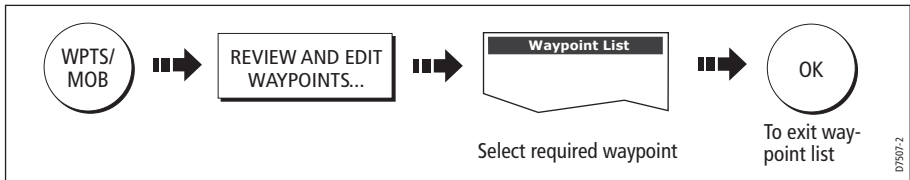
### ...using the waypoint list

The waypoint list shows all the waypoints that have been placed (including the active one), and displays details of the selected waypoint:

**Note:** Temperature and depth are only captured (if available) for waypoints placed at your vessel's position.



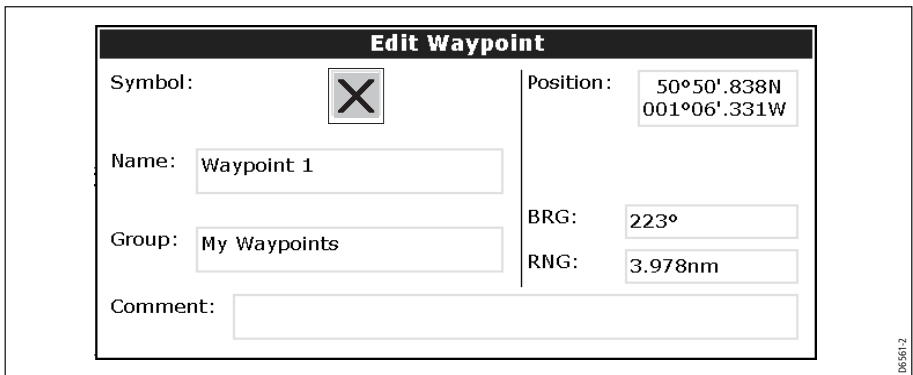
To access the waypoint list:



### 3.6 Editing a waypoint

Once a waypoint has been placed it can be edited in a variety of ways. You can:

- Change the waypoint details - name, symbol, group or add a comment.
- Move a waypoint.
- Erase a waypoint.
- Change the default symbol and group of newly placed waypoints.



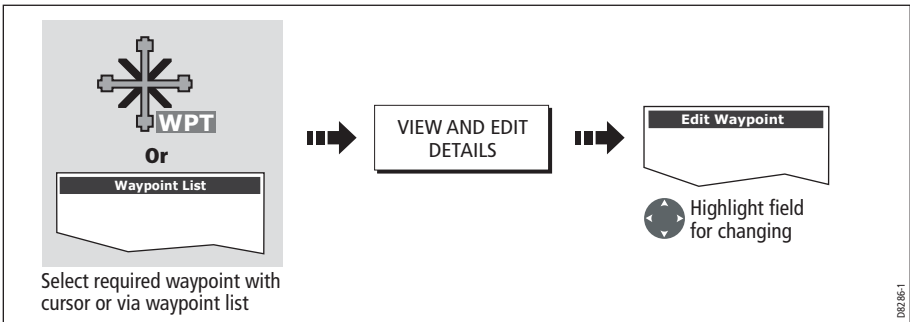


## Changing waypoint details

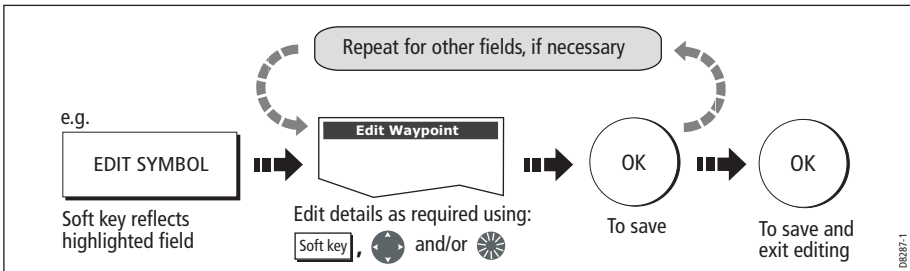
When a waypoint is created it is assigned a default name, symbol and group. You can change these details to suit your needs and add a comment if required. This is particularly useful when you are managing large numbers of waypoints.

To change the details of a waypoint:

1. Select the detail you wish to edit:



2. Edit the selected detail:



**Note:** *If you make a mistake whilst editing, press CANCEL.*

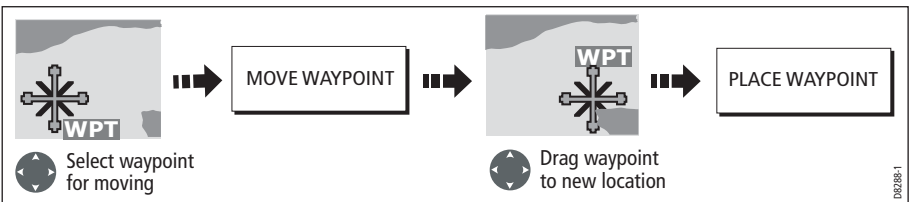
## Moving a waypoint

You can move any waypoint (except the active one) to a new position. There are two methods of moving a waypoint:

### ... by entering new coordinates

If you know the new co-ordinates, bearing or range for the particular waypoint, you can enter this information by editing the waypoint as described in the previous section.

### ... by dragging the waypoint to a new position



**Note:** *To abandon the move, press CANCEL.*

**CAUTION:**

It is possible to move waypoints that are used in routes. In such instances, the stored route will include the Waypoint in its new position. Ensure that this does not present a navigation hazard.

### Erasing a waypoint(s)

You can erase any waypoint on the system (including groups of waypoints) **except**:

- The active waypoint or
- Any waypoint used in a route.

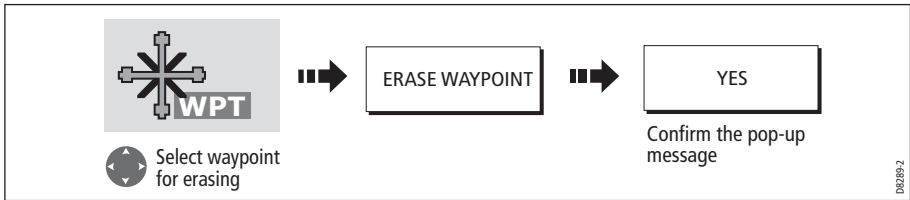
**Notes:** (1) *If a route is hidden its waypoints can still be displayed. If you attempt to erase a waypoint from a hidden route, a warning message will be displayed.*

(2) *For details of erasing groups of waypoints, see page 47.*

### Erasing an individual waypoint

You can erase individual waypoints on screen or via the waypoint list.

#### ...using the cursor

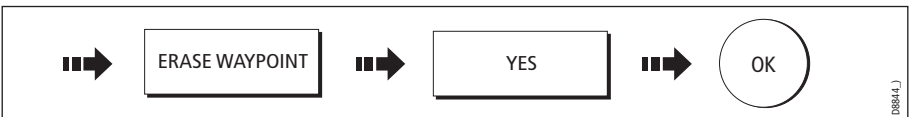


#### ... using the waypoint list

1. Select the waypoint for erasing from the waypoint list:



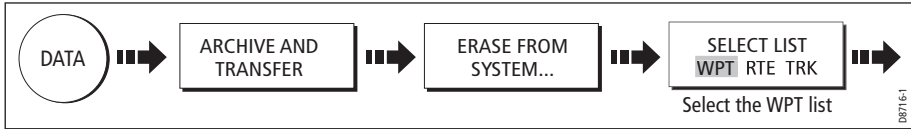
2. Erase the selected waypoint:



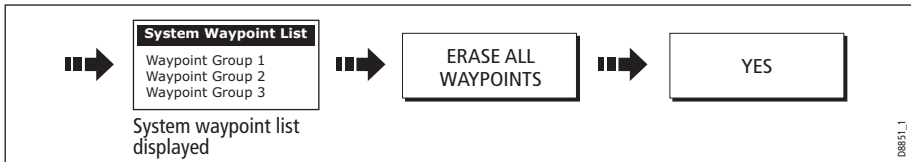
### Erasing all waypoints

If you need to erase all your waypoints, you can use the ARCHIVE & TRANSFER soft keys:

1. Select the ERASE FROM SYSTEM option and the appropriate list:

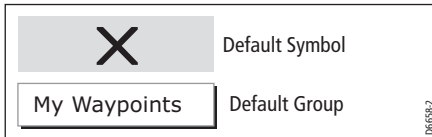


2. Erase all waypoints:



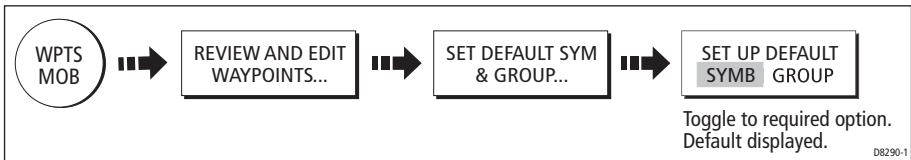
### Changing the default symbol or group

When you add a waypoint to your system it is assigned to the default group and given the default symbol:

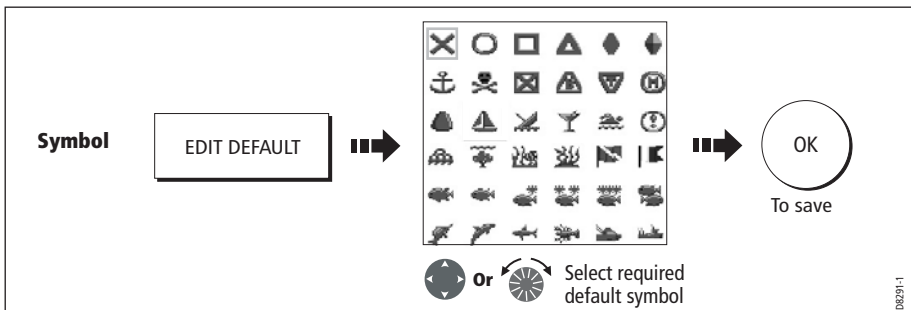


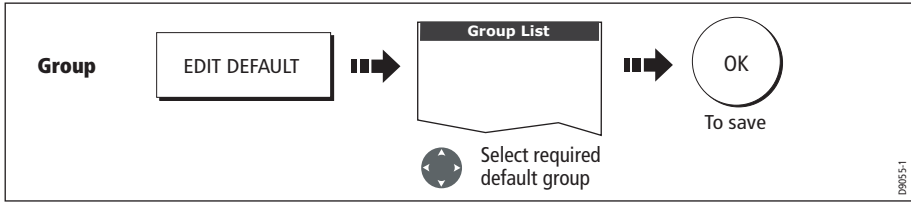
If these are not suitable, you can select an alternative symbol and group to be the default. For an alternative group to be selected for the default, it must first be created - see *page 45*.

1. Select either the default symbol or group:



2. Change the symbol or group default:





**Note:** To abandon the symbol or group default change, press CANCEL.

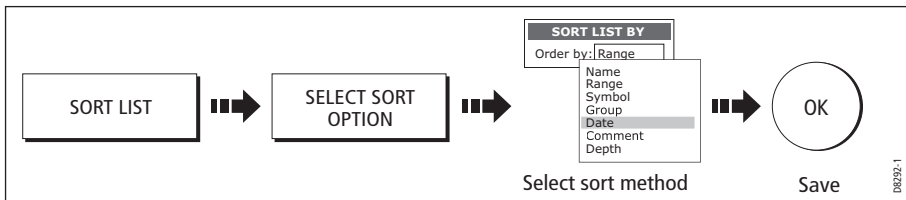
### 3.7 Sorting the waypoint list

If your system contains a large number of waypoints, you can sort your waypoint list to make it easier to locate a particular waypoint.

The waypoint list can be sorted by:

- Name (default)
- Range (closest first)
- Symbol
- Group name
- Date
- Comment
- Depth

To sort the waypoint list:



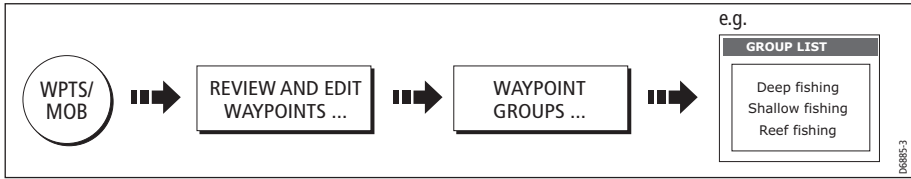
### 3.8 Organizing waypoints into groups

Provided that you have not changed the default group, all waypoints are automatically placed in the default “My Waypoints” group when they are created. In order to make your waypoints easier to manage, you can organize them into groups of your choice. When fishing, for example, you may only wish to see the waypoints that indicate good fishing sites. Other waypoints, say, for racing, would be superfluous at this time.

**Note:** A waypoint cannot be placed in multiple groups

### Displaying the waypoint group list

To display the group list with its options:

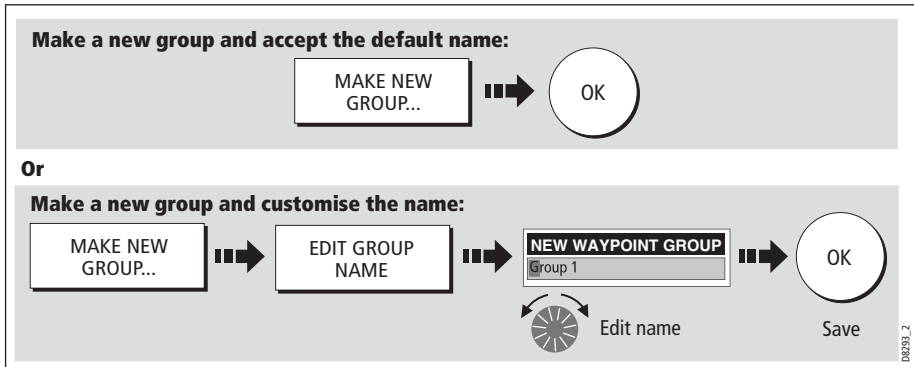


You can now make a new waypoint group, or erase, move or rename existing groups.

### Making a new waypoint group

To create a new waypoint group:

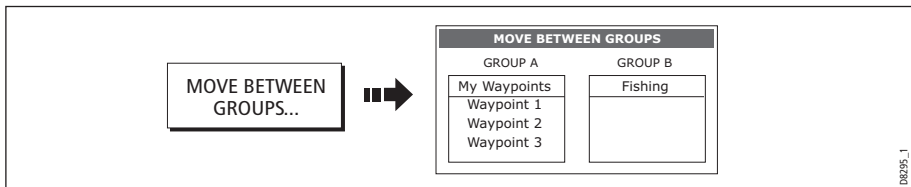
1. Display the group list (see above).
2. You can now either:



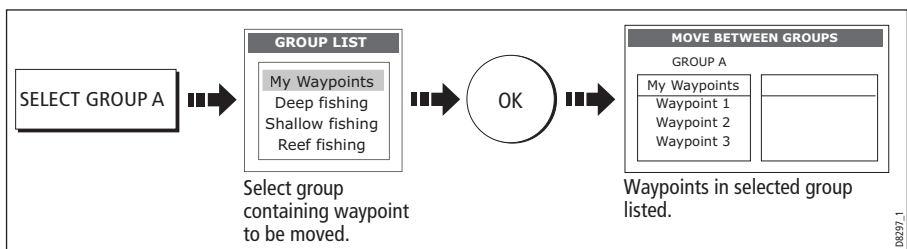
### Moving waypoints between groups

Waypoints can be easily moved between groups:

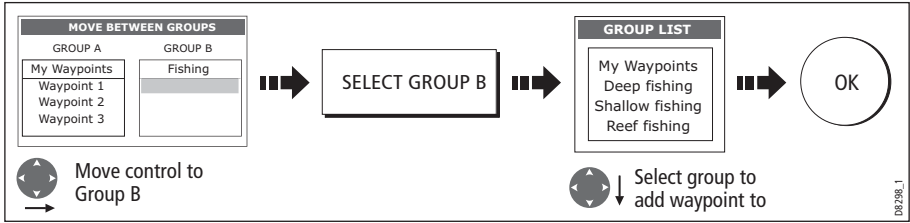
1. Display the group list (see page 44).
2. Display the MOVE BETWEEN GROUPS option:



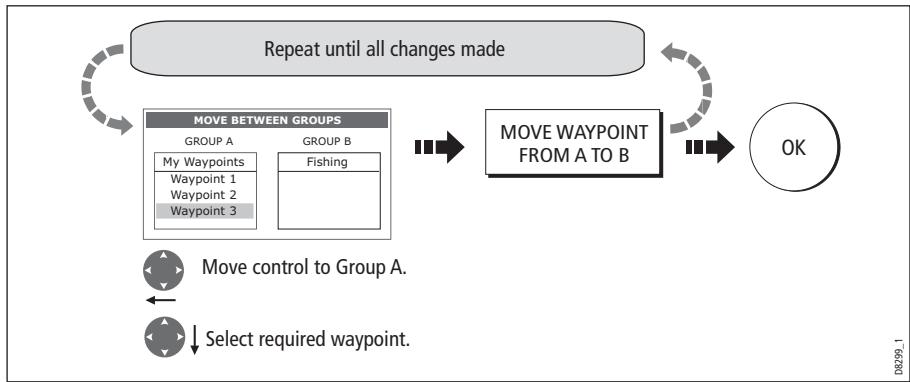
3. Determine the group that contains the waypoint to be moved:



4. Determine the group that the waypoint is to be moved to as follows:



5. Select waypoint to be moved:

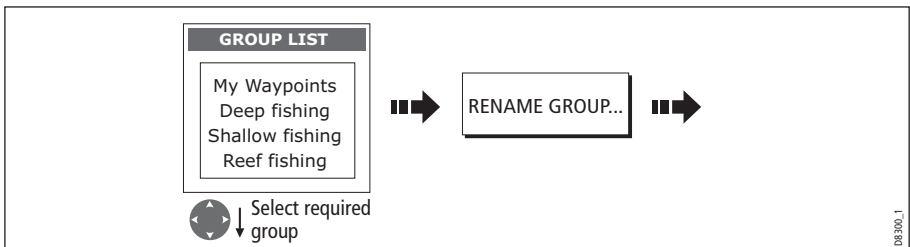


**Note:** *Alternatively, waypoints can be moved from Group B to Group A if required. The soft keys reflect this accordingly.*

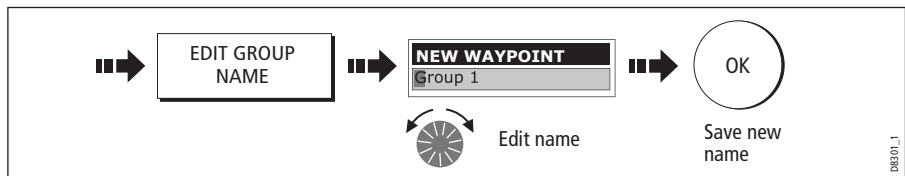
### Renaming an existing group

You can change the name of an existing waypoint group:

1. Display the group list (see *page 44*).
2. Select the group for renaming:



3. Edit the selected group name:



**Note:** *To revert to the original name whilst editing, press CANCEL.*

### Erasing a group

You can erase any waypoint group from the system **except** the group containing the active waypoint.

When a waypoint group is erased, the group name together with all of the waypoints in that group are erased from the system with the exception of:

- 'My Waypoints' - the waypoints contained within this group are deleted but the group name remains.
- Waypoints used in routes within your system.

You should therefore ensure that any individual waypoints that you want to keep (which are not part of a route), are moved before their group is erased.

1. Display the group list (see *page 44*).
2. Select and erase the group:



**Note:** *Waypoint groups can also be erased via the ARCHIVE AND TRANSFER function (page 43). For details of how to erase waypoint groups from a card, see page 25.*

### 3.9 Controlling waypoint display

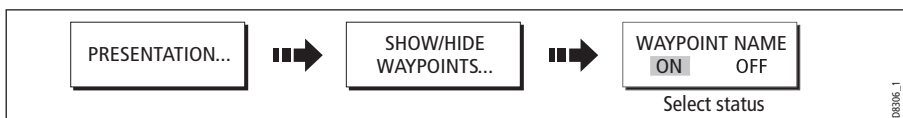
When you have placed many waypoints on your system, it may become difficult to easily interpret chart or radar information. This is particularly the case if you have many waypoints in a small area. There are a number of ways that you can control the display of waypoints and waypoint information in chart and radar windows. These are:

- Show or hide all of the waypoint names.
- Show or hide waypoints with a particular symbol.
- Show or hide waypoints belonging to a specific group.
- Show or hide the index of a waypoint within a route (chart only -see *page 104*).

**Note:** *The show/hide status of a waypoint is a local setting and will therefore only affect the individual display on which you are working.*

#### Show/hide waypoint names

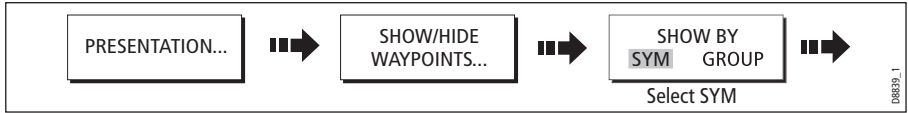
You can show or hide all waypoint names if required:



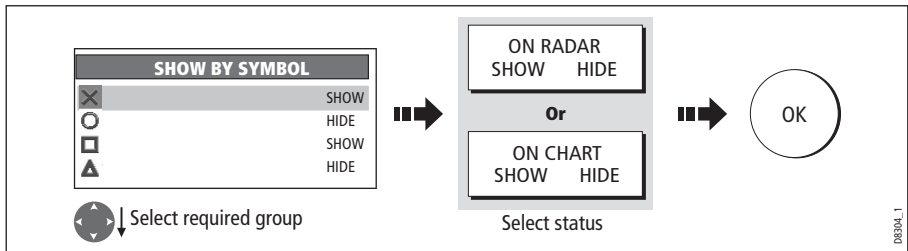
### Showing/hiding waypoint symbols

You can define which waypoint symbol types are shown/hidden in the radar or chart application:

1. Display the SHOW BY SYMBOL option:



2. To change the status (show or hide) of a symbol type:

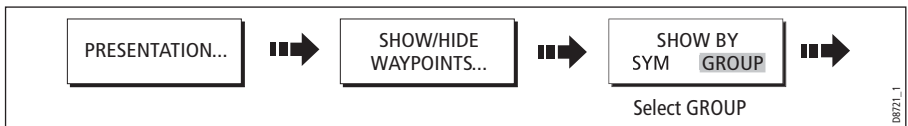


**Note:** Waypoints in an active route are always displayed, regardless of whether the display is set to show or hide.

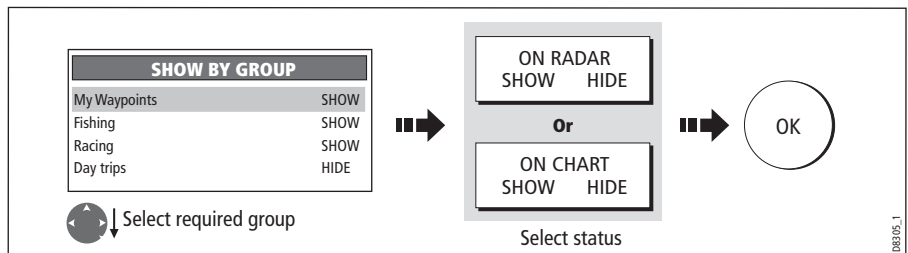
### Showing/hiding waypoint groups

You can define which waypoint symbol types are shown/hidden in the radar and chart applications:

1. Display the SHOW BY GROUP function.



2. To change the status (show or hide) of a waypoint group:



**Note:** Waypoints in an active route are always displayed, regardless of whether the display is set to show or hide.



# Chapter 4: Using the Chart

## 4.1 Important

### Navionics support

In addition to Gold and Platinum, the E-Series now supports the following Navionics cartography:

- Silver
- Gold Plus
- HotMaps USA
- HotMaps Premium
- Fish 'N Chip

For more information on Navionics charts, see [www.navionics.com](http://www.navionics.com).

### Safety

When using your chartplotter you should always check that a route is safe. Zoom in to check for hazards, such as small shoals, that may not be shown on a smaller scale chart.

Until you are familiar with interpreting the chart display, you should take every opportunity to compare the displayed objects with visual targets, such as buoys and coastal structures. You should practice harbour and coastal navigation during daylight and in clear weather conditions. The simulator mode can also be used to help you gain experience.

It is strongly recommended that before you use your chart application, that you read and understand *Chapter 3: Working with Waypoints*.

#### **CAUTION:**

**The equipment should not be used as a substitute for good navigational practice nor for official government paper charts. Do not use the chart before you have read this chapter.**

### Chart functionality

1. To access full functionality, your chart application requires position and heading data from your boat's Global Positioning System (GPS).
2. Your E-Series Display has a built in world map, but to use your Display as a navigation aid, you will need detailed information for the area you wish to navigate. This information comes in the form of a chart card and is available from Navionics (see the *Important Information* section at the front of this manual for details). For full information on installing and removing chart cards refer to *page 21*. If you have a

network of E-Series Displays, the chart card data is accessible from any Display on the network, provided that the unit with the card is powered on. Data from more than one chart card can be shown simultaneously.

3. For your GPS and chart to correlate accurately with your paper charts, they will need to be using the same datum. The default datum for your display is WGS84. If this is not suitable, you can change the setting via the Chart Setup menu (see *page 108*). When you adjust the datum of the E-Series Display, a Raymarine GPS will automatically correlate. If you have a third party GPS, you will need to correlate this separately.
4. For the Automatic Identification System (AIS) to function you should have a suitable AIS receiver connected.

## Chart cards

To use your E-Series Display as a navigation aid, charts with the appropriate level of detail for the geographic area you wish to navigate are required. The charts are available in electronic format on Navionics Chart cards.

A chart card provides an appropriate level of detail and scale for a given geographic area. Up to 6 Gold or 2 Platinum chart cards can be used in an E-Series Networked system. The maximum capacity Navionics card is 16Gb.

To check the current availability of Navionics® chart card types and the latest feature sets, visit [www.navionics.com](http://www.navionics.com) or [www.navionics.it](http://www.navionics.it).

To obtain Navionics cards, contact your local dealer or visit the Navionics web site.

Alternatively, anywhere in North America call Navionics toll-free on **1-800-848-5896** Outside of North America, contact your local dealer or Navionics SpA on:

**Phone: (+39) 0584 961696 or Fax: (+39) 0584 961309).**

When archiving data, Raymarine recommends that you only use SanDisk brand CF memory cards. Other brands of CF memory cards may not work in your E-Series Display.

## 4.2 Uses of the chart application

Once the heading and position data is available you can use your chart to:

- Find out where you are (see *page 53*).
- Interpret your surroundings (see *page 54*).
- Measure the distance and bearing between two points (see *page 69*).
- Place waypoints at specific locations (see *page 70*).
- Navigate to a specific point (see *page 70*).
- Build and follow a route (see *page 72*).

- Monitor where you are going (see *page 88*).
- Distinguish between fixed and moving objects using radar overlay (see *page 90*).
- Record where you have been (see *page 94*).
- Manage and edit routes and tracks (see *page 82* and *page 97*).
- View AIS data (see *page 68*).

Facilities are also provided to customize your chart application to your own particular requirements and circumstances. You can:

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

**Note:** *To change the data displayed in the data bar at the top /side of the screen, please refer to page 277.*

### 4.3 Viewing the chart

You will normally view your chart with the vessel on screen and motion mode 'active'. When motion mode is active, as your vessel moves, the chart is redrawn to keep the vessel on screen. When you zoom the chart in active mode, the chart zooms about your vessel position.

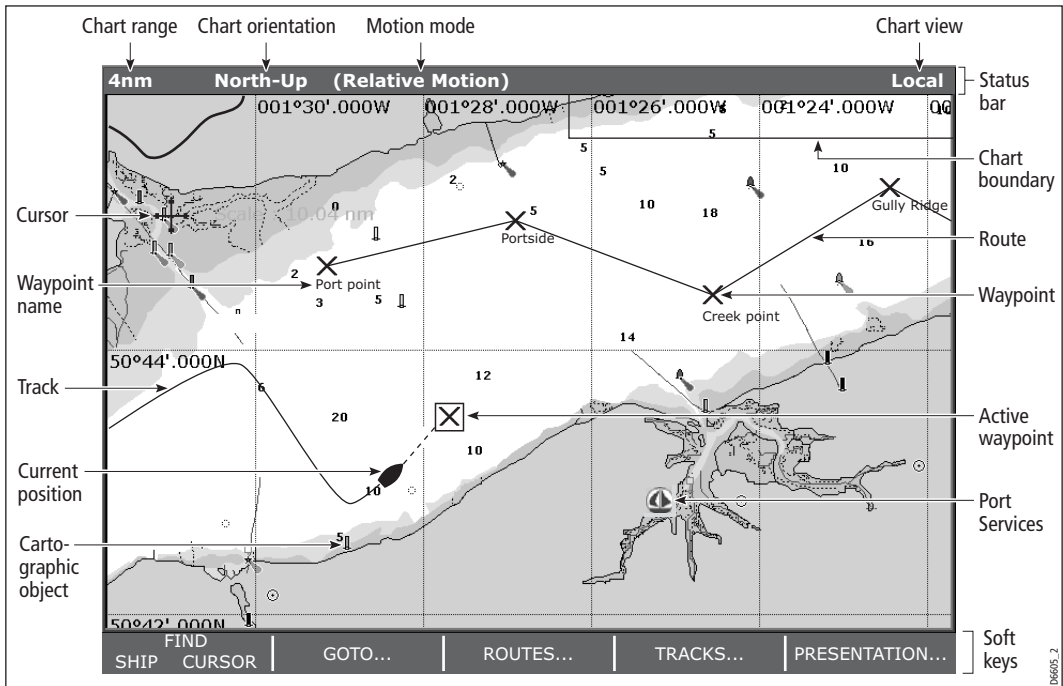
Alternatively, you may be planning a journey and do not want the chart to redraw as your vessel moves. You can suspend the active motion mode by using the cursor to pan the chart (see page 53) or by selecting FIND CURSOR.

When motion mode is suspended, the mode is shown in the status bar in parenthesis e.g. (RELATIVE MOTION); zoom operates about your cursor position.

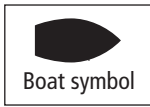
Provided the necessary data to ascertain your vessel's position is available, you can activate the motion mode, by selecting FIND SHIP.

### 4.4 The chart display

The main features of the chart display are as follows:



### 4.5 Where am I on the chart?



Your current position is represented on screen by a boat symbol. If neither heading nor COG data is available, the vessel is shown as a solid circle.

If positional data has been selected for display your position will be displayed in the data bar under VES POS.

**If you cannot see your boat:**

Toggle to FIND SHIP

Chart redraws with boat at centre

---

**To mark your current position:**

(or wait 3 seconds)

Accepts default

D8714\_1

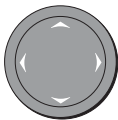
**Note:** For more information on waypoints, please refer to the Waypoint Chapter.

### 4.6 Moving around the chart

To move around the chart and display the area required at the appropriate scale, use a combination of zooming and panning.

**Note:** *When you pan the chart, or when you change the scale in autorange mode, the motion mode is suspended - see page 52 and page 101.*

#### Panning



Panning moves the chart that is displayed to a different area. To pan a chart, simply press the appropriate arrow (left/right, up/down) on the trackpad. When the cursor reaches the edge of the screen, the chart pans.

**Note:** *When you pan the chart, active motion mode is suspended.*

#### Zooming in/out

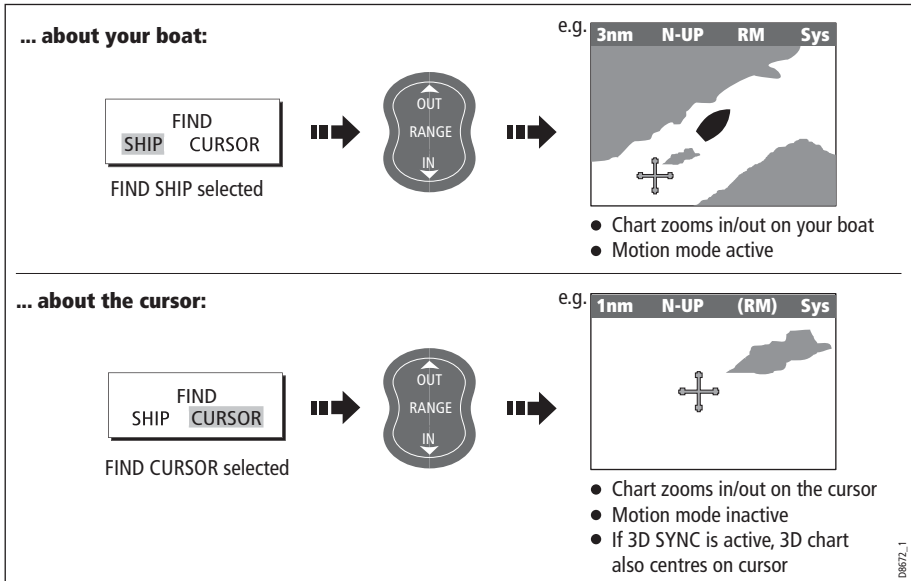


When you zoom in, the chart scale changes to show a smaller area in more detail. Conversely, if you zoom out the chart area displayed is increased but the detail is reduced.

**Note:** *The cartographic detail available on charts varies according to the chart and the chart scale. Some areas provide detail at smaller scales than others.*

A feature of the chart is 'autoscale'. If you select a chart scale that does not have cartographic detail in some areas, the chart will use the most detailed level available for the surrounding area and stretch it to fit the selected scale. This means that you will never have blank or hatched areas on your screen. However there may be some misalignment of objects which cross the chart boundary in this area.

To zoom in/out:



## 4.7 Additional information on the chart

Depending on the chart card you are using, you will also be able to view some or all of the following additional information:

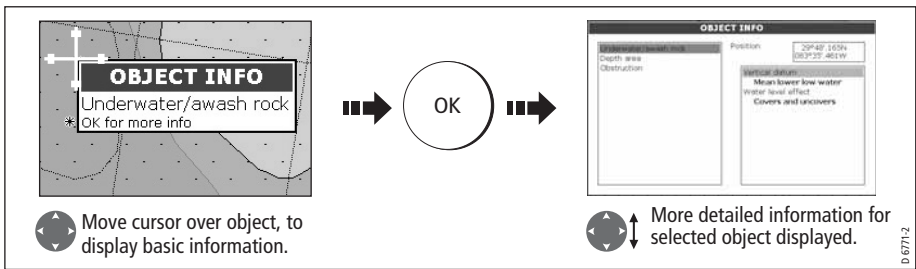
- Details of each cartographic object that is marked on the chart, including source data for structures, lines, open sea areas etc.
- Details of ports, port and business services, tidal and current information, wrecks and obstructions.
- Panoramic photos.
- Aerial photo overlay.
- Pilot books.
- Coastal roads.

**Note:** For full details of the features available with each chart card type, please refer to the Navionics website at [www.navionics.com](http://www.navionics.com) or [navionics.it](http://navionics.it).

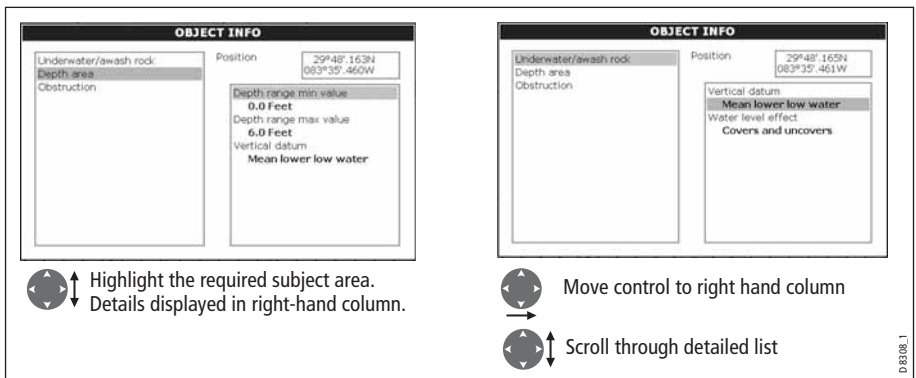
To change the set up options to control how selection of object information operates - see page 107.

## Displaying details of objects and features

To view details:



If the object you have selected has more than one subject area:



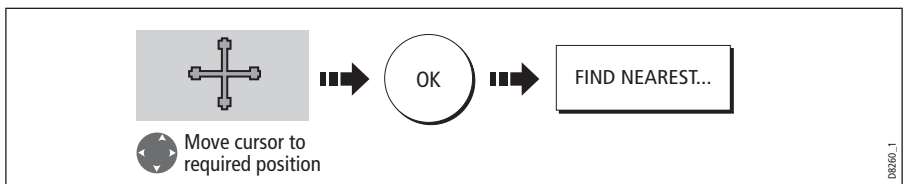
The soft keys provide controls to:

- Locate the nearest waypoint, port, port service, tidal and current stations, wreck or obstruction, to the selected position.
- Search for a named port.
- View detailed data for the selected port, tidal station or current station.
- View panoramic photographs (dependent on the type of chart card in use).

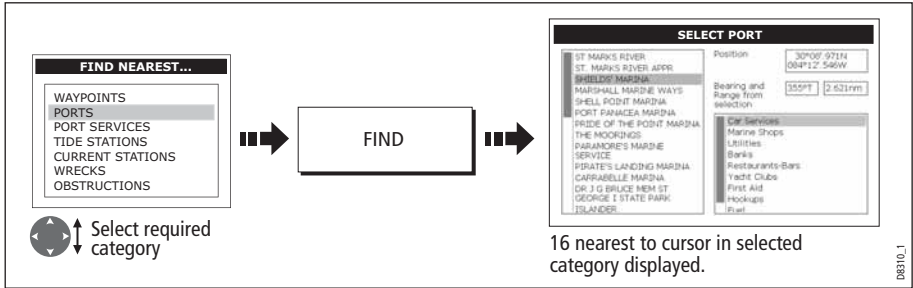
## Finding nearby features and services

You can locate the nearest waypoint, port, port service, tidal and current stations, wreck or obstruction, to the cursor position.

1. Select position for the FIND NEAREST option:



2. Select the feature or service. For ports, you can select a specific service and for a selected port or business service you can find the nearest ports:



Once located, you can use the soft keys and trackpad to:

- Display detailed data for services at the listed ports.
- Show the selected item on the chart.
- GOTO the selected waypoint
- View tidal/current data for the selected tidal/current station.

### Animated tides and currents

You can set the date for the animation and choose to see the whole animation from the beginning or start it at any point within the 24-hour period. You can also choose to view the animation continuously or to step through it in increments of time you set.

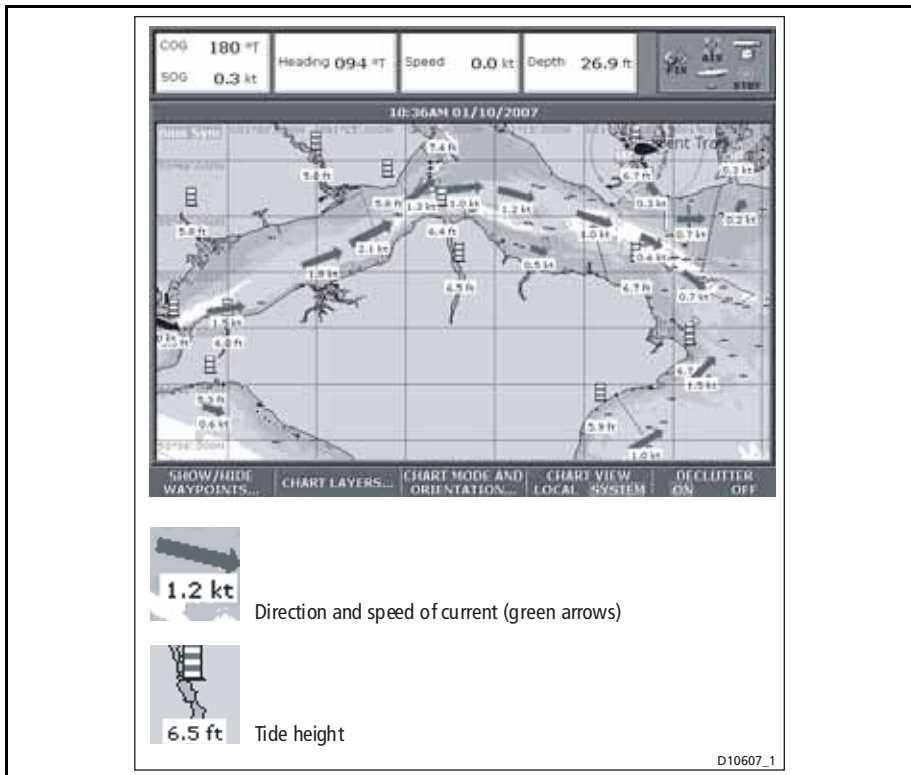
#### To view tide and current animations

In the Chart application:

1. Highlight a tide or current icon.
2. Press **OK** to open the Object Info dialog box and toolbar.
3. Press the **ANIMATE...** softkey.

The Tide/Current Animation screen opens with animation paused.





Press the **ANIMATION PLAY/PAUSE** softkey to start animation.

Animation time and date are displayed on the status bar; the animation starts from the current time.

## Controlling the animation

When you open the Tide/Current Animation screen, the toolbar provides softkeys to stop and start the animation; step the animation forwards or backwards in time; set the size of the step, or select a date for the animation.

The animation plays in a loop: when it reaches the end of a 24-hour animation period, it starts again at the beginning.

## To start or stop the animation

On the Tide/Current Animation screen:

- Press the **ANIMATION PLAY/PAUSE** softkey.

## To view the animation in steps

On the Tide/Current animation screen:

- Press either the **STEP BACK** or **STEP FWD** softkeys.

## To set the step interval

The Set Time Interval softkey gives you control over the Step Forward and Step Back functions.

1. If the animation is playing, press **PAUSE**.
2. Press the **SET TIME INTERVAL** softkey.

This displays a slider with the current time interval shown. Use the rotary controller to adjust it (within the range of 15 to 120 minutes).

3. Press **OK** or **CANCEL** to save the new interval.

**Note:** *The animation must be paused for the Set Time Interval function to be available.*

## To set the animation date

1. Press the **SET DATE** softkey.

This displays the Edit Date screen and toolbar.

Table 4-1: Animation Date Toolbar

<b>TODAY'S DATE</b>	Set the animation date to the current date.
<b>PREV DATE</b>	Set the animation date to 24-hours previous to current date.
<b>NEXT DATE</b>	Set the animation date to 24-hours ahead of current date.
<b>EDIT DATE</b>	Opens the Edit Date pop-up screen: use the trackpad or rotary controller to enter the date you want to see an animation for.

2. Press **OK** to save the new date and return to the Tide/Current Animation screen, which will update to display the tide or current for the date you chose.

**Note:** *Press CANCEL to ignore the date change and go back to the Tide/Current Animation screen, leaving the date setting unchanged.*

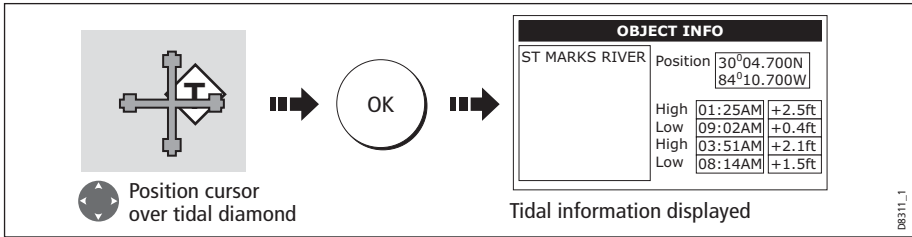
## Displaying details of tides

You can display details of tides by:

- Selecting the appropriate tidal diamond (see below) or
- Via the FIND NEAREST function (see *page 55*).

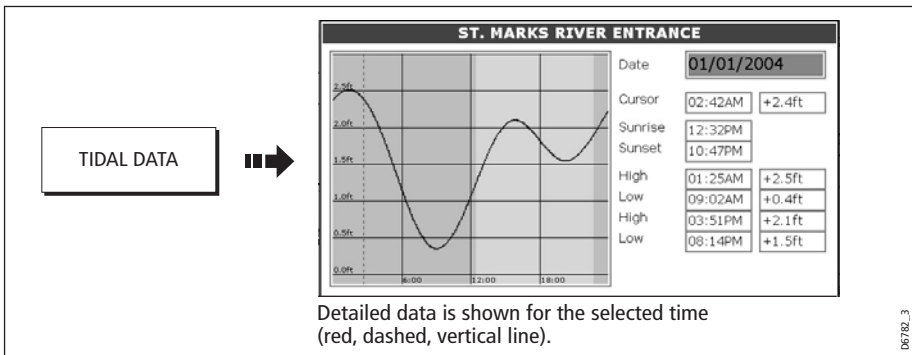
### ...Using the tidal diamond

1. To display numerical tidal information:



You can now view additional tidal data.

2. To display additional tidal data including a tidal curve:



You can now:

- Move the time-selector, using the trackpad/rotary control.
- Change the displayed date, using the soft keys.

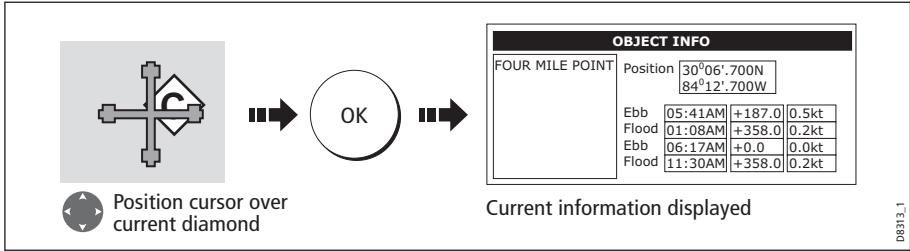
## Displaying details of currents

You can display details of currents by:

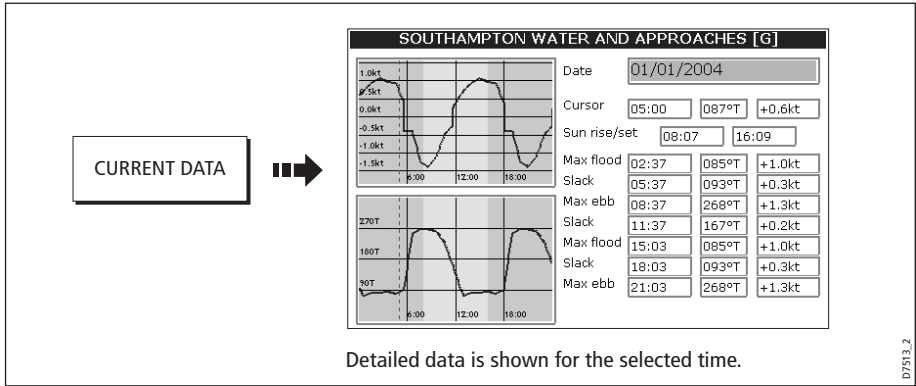
- Selecting the appropriate current diamond (see below) or
- Via the FIND NEAREST function (see *page 55*).

### ... using the current diamond

1. To display numerical current information:



2. To display additional current data including a current curve:



You can now:

- Move the time-selector, using the trackpad/rotary control.
- Change the displayed date, using the soft keys.

### Displaying details of port services

You can display details of port services by:

- Using the port search option (see below).
- Selecting the appropriate port symbol (see *page 62*).
- Using the FIND NEAREST function (see *page 55*).

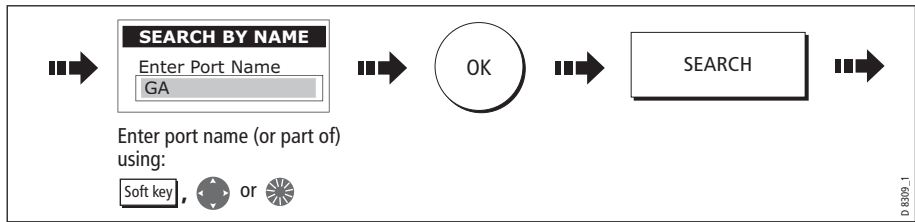
#### ... using the port search option

The port search option allows you to specify the name a port and display its services:

1. Select the edit name option:

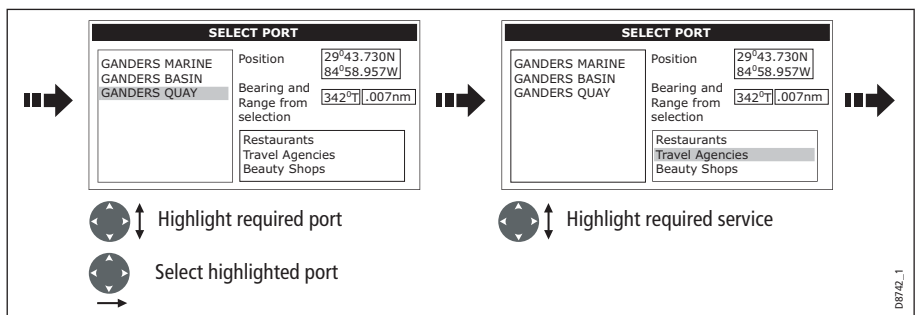


2. Enter the port name (or the first few characters of the port name) and search:

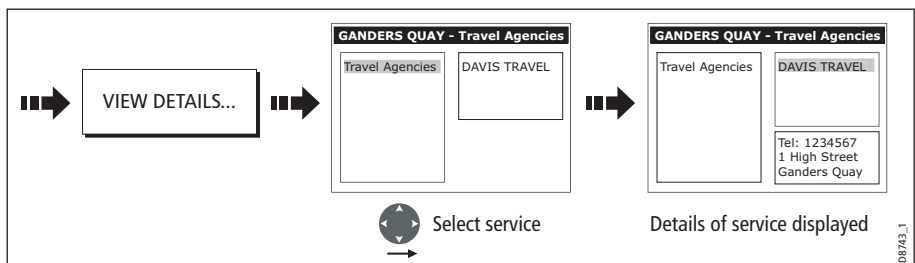


**Note:** For help with entering text into a dialog box, please refer to page 13.

3. If the search returns more than one port, you can select which port's facilities and services you want to display:
  - i. Select a particular port and its service:



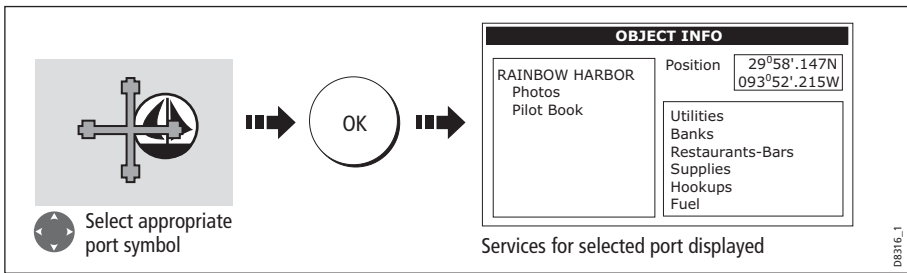
- ii. Display details of the selected service:



4. You can now centre the screen on the selected port by pressing SHOW ON CHART.

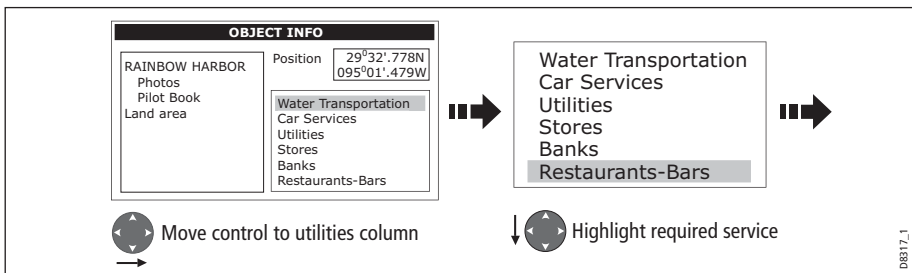
### ... using the port symbol

The services available at a particular port can be displayed by selecting its symbol:

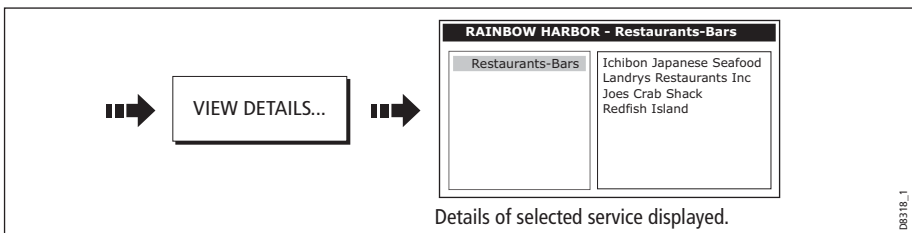


You can now view details of individual services:

1. Select required service:



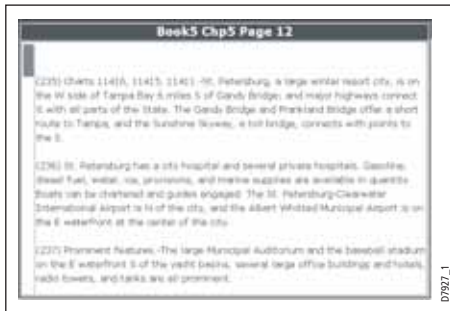
2. Display service details:



**Note:** This method is also used when using the SEARCH BY NAME and FIND NEAREST functions.

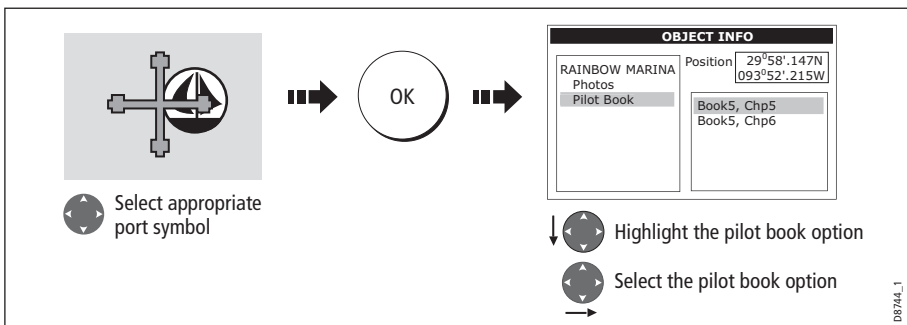
## Pilot book information

The pilot book information option enables you to view detailed information normally contained in an almanac e.g.

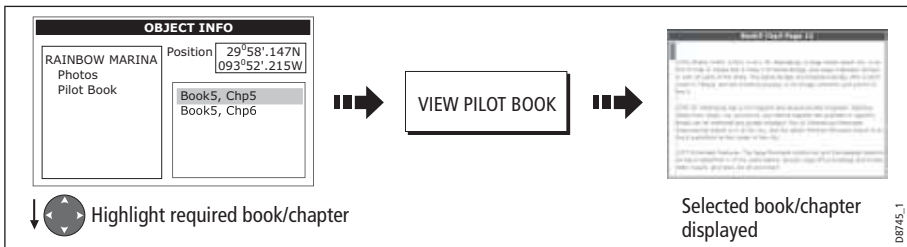


To view pilot book information:

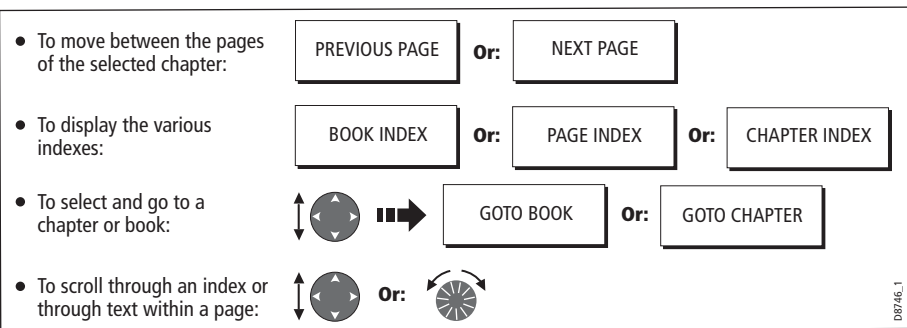
1. Select the pilot book option:



2. Select the required book/chapter



3. You can now navigate around the book as follows:

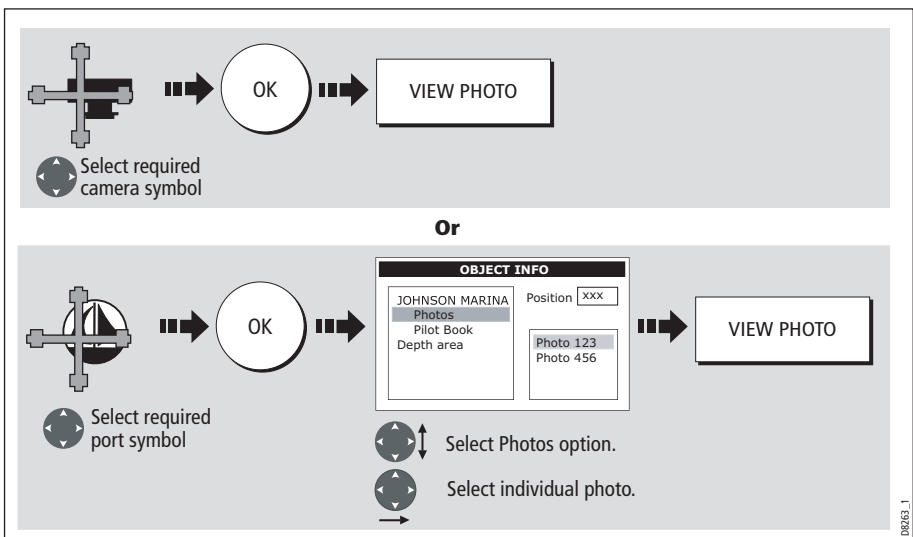


## Displaying panoramic photos



If you are using a suitable chart card, you can display a panoramic photo(s) of many ports and marinas. The availability of photos is indicated by a camera symbol on the chart. This symbol is placed where the photo was taken and the angle of the shot is indicated by the camera symbol. You can also access the photo from the port services information.

To display a panoramic photo:





## Displaying details of business services & points of interest

When a suitable chart card is installed the location of various business services and points of interest are indicated by the following symbols:

**Business services/points of interest symbols**

Anchorage	Airport	Babysitting	Barber	Bank	Camping	Car hire	Firemen
Fishing equipment	Gas/Petrol	Parking	Golf	Gym	Hospital	Hotel	Laundry
Nautical repairs	Marina	Museum	Police	Post Office	Restaurant	Ship repairs	Shop
Taxi station	Tourist information	Train	Water transport	Weather station			

DB236\_1

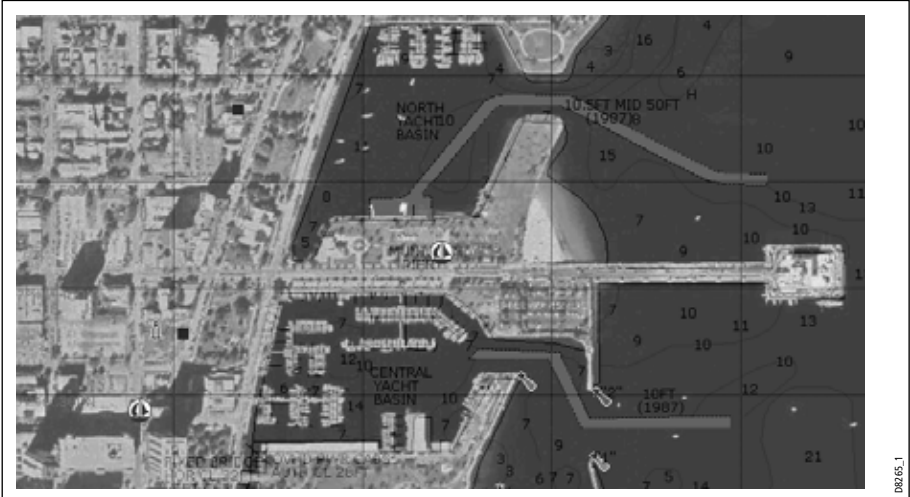
You can view the name, address, telephone number, and type of business of an individual service by selecting its symbol on screen:

The diagram illustrates the user interaction process. It starts with a cursor pointing to a restaurant symbol on a chart. A text box below the cursor says "Select business service symbol e.g restaurant". An arrow points to a circular "OK" button. Another arrow points to an "OBJECT INFO" window. The window has a "Point of Interest" field with "Land area" and a "Position" field with "xxx". A scrollable list shows "Eating places" with details: "Name: The Haven", "Address: 20 High Rd Seaview, Isle of Wight", and "Phone: 0123 45678". Below the window, it says "Additional information displayed".

DB264\_1

**Note:** If required, you can declutter your chart by either switching off the business services symbols (via the Cartography Setup Menu) or by switching on the DECLUTTER option (via the PRESENTATION soft key).

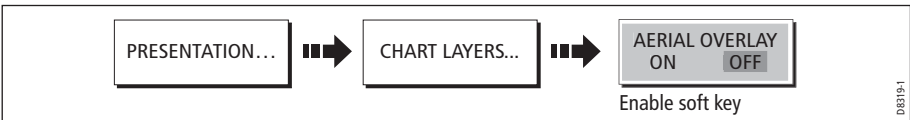
## Displaying an aerial photo overlay



If you are using a suitable chart card, the aerial photo overlay feature can be applied to individual chart windows and will help you to interpret your environment and its features. They cover the navigable waters up to 3 miles inside the coastline. Beyond these limits the land will appear green (color charts) and grey (black and white charts). The level of resolution and the availability of a colored overlay is dependent on the region covered by the chart card.

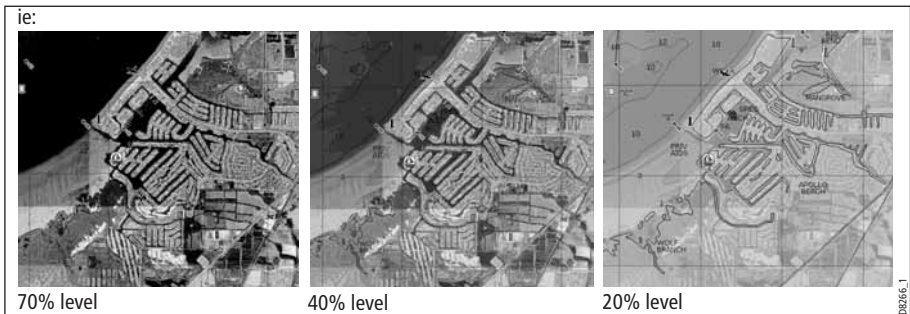
**Note:** *If an aerial photo overlay is applied to a chart window that is set to system view, the overlay will be displayed in all other system view chart windows.*

To display an aerial photo overlay:

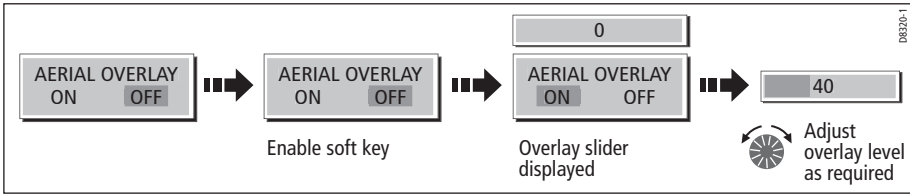


## Adjusting the level of opaqueness

You can adjust the balance between the chart and the aerial photograph by changing the overlay's level of opaqueness. Any changes that you make will affect all displays in your system.



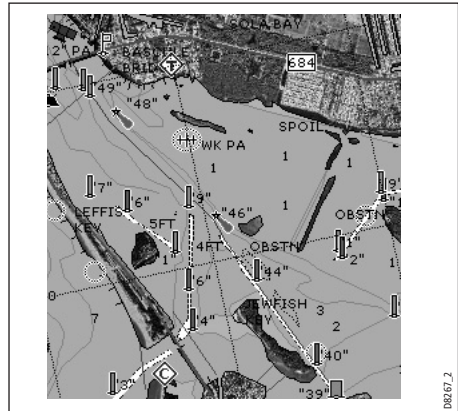
To change the level of opaqueness:



### Specifying the overlay area

You can specify whether the aerial photo overlay is displayed for land areas only or for land and sea areas.

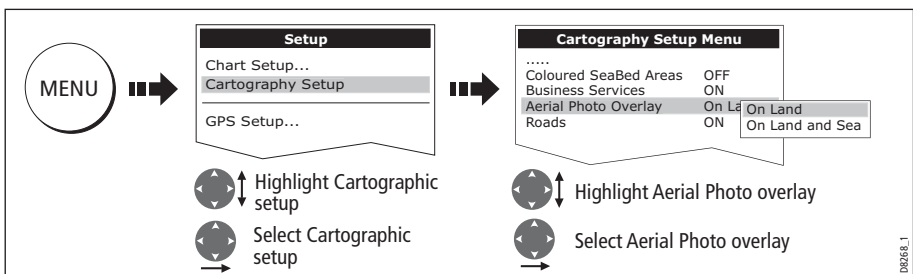
- **On Land** - displays a normal chart view for sea areas and overlays an aerial photo on the land. This will enable you to clearly see cartographic detail in the area that you are cruising whilst helping you to interpret your surroundings by displaying land features.



- **On Land and Sea** - displays an aerial photo on both the land and sea areas. This enables you to interpret deeper water (dark blue) from shallower (light blue) and to view land features simultaneously. In shallow water, in some parts of the world where the photos are good and clear you will actually see bottom features like sandbanks, reefs etc.



To specify the overlay area:

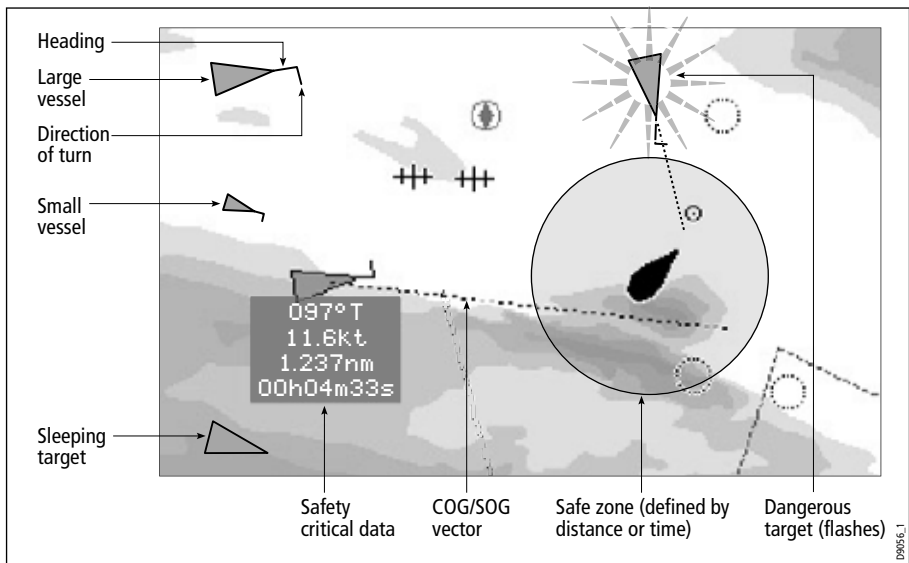


## Displaying vessel identity (AIS)

If you have an AIS receiver fitted to your system, you can use the AIS feature to:

- Display targets for any other AIS equipped vessels.
- Display voyage information being broadcasted by these targets i.e. their position, course, speed and rate of turn.
- Display basic or detailed information for each target vessel including safety critical target data.
- Set up a safe zone around your boat.
- View AIS alarm and safety related messages.

This information is displayed in the form of an overlay and additional data is displayed in a dialog box on your 2D chart screen e.g.



To switch on AIS:



This feature can also be used in conjunction with the radar application. For full information on how to use the AIS feature, please refer to *Chapter 16: Automatic Identification System (AIS)*.

## 4.8 Measuring distances and bearings

### ... from your boat

You can determine the position, distance and bearing from your boat to the position of the cursor by referring to the cursor position (Csr Pos) data in the databar.

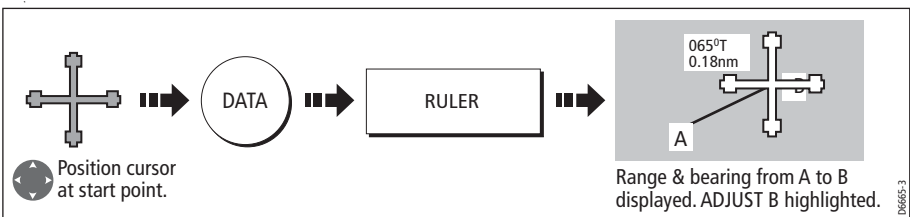
### ... between two points on your chart

The ruler option of your chart application can be used to obtain an accurate measurement of the distance and bearing between two points on your chart.

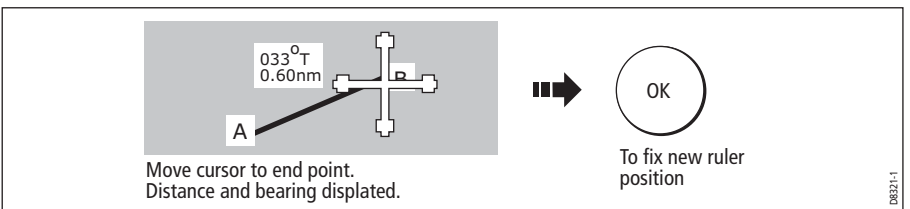
**Note:** *The ruler option is a local setting and will therefore only affect the individual window on which you are working.*

### To position the ruler

1. Position the ruler starting point:

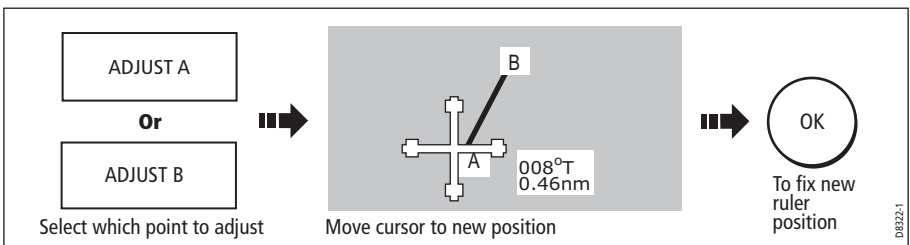


2. Position the ruler end point:



### To reposition the ruler

To reposition either the start or end point of the ruler:



### To clear the ruler

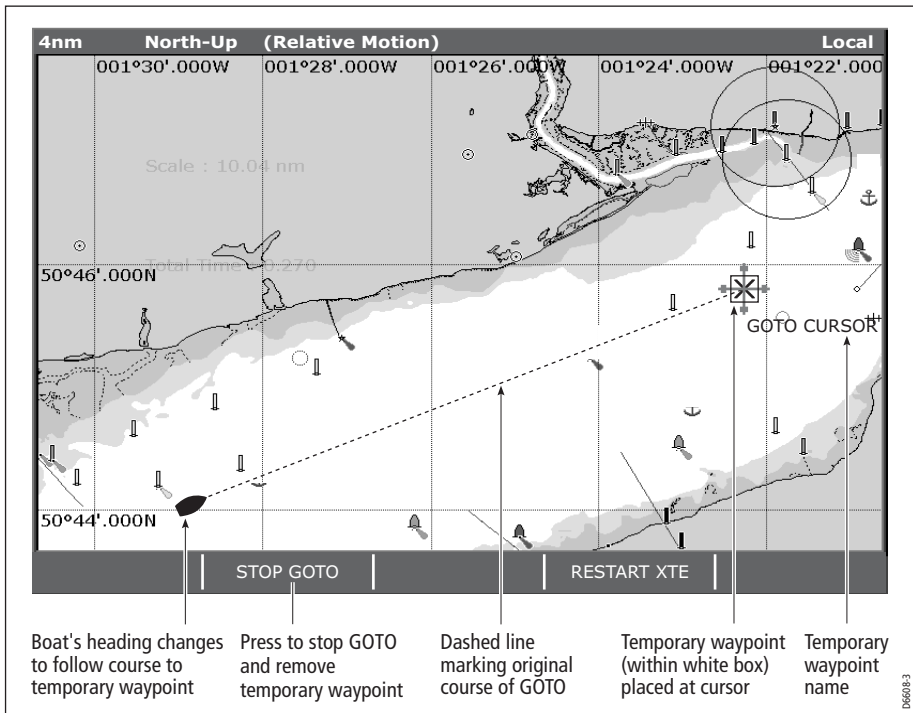


### 4.9 Navigating to a specific point

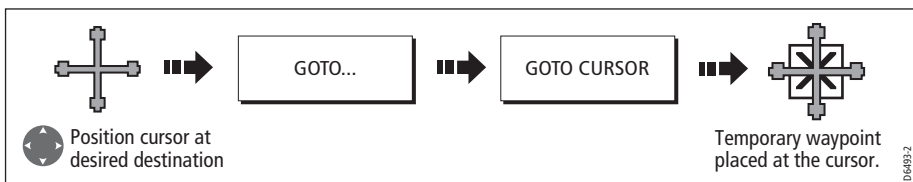
You can use your chart to navigate to a specific point marked by the cursor (temporary waypoint) or to a waypoint. If required you can display the largest chart scale possible that will display both your boat and the target waypoint. When you navigate to a waypoint or to the cursor position, the data is sent on NMEA 0183 and SeaTalk and can be used by an autopilot, if connected. On arrival at the specified point a message is displayed and an alarm sounds.

When you are steering manually, you can also use the chart to determine the bearing or direction to steer.

**Note:** *If you are currently navigating a route or going to the cursor /waypoint, you must press STOP GOTO, before the system can commence a new GOTO request.*



To go to the cursor position:



**Note:** *This target waypoint is also identified on the radar*

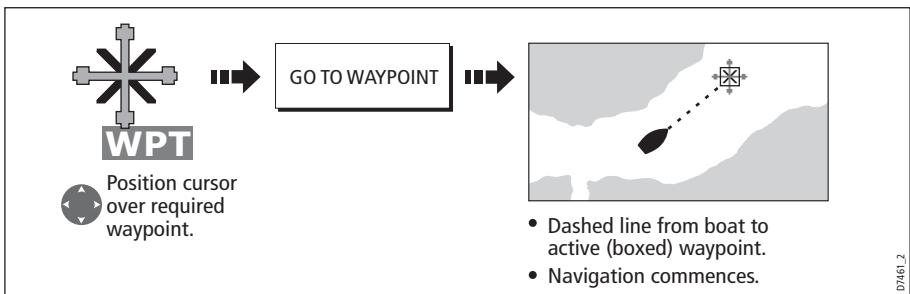
## Go to an existing waypoint

You can navigate to an existing waypoint by either selecting the appropriate waypoint on-screen with the cursor or by selecting it from the waypoint list:

**Note:** For more information on navigating with Waypoints, please refer to Chapter 3: Working with Waypoints.

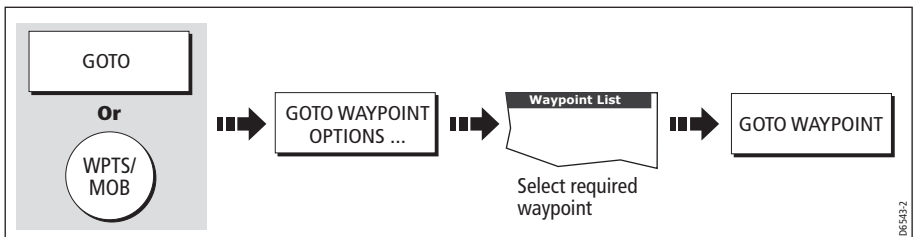
### ... selected with the cursor

This option navigates you to the waypoint that you select on screen.



### ... selected via the waypoint list

This option selects the waypoint that you wish to navigate to from the waypoint list.



## Resetting cross track error (XTE)

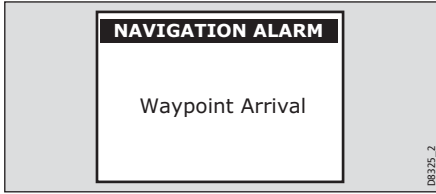
When you are following a waypoint, you can restart the XTE. This results in a new course from the current vessel position to the current target waypoint.

Restarting XTE is useful if you find yourself off track and want to go straight to your target, rather than get back onto the original track.

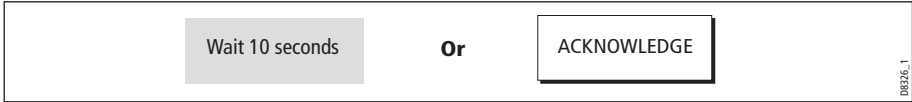
## Arriving at your target waypoint

When you arrive at the target (active) waypoint:

- An alarm sounds and
- A warning message is displayed.

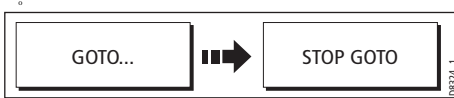


**To de-activate the arrival alarm**



**Stop navigating to your target waypoint**

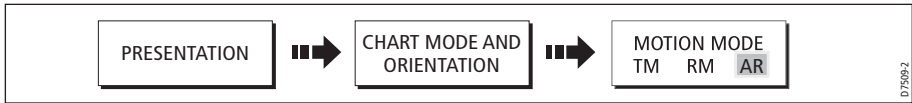
To stop navigating towards the selected waypoint:



**Maintaining a view of your navigation**

By selecting Auto Range mode, your chart will automatically adjust the range to maintain both your boat and the target waypoint on screen, using the largest scale possible.

To select Auto Range mode:



**Note:** For more detail, see *Setting the motion mode on page 101*.

**4.10 Building and following a route**



This section describes how to use routes and includes the following:

- What is a route?
- What can I do with a route?
- Building and saving a route.
- Following a route.
- Viewing details of routes.

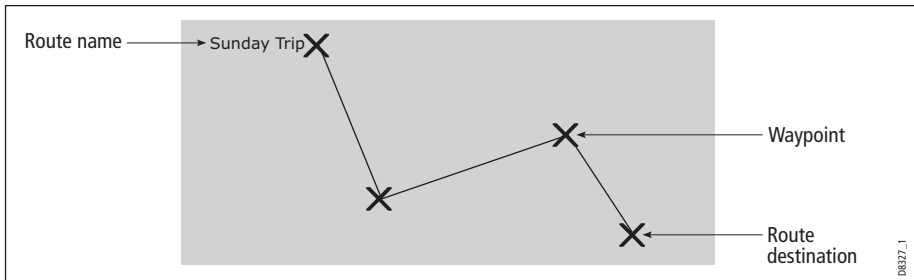


Once created you have the option to view a route's details, amend its course, edit its name and color or erase it.

All route options can be accessed via the ROUTES soft key.

## What is a route?

A route is a series of waypoints used to navigate a course. A route is displayed on screen as a series of waypoints linked by a line.



If you have a network of E-Series Displays, routes are shared across all the Displays.

## What can I do with a route?

You can:

- Build a temporary route that you follow immediately (Quick Route). If you do not rename a quick route, it will be overwritten and its waypoints deleted when a new quick route is built.
- Build and save a route for later use, in which case the route is stored in the route list.
- Convert a track of your course into a route (see *page 96*).

## Building a route

Routes can either be built on screen or via the waypoint list. A route consists of:

- New waypoints that you have specifically placed for that route *Or*:
- Existing waypoints that are already stored in the system *Or*:
- A combination of new and existing waypoints.

**Note:** A route can also be created from a track. See page 96 for details.

Up to 150 routes can be added to your system, each consisting of up to 50 waypoints. As each waypoint is added, it is assigned an index number corresponding to its position in the route and drawn on the chart using the currently specified symbol.

The following should be noted:

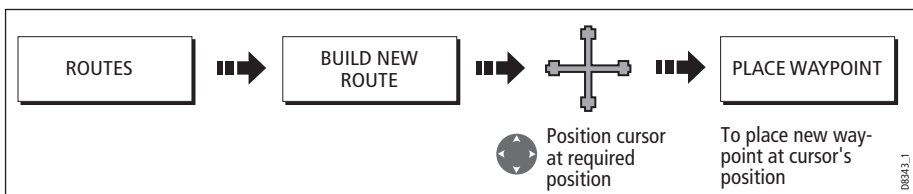
- When a route is being built it is not active and does not affect any current navigation.
- You can include a waypoint more than once in a route, but the same waypoint cannot be placed consecutively.
- You can create a new route when the route list is full but on saving this, you will be prompted to choose an existing route to overwrite.
- You cannot save a new route if any of the waypoints within it are currently active.
- The way in which the **OK** and **CANCEL** buttons operate is different when you are building and editing routes (see below).

## Building a route on screen

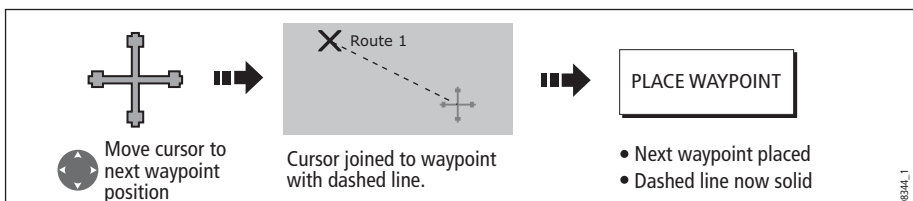
You can build a route on screen that consists of either new or existing waypoints or a combination of both.

### ... using new waypoints

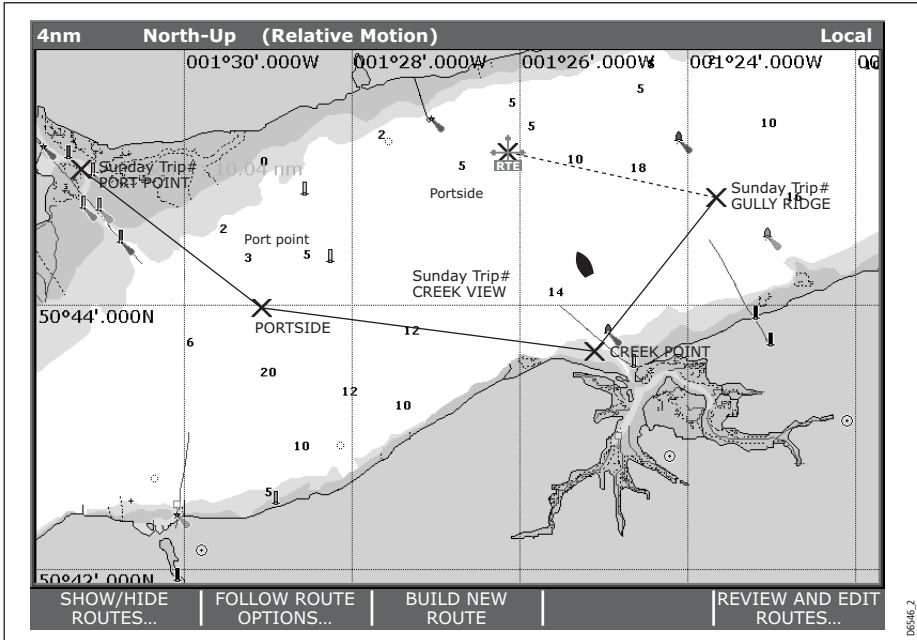
1. To place the first waypoint in a route:



2. To place subsequent waypoints in the route:



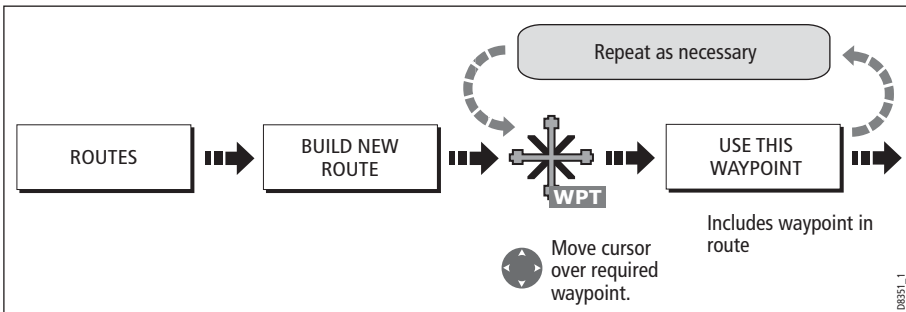
3. Continue entering waypoints. If you make an error, you can remove the last waypoint (see *page 76* for details).
4. Save your route when it is complete (see *page 77* for details).



### ... using existing waypoints

You can use waypoints that already exist, to build a new route.

1. Create your route:



**Note:** If you make an error, you can remove the last waypoint (see *page 76* for details).

2. Save your route when it is complete (see *page 77* for details).

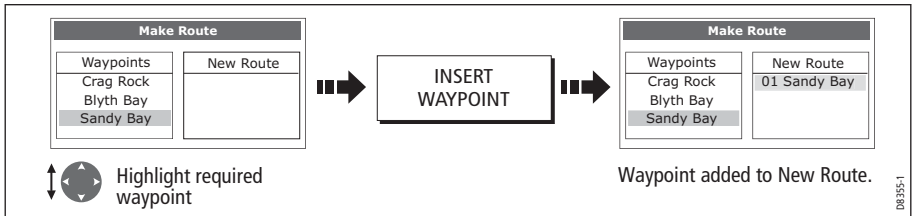
### Building a route using the waypoint list

You may prefer to build routes using existing waypoints in the waypoint list:

1. Select the Waypoint List route build option:



2. Select and insert the first waypoint in the new route:



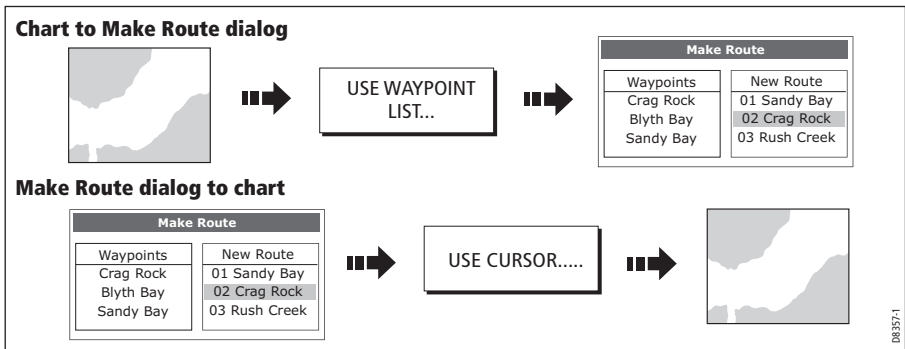
3. Continue entering waypoints until your route is complete.

**Note:** *If you make an error, you can delete the waypoint from the new route list (for details see page 77).*

### Building a route on-screen and via the waypoint list

You can build your route using both the on-screen and the waypoint list methods described on the previous pages. This will necessitate alternating control between the Make Route dialog and the chart.

### Changing control



### Making changes to the route being built

If you make an error whilst building a route you can:

- Undo the last waypoint (on-screen route build only).
- Delete a waypoint from the new route list (waypoint list route build only).
- Abandon the route build.

### Undoing the last waypoint

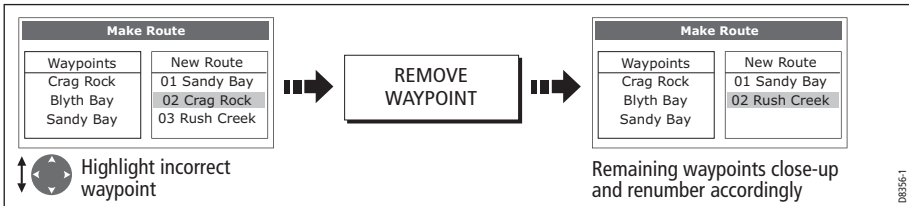
To remove the last waypoint when you are building a route on-screen:



The waypoint and its dotted line are removed from the screen and the cursor moves back to the previous waypoint. If you repeatedly press these keys, successive waypoints are removed.

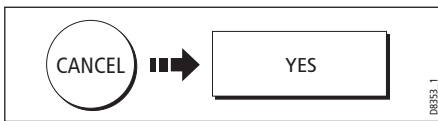
### Delete a waypoint from the new route list

If you insert a waypoint incorrectly into a route that you are building via the waypoint list, you can remove it:



### To abandon the route build

To cancel the route that you are currently building (on-screen or via the waypoint list):



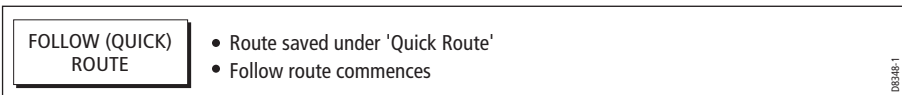
### Saving routes

Once you have built your route either on screen and/or via the waypoint list you have the option to either:

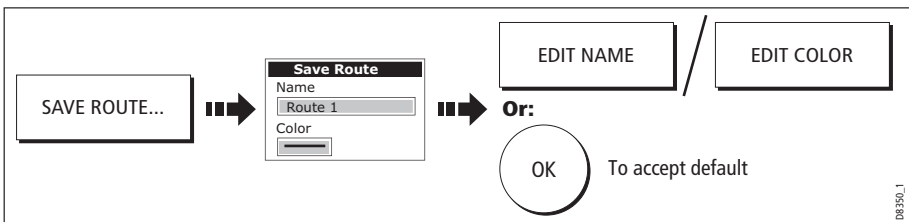
- Save and immediately follow the built route (Quick Route) *Or*:
- Save the built route for later use (and rename it if required).

### Quick routes

A route that is saved and immediately followed is referred to as a Quick Route. If a Quick Route already exists, it is overwritten unless you rename it (see *page 98*).



### To save the built route for later use



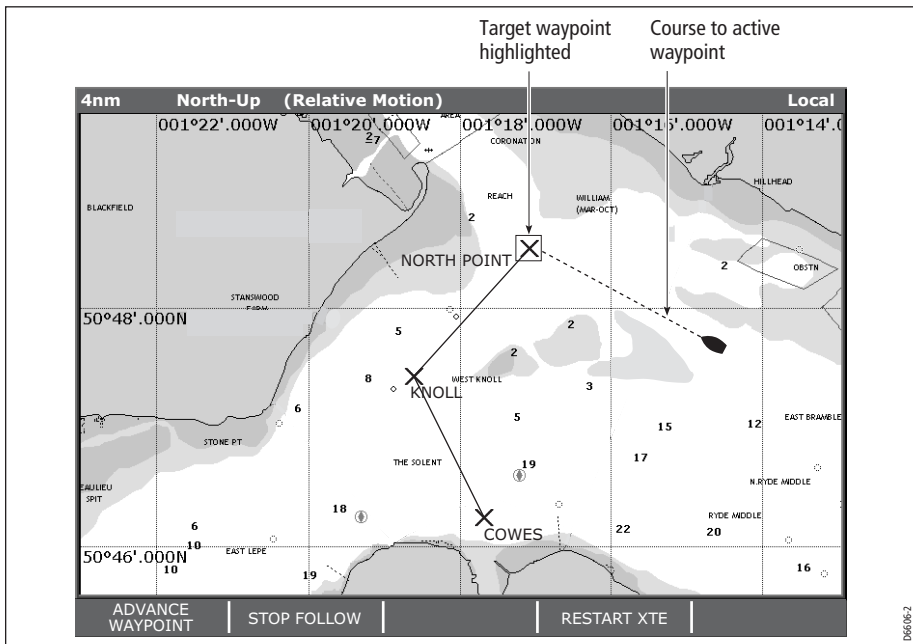
**Note:** For further details on editing a dialog box, please refer to page 13

## Following a route

When you are following a route the active route is shown on all chart windows. On a networked system, an active route is shown and can be controlled from all the displays. When the distance to the next waypoint in the route is less than that specified for the arrival alarm radius (see *page 289*), or your boat reaches the closest point of approach to the target (defined by a line passing through the waypoint and perpendicular to the route leg), a warning dialog is displayed and an alarm sounds (see *page 77*). Once the alarm is acknowledged the next waypoint is selected, the display updates to indicate the next leg of the route and the system sends the new navigation data to the autopilot.

There are several ways to select the follow route option:

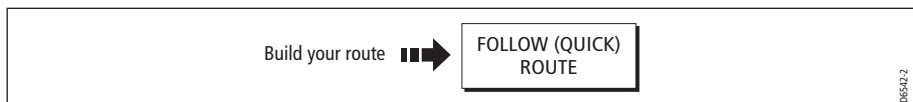
- Using Quick Route.
- Using the cursor.
- Via the route list.
- In reverse order.



**Note:** You can stop following an active route at any time by pressing **STOP FOLLOW**.

## Follow using Quick Route

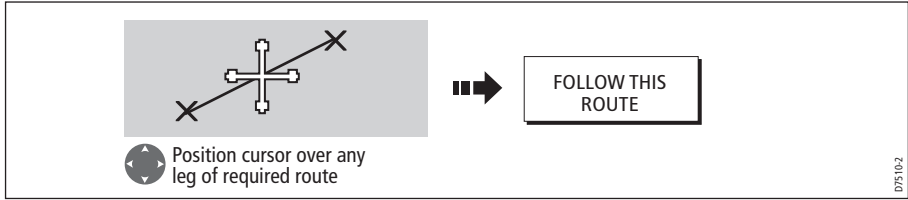
This option follows a route as soon as it is built. For more details see *page 74*.



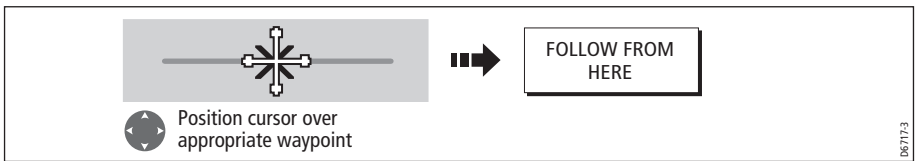
### Follow using the cursor

You can either use the cursor to select and follow a route from the start of the route or from a selected waypoint within the route.

#### ... from the start of the route

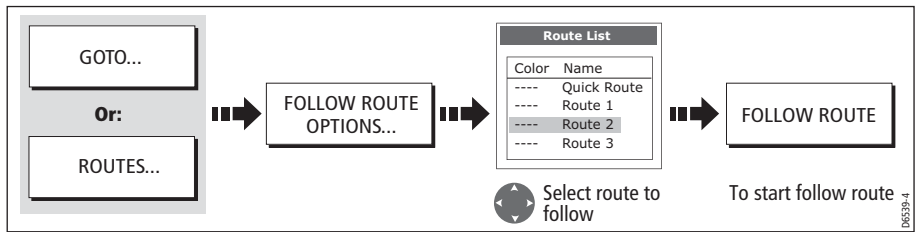


#### ... from a selected waypoint within the route



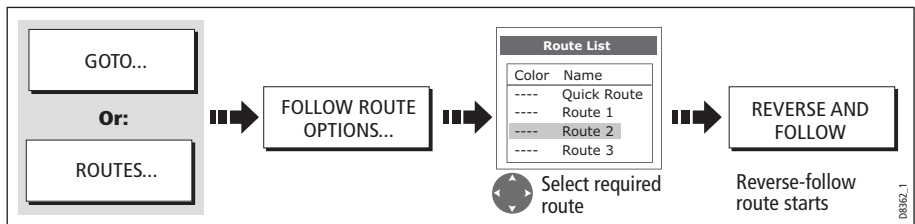
### Follow using the route list

This option directs you to the start of the route that you have selected on the route list and then follows it:



### Follow in reverse order

This option reverses the waypoint order (i.e. the last waypoint of the original route is now the first) and renumbers the waypoints accordingly. The route name moves to the reassigned first waypoint and then the system automatically activates the reverse-follow route function.



**Note:** To stop following an active route at any time, press STOP FOLLOW.

### Advance to the next waypoint in a route

If you are following a route, you have the option to advance to the next waypoint in that route.

Example:

In this example, the advance waypoint option was selected following arrival at Waypoint 2.

This has resulted in Waypoint 3 being dismissed and the course of the route advancing to Waypoint 4.

D6603\_3

To advance to the next waypoint in a route:

D6499\_4

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

### Resetting cross track error (XTE)

When you are following a route or going to a waypoint, you can restart the XTE. This results in a new course from the current vessel position to the current target waypoint.

Restarting XTE is useful if you find yourself off track and want to go straight to your target, rather than get back onto the original track.

Although RESTART XTE causes your vessel to change course, it does not affect the saved route.

When you are following a route ..

D6548\_3



## Viewing details of routes

Details of all routes that you create are held in the Route List. You can:

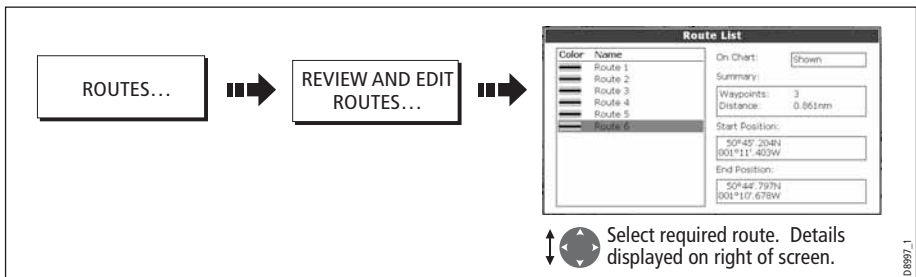
- View the route list and then select the required route, or
- Select the required route on-screen.

The TIME and SOG options can then be used to aid passage planning by displaying the time in hours or as an ETA and the SOG as actual or planned.

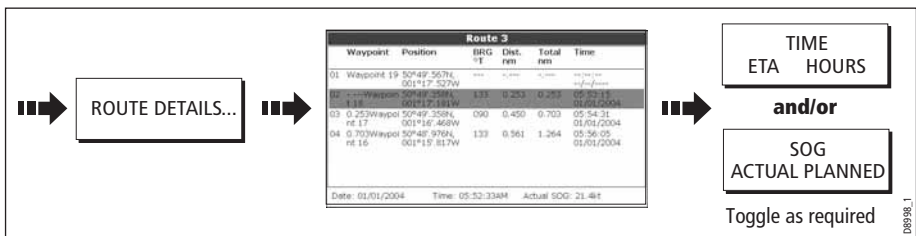
If the route is currently being navigated to (active), the data is updated to show bearing, distance and time from your current position.

### ... via the route list

1. Display the Route List:

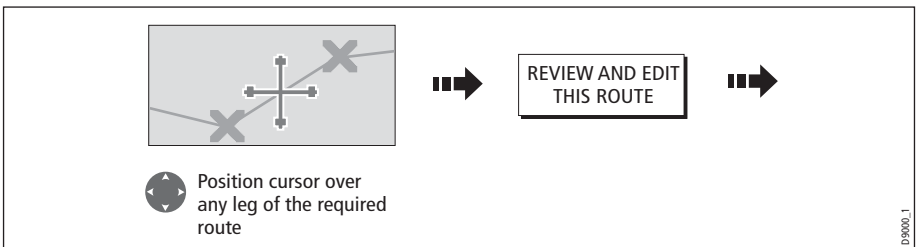


2. Display details of the selected route:

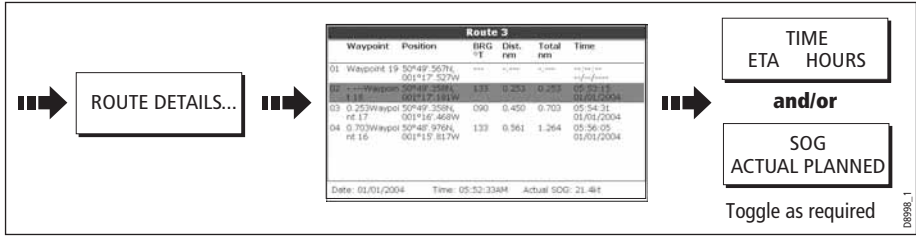


### ... with the cursor

1. Select route and the REVIEW AND EDIT THIS ROUTE option:



2. Display details of the selected route:



### 4.11 Editing routes

Once you have created a route, it can be edited in a variety of ways. You can:

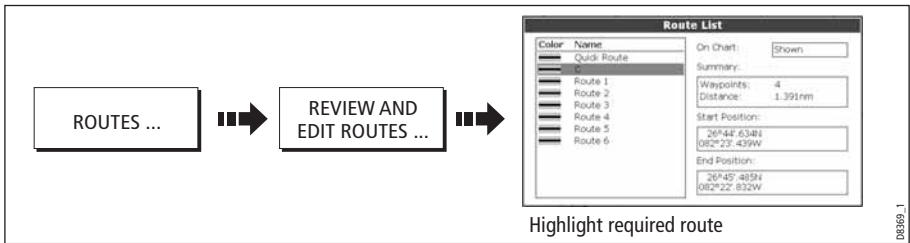
- Reverse a route (see page 79)
- Amend the course of a route (see page 83).
- Change the name of a route (see page 87).
- Change the color of a route (see page 87).
- Erase a route (see page 87).

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

### Selecting a route for editing

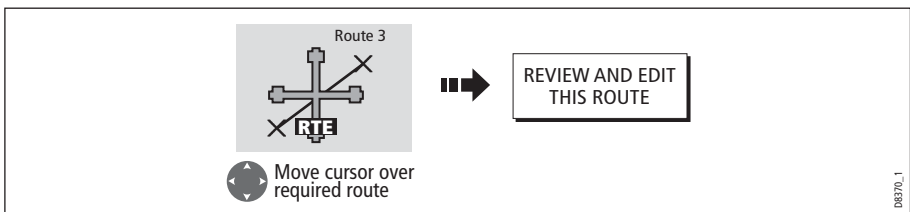
For a route to be edited it must first be selected either via the route list or by selecting the appropriate route on-screen.

#### ... via the route list



You can now edit the route as described on page 83.

#### ... with the cursor



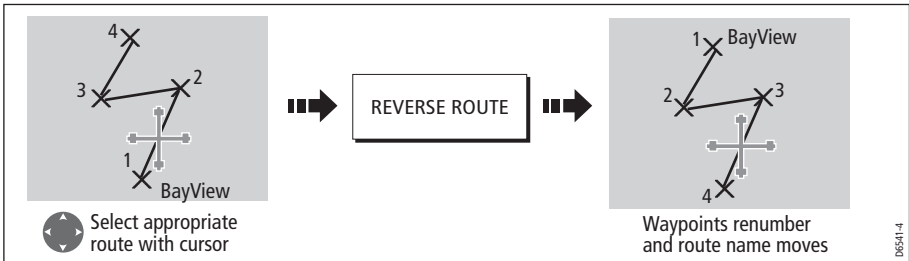
You can now edit the route as described on page 83.

## Editing the selected route

Once you have selected the appropriate route (see previous section) you can proceed to edit it.

### Reversing a route

You can reverse the course of a route:



**Note:** For details of how to reverse and immediately follow a route, see page 79.

### Changing the course of a route

You can amend the course of a route by:

- Adding a waypoint to the beginning or end of the route or between two existing waypoints.
- Moving a waypoint within a route.
- Removing a waypoint.

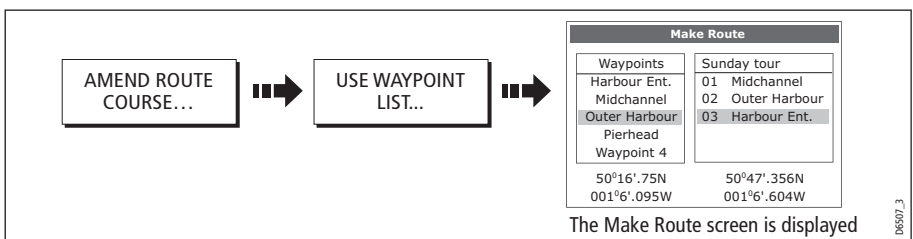
You can effect these changes either via the Make Route dialog box or by selecting the route on screen and then using the appropriate soft keys (not applicable when adding a waypoint at the beginning of a route).

**Note:** You will not be able to edit the waypoint that you are currently navigating to (target waypoint).

### Add a waypoint at the beginning of a route

This option changes the course of a route by adding an existing waypoint to the start of the route:

1. Select the appropriate route for editing (see page 82).
2. Display the Make Route screen:



3. Select the start of the route and the waypoint for insertion:

Make Route	
Waypoints	Sunday tour
Harbour Ent.	01 Midchannel
Midchannel	02 Outer Harbour
Outer Harbour	03 Harbour Ent.
Pierhead	
Waypoint 4	
50°16'.75N	50°47'.356N
001°6'.095W	001°6'.604W

Move control to route column.  
 Move highlight above first waypoint in route.  
 Return control to Waypoint column.  
 Select waypoint for insertion.

4. Insert waypoint and save route:

INSERT WAYPOINT

➡

Make Route	
Waypoints	Sunday tour
Harbour Ent.	01 Pierhead
Midchannel	02 Midchannel
Outer Harbour	03 Outer Harbour
Pierhead	04 Harbour Ent.
Waypoint 4	
50°16'.75N	50°47'.356N
001°6'.095W	001°6'.604W

➡

SAVE ROUTE...

- Waypoint insert at beginning of route.
- Route index renumbers.

### Add a waypoint within a route

This option inserts a waypoint within a route in order to change its course e.g.

4nm North-Up (Relative Motion) Local

001°30'.000W 001°28'.000W 001°26'.000W 001°24'.000W 001°22'.000W

Scale : 10.04 nm

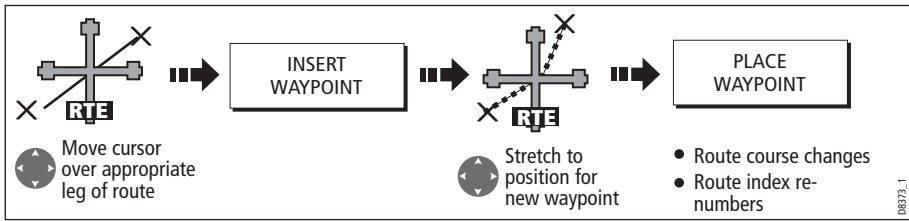
50°46'.000N

50°44'.000N

PLACE WAYPOINT

Original course Position for new waypoint Amended route

To add a waypoint within a route:

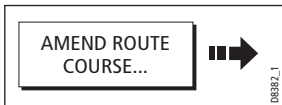


**Note:** You can also use the method described on page 83, to add a waypoint within a route.

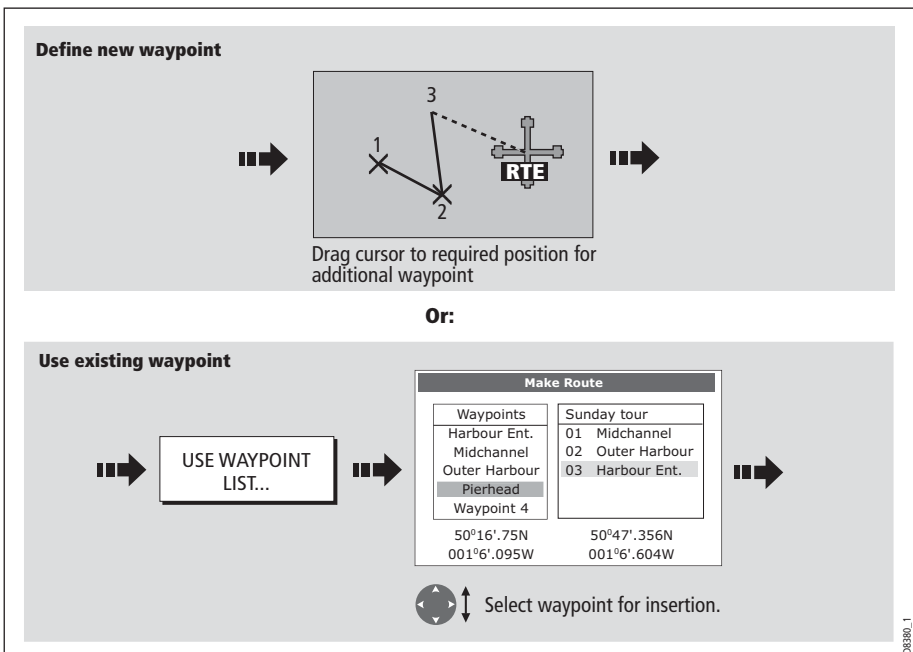
**Add a waypoint(s) to the end of a route**

This option inserts a waypoint (or series of waypoints) at the end of a route in order to extend its existing course. You can create new waypoints for this purpose and/or use a waypoint that already exists in the system.

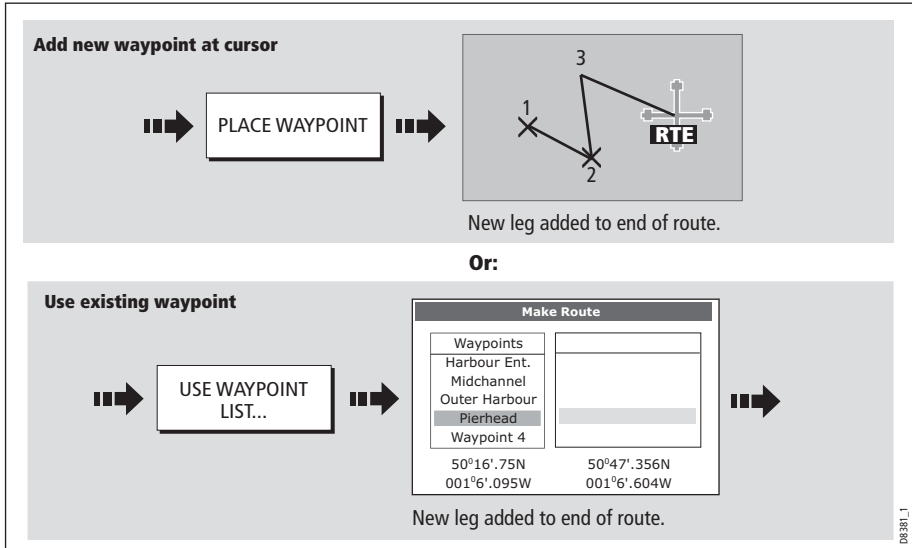
1. Select the appropriate route for editing (see page 82).
2. Select the amend route course option:



3. Define new or existing waypoint:



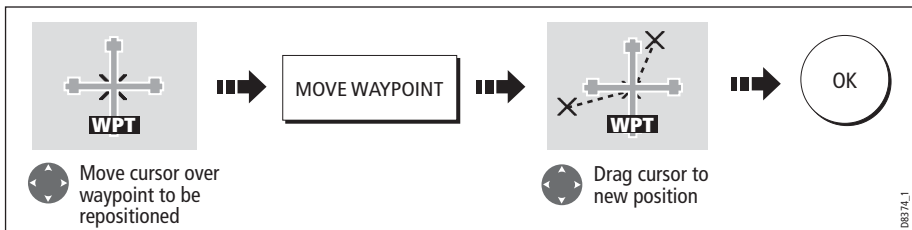
4. Select waypoint to be added:



5. If required, you can add further waypoints to the end of the route by repeating steps (3) and (4) above.

**Note:** If you wish to add a combination of existing and new waypoints to the end of a route, you will need to move control from/to the on-screen cursor/Make Route screen (see page 76).

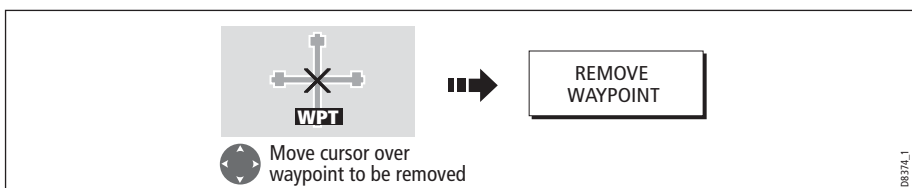
### Move a waypoint within a route



**Note:** A waypoint's new position will be reflected in all other routes that make use of it.

### Remove a waypoint from within a route

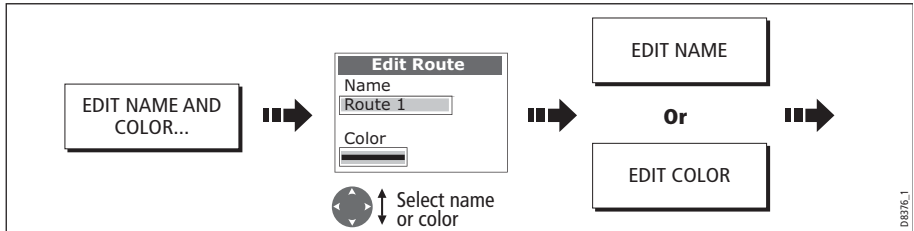
You can remove a waypoint from within a route provided that it has not been used in another route. If you try to remove a waypoint that is used in another route, the system will warn you that it cannot be removed.



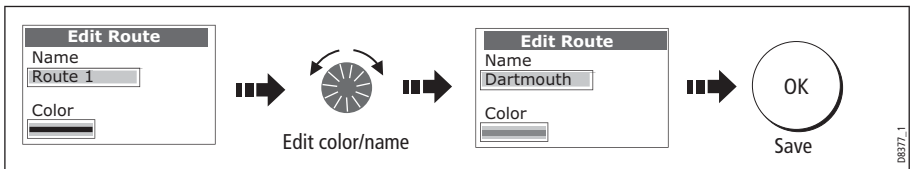
### Changing the name or color of a route

You can change the name of a route from the default to a more meaningful one and/or change the color if required. This will make them easier to distinguish from one another, particularly if you have numerous routes in your system.

1. Select the appropriate route for editing (see *page 82*).
2. Select the Edit Name or Edit Color option:



3. Edit and save:



**Note:** If the route has been saved by pressing FOLLOW (QUICK) ROUTE, the route is named 'Quick Route'. Changing its name prevents it being overwritten by a new Quick Route.

### Erasing a route

You can delete any route in your system except for the one that you are following. When you erase a route the system deletes only those waypoints created with this particular route. Waypoints that have been created separately or are used in other routes are not deleted.

To erase a route:

1. Select the appropriate route for editing (see *page 82*).
2. Erase the track or route:



You can also erase all or selected routes, using the ARCHIVE & TRANSFER function as described on *page 25*.

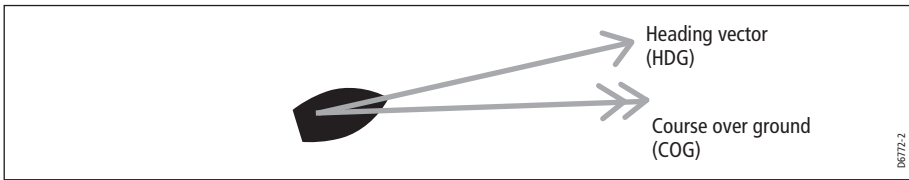
## 4.12 Monitoring where you are going

### ... using chart vectors

You can display a variety of graphical indicators to help monitor where you are going. The chart vectors can be set to either; Thin, Normal (default), or Wide:

**Note:** *Any vectors applied to a chart window that is set to system view, will be displayed in all other system view chart windows.*

### Heading (HDG) and course over ground (COG) vectors



The ship's heading (HDG) is displayed as a line with an open arrow head. It does not take account of winds or tides.

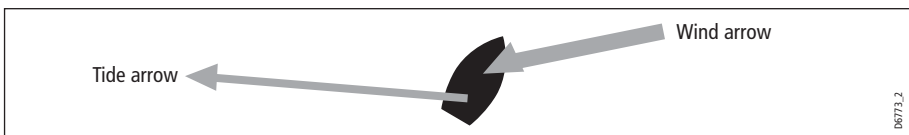
The course over ground (COG) indicates the boat's actual course and is displayed as a line with two open arrow heads.

The length of these lines is determined by the distance your boat will travel in the time you have specified (3 mins, 6 mins or infinite) in the Chart Setup Menu (see *page 107*) at the current speed.

Any times that you specify will apply to all chart views and if INFINITE is selected the vector will extend to the edge of the chart window.

**Note:** *If neither the speed over ground (SOG) or heading are available, vectors cannot be displayed.*

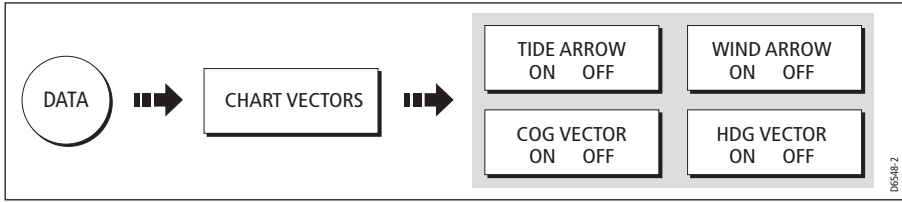
### Wind and tide arrows



Winds and tides are displayed as lines with solid arrow heads in the direction of the wind or tidal set. Winds arrows point into your boat and tidal arrows point away. The width of the arrow indicates its strength.

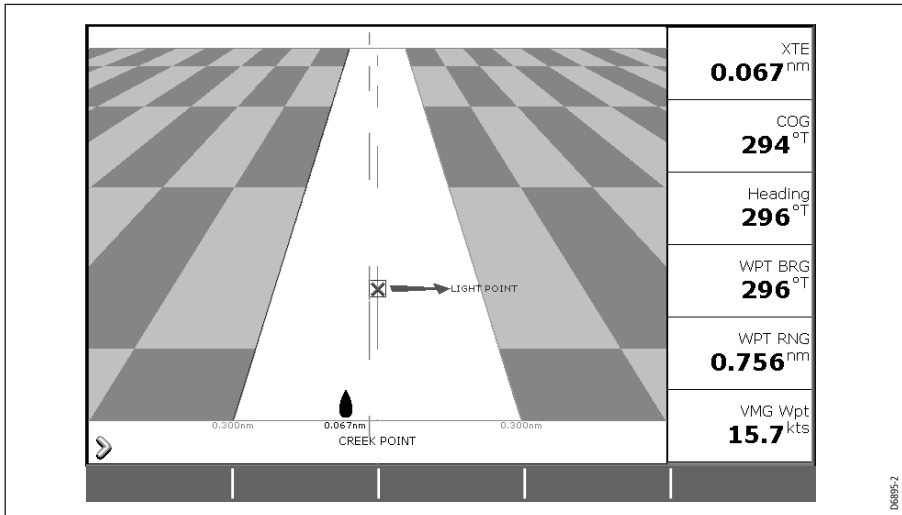
To switch graphical indicators on/off:





### ... using the Course Deviation Indicator (CDI)

The CDI assists with accurately maintaining your course to your destination. A ‘rolling road’ in three dimensional perspective provides a real-time display of your boat’s course. See *Chapter 13:Using the Course Deviation Indicator* for more information.



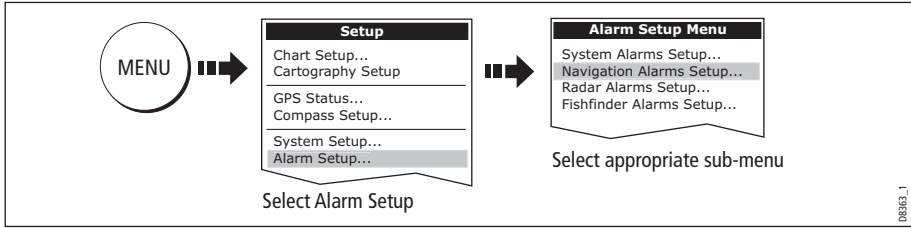
## 4.13 Warnings of potential dangers

When the appropriate equipment is installed and switched on, the following alarms will be triggered when you are in the chart application:

- System alarms - Anchor, Timer, Alarm clock and Temperature.
- Navigation alarms - Arrival and Off track.
- Radar alarms - Guard zones.
- Fishfinder alarms.
- AIS alarms.
- Weather alarms.

When an alarm is triggered, a buzzer sounds and a pop-up window describing the alarm and how to clear it is displayed. In some cases, the appropriate action is taken by the Chart. For example, following an arrival alarm, the next route leg is activated.

To switch these alarms on/off and set the limits:



**Note:** For more details of alarms, see page 289.

### 4.14 Using the radar with the chart

You can enhance the use of your chart by combining it with the following radar features:

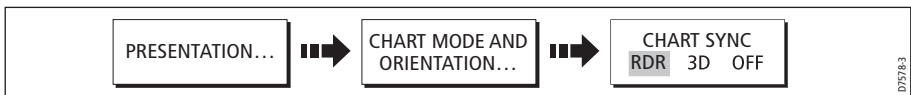
- Radar range synchronization
- MARPA.
- Radar overlay.

#### Synchronizing the chart with radar range

When synchronization is switched on:

- The radar range in all radar windows, changes to match the chart scale.
- 'Sync' is indicated in the top left-hand corner of the chart window.
- If you change the radar range, in any radar window, all synchronized chart views change scale to match.
- If you change the scale of a synchronized chart window, all radar windows change range to match.

To set the radar range synchronization:



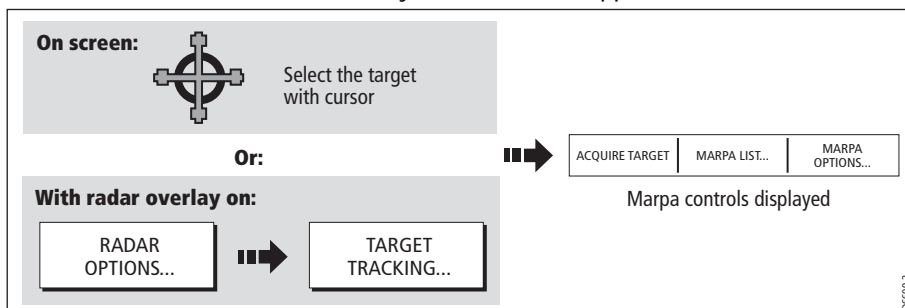
- Notes:**
- (1) Radar range synchronization is not available when the chart motion mode is set to Autorange.
  - (2) The 2D chart can be synchronized with either the 3D chart (see page 125) or the radar but not both.
  - (3) If you have a digital radar set to dual range connected to your system then Chart-Radar sync is temporarily disabled, to re-enable Chart-Radar sync mode, disable Dual Range mode.

#### Viewing MARPA targets on the chart

The Mini Automatic Radar Plotting Aid (MARPA) function is used for target tracking and risk analysis. Although set up in radar mode or radar overlay, all MARPA targets

are displayed in the chart window and associated MARPA functions can be accessed via the chart. For detailed information on MARPA see *page 174*.

To access the MARPA controls when you are in a chart application:



**Note:** *MARPA targets can not be acquired if you have a Digital Scanner, which is set to Dual Range.*

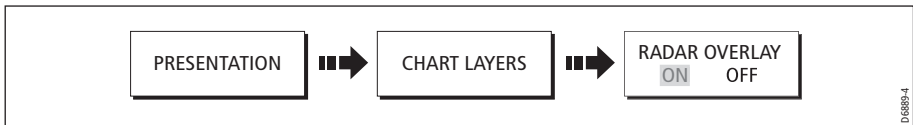
## Distinguishing between fixed and moving objects

You can overlay radar image data over your chart image allowing better distinction between fixed objects and other marine traffic. For best results, switch on Radar-Chart synchronization (see *page 90*) to ensure radar range and chart scale are synchronized.

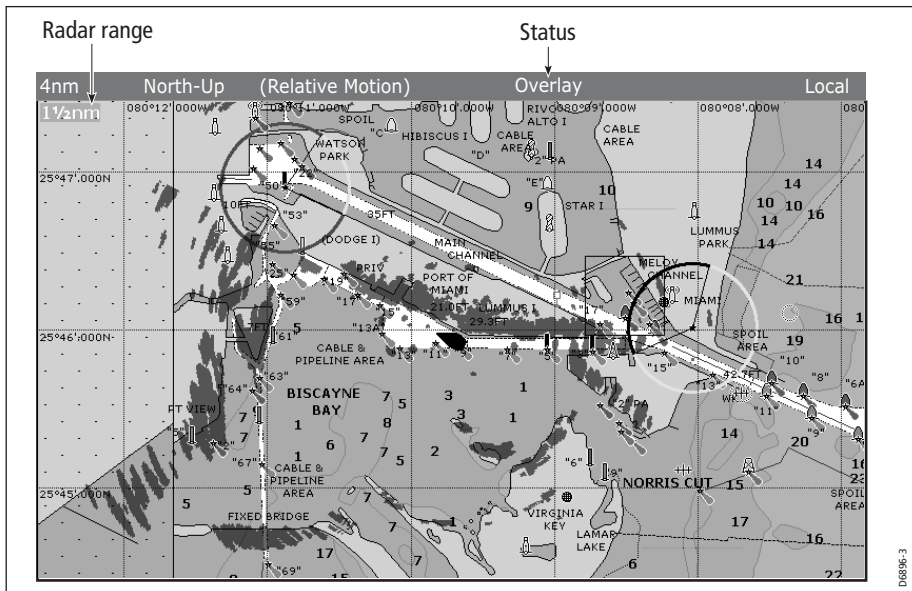
### To switch radar overlay on:

1. Select radar overlay:

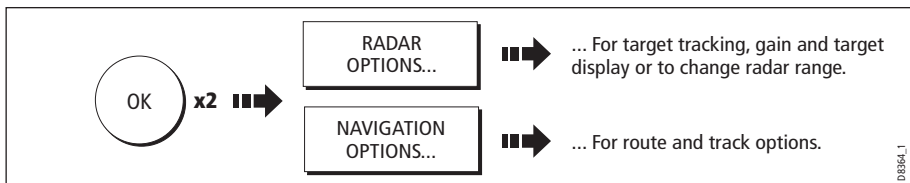
**Note:** *If you have a Digital radar connected to your system and Dual Range is set to 'ON' the overlay is temporarily disabled. The 'Overlay' status indicator is shown in parenthesis '()', but the soft key remains set to ON. To re-enable Overlay, disengage dual range.*



The default soft keys change to give access to some of the radar options and if a radar is connected, the radar image will be overlaid on the chart e.g.



2. To access radar and navigation options:



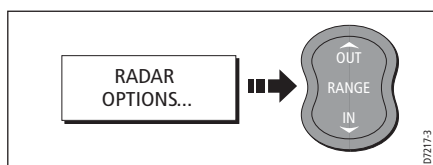
**Note:** *If radar overlay is applied to a chart window that is set to system view, the overlay will be displayed in all other system view chart windows.*

**To turn off radar overlay:**



### Changing the radar range from the chart window

When the radar overlay is set to ON, the radar range is indicated in the top left-hand corner of the chart window in the same color as the overlay. You can now change the radar range:

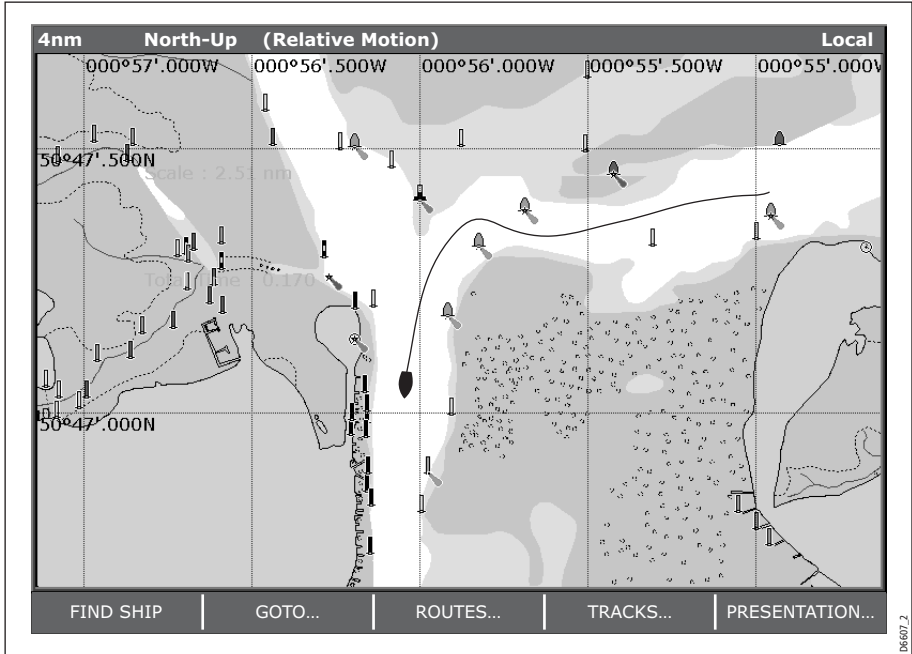


**Note:** *If RDR RNG SYNC is set to ON (see page 90), the chart scale also changes*

## 4.15 Recording where you have been

### What is a track?

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



## How can I use tracks?

Tracks can be used to:

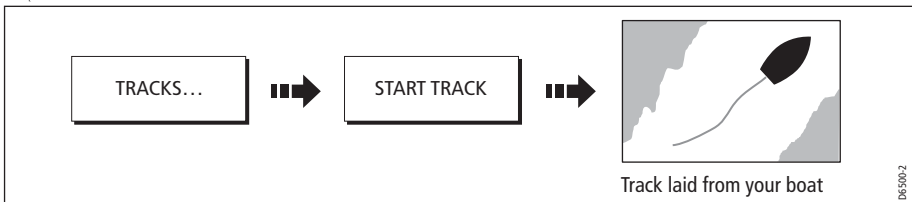
- Review where you have been.
- Retrace your original journey by converting the track to a route and automatically reversing it.

If required, a track can be personalized and the track options customized to your own particular needs. You can:

- Rename a track.
- Change the color of a track.
- Specify the time period between track point creation (see *page 107*).
- Specify the distance between each track point (see *page 107*).

## Creating a track

### To start a track...

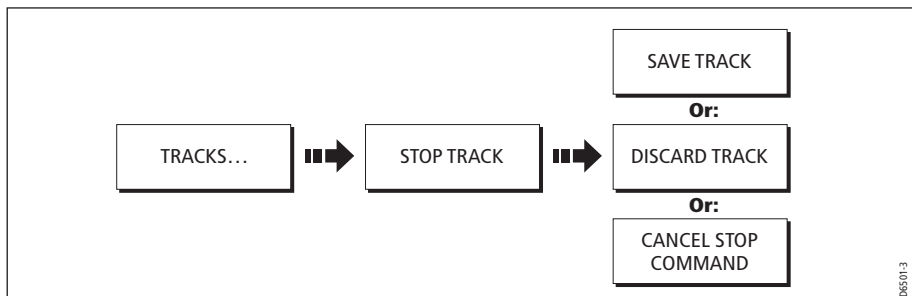


If the power fails whilst a track is being recorded or the position fix is lost, a break will occur in the track. Only the last segment of a track can be converted into a route.

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

### To stop the track...

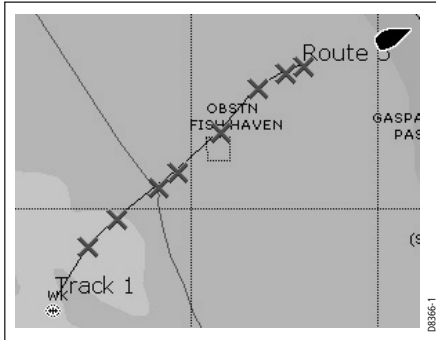
Stop the tracking process:



## Creating a route from a track

Creating a route from a track enables you to retrace the course of that track.

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



On completion, the maximum deviation of the route from the recorded track is displayed and the new route is added to the route list. It can now be displayed, edited and erased etc. in the same way as other routes in the system.

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

### CAUTION:

**Before following the route, ensure that it is safe for navigation, noting that it may deviate from your actual path travelled.**

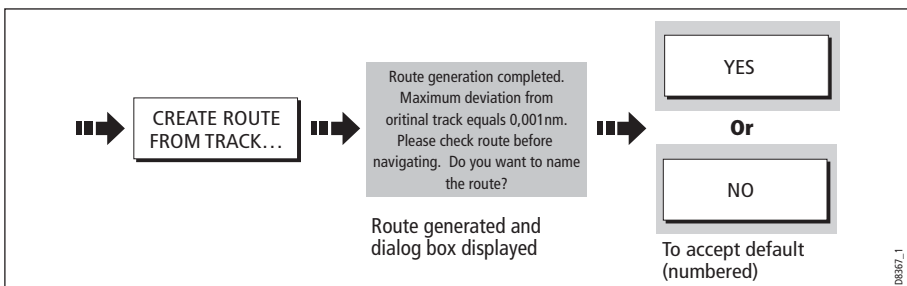
### ... from the current track

You can create a route from the track that you are currently laying. This method will take a 'snapshot' of the track to date, convert it to a route and then continue laying the track:

1. Select the track list:



2. Create a route from current track:

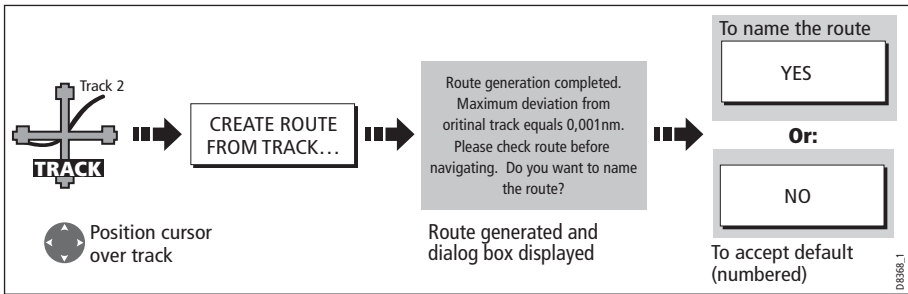


**Note:** *Alternatively you can also select the current track with the cursor and convert it to a route.*



### ...from a saved track

You can create a route from a track that you have already saved:



**Note:** Alternately you can select the track via the track list - see page 96.

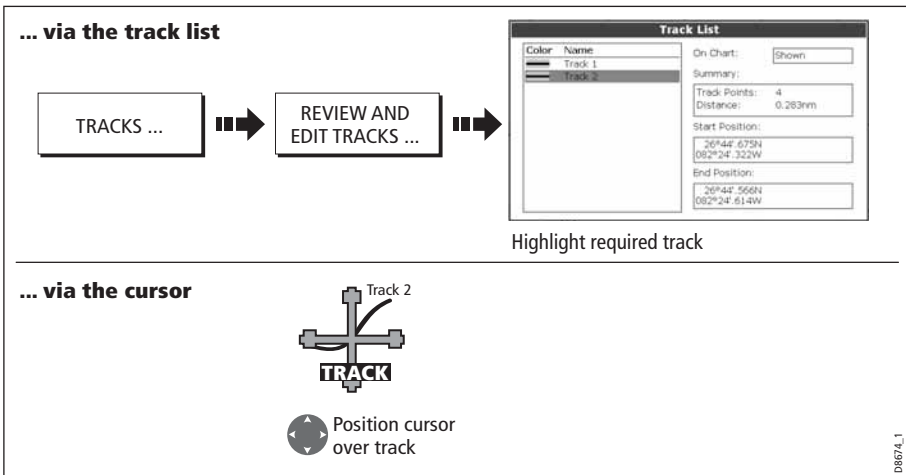
## 4.16 Editing tracks

Once you have created a track, it can be edited in a variety of ways. You can:

- Change the name of a track (see page 98).
- Change the color of a track (see page 98).
- Erase a track (see page 98).

### Selecting a track for editing

For a track to be edited it must first be selected either via the track list or by selecting the appropriate track on-screen.



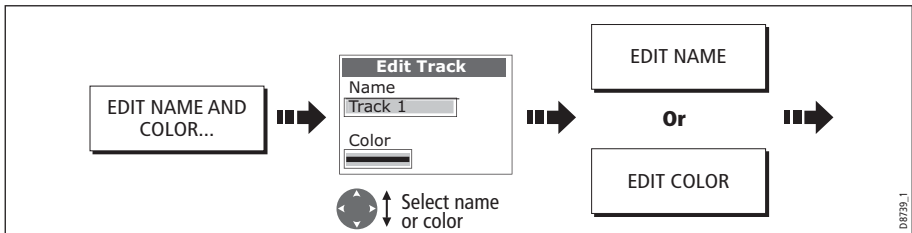
## Editing the selected track

Once you have selected the appropriate track (see previous section) you can proceed to edit it.

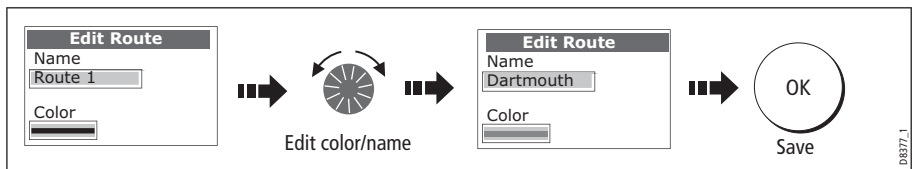
### Changing the name or color of a track

You can change the name of a track from the default to a more meaningful one and/or change the color if required. This will make them easier to distinguish from one another, particularly if you have numerous tracks in your system.

1. Select the appropriate track for editing (see *page 97*).
2. Select the Edit Name or Edit Color option:



3. Edit and save:



### Erasing a track

You can delete any track in your system:

1. Select the appropriate track for editing (see *page 97*).
2. Erase the track:



You can also erase all or selected tracks, using the ARCHIVE & TRANSFER function as described on *page 25*.

## 4.17 Defining how the chart windows are presented

Each chart window can be tailored to meet your particular needs. You can:

- Set the chart view for individual windows or system wide (see below).
- Change how the chart is orientated (see *page 100*).
- Change the way your chart is drawn in relation to your boat movement (see *page 101*).

### Working with multiple chart views

If you have more than one chart window, you can either share the presentation or present each window independently. The option you have chosen is indicated on the chart status bar as LOCAL or SYSTEM. The system view is shared across networked E-Series displays.

#### System chart view

When a chart application is started it defaults to system view. Any windows set to system view will have the same presentation as other system windows for:

- Chart mode and orientation.
- Chart layers - aerial, radar, 3D locator and AIS
- Synchronization - Radar/chart and 3D/chart.
- Show/hide waypoints, routes and tracks.
- Declutter.
- Vectors.

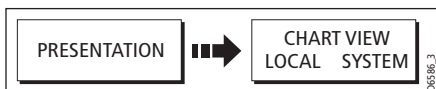
If you change any of these options in one window, ALL system windows will update.

#### Local chart view

When local chart view is selected the presentation for each window is set independently.

### Defining chart window presentation

To define how the chart windows are presented:



**Note:** *The motion mode will be set but not synchronized across windows when the chart view is set to system.*

## Setting the orientation of the chart

The orientation of a chart refers to the relationship between the chart and the direction that you are travelling in. It is used in conjunction with motion mode (see *page 107*) to control how your boat and chart relate to one another and how they are displayed on screen. The mode that you choose is restored at power up. Any changes that you make to a chart window that is set to system view will be reflected in all other system view chart windows. The following options are available:

### North Up (N-up)

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

### Head Up (H-up)

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

**Notes: (1)** *To prevent continuous backwards and forwards rotations as the boat yaws from side-to-side, the chart will not update unless the heading changes by at least 10 degrees from the last displayed orientation.*

**(2)** *It is not possible to select Head Up when the motion mode is set to True.*

### Course Up (C-UP)

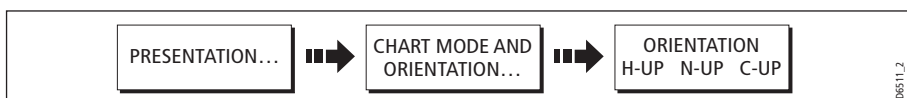
In Course Up mode, the chart picture is stabilized and shown with your current course upwards. As your boat's heading changes, the ship symbol moves accordingly. If you select a new course, the picture will reset to display the new course upwards.

The reference used for Course-Up depends upon the information available at a given time. The system always prioritizes this information in the following order.:

1. Bearing from origin to destination, i.e. intended course.
2. Locked heading from an Autopilot.
3. Bearing to waypoint.
4. Instantaneous heading.

If heading data becomes unavailable whilst in this mode, a warning message will be shown and the chart uses 0° heading in relative motion.

To set the orientation of the chart:



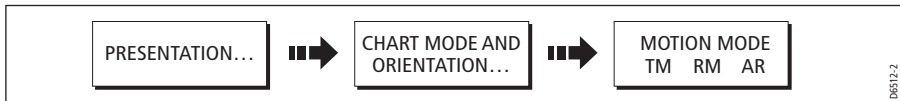
## Setting the motion mode

The motion mode controls the relationship between the chart and your boat. Whilst motion mode is active, as your boat moves, the chart is redrawn to keep the boat on-screen. The three motion modes are:

- Relative motion.
- True motion.
- Autorange.

When you pan the chart or toggle FIND SHIP/CURSOR to CURSOR, the motion mode is suspended. This is indicated in the status bar by '()' around the motion mode and enables you to view another area of the chart whilst navigating. To reset the motion mode and return your boat to the screen, press FIND SHIP. Manually changing the range in autorange also suspends motion mode.

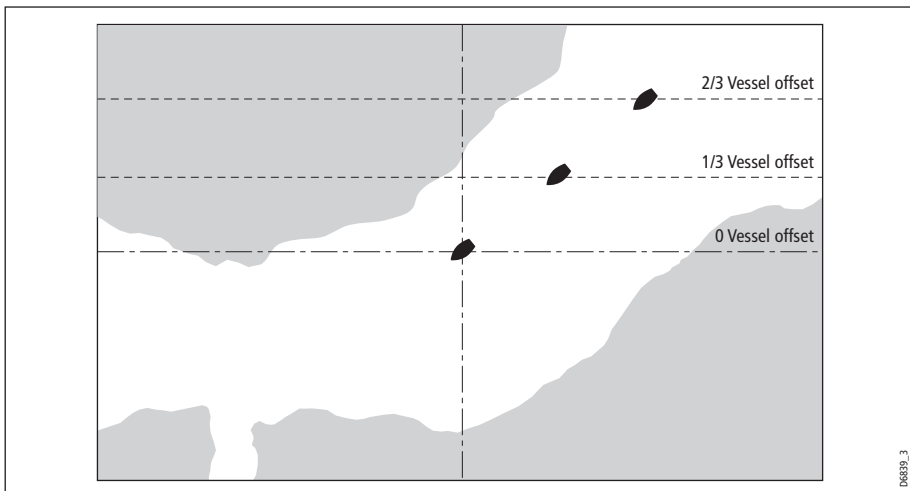
The default setting is relative motion with zero offset. The mode that you select is restored at power up. When a chart window is set to SYSTEM view the motion mode will be set but not synchronized across other system view windows.



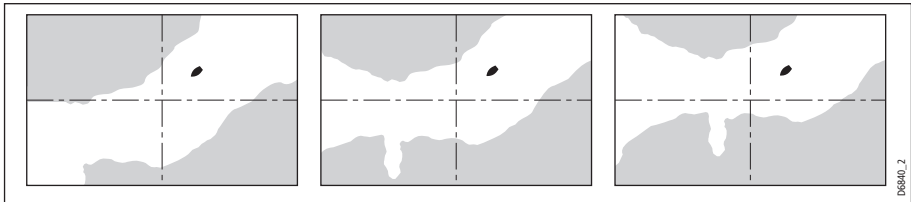
### Relative motion (RM) with optional vessel offset

When the motion mode is set to Relative, the position of your boat is fixed on the screen and the chart picture moves relative to your boat.

You can specify using the VESSEL OFFSET soft key, whether the boat is fixed in the centre of the window (0 offset) or offset by 1/3 or 2/3. If you change the offset to 1/3 or 2/3, the view ahead of your boat will be increased.



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



### True motion (TM)

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

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



### Autorange

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

## 4.18 Altering the level of chart detail displayed

The chart features that you need to see will vary according to your particular needs and circumstances. You can adjust this level of detail by showing/ hiding the following features:

- Range rings
- Waypoints.
- Waypoint index of a route.
- Individual routes and tracks.
- Cartographic features.
- Chart type (Fish or Nav)
- Chart vectors for COG, heading, tide and wind (see *page 88*)

**Note:** *You can also specify the level of detail on the chart display (simple, detailed or extra detailed). For more details, see page 110.*

## Range rings

Range rings give you an incremental representation of distance from your vessel to help you judge distances at a glance. The rings are always centred on your vessel, and the scale varies to suit your current zoom setting. Each ring is labelled with the distance from your vessel.

### To turn range rings on or off

In the Chart application:

1. Press the **PRESENTATION** softkey.
2. Press the **CHART LAYERS** softkey.
3. Select **RANGE RINGS ON/OFF**.

## Navionics combined data cards

Some Navionics data cards provide detailed bathymetric information (Fish 'n' Chip) in addition to standard chart information. You can choose between the standard chart view, or the view displaying bathymetric contours.

### To display bathymetric information (Fish 'n' Chip)

In the Chart application:

1. Press the **PRESENTATION** softkey.
2. Press the **CHART LAYERS** softkey.
3. Press the **CHART TYPE** softkey to toggle between **FISH** and **NAV** options.
  - The **FISH** option displays bathymetric information.
  - The **NAV** option displays the standard chart view.

If you select **FISH** and no data is available for your current position, the databar displays (FISH) to indicate that you are in that mode but without data.

## Showing or hiding waypoints/waypoint information

The system has various options to control the display of waypoints and waypoint information. You can show or hide all your waypoints and their names or show or hide waypoints by group or by symbol.

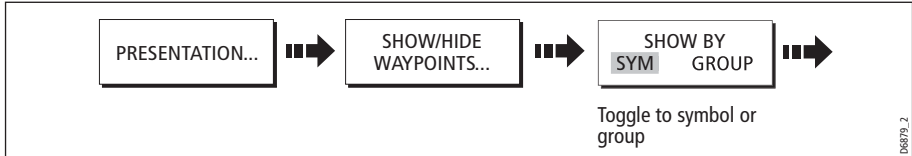
These options are particularly useful when you have placed a large number of waypoints in a small area and rendered your chart difficult to interpret.

**Note:** *The show/hide status of a waypoint is a local setting and will therefore only affect the individual display on which you are working.*

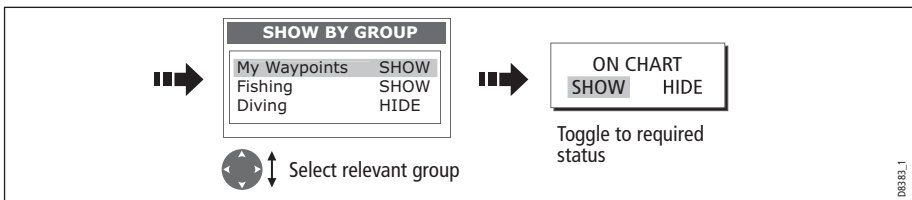
### Show/hide by group/symbol

You can show or hide waypoints with a particular symbol or belonging to a specified group:

1. Select to show/hide by waypoint group or symbol:

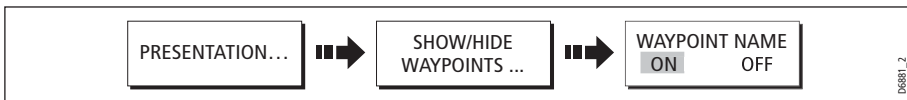


2. Change status to show or hide as required.



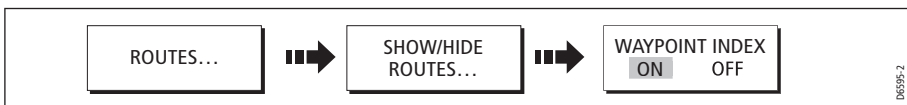
### Show/hide waypoint name

You can show or hide the waypoint names from the screen:



### Show/hide waypoint index

The order of waypoints within a route is indicated by the waypoint index. To show/hide this index:





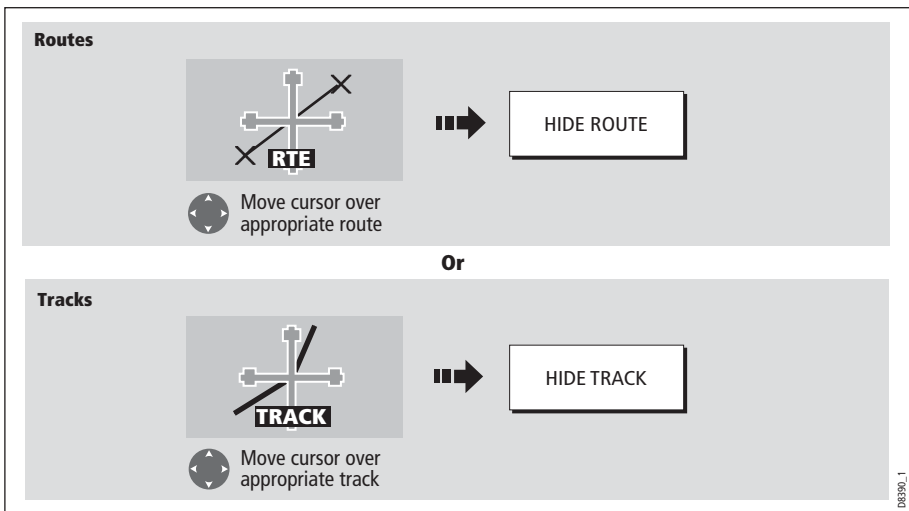
## Showing or hiding a route or a track

You can define which routes or tracks are shown or hidden from the screen. When a route is set to HIDE, the route line is not displayed. The display of waypoints within a hidden route depends however on the show/hide waypoint setting (see *page 103*). The active route is always displayed irrespective of the display status.

**Note:** *The show/hide status of a route or track applied to a chart window that is set to system view, will be displayed in all other system view chart windows.*

### ... using the cursor

You can use the cursor method to hide a route or track.

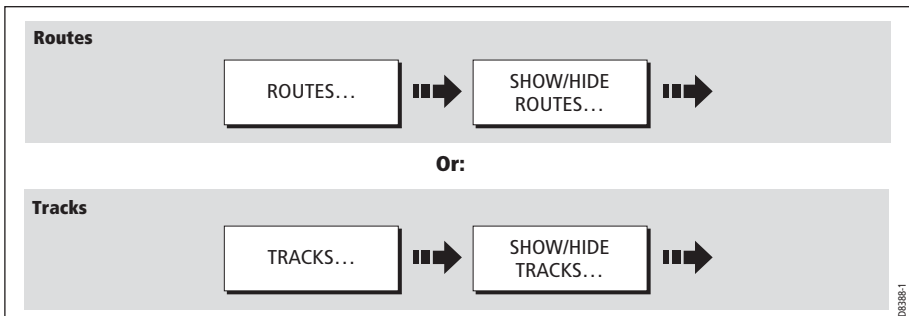


**Note:** *Use the route/track list to return the display status to SHOW.*

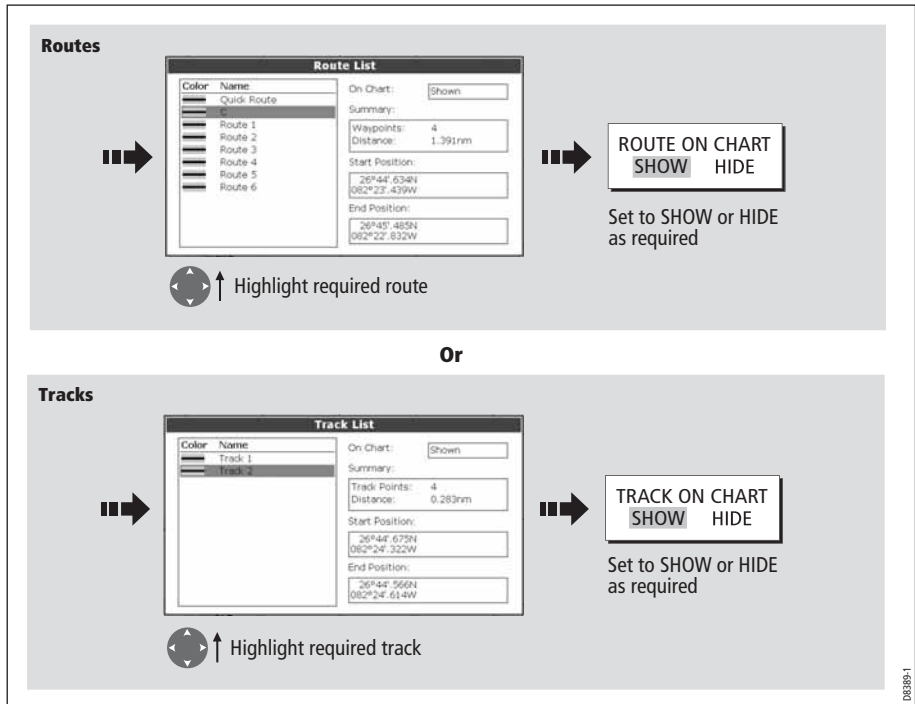
### ... via the route/track list

You can show or hide a route /track via the appropriate list:

1. Select the Show/Hide Route or Show/Hide Track option:



2. Select required route or track:

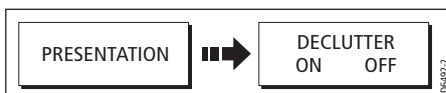


## Showing or hiding cartographic features

If there are a large number of cartographic objects in a particular area, you can reduce the amount of detail by de-cluttering the chart display. Turning declutter on hides the following cartographic objects:

- Text.
- Chart boundaries.
- Spot soundings.
- Depth contours.
- Light sectors.
- Caution & routing data.
- Land and marine features.
- Business services (if available on your cartography)

To declutter your chart:



If the declutter option is applied to a chart window that is set to SYSTEM view, the declutter will be applied to all other system view chart windows. If de-cluttering does not hide/show the particular features of your choice, they can be turned on/off individually via the Cartography Setup menu (see *page 110*).



<b>FUNCTION</b> Description	<b>OPTIONS</b> (Default in <b>bold</b> )
<p><b>Track Interval</b> Options available depend on setting in Record Vessel Track By function: TIME - specify time period between track points creation. DISTANCE - specify distance between track points creation. AUTO - no options available</p>	<p>TIME selected: <b>1 sec</b> 5 secs 10 secs 30 secs 1 min 3 min 5 min 10 min 30 min</p> <p>DISTANCE selected: <b>0.1 nm</b> 0.5 nm 1.0 nm</p>
<p><b>Datum</b> Grid moves according to datum selected and the lat/lon of cartographic features change. System attempts to set up any GPS to the new mode and indicates whether successful or not. See additional information below.</p>	<p><b>WGS 84</b> List of datum provided</p>
<p><b>Chart Offset</b> Moves the position of the chart in order to correct for position errors in the cartography. See below for further information.</p>	<p><b>ON</b> <b>OFF</b></p>

## Datum

For your GPS and chart to correlate accurately with your paper charts, they will need to be using the same datum. The default datum for your display is WGS1984. If this is not suitable, you can change the setting. When you adjust the datum of the E-Series Display, a Raymarine GPS will automatically correlate. If you have a third party GPS, you will need to correlate this separately.

**CAUTION:\*** Changing the chart datum does not cause any waypoint or routes stored in the chartplotter to move on the display, although their latitude and longitude changes to reflect the new datum.

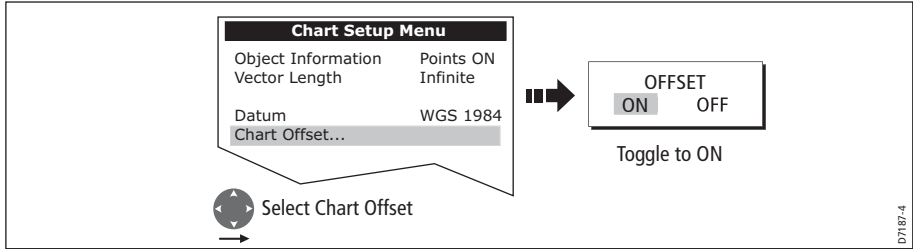
**When adding waypoints numerically to the waypoint list, or via SeaTalk or NMEA, it is important that they are referenced to the same datum to which the display is currently set.**

## Chart Offset

This feature allows you to move the position of the chart in order to correct for position errors in the cartography. This adjustment is indicated as a distance north/west (+ve) or south/east (-ve) from your vessel position to a maximum of 1000m. To view the effects of an offset you can turn the feature on/off. Once calculated, the offset is applied to **all** charts.

**Important:** Any offset entered will be applied to all charts on the chart card. You should therefore ensure that this feature is switched off once you have transitioned off of the errant chart. Any charting errors that you discover should be reported to Navionics (see *page 305*).

To switch on chart offset:

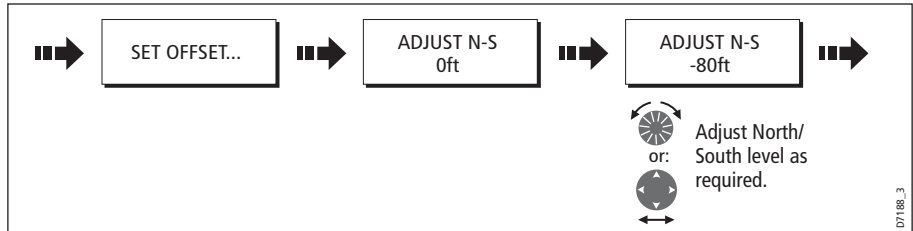


**Note:** If your vessel position is not available, the current chart centre is used as the reference point.

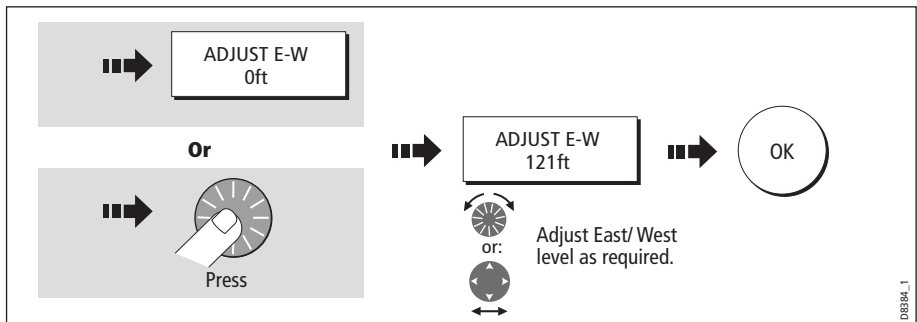
### Changing the offset value

To change the offset value:

1. Select the Chart Offset function (see previous section)
2. Set the north/south offset value:



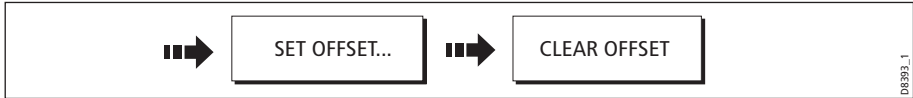
3. Set the east/west offset value:



### Resetting the offset value

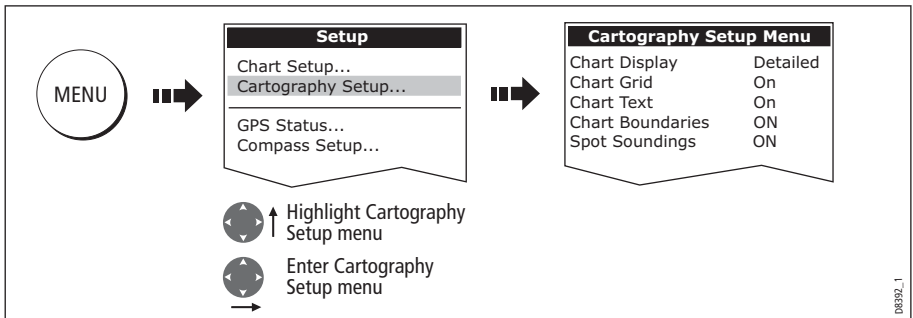
To reset the chart offset to zero:

1. Select the Chart Offset function (see previous section).
2. Reset to zero:



## Cartography Setup

The Cartographic Setup Menu allows you to configure what is displayed on your chart:  
To select the Cartography Setup Menu:



The following table details the functions and options within the Cartography Setup menu:

FUNCTION Description	OPTIONS (Default in <b>bold</b> )
<b>Chart Display</b> The level of detail shown on the chart.	Simple <b>Detailed</b> Extra detailed
<b>Chart Grid</b> Grid lines of latitude and longitude.	<b>ON</b> OFF
<b>Chart Text</b> Text appearing on the chart e.g. place names etc.	<b>ON</b> OFF
<b>Chart Boundaries</b> The line indicating the boundary of the chart.	<b>ON</b> OFF
<b>Spot Soundings</b> Number on the chart indicating depth.	<b>ON</b> OFF
<b>Safety Contour</b> Areas with depths shallower that the specified value, are shaded in a darker blue than those areas with depths greater than the specified value.	OFF 6ft 9ft 16ft 19ft 32ft <b>65ft</b> (Contour always drawn at or deeper than the selected depth).

<b>FUNCTION</b> Description	<b>OPTIONS</b> (Default in <b>bold</b> )
<b>Depth Contour</b> A line indicating the depth at a particular position.	<b>ALL</b> 16ft 19ft 32ft 65ft OFF
<b>Nav. Marks</b>	<b>ON</b> OFF
<b>Nav. Marks Symbols</b> The set of symbology used for navigation marks. Corresponds to paper charts.	<b>International</b> US
<b>Light Sectors</b> The sector of light cast by a fixed beacon.	<b>ON</b> OFF
<b>Caution &amp; Routing Data</b>	<b>ON</b> OFF
<b>Marine Features</b> The following cartographic features displayed on the water - cables, nature of seabed points, tide station, current stations and port information.	<b>ON</b> OFF
<b>Land Features</b> The cartographic features that are displayed on the land.	<b>ON</b> OFF
<b>Colored Seabed Areas</b> In available areas (e.g. Portugal) this gives greater definition of seabed.	ON <b>OFF</b>
<b>Background Color</b> The color of background water when there is no Navionics cartography.	<b>White</b> Blue
<b>Business Services</b> The symbols indicating the location of a business	<b>ON</b> OFF
<b>Aerial Photo Overlay</b> The area displaying the aerial photo overlay	On Land and Sea <b>On Land</b>
<b>Roads</b> Major coastal roads	<b>ON</b> OFF
<b>Additional Wrecks</b> Extended wrecks data for new wrecks	<b>ON</b> OFF

## 4.20 Chart layers

You can overlay data onto a chart window to give greater depth of information. You can overlay radar, AIS or range rings.

## Radar overlay

Overlaying the chart image with radar data allows for better distinction between stationary and moving objects. For best results, switch on radar-chart synchronization.

You can customize the opacity setting for the overlaid image by twisting the rotary controller.

If you have two radar scanners installed, select which one you want to use for the overlay in the setup menu.

**Note:** *A radar image cannot be overlaid onto a chart window if dual-range is enabled in the radar application.*

### To switch radar overlay on or off

1. Press the **PRESENTATION** softkey.
2. Press **CHART LAYERS**.
3. Toggle radar overlay on or off with the **RADAR OVERLAY** softkey.

### To access radar and navigation options from the chart application

1. Press **OK** twice.
2. Select **RADAR** options or **NAVIGATION OPTIONS** with the appropriate softkey.

### Using radar with the chart

You can combine the chart view with the following radar features:

- Radar range synchronization
- MARPA
- Radar overlay

## Synchronizing chart scale with radar range

When synchronization is switched on:

The radar range changes to match the chart scale.

'Sync' is indicated in the top left-hand corner of the chart window.

If you change the radar range in any radar window, all synchronized chart views change scale to match.

If you change the scale of a chart window, all radar windows change range to match.

### To set radar range synchronization

1. Press the **PRESENTATION** softkey.
2. Press the **CHART MODE AND ORIENTATION** softkey.
3. Select the appropriate synchronization mode on the **CHART SYNC** softkey.



**Note:** *Radar range synchronization is not available when the chart motion mode is set to Autorange. The chart can be synchronized with either the 3D chart or the radar but not both. You cannot sync with radar if dual range is enabled in the radar application.*

## Viewing MARPA targets on the chart

The Mini Automatic Radar Plotting Aid (MARPA) function is used for target tracking and risk analysis. Although set up in radar mode or radar overlay, all MARPA targets are displayed in the chart window, from which you can also access MARPA functions.

For detailed information about MARPA, see *page 152*.

**Note:** *MARPA does not function if the Digital Scanner is set to Dual Range.*

### To access MARPA controls from the chart application

1. Highlight a MARPA target with the cursor.

**or**

1. If radar overlay is switched on, press the **RADAR OPTIONS** softkey.
2. Press the **TARGET TRACKING** softkey.

#### **Radar options:**

- Target tracking
- Gain
- Target display
- Change range (using the Range button)

#### **Navigation options:**

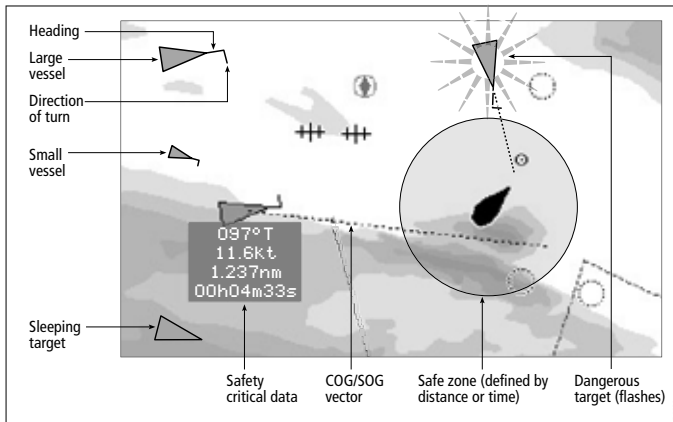
- Route
- Track

## AIS

If you have an automatic identification system (AIS) fitted to your vessel, you can use it to:

- Display the position of other craft which are appropriately enabled with AIS.
- Display broadcast AIS information from appropriately-equipped vessels including position, course, speed, rate of turn and other safety-critical data.
- Set up a safe zone around your vessel.
- Receive AIS alarms and safety-related messages.

This information is displayed in an overlay. Additional data, when available, is displayed in a dialog box.



For more information about how to use AIS, see *Chapter 12*:

### To switch AIS overlay on or off

1. Press the **PRESENTATION** softkey.
2. Press **CHART LAYERS**.
3. Toggle the **AIS LAYER** setting to **ON** or **OFF**.

## Range rings

Range rings give you an incremental representation of distance from your vessel to help you judge distances at a glance. The rings are always centred on your vessel, and the scale varies to suit your current zoom setting. Each ring is labelled with the distance from your vessel.

### To turn range rings on or off

1. Press the **PRESENTATION** softkey.
2. Press the **CHART LAYERS** softkey.
3. Select **RANGE RINGS ON/OFF**.

# Chapter 5: 3D Chart

## 5.1 Important

### 3D Chart functionality

To obtain the best results from the 3D cartography application you should make sure that your display is receiving accurate heading and position data from a suitable source and that you are using a chart card incorporating 3D cartography for the appropriate area.

### Safety

The 3D chart is an aid to visualization. When navigating with your 3D chart you should also check your 2D chart and ensure that a route is safe. Until you are familiar with interpreting the 3D chart, you should take every opportunity to compare the displayed objects with visual targets, such as buoys and coastal structures. You should practice harbour and coastal navigation during daylight and in clear weather conditions. The simulator mode can also be used to help you gain experience.

It is strongly recommended that before you use your 3D chart application, you read and understand *Chapter 3: Working with Waypoints* and *Chapter 4: Using the Chart*.

#### **CAUTION:**

**The 3D application should not be used as a substitute for good navigational practice nor for official government paper charts. Do not use this application before you have read this chapter.**

## 5.2 An introduction

This chapter describes how to use your 3D chart and its various functions including:

- Setting up your 3D chart (see *page 128*).
- Using the controls (see *page 117*).
- Setting the operation mode (see *page 119*).
- Changing the view point (see *page 120*).
- Rotating the selected view (see).
- Changing the pitch (see *page 118*).
- Exaggerating the view (see *page 122*).
- Synchronizing the 3D and 2D chart (see *page 125*).
- If a transducer is fitted - displaying the fishfinder cone area (see *page 126*).

### 5.3 What can I use the 3D Chart Application for?

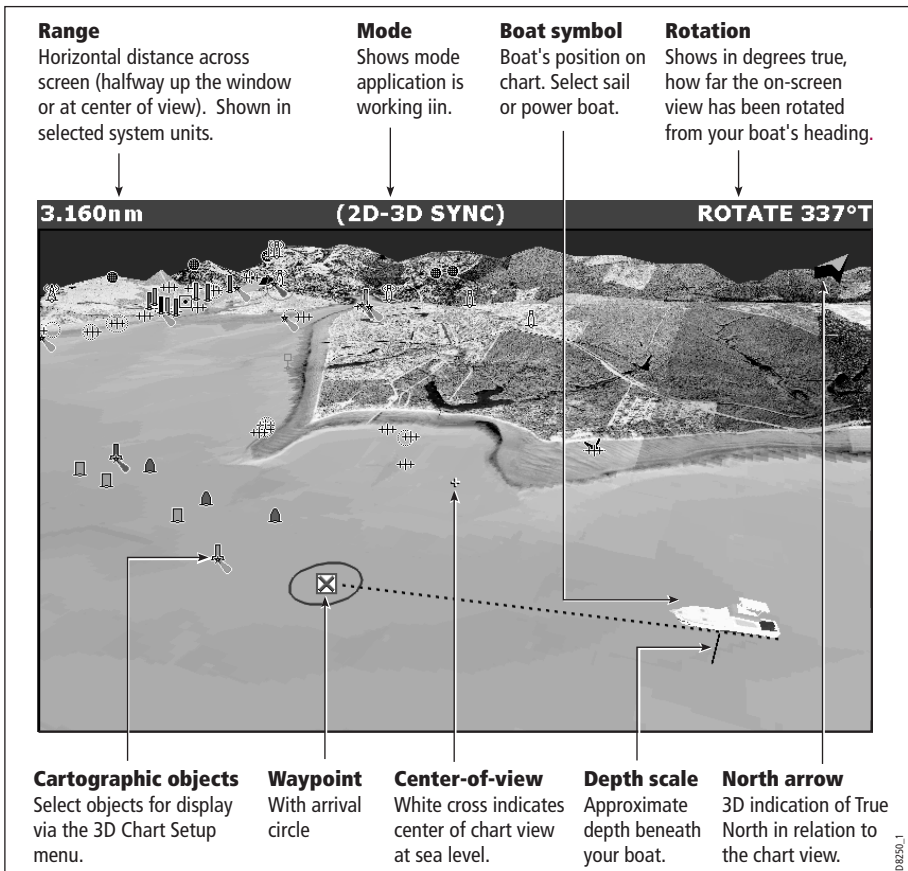
3D cartography introduces an easy-to-use chart format that provides you with a three dimensional graphical view of land and sea contours around your boat. Land masses are shown in green, the shade depending on the height above sea level. Water, the sea-bed and submerged objects are shown in varying shades of blue.

Much of the information available on a conventional chart can be shown in three dimensions, giving you an accurate easy-to-view image of the area around your boat that can help you plan:

- Fishing spots.
- What fishing pattern to use.
- Safe routes.

If the area that you are in is new to you, or visibility is poor, 3D cartography can help to give you the confidence to know where you are and what is around you. As with a conventional chart, active waypoints and routes can also be shown on the 3D chart.

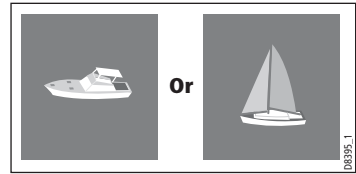
### 5.4 The 3D chart display



### 5.5 Where am I on the 3D chart?

Your current position is represented by a boat. You can choose from a power boat or yacht.


To change the style of vessel displayed, see *page 128*.



If positional data has been selected for display (see *page 281*), your position will be displayed in the data bar under VES POS.

**Note:** *If neither heading nor COG data is available, the boat symbol is not displayed and the FIND SHIP soft key is greyed out.*

**If you cannot see your boat:**

FIND SHIP → 

3D Chart redraws with boat in forward looking view at your current position

---

**To mark your current position:**

WPTS MOB x2 → OK (or wait 3 seconds)

Accepts default

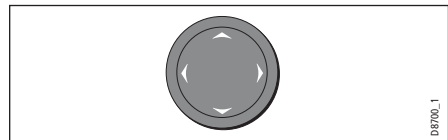
DB394\_1

### 5.6 Moving around the 3D chart

The 3D chart is operated in a similar way to a 2D chart. To move around the 3D chart and display the area required at the appropriate scale and angle, use a combination of panning, zooming, rotating and pitching:

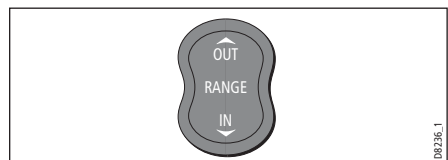
#### Panning

Panning moves the 3D chart that is displayed to a different area. To pan a 3D chart, press the appropriate arrow (left/right, up/down) on the trackpad.



#### Zooming in/out

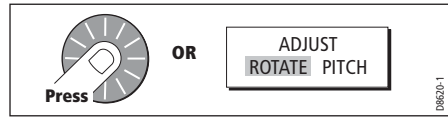
Range **OUT** to show a larger area of the chart (approximately 8nm maximum). Range **IN** to show a smaller area of the chart.



## Rotating and pitching

### Select

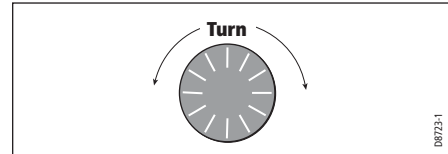
Toggle control between the rotate and pitch functions.



### Adjust

Turn the rotary control to adjust the active function:

- Rotate - rotates the view 0-360°.
- Pitch - changes the vertical angle of view. (1-90 degrees)

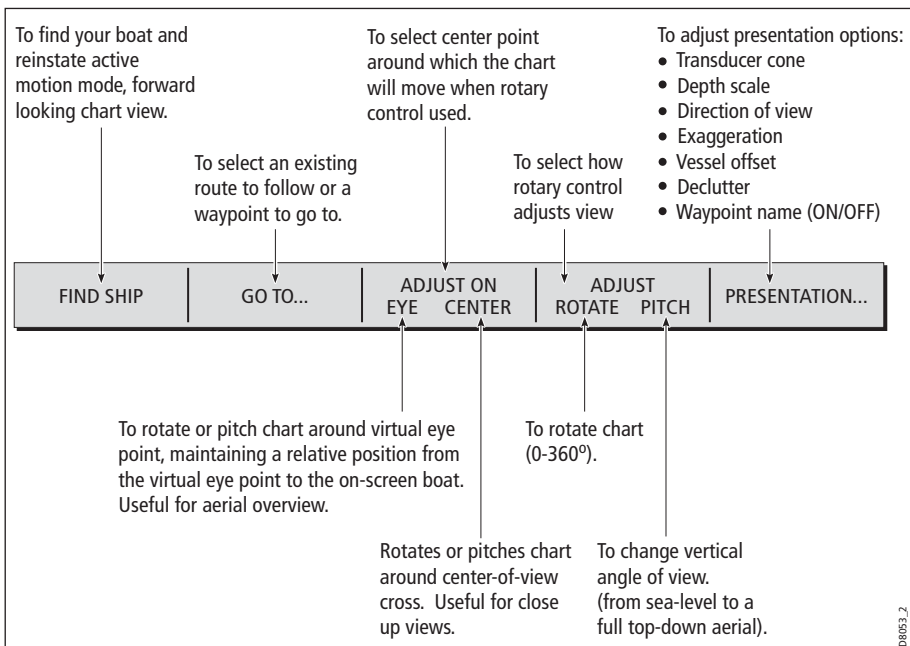


**Note:** The rotary control is always active to adjust pitch/rotation (even when the soft key sub-menus are displayed, except when adjusting exaggeration). This is different to most other uses of the rotary, which require you to press a soft key to enable adjustment.

## 5.7 Other 3D controls

### Soft keys

The soft keys control the application as follows:



## 5.8 Changing the mode

You can choose to view the chart in one of two modes:

- Active motion mode.
- Planning mode.

### Active motion mode

This is the default mode when you open the 3D application provided that there is a valid fix. The screen shows an aerial view of the 3D chart as if you are above your boat, slightly behind it and looking forward (virtual eye point).

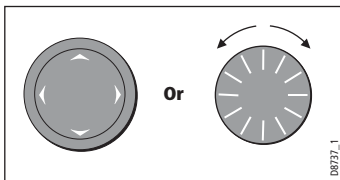
You can also view the chart from different positions relative to your boat - see "View options" on page 120. As your boat moves forward the chart automatically updates and reveals the changing view ahead.

**Note:** *In active motion mode you can adjust the pitch when ADJUST ON is set to CENTRE, but rotating or panning the chart will put it into planning mode.*

### Planning mode

Planning mode enables you to view an area of the chart, different to the one in which you are navigating, so that you can analyse locations and features. You can use the controls to view a particular area from different angles, bearings and ranges. The chart no longer automatically keeps your boat on-screen.

When you are in planning mode, the controls and functions available are the same as for active motion mode.

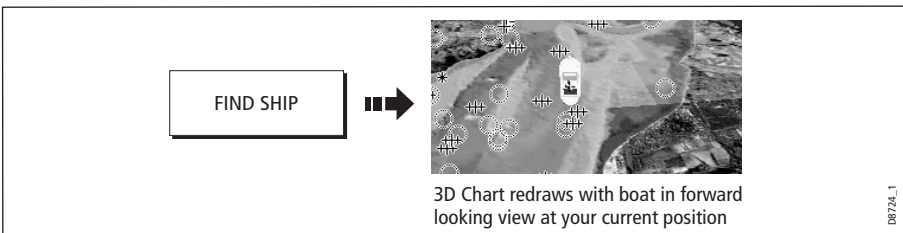


To enter planing mode:

- Pan to the area of the chart that you want to view or
- Turn the rotary control (except if set to CENTRE and ADJUST PITCH).

Planning mode is indicated in the status bar by brackets around the mode information e.g. (FWD).

### To return to active motion mode



## 5.9 Changing the view

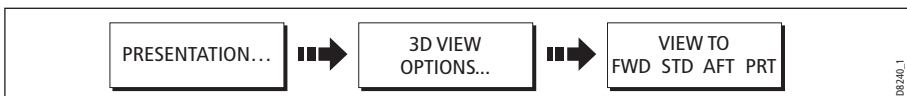
### View options

There are Five view options that you can choose from - Forward, Aft, Port, Starboard and Depth Plane.

Forward	<ul style="list-style-type: none"> <li>•Default View.</li> <li>•Eye point above and behind the boat, looking forward.</li> </ul>
Aft	<ul style="list-style-type: none"> <li>•Eye point above and in front of the boat, looking aft</li> </ul>
Port	<ul style="list-style-type: none"> <li>•Eye point above and to Starboard of the boat, looking to Port.</li> </ul>
Starboard	<ul style="list-style-type: none"> <li>•Eye point above and to Port of the boat, looking to starboard.</li> </ul>
Depth Plane	<ul style="list-style-type: none"> <li>•Allows you to select and set the Depth Plane ON/OFF, and Adjust Transparency levels.</li> </ul>

With each view the eye point is changed to show a different area of the chart. The current option is highlighted on the soft keys and displayed in the status bar.

To select the view option:



**Note:** *When the VIEW TO soft key is pressed the system automatically puts you into active motion mode.*

### Depth Plane

The Depth Plane is shown as a shaded area, which moves up and down according to a set limit. Depth's of Water greater than the Depth Plane limit are shaded. Water/bottom feature's of a shallower depth than the set limit is shown as a lighter shade. Transparency settings can be used to adjust the level of shading.

### Multiple views

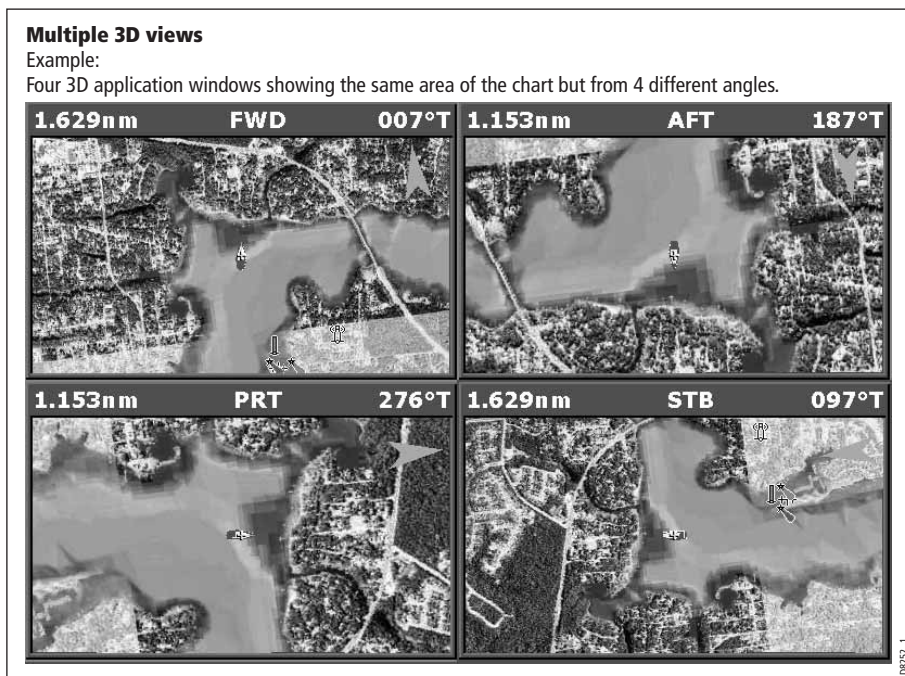
You can display multiple 3D chart views by creating a page that shows 3D cartography in up to 4 windows. As each window is a separate application, they can be set up to operate in active motion mode or planning mode or a combination of the two.



These can be views of:

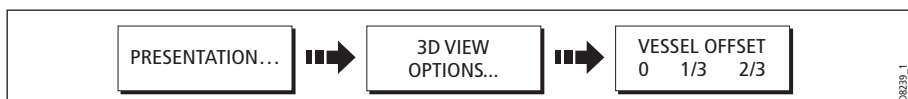
- The same area of the chart from different angles.
- Views of up to 4 different areas of the chart.

**Note:** For full details of page set up and “active” windows refer to page 18.



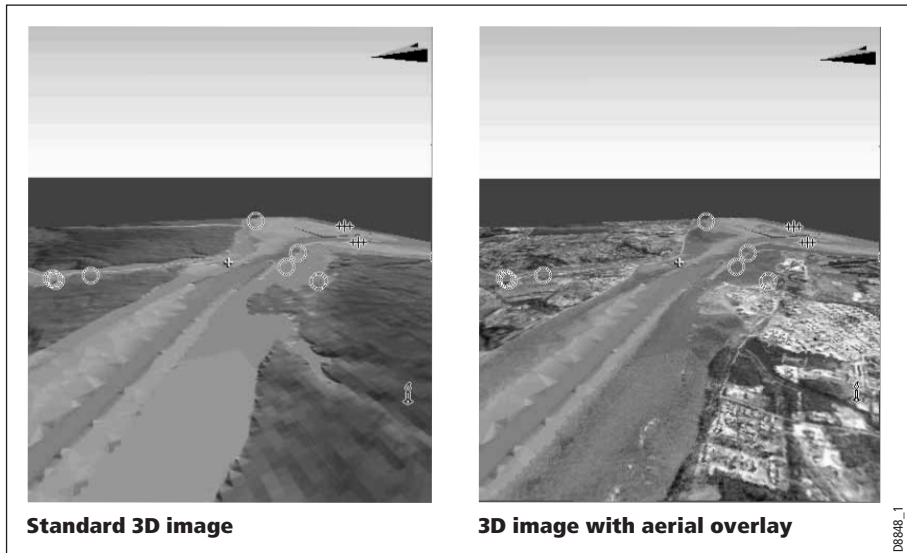
## Vessel offset

You can specify whether the boat is fixed in the centre of the window (0 offset) or offset by 1/3 or 2/3 of the screen. If you change the offset to 1/3 or 2/3, the view ahead of your boat will be increased.



## 5.10 Aerial photo overlay

You can overlay an aerial photo onto the 3D image. This will help you to interpret your environment and its features. Aerial photos cover the navigable waters up to 3 miles inside the coastline. Beyond these limits the land will appear green (color charts) and grey (black and white charts). The level of resolution and the availability of a colored overlay is dependent on the region covered by the chart card.



Aerial photo overlay is controlled via the 3D Chart Setup Menu. See *page 127* for more details.

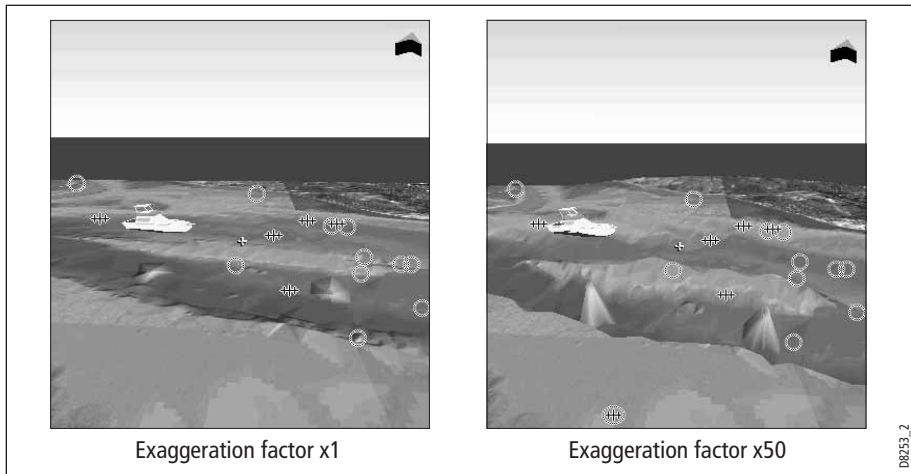
## 5.11 Making the view clearer

You can make the view clearer using the following features:

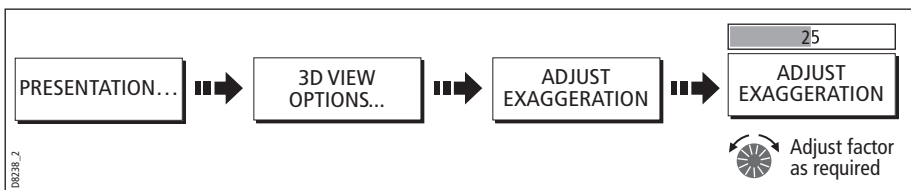
- Exaggeration.
- Declutter.

### Exaggeration

Sometimes it is easier to see certain topographical features if they are exaggerated. Adjusting the exaggeration has the effect of vertically stretching objects on the chart, making it easier to see their shape and position. This could be particularly helpful if you are fishing, for example.



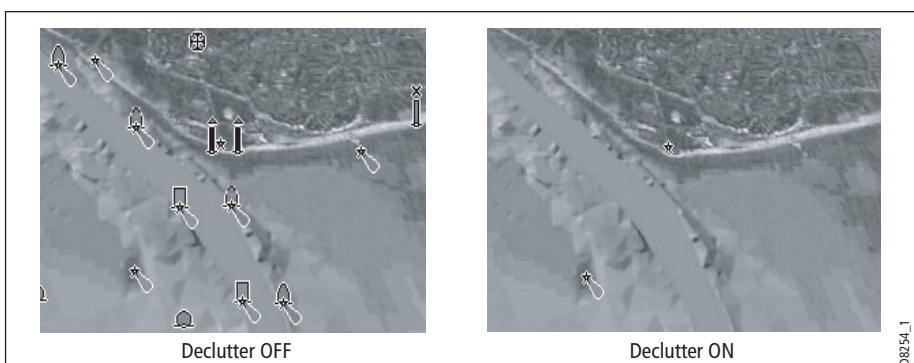
To adjust exaggeration:



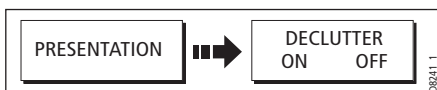
Press **CANCEL** at any time during adjustment to return to the previous setting.

## Declutter

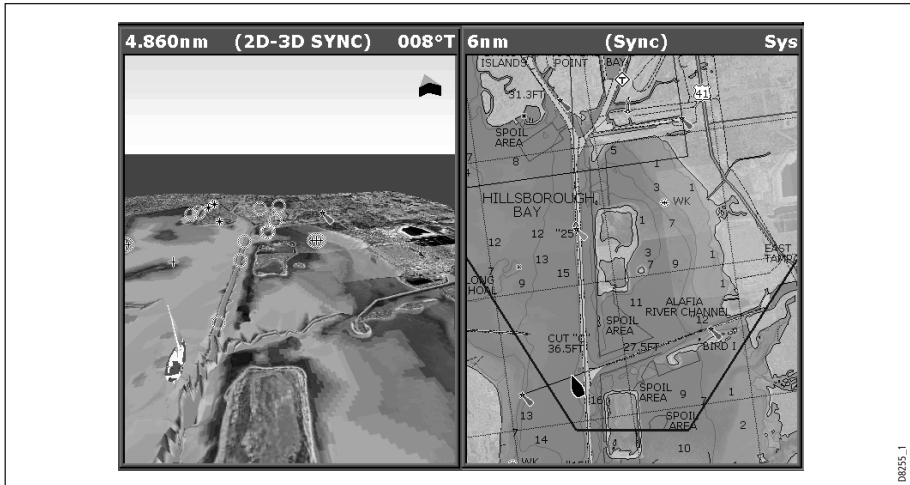
Navigating in an area that shows a lot of information on the chart, such as navigation marks, can be confusing. Depending on your chart view level it can make features or even your position difficult to see. Declutter helps you to reduce this confusion and make the chart clearer, by removing some objects from view.



To declutter your 3D screen:



## 5.12 Using 2D and 3D charts together



If the area in which you are navigating is unfamiliar, or visibility is poor, working with 2D and 3D chart applications on the screen side-by-side can give you extra confidence and help you find out what is around you. With the charts displayed side by side, a comprehensive view of the surrounding area is available. As with all multiple page sets, the active window is indicated by a red border. To make changes to an application it must be the active window.

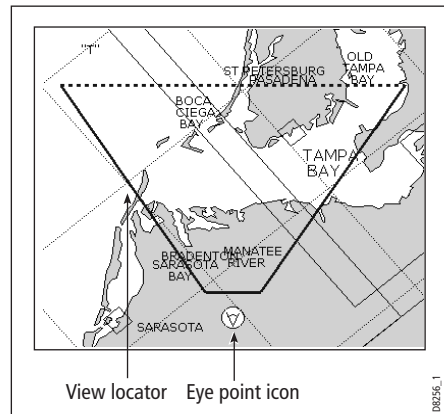
For details of how to set up a page set to view the two applications together see *page 18*.

### 3D view locator

If required, you can show the 3D view locator on the 2D chart. This is a polygon outlined in blue and extending from the virtual eye point icon. This polygon indicates the boundaries of the area shown on the current 3D chart.

As you rotate, adjust pitch, pan or zoom, the 3D chart the view locator moves on the 2D chart and shows the area covered.

To display the 3D view locator when a chart window is active:



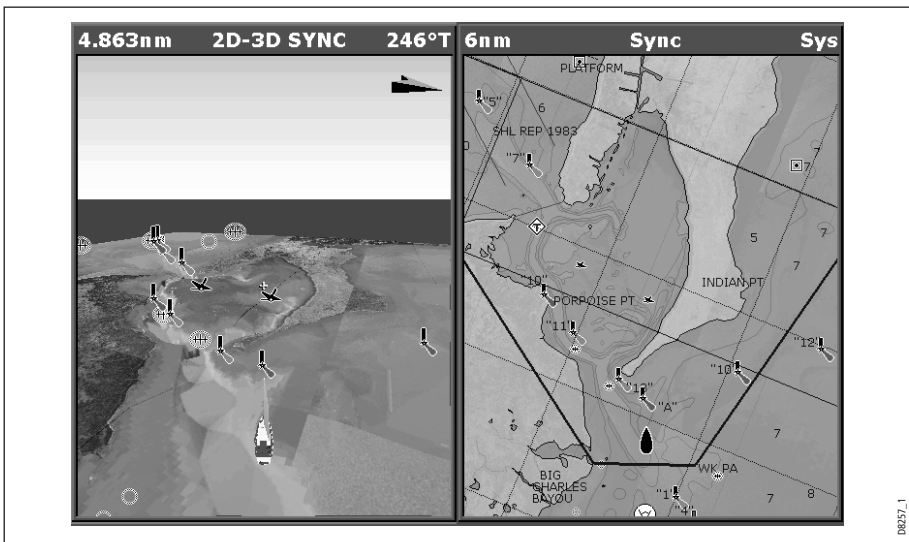
**Note:** *If the 3D view locator is switched on in a chart window that is set to system view, the locator will be displayed in all other system view chart windows.*

## Chart synchronization

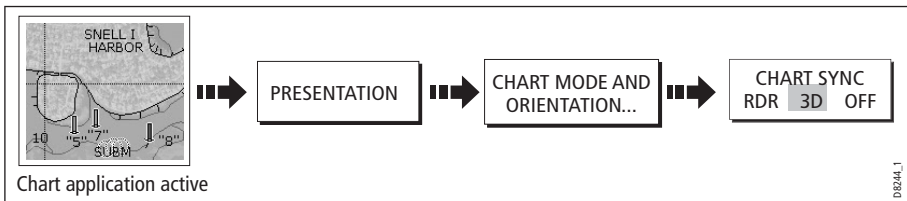
Chart synchronization enables you to synchronize the heading, range and position information on the 2D and 3D charts.

When chart synchronization is **ON**, please note the following:

- The 2D-3D synchronization is shown in the status bar of the applications.
- Soft key options that are not available with this feature are "grayed" out.
- Pressing FIND SHIP from any synchronized application, will return the 3D chart to the default active motion mode view and synchronize the 2D chart to the same view.
- Any changes made to the heading, range or position in **either 2D or 3D** charts will be displayed in both 2D and 3D windows.
- If the 2D chart view for the current window is set to SYSTEM and you have multiple windows on a page/more than one display, any changes made to a chart will be reflected in all windows in all displays.
- If the 2D chart view for the current window is set to LOCAL, no other windows will be affected.
- You can synchronize the 2D chart with the 3D chart **or** the radar but not both.

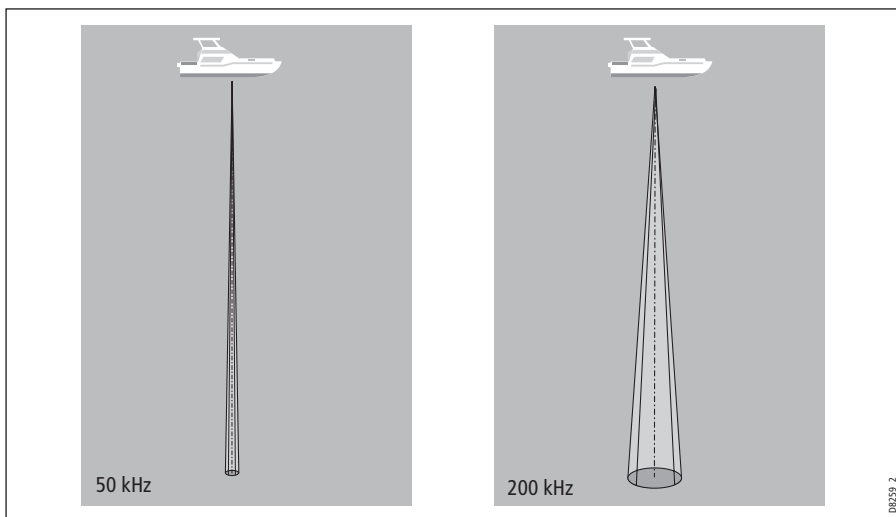


To synchronize the 2D and 3D charts:

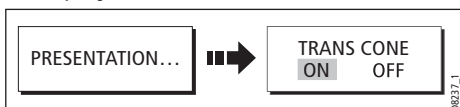


## 5.13 Using the 3D chart with a fishfinder

If you have a fishfinder in your system, you can display the transducer cone to indicate the area that it covers on the 3D chart. This is particularly useful when fishing as it enables you to compare the chart view with the information your fishfinder is showing you.

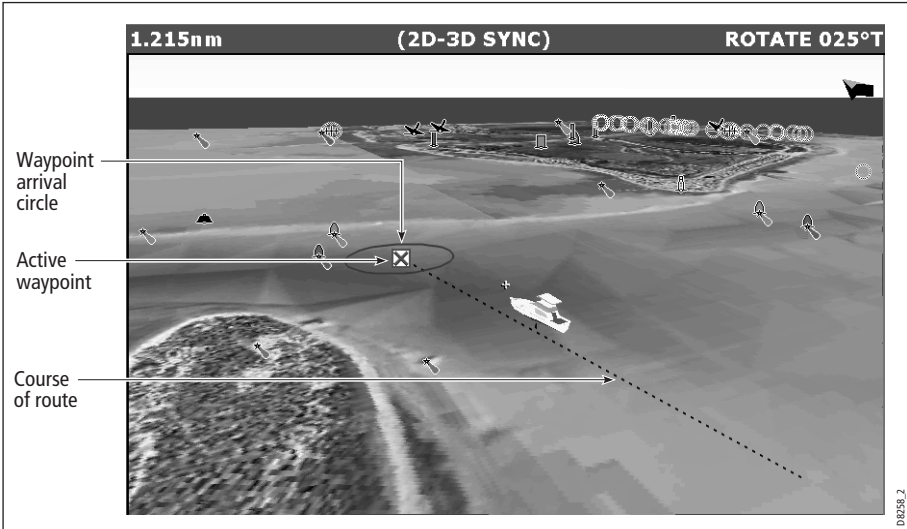


To display the transducer cone:

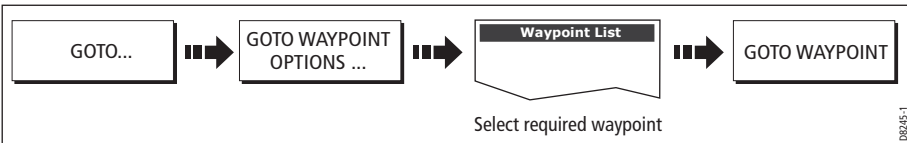


### 5.14 Navigating with 3D charts

You can access navigation options when a 3D chart is active. This includes following a route and selecting a waypoint from the waypoint list to start a GOTO.

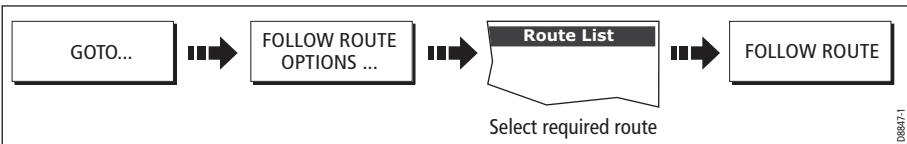


#### ... via the waypoint list



**Note:** Please refer to "Navigating to a waypoint" on page 38, for full details.

#### ... using the follow route option



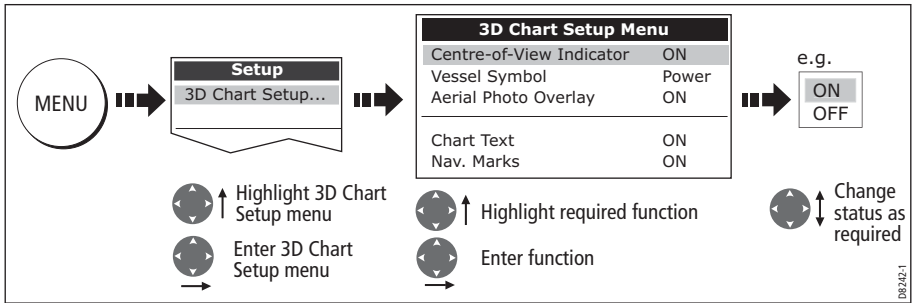
**Note:** Please refer to "Following a route" on page 78, for full details.

**REMEMBER:** A route can only be edited using a 2D chart. Changes made on the 2D chart are also shown on the 3D chart.

### 5.15 Setting up the 3D Chart

The set up for your 3D chart can be changed from the standard configuration to suit your particular needs. Although you will probably only do this when you first use the chart, you may decide to make subsequent adjustments once you become more familiar with the system. Any settings that you change are retained at power off.

To select the 3D Chart Setup Menu:



This menu lets you change:

<b>FUNCTION</b> Description	<b>OPTIONS</b> (Default in <b>bold</b> )
<b>Centre-of-view indicator</b> Centre-of-view indicator (marked with a white cross)	<b>ON</b> OFF
<b>Vessel symbol</b> Style of boat symbol displayed on-screen.	Sail <b>Power</b>
<b>Vessel size</b>	Tiny Small <b>Medium</b> Large Huge
<b>Aerial photo overlay</b> Overlay an aerial photograph on the 3D chart	<b>ON</b> OFF
<b>Chart text</b> Text viewed on the 3Dchart	<b>ON</b> OFF
<b>Navigation marks</b> Navigation marks viewed on the 3Dchart.	<b>ON</b> OFF

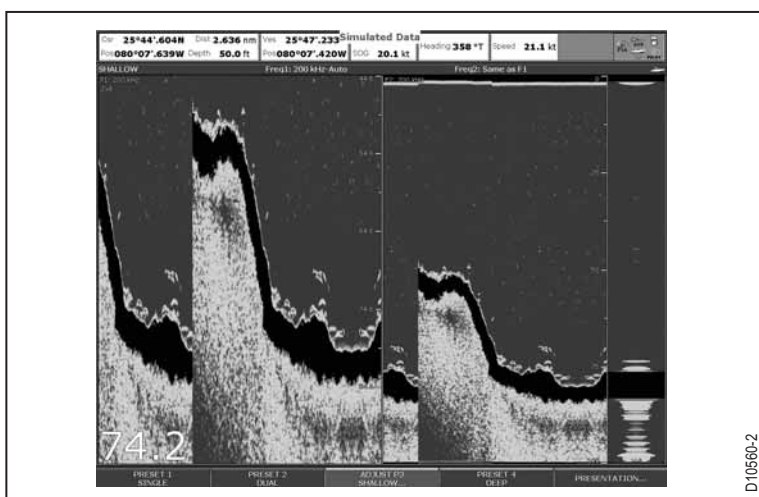


## Chapter 6: The Fishfinder

The fishfinder uses acoustic sounding to display fish, seabed structure, and underwater obstructions like wrecks.

### 6.1 The fishfinder display

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



The fishfinder status icon is located in the top-right section of the monitor:



(animated icon)

**Icon animated** - connection to a DSM has been successful.

**Icon static** - the DSM is connected but not transmitting.

**Icon greyed-out** - no DSM is connected.

### 6.2 Background information

The fishfinder requires a Digital Sounder Module (DSM) to process acoustic signals and build up a detailed picture of the seabed.

A transducer on the bottom of the boat sends pulses of sound waves into the water and measures the time it takes for the sound wave to travel to the bottom and back. The returning echoes are affected by bottom structure and by any other objects in their path, for example reefs, wrecks, shoals or fish.

The strength of the echoes is indicated on the display by different colors. You can use this information to determine the shape and make-up of the seabed, or the size of shoals, or of other objects.

## 6.3 Operating the fishfinder

The fishfinder provides you with four preset configurations, available on the default toolbar. These are tailored to provide optimal operation in different circumstances - you should be able to find a preset that gives you excellent results in any situation.

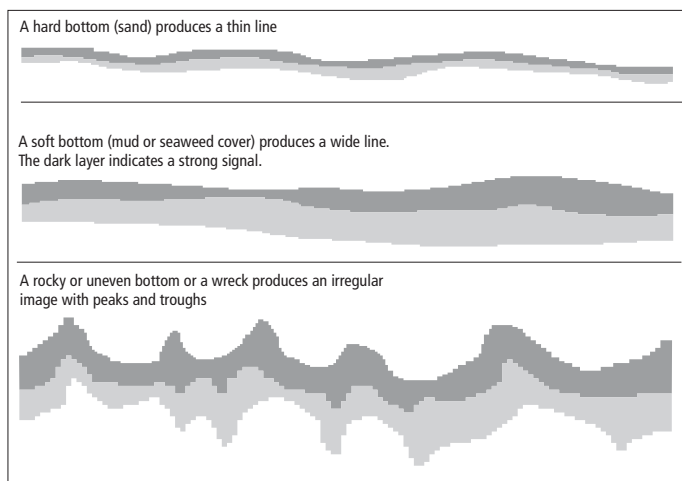
The presets are labelled single, dual, shallow and deep. When you make a fishfinder window active, the title bar shows you which preset is selected, along with its settings.

Each preset has been configured to provide the best operating parameters for the fishfinder. However, it is possible to adjust the presets if necessary.

### To select a preset mode

1. Press the appropriate softkey.

## 6.4 Explaining the readout



The dark layers indicate a good echo; the lighter areas weaker echoes. This could mean that the upper layer is soft and therefore allowing sound waves to pass to the more solid layer below.

It is also possible that the sound waves are making two complete trips – hitting the bottom, bouncing off the boat, then reflecting off the bottom again. This can happen if the water is shallow, the bottom is hard, or gain is set too high.

## 6.5 Factors influencing the readout

The quality and accuracy of the display can be influenced by a number of factors including boat speed, depth, object size, background noise and transducer frequency.

## Boat speed

The fishfinder's reading of the bottom changes as your speed changes. Slower speeds return flatter, more horizontal marks; as your speed increases, the image will tend to thicken and arch, until at high speeds the bottom resembles a double line on the fishfinder display.

## Depth

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

## Object size

The larger an object is, the stronger its return on the fishfinder display will be. However, the strength of return from fish depends upon the species' swim bladder, rather than the body size.

## Background noise

The fishfinder readout can be affected by weak echoes from floating or submerged debris, air bubbles, or by your boat's movements.

This background noise is also known as clutter, and the E-Series system automatically adjusts sensitivity to it based on sea depth and water conditions. You can, however, set the sensitivity manually by using the gain modes (gain, color gain and TVG).

## Transducer frequency

- **Lower frequencies** scan a wide area and penetrate water well. Use these settings if you want a large coverage beneath your boat or if you are in deep water.
- **Higher frequencies** (200 KHz) scan a narrow area but produce more detail, especially at high boat speed. They are most useful in shallower waters (up to 1000 feet).

Various frequencies may be available on your system, depending on the transducers fitted to your vessel.

## Viewing single or dual frequencies

If the preset you are using includes two frequencies, you can use one fishfinder window to view both frequencies or just one. You can then send the second frequency to a fishfinder window on a second monitor, enabling you to view both frequencies at full screen.

## 6.6 Display mode settings

When a fishfinder preset is selected, its softkey label changes to **ADJUST**. Pressing this key allows you to configure the display mode settings to suit your requirements. (Changes to the display mode are saved with the preset at power-off.)

For each preset (and for each frequency within the preset), you can change the following display mode settings:

- Zoom
- Bottom Lock
- A-Scope

### **To change the settings for a preset**

1. Press the **ADJUST** <preset name> softkey.
2. Select **F1** or **F2**.
3. Select the mode you want to adjust.
4. Make changes using the trackpad or rotary controller.
5. Press **OK** when complete.

### **Zoom**

If necessary you can zoom in on the bottom to display more detail.

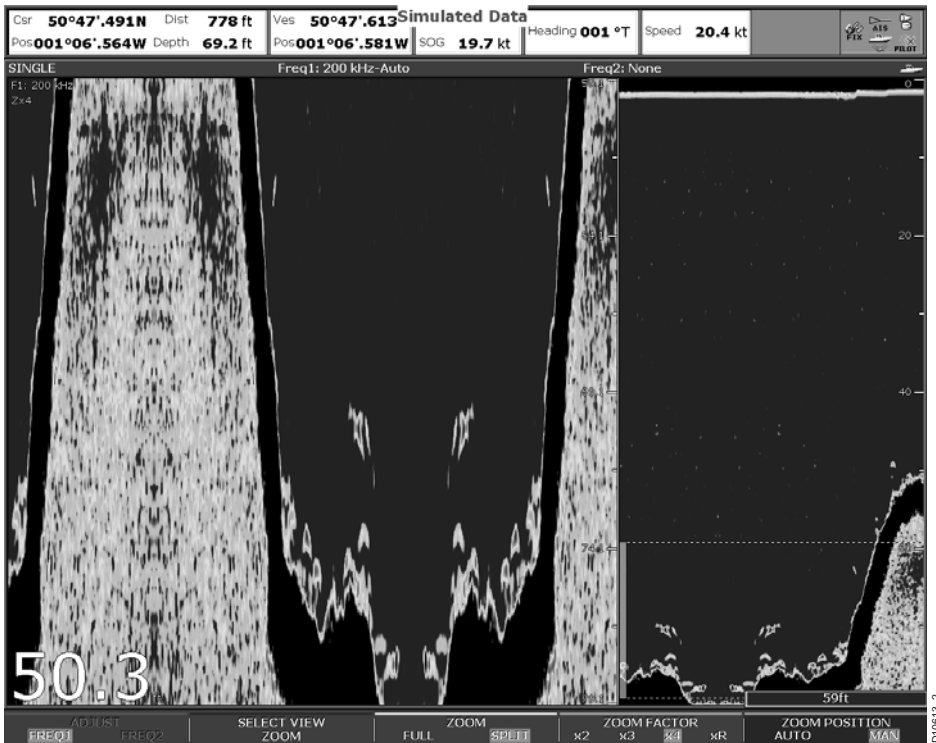
This zoom option lets you:

- Replace the standard fishfinder image with the zoomed image, or display the zoomed image alongside the standard fishfinder image.
- Set the zoom factor to a pre-defined level, or adjust it manually.
- Reposition the zoomed portion of the image to a different point in the display.

When the range increases, the area shown in the zoom window also increases.

### **Full or split screen**

You can either replace the standard fishfinder image with the zoomed image or split the screen and display the zoomed image alongside the standard fishfinder image (**ZOOM SPLIT**). The zoomed section is indicated on the standard fishfinder screen by a zoom box (see illustration below).



To select split-screen or full-screen

1. Select **FULL** or **SPLIT** with the **ZOOM** softkey.

When the zoom function is active (ZOOM FULL or ZOOM SPLIT), you can either select a predefined zoom factor or adjust it manually.

To select the zoom factor

1. Press the **ZOOM** softkey.
2. On the **ZOOM FACTOR** key, toggle between pre-defined settings or select xR to set a factor manually. For manual settings, adjust the zoom factor with the rotary controller.
3. Press **OK** to accept your setting.

### Adjusting the position of the zoomed area

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

### To set the zoom position

1. Press the **ZOOM** softkey.
2. Select **MAN** with the **ZOOM POSITION** softkey.
3. Reposition the zoomed image using the rotary controller.
4. Press **OK**.

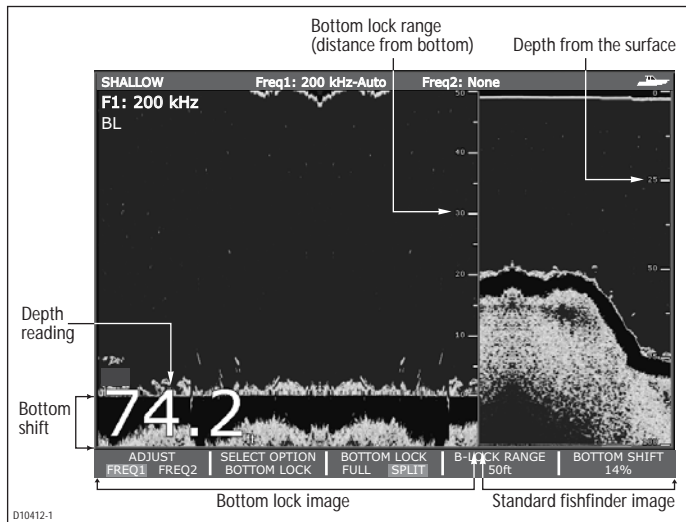
## Bottom lock and bottom shift

The Bottom Lock function applies a filter to flatten the image of the seabed and make any objects on or just above it easier to discern.

This feature is particularly useful for finding fish that feed close to the bottom.

Bottom Lock is selected for individual fishfinder windows and can replace or appear alongside the standard fishfinder image.

Adjusting the range of the bottom lock image allows you to view more bottom details. You can also reposition the image on screen to anywhere between the bottom of the window (0%) and the middle of the window (50%) by using the Bottom Shift control.



### To adjust bottom lock

1. Toggle to **FULL** or **SPLIT**.
2. Use the appropriate softkeys and rotary controller to set the range and bottom-shift values.

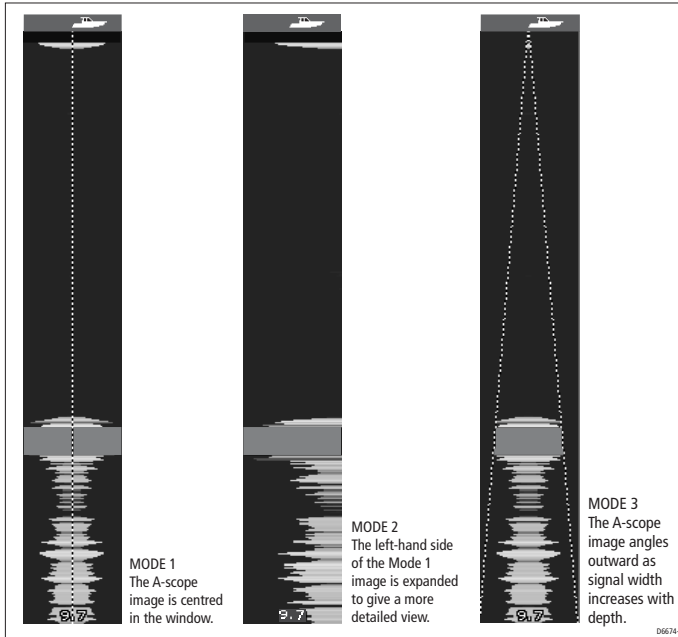
## Using A-Scope to view a live image

The standard fishfinder display shows a historical record of fishfinder echoes. If required, you can display a live image of the bottom structure and the fish directly

below the transducer by using the A-Scope feature. The width of the bottom area covered by the A-Scope is indicated by the number at the bottom of the window.

### 'A-SCOPE' modes

When A-Scope is on you can select one of three display modes:



To display the A-Scope image

1. Select A-Scope on the **SELECT VIEW** softkey.
2. Choose your mode on the **A-SCOPE MODE** softkey.

## 6.7 Range control

### Changing the range

You can change the range for each displayed frequency from the Range Adjust toolbar, which gives you control over the range and range-shift settings.

The DSM automatically adjusts the display to show the shallowest required range. Alternatively, you can range in or out on the image, up to the maximum depth displayed on the scrolling bottom and A-Scope images. Changes to the range affect all fishfinder windows.

**To open the Range Adjust toolbar**

1. Press the **RANGE** button on the E-Series keyboard.

**To select manual or auto range mode**

1. Open the **Range Adjust** toolbar.
2. Toggle to **AUTO** or **MAN** on the RANGE softkey.
3. Press **OK**.

**Range shift**

The DSM automatically adjusts the display to keep the bottom in the lower half of the display window. Alternatively, you can shift the image within the current range. Changes to the range shift are reflected in all Fishfinder windows.

**To shift the range image**

1. Open the **Range Adjust** toolbar.
2. Press the **RANGE SHIFT** softkey.
3. Select your desired setting using the rotary controller or trackpad.
4. Press **OK**.

**To return to the standard fishfinder image**

1. Toggle to **AUTO** on the **RANGE** softkey.
2. Press **OK**.

## 6.8 Presentation toolbar

The PRESENTATION softkey gives you access to GAIN, VRM (for measuring depth and distance), frequency view selection, scroll control and power settings. These settings affect the monitor you are working on.

**Adjusting gain and power**

Changing the preset gain settings alters the way the fishfinder processes background noise (also called clutter), and can improve the readout on the monitor. You can adjust:

- Gain mode (choose from three auto-settings or manual control)
- Color gain
- TVG
- Color threshold

If you change settings for any of these modes (except auto gain), the fishfinder applies them to all transducer frequencies.

For optimum performance, use the auto settings.



## Auto gain settings

The gain, or sensitivity, of the display adjusts background noise by varying the echo strength for display. The value of the GAIN control determines the strength above which echoes are displayed. There are three AUTO GAIN modes, which are saved with the preset if power is removed from the system:

- **CRUISING (Low)** is ideal for viewing fishfinder images with a minimum of background noise while you cruise to your fishing spot. Only the strongest echoes are displayed.
- **TROLLING (Medium)** is a slightly higher gain setting that displays more detail.
- **FISHING (High)** provides the most detail, but also displays the most background noise and surface clutter.

### To select an auto gain setting

1. Select the **PRESENTATION** softkey
2. Press the **GAIN** softkey.
3. Toggle the setting to **AUTO**.
4. Press **OK**.

## Manually-set gain levels

If necessary you can set gain levels manually. Manually-set gain levels are applied to the active window and any other fishfinder windows displaying that frequency.

### To set the gain level manually

1. Select the **PRESENTATION** softkey
2. Press the **GAIN** softkey.
3. Toggle the setting to **MAN**.
4. Use the slider to set your required gain value.
5. Press **OK**.

Gain should be set high enough to see fish and bottom detail but without too much background noise. Generally, high gain is better in deep or clear water; low gain is better for shallow or murky water. The default setting for manual gain is 75%.

## Color Gain

This sets the lower limit for the strongest echo color. All echoes with a signal strength above this value are displayed in the strongest color. Those with a weaker value are divided equally between the remaining colors. Setting a low value produces a wide band for the weakest color, but a small signal band for the other colors; setting a high value gives a wide band for the strongest color, but a small signal band for the other colors.

## TVG (Time Varied Gain)

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

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

## Power setting

The power setting controls the power level of the transducer.

### Auto

This is the default setting. When it is selected the DSM automatically determines the required power setting based on the current depth, speed, and (bottom) signal strength.

### Manual

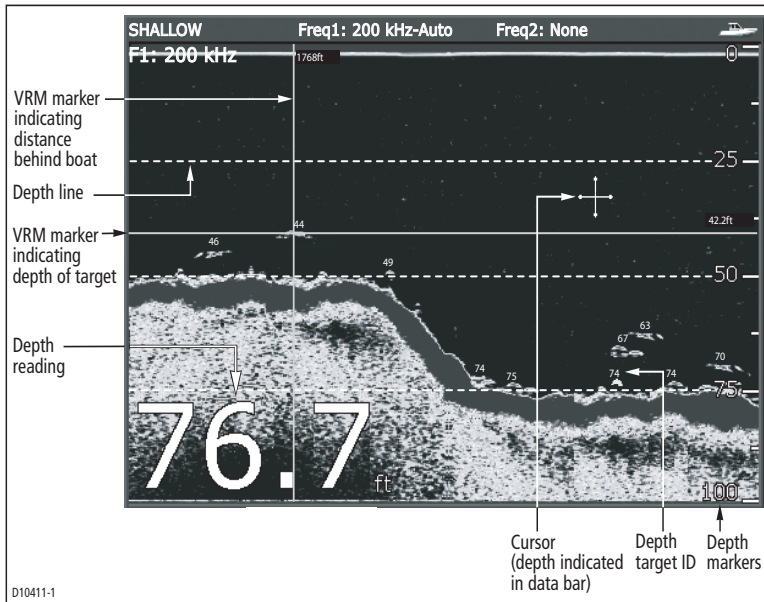
If you wish to manually adjust the power to suit current conditions, you can adjust the power level between 0% and 100%, in 10% increments. Lower power levels are normally used in depth ranges less than 8 ft. (2.4 m) and higher power levels are typically selected for depths greater than 12 ft. (3.7 m).

### To change the power setting

1. Press the **PRESENTATION** softkey.
2. Select the manual or auto setting on the **POWER** softkey **AUTO** or **MAN**.
3. In manual mode, use the rotary controller or trackpad to choose the power setting you want to use.
4. Press **OK**.

## 6.9 Measuring depth and distance

The fishfinder display gives you various methods of measuring depth and distance:



- **Depth reading** - your current depth. The size and position of this readout can be changed in the Fishfinder display Setup menu (see *page 143*).
- **Depth lines** - horizontal dashed lines drawn at regular intervals to indicate the depth from the surface. These are switched on/off in the Fishfinder Display Setup menu (see *page 143*).
- **Depth Target ID** - depths noted against recognized targets. The sensitivity of these IDs is directly linked to the Fish Alarm sensitivity; the greater the fish alarm sensitivity, the greater the number of labelled returns. These targets are switched on/off in the Fishfinder Display Setup menu (see *page 143*).
- **Cursor depth** - the depth and the distance from your boat marked by the cursor, is indicated in the data bar at the top of the screen. This performs in a similar way to a VRM, but without lines.
- **VRMs** - to indicate the distance behind your boat and the depth below of selected objects.

**Note:** *When multiple fishfinder windows are open, we recommend you have the depth reading displayed in at least one window.*

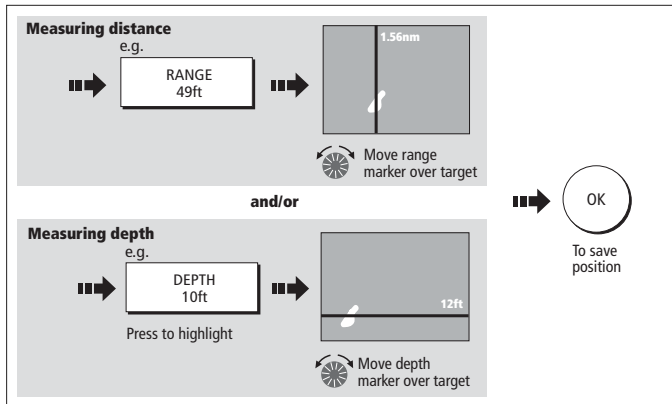
## Measuring depth and distance with VRM

You can use a Variable Range Marker (VRM) to determine the depth and distance-behind-boat of an object. These markers consist of a horizontal (depth) line and a vertical (distance-behind-boat) line; each of which are marked with the appropriate measurement and are controlled individually.

**Note:** *VRMs set up in Fishfinder are unrelated to those set up in Radar.*

### To make a measurement using VRM

1. Press the **PRESENTATION** softkey.
2. Press the **VRM** softkey.
3. Toggle to **ON**.
4. Pause the display to make it easier to position the VRM over the object.
5. Take your measurements:



To return the marker to its previous position, press **CANCEL**.

## Adjusting the scroll mode and speed

You can adjust the speed at which the display scrolls, but the same section of the bottom is displayed regardless of scrolling speed. A faster speed displays more detail. This is useful when you are looking for fish. If you select a slower speed the information remains on the display for longer.

The following options are available:

- **Manual** - This allows you to set the scroll speed as a percentage of the maximum scroll rate for that depth. The lower the percentage, the slower the image will scroll. The default is manual adjustment with a full speed scroll (100%).

### To select the scroll mode and speed

1. Open the **Fishfinder Setup Menu**.
2. Set your preferred values in the Manual Scroll Speed setting.

## Pausing scroll

You can pause the display to see a 'snapshot' of the image. When a display is paused, scrolling stops but the depth indication continues to be updated. Scroll pause/resume affects the frequency showing on your display (both frequencies if two are selected) while other displays continue to scroll.

This allows you to inspect a paused image, place waypoints or VRMs, while the other frequency continues to scroll and detect fish.

#### To pause or resume scrolling

1. Press the **PRESENTATION** softkey.
2. Press the **SCROLL** softkey to pause or resume scroll.
3. Press **OK**.

### Viewing frequencies within a preset

If the preset you are using has two frequencies, you can view either one or both of those frequencies in separate windows.

#### To set frequency views

1. Press the **PRESENTATION** softkey.
2. Toggle to **F1**, **F2** or **BOTH** on the **VIEW** softkey.
3. Press **OK**.

### Placing waypoints

You can pause the scrolling image to place a waypoint at a position or target that you want to return to at a later date. When a waypoint is placed, its details are added to the Waypoint List and a vertical line labelled WPT is placed on screen. You can edit waypoints and navigate to them in an active fishfinder window.

## 6.10 Fishfinder alarms

In addition to the system alarms (see *page 289*), the following alarms can be set when you are connected to a DSM or when the simulator is on:

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

You can switch the alarms on, set the limits and specify the fish alarm sensitivity.

## 6.11 Editing presets

You can select frequencies for each preset from the Setup Frequency Preset screen. All available frequencies are detected by the system and made available on this menu. You can:

- Specify one or two frequencies for each of the four presets.
- Edit preset names (EDIT NAME softkey).
- Reset all presets to factory defaults (RESET ALL softkey).

- Reset a selected preset to factory defaults (RESET <PRESET> softkey).

The fishfinder can handle only one set of frequency presets across displays. It is not possible to set one Display up with a different set of fishfinder frequencies to another.

### To open the Setup Frequency Preset screen

1. With a fishfinder window active, press the **MENU** button.
2. Select **Fishfinder Setup** menu.
3. Select **Configure Preset Frequencies**.
4. Select the frequency you wish to use from the list available.

## Manual frequency selection

If you select a frequency manually, the fishfinder operates at that fixed frequency.

### To set frequencies manually

1. With a fishfinder window active, press the **MENU** button.
2. Select **Fishfinder Setup** menu.
3. Open the **Configure Preset Frequencies** screen.
4. Select the frequency you wish to use from the list available.

## Automatic frequency selection

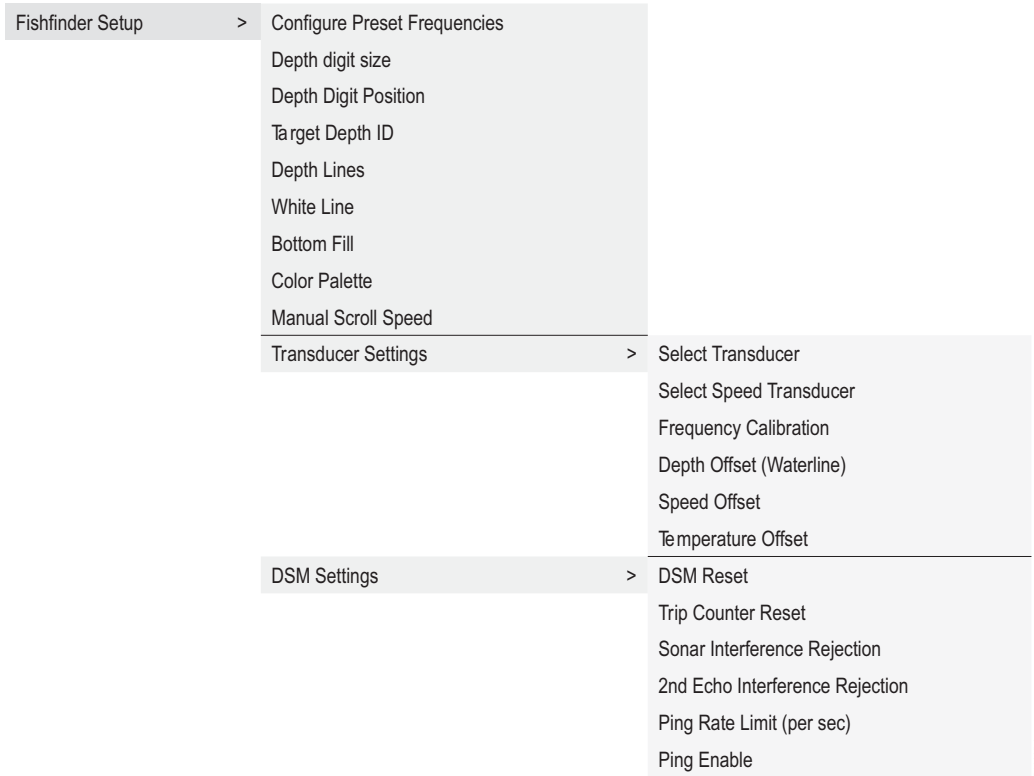
The behavior of automatic frequency selection varies according to the configuration of your system and whether you are using a DSM300 or DSM400. The table below summarizes this behavior.

	Frequency 1	Behavior	Frequency 2	Behavior
DSM400	AUTO	Automatically adjusts to suit depth.	NONE/MAN	Manual setting is fixed.
	MANUAL	Fixed at selection.	NONE/MAN	Manual setting is fixed.
	AUTO	Automatically selects highest frequency and widest beam.	AUTO	Automatically adjusts to suit depth.
DSM300	AUTO	Changes with depth; alternate pings of 50 Khz and 200 Khz.	MANUAL	Fixed at selection.
	AUTO	Changes with depth; alternates between 50 Khz and 200 Khz.	NONE	-
	AUTO	Frequency set to 200 Khz.	AUTO	Frequency set to 50 Khz.

## 6.12 Fishfinder configuration

This section describes the settings you can change using the fishfinder setup menu. The setup menu contains settings that are likely to be changed infrequently.

For information on how to use setup menus, see *Menus* on page 12.



### To open the fishfinder setup menu

1. Make a fishfinder window active.
2. Press the **MENU** button.
3. Select **Fishfinder Setup**.

### DSM and transducer setup

Nearby vessels equipped with a fishfinder, or certain physical conditions (like hard seabeds), can affect the DSM. Its setup menu enable you to change settings to allow for this.

The system automatically adjusts the following settings to optimize the fishfinder image.

- Operating frequency.
- Gain modes (Gain, Color Gain, TVG).

- Power setting.

**Note:** *The setup options available depend upon the DSM fitted to your vessel. Fishfinder settings should not ordinarily require adjustment.*

### **Configure preset frequencies**

Change the settings for one or more of the fishfinder presets. The settings available depend upon the transducer fitted.

### **Target depth ID**

Depth readings for identified targets.

### **Depth lines**

Horizontal lines indicating depth.

### **White line and bottom fill**

Distinguish between echoes from fish near the bottom and from the bottom itself. (See illustration.)



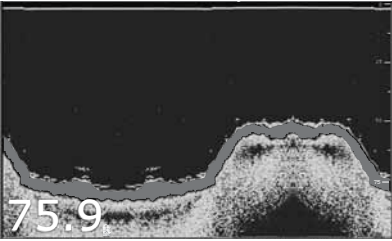
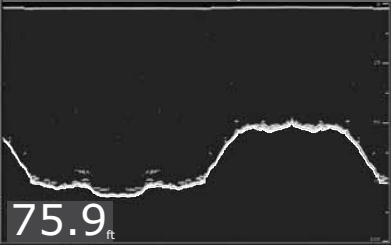
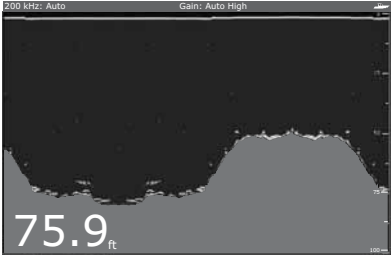
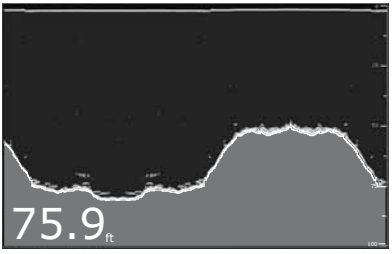
	<p><b>Standard fishfinder image</b></p> <p>The standard fishfinder image displays the bottom as a combination of features (mud, sand, fish targets etc) with various sonar signal strengths.</p>
	<p><b>White line</b></p> <p>When this feature is applied, a white line is drawn along the bottom (as defined by the digital depth value) and the detail below the bottom removed.</p> <p>Fish near the bottom can now be seen more easily.</p>
	<p><b>Bottom fill</b></p> <p>When this feature is applied, the detail below the bottom is removed and replaced by a single contrasting color.</p> <p>The bottom is now clearly defined and the fish near the bottom can be seen more easily.</p>
	<p><b>White line and bottom fill</b></p> <p>When both White Line and Bottom Fill are applied, the bottom is defined by a white line and the detail below it replaced by a single contrasting color.</p> <p>Both the bottom and fish near the bottom are now clearly defined.</p>

FIGURE 3

## Color Palette

Choose the color palette to suit your conditions or personal preference.

## Manual Scroll Speed

Specify the speed at which the fishfinder view updates and scrolls.

## Select Transducer

### DSM400

The system automatically detects any attached Raymarine approved transducers and sets the power and frequency settings.

**Note:** *Please refer to the DSM400 's installation manual for information on how to configure any non-Raymarine approved transducers.*

### DSM300

When selecting a transducer for the DSM300 you must enter the **Transducer Settings** menu (*See "To open the fishfinder setup menu" on page 143*), and select the transducer connected to the DSM300. The E-Series allows you to manually select the appropriate transducer.

## Select Speed Transducer

This option is only available if the selected transducer is one that does not include an integrated speed transducer.

## Frequency Calibration

Hides the setup menu and brings up a set of soft keys to tune the transducer frequencies.

## Depth Offset (waterline)

Offset represents the depth of the transducer (relative to the waterline)

## Speed and temperature offsets

Calibrate the speed transducer and thermistor (if fitted).

## DSM Reset

Restores all settings to factory default.

## Trip Counter Reset

Zero the trip counter.

## Interference Rejection

Removes spikes caused by interference from other fishfinder-enabled vessels.

## 2nd Echo Interference Rejection

Finely adjust the ping rate according to the 2nd echo level.

## Ping Rate Limit (per sec)

Provides a speed limiter. It can be useful to adjust ping rate to suit local conditions, for example when you are over a hard seabed or in shallow water.

## **Ping Enable**

Normally enabled, you can disable the ping when appropriate: to test other equipment, or if there is a diver beneath the vessel, for example.



# Chapter 7: Using the Radar (Analog)

## 7.1 Introduction

This chapter describes the basics of radar and the things that can affect your radar picture. It then shows you how to use your radar and its various functions including:

- Changing orientation and motion mode.
- Getting the best radar picture.
- Measuring distances and bearings.
- Collision avoidance using Guard Zones, MARPA and AIS.
- Using waypoints to mark positions.
- Setting up the radar display.
- Radar alarms.
- View AIS data.

## 7.2 What is radar?

Radio Detection And Ranging (RADAR) is something that is in use all around us, although it is normally invisible. One of the most common uses of radar at sea is to detect the presence of objects, known as 'targets' at a distance, and if they are moving, detect their speed.

This chapter of the Reference manual provides the information and instructions to enable you to start using the radar so that you know what is around you and use the in-built Mini Automatic Radar Plotting Aid (MARPA) functions to help in collision avoidance.

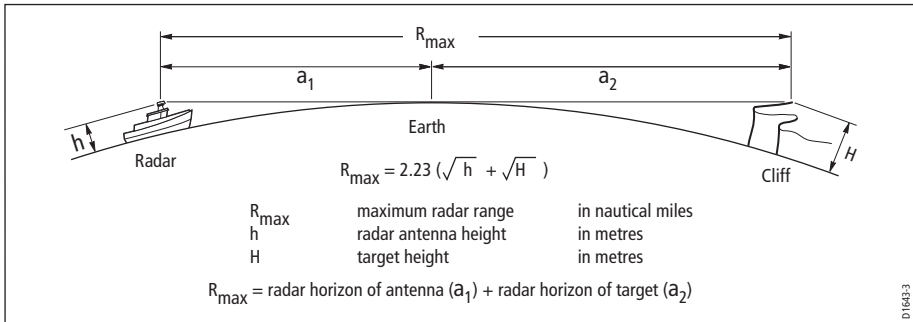
Until you are familiar with interpreting the radar display, every opportunity should be taken to compare the radar screen patterns with visual targets, such as other boats, buoys and coastal structures. You should practise harbor and coastal navigation during daylight hours and in clear weather conditions.

### Detecting targets

Radar works by transmitting radio pulses, then detecting reflections of these pulses (echoes) from objects in the area and displaying the reflections as targets on your display.

## Maximum radar range

Maximum radar range is essentially line-of-sight, so is limited by the height of the scanner and the height of the target as illustrated below:



The table below shows typical maximum radar ranges for various radar antenna heights and target heights. Remember that although the radar horizon is greater than the optical horizon, the radar can only detect targets if a large enough target is above the radar horizon.

Antenna height (m)	Target height (m)	Maximum range (nm)
3	3	7.7
3	10	10.9
5	3	8.8
5	10	12.0

## Factors impairing a radar picture

Not all radar echoes are produced by valid targets. Spurious echoes may be caused by:

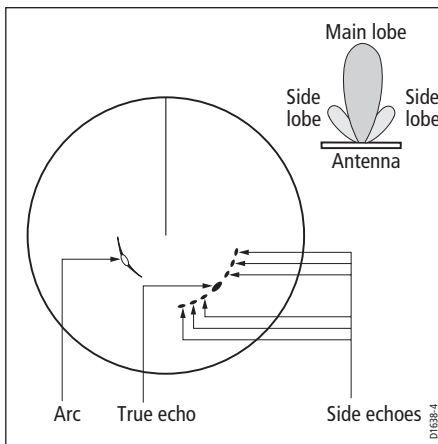
- Side lobes.
- Indirect echoes.
- Multiple echoes.
- Blind sectors.
- Sea, rain or snow clutter.
- Interference.

Through observation, practice, and experience, you can generally detect these conditions very quickly and use the radar controls to minimize them.

## Side lobes

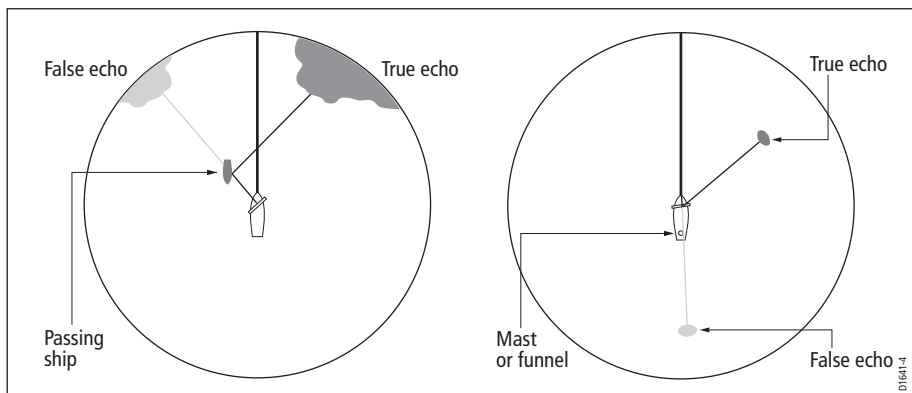
Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside the narrow main beam.

The effects of side lobes are most noticeable with targets at short ranges (normally below 3 nm), and in particular with larger objects. Side lobe echoes form either arcs on the radar screen similar to range rings, or a series of echoes forming a broken arc.



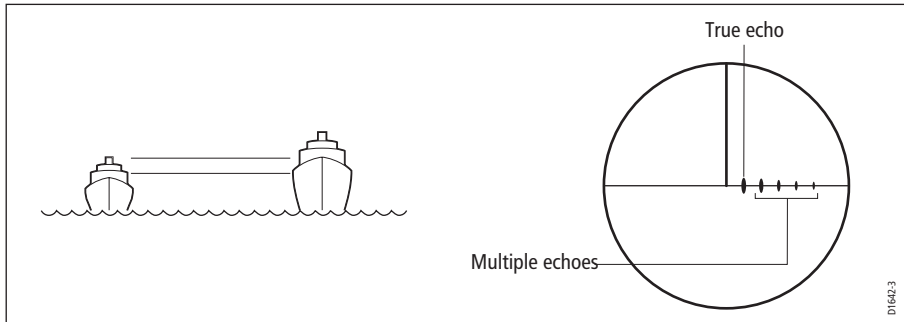
## Indirect echoes

There are several types of indirect echoes or ghost images. These sometimes have the appearance of true echoes, but in general they are intermittent and poorly defined.



## Multiple echoes

Multiple echoes are not very common but can occur if there is a large target with a wide vertical surface at a comparatively short range. The transmitted signal will be reflected back and forth between the target and your own ship, resulting in multiple echoes, displayed beyond the range of the true target echo, but on the same bearing.

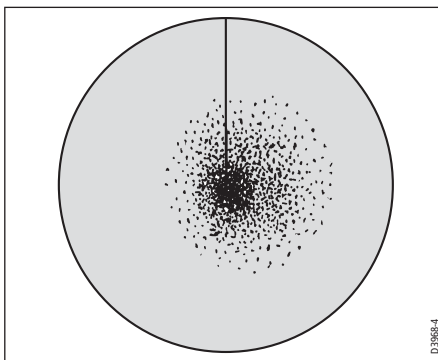


## Blind sectors

Obstructions such as funnels and masts near the radar antenna may obstruct the radar beam and cause radar shadows or 'blind sectors'. If the obstruction is relatively narrow, there will be a reduction of the beam intensity, though not necessarily a complete cut-off. However, for wider obstructions there may be a total loss of signal in the shadow area. There may also be multiple echoes which extend behind the obstruction. Blind sector effects can normally be minimized by careful selection of the scanner site prior to installation.

## Sea clutter

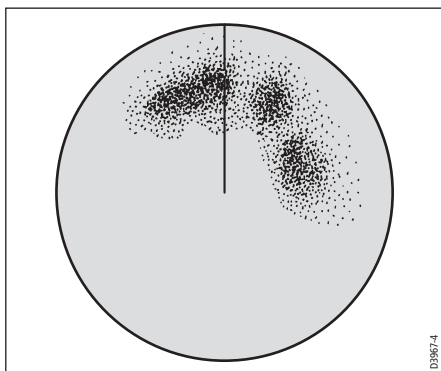
Radar returns from waves around the vessel can clutter the centre of the radar picture, making it difficult to detect real targets. Such 'sea clutter' usually appears as multiple echoes on the display at short range scales, and the echoes are not repetitive or consistent in position. With high winds and extreme conditions, echoes from sea clutter may cause dense background clutter in the shape of an almost solid disc.





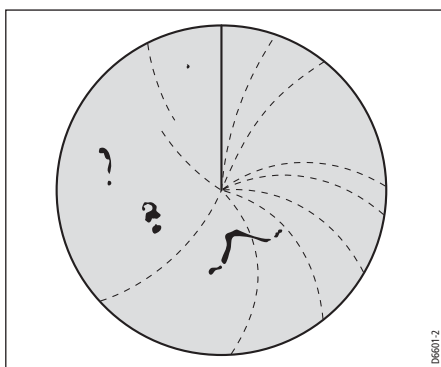
## Rain or snow clutter

The radar can see echoes from rain or snow. Returns from storm areas and rain squalls consist of countless small echoes that continuously change size, intensity and position. These returns sometimes appear as large hazy areas, depending on the intensity of the rainfall or snow in the storm cell.



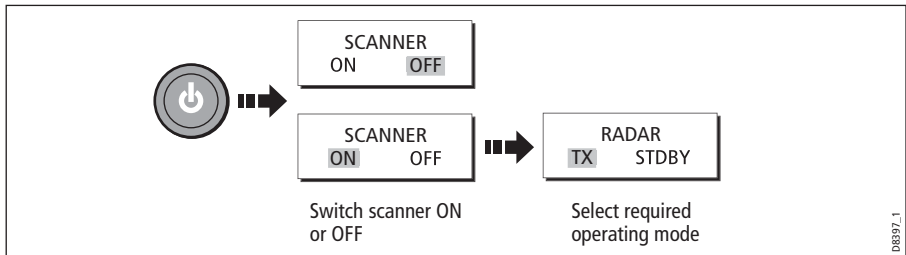
## Interference

When two or more radar-equipped vessels are operating within range of each other mutual radar interference can occur. This usually appears as a spiral of small dots from the display centre. This type of interference is most noticeable at long ranges.







### 7.3 Powering on/off the various scanner operating modes

To control the power to the radar:



The scanner icon in the data bar indicates the chosen status and is described as:

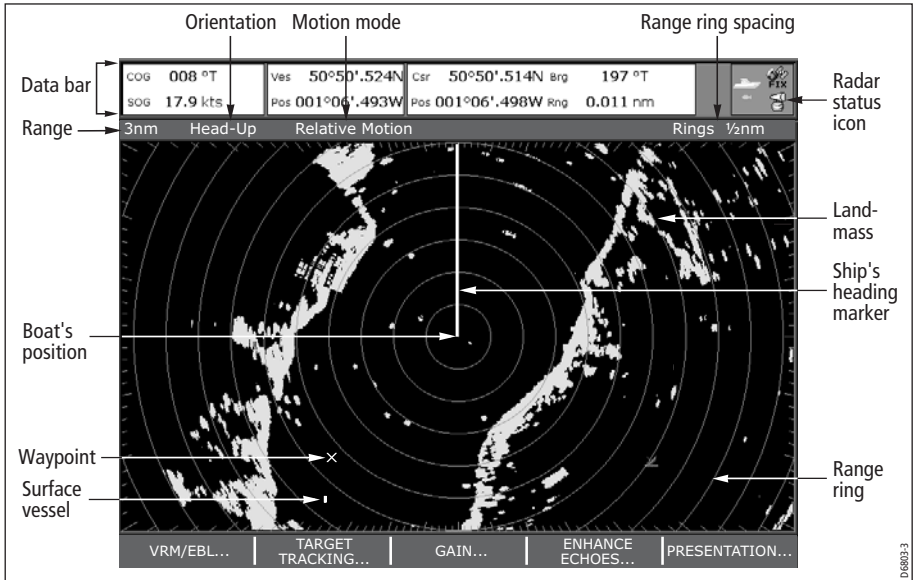
Radar Mode	Radar status icon	Status description/use
Transmit (TX)	 (Rotating icon)	<b>Scanner on and transmitting.</b> When SCANNER set to ON, select this mode to activate scanner. This is the usual mode of operation.
Standby (STDBY)	 (static icon)	<b>Scanner on but not transmitting and antenna not rotating.</b> Antenna does not rotate, the scanner does not transmit and the radar data is removed from the screen. This is a power save mode used when radar not needed for short time periods. When you return to transmit mode, the magnetron does not need to warm up. This is the default mode.
Off	 (grayed-out icon)	<b>Scanner powered off</b> When radar not required but display in use for other applications e.g. chart. When selected, system countdowns - during this time you cannot re-power the scanner.
Timed transmit	 (rotating/static icon)	<b>Scanner switches between on/transmitting &amp; standby mode</b> Power save mode when constant use of radar not required. To set up this option, see <i>page 179</i>

- Notes:**
- (1) *When an open array antenna is fitted, the system stops the antenna in the forward facing position when Standby mode is selected.*
  - (2) *Dual radar support will only allow one radar to be active at any one time. You cannot set up two radar windows, each using a different scanner.*

## 7.4 The radar picture

You will need heading and position data for full functionality of your radar. A fast heading sensor is also needed for operation of MARPA and can maximize the performance of radar/chart overlay.

With your radar scanner connected and the radar in transmit mode, the radar picture, provides a map-like representation of the area in which the radar is operating e.g.



Typically, your boat's position is at the centre of the display, and its dead ahead bearing is indicated by a vertical heading line, known as the Ship's Heading Marker (SHM).

On-screen targets may be large, small, bright or faint, dependent on the size of the object, its orientation and surface. Strongest target returns are displayed in yellow with weaker returns in two shades of blue. Be aware that the size of a target on screen is dependent on many factors and may not necessarily be proportional to its physical size. Nearby objects may appear to be the same size as a distant larger objects.

With experience, the approximate size of different objects can be determined by the relative size and brightness of the echoes. You should bear in mind that:

The size of each on-screen target is affected by:

- The physical size of the reflecting object.
- The material from which the object is made. Metallic surfaces reflect signals better than non-metallic.
- Vertical objects such as cliffs reflect signals better than sloping ones such as sand-banks
- High coastlines and mountainous coastal regions can be observed at longer radar ranges. Therefore, the first sight of land may be a mountain several miles inland

from the coastline. Although the coastline may be much nearer, it may not appear on the radar until the vessel is closer to shore.

- Some targets, such as buoys and small boats, can be difficult to discern, because they do not present a consistent reflecting surface as they bob and toss about in the waves. Consequently, these echoes tend to fade and brighten and at times, to disappear momentarily.
- Buoys and small boats often resemble each other, but boats can often be distinguished by their motion.

## 7.5 Marking a position on the radar screen

You can mark a position by using a waypoint. Waypoints are positions marked on the screen as a reference or destination point and are stored in the Waypoint list. They can also be used to build routes and assist in passage planning.

Waypoints are placed on the radar screen via the **WPTS/MOB** button in the same way as they are placed on a chart.

You can edit waypoints and navigate to waypoints in the radar window

For full details on using waypoints and passage planning see *Chapter 3: Working with Waypoints* and *Chapter 4: Using the Chart*.

## 7.6 Changing what you see in the radar window

The radar screen can be tailored to your particular needs. You can:

- Change how the radar is orientated (see *page 156*).
- Change where your boat is positioned (motion mode) in relation to the radar (see *page 158*).
- Show or hide waypoints (see *page 48*).
- Show or hide range rings (see *page 160*).
- Change the bearing mode for EBLs (see *page 160*).
- Show AIS targets.

**Note:** *The radar settings are locally applied and will therefore only affect the individual display on which you are working.*

### Setting the orientation of the radar

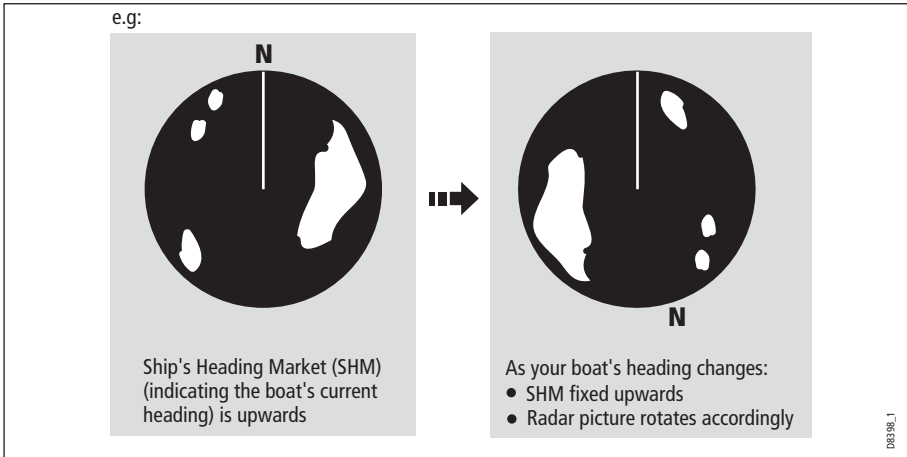
The orientation of the radar refers to the relationship between the radar and the direction that you are travelling in. There are three orientation modes to choose from:

- Head up.
- North up.
- Course up.

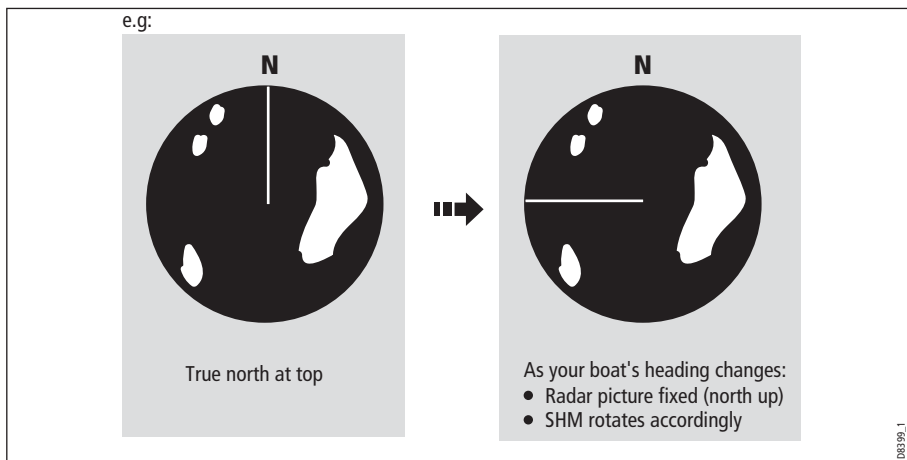
These orientation modes are used in conjunction with motion mode (see page 158) to control how your boat and radar relate to one another and how they are displayed on screen. Any changes that you make to the orientation of the radar are retained when you switch off.

### Head Up (H-UP)

This is the default mode for the radar application.



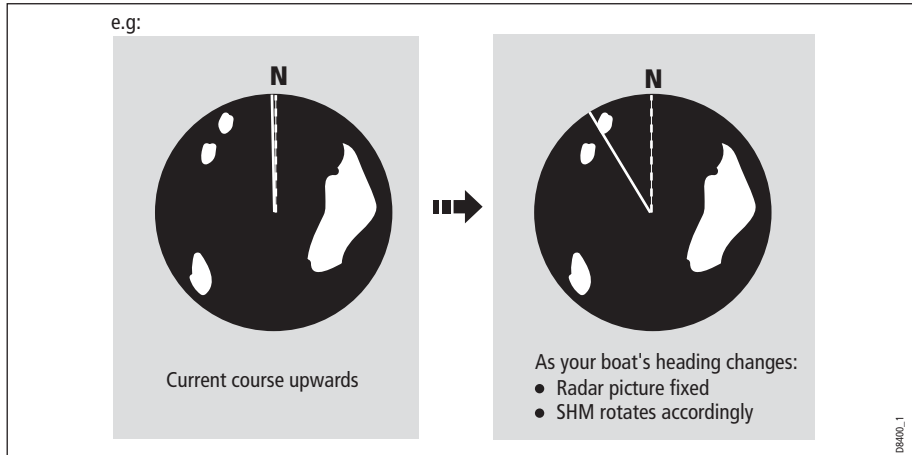
### North Up (N-UP)



**Notes:** (1) *If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates North-Up in brackets and the radar uses 0° heading in relative motion. When heading data becomes available once more, North-Up mode is reinstated.*

(2) *It is not possible to select Head Up mode when the motion mode is set to True.*

## Course Up (C-UP)



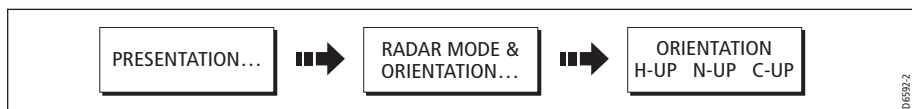
If you select a new course, the picture will reset to display the new course upwards.

The reference used for Course-Up depends upon the information available at a given time. The system always prioritizes this information in the following order.:

1. Bearing from origin to destination, i.e. intended course.
2. Locked heading from an Autopilot.
3. Bearing to waypoint.
4. Instantaneous heading.

**Note:** *If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates the Course Up in brackets and the radar uses 0° heading in relative motion. When heading data becomes available once more, Course-Up mode is reinstated.*

### To select the orientation mode:



The selected motion mode is displayed in the status bar.

## Setting the motion mode

The motion mode controls the relationship between the radar and your boat. There are two modes:

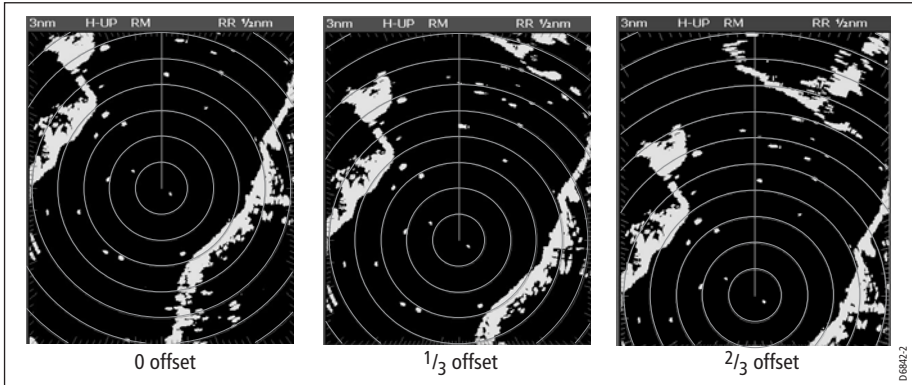
- Relative motion.
- True motion.

The selected motion mode is displayed in the status bar. The default setting is relative motion with zero offset

### Relative motion (RM) with optional vessel offset

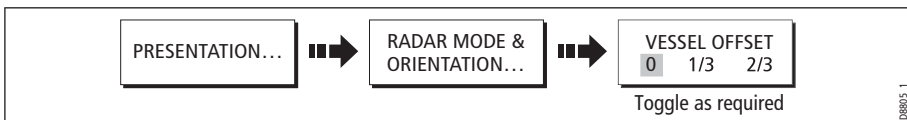
When the motion mode is set to Relative, the position of your boat is fixed on the screen and all the targets move relative to the boat.

You can specify whether the boat is fixed in the centre of the window (0 offset) or offset by 1/3 or 2/3 to increase the view ahead i.e.



The default mode for the radar application is Relative with zero offset.

To change the vessel offset:



**Note:** *If no position data is available, the status bar shows the motion mode in brackets.*

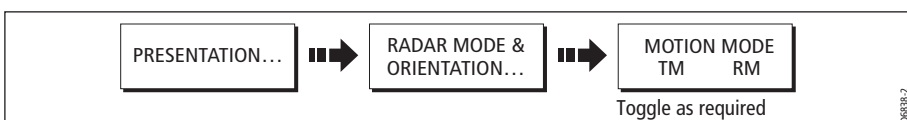
### True Motion (TM)

When the motion mode is set to True, fixed radar targets maintain a constant position and moving vessels (including your boat) travel in true perspective to each other and to fixed landmasses on the screen. As the boat's position approaches the edge of the screen, the radar picture is automatically reset to reveal the area ahead of the boat.

**Notes:** (1) *If heading and position data become unavailable when True motion is selected, a warning message will be shown, the mode will revert to relative motion and be noted in the status bar in brackets e.g. (TM)*

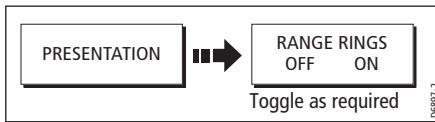
(2) *It is not possible to select True Motion when the orientation is set to Head Up.*

To change the motion mode:



## Showing or hiding the range rings

To turn the range rings on/off:



## Changing the bearing mode for EBLs

The default bearing mode for EBLs is relative to your vessel's heading. If heading data is available, you can set the bearing mode to be relative (REL), magnetic/true (M/T).

When M/T is selected, the EBL bearings will be expressed as either true or magnetic dependant on the equipment connected. The current EBL bearing is expressed on both the radar screen EBL label and on the ADJUST EBL soft key.

To change the EBL reference,

1. Select **MENU**
2. Select **Radar Setup**
3. Select **EBL Reference**
4. Select either **Mag/True** or **Relative**.

## 7.7 Getting the best picture

You can improve the quality of the radar picture by using:

- The gain controls - sea, gain, FTC and rain.
- The target display controls - interference rejection, expansion, wakes.

### Using the GAIN functions

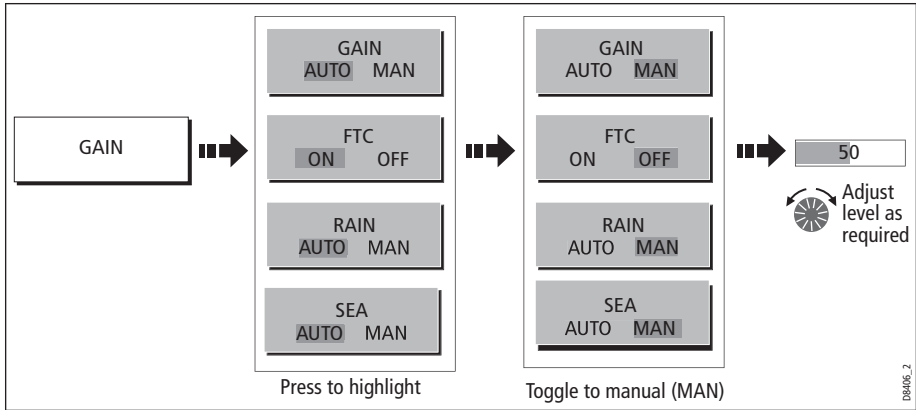
The gain function reduces the effects of false echoes and clutter.

For the best results Raymarine recommends that you retain the AUTO default setting. You can however adjust these settings manually if required.



## Manually adjusting the gain modes

The gain, sea, FTC and rain controls can all be adjusted manually if necessary:



**Note:** *The new values remain set even when you switch off the display and are applied to both the active window and any other radar windows. Analog*

## Sea

Radar echoes from waves around your boat can clutter the centre of the radar picture, making it difficult to detect real targets (see *page 152*).

Adjusting the sea mode will reduce this clutter for up to 5 nautical miles (depending on wave and sea conditions) from your boat. This has the effect of reducing the sea echoes to intermittent small dots whilst small targets remain visible and persistent. Gain levels further from your boat remain unchanged. There are three sea gain modes:

- **HBR** (Automatic Harbor mode) - this takes account of the effects of land clutter so that small target are not lost. It should be used when you are in harbor or in close proximity to land.
- **OSH** (Automatic Offshore mode) - the system continually calculates the required level of sea clutter control.
- **MAN** (Manual mode) - this enables you to select the sea clutter level and then adjust the settings to ensure that all close small targets are visible. On short range scales, do not set the SEA control so high that all clutter is removed, since this could stop you seeing echoes from close targets. The acuteness of the sea clutter curve is set up in the Radar Setup menu (see *page 180*). Manual sea clutter mode should be used in conjunction with the GAIN function (described below).
- **Coastal** (Automatic Coastal mode) - The system automatically selects mean levels for coastal radar operation.

## Gain

The gain function makes the radar picture clearer by changing the sensitivity of radar reception.

- **For long ranges** - select a sensitivity level that gives a slight speckle in the background. Be careful not to set the gain too low, or you may miss weak or small targets.
- **For shorter ranges** - reduce the gain slightly to reduce the speckle and therefore improve target definition.

**Note:** *If you set the GAIN to MAN (manual), you should check it every time you change the range scale.*

## FTC

You can use the Fast Time Constant (FTC) function to remove areas of clutter at a distance from your boat or to distinguish between two very close echoes on the same bearing, which may otherwise merge and appear as one echo

When the FTC function is turned up, only the leading edge of large (rain clutter) echoes is shown, while the effect on smaller (ship) echoes is only slight. As the receiver is less sensitive, and background noise and fill-in returns from land and other large targets reduced, you should turn the FTC function down when its use is not required. Since storm cells are usually visible for long distances due to their extreme altitude, you may wish to leave them displayed so that you can observe the location of bad weather.

**Note:** *Use FTC in conjunction with the RAIN function to obtain the best picture.*

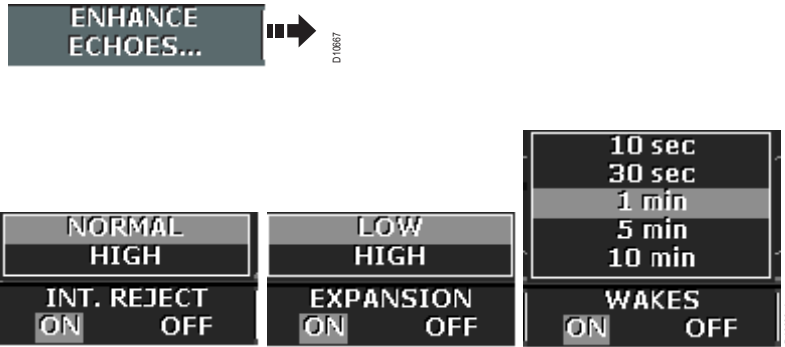
## Rain

Your radar detects echoes from rain or snow. The strength of these echoes is dependent upon the altitude, range, density and size of the snow flakes or rain droplets and will appear on screen (see *page 153*) as countless small echoes continuously changing size, intensity and position.

Turning the RAIN clutter function on suppresses the bulk effect of rain returns from around your boat, so that detection of actual targets is made easier.

## Using the enhance echoes softkey functions

You can improve visibility with the enhance echoes softkey function. Select the enhanced echoes softkey from an active radar window to access it's functions.



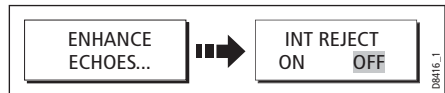
### Interference Rejection

#### ON

The interference rejection function, which is normally left switched on, automatically reduces any close by radar interference when two radar equipped vessels are operating within range of each other (see *page 153*).

#### OFF

If you wish to detect the presence of other radars in the vicinity turn INT. REJECT to OFF.



### Expansion

The expansion function allows you to either override the pulse length or to give larger returns so targets are easier to see:

#### Overriding the pulse length

To override the pulse length:

1. Select **ENHANCED ECHOS** softkey
2. Select **EXPANSION** softkey
3. Set the magnification level for target expansion to HIGH:

#### For Larger returns

To alter the processing to give larger returns:

1. Select **ENHANCED ECHOS** softkey
2. Select **EXPANSION** softkey

3. Set the magnification level for target expansion to LOW:

**Note:** *Selecting this option may compromise target resolution.*

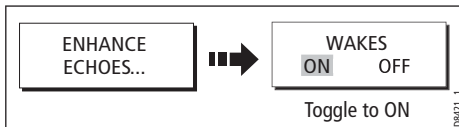
## Wakes

When the wakes function is switched on, you can see the direction and speed of moving targets relative to your boat. A target is displayed in yellow and as the signal diminishes with time it is shown in paler shades of blue.

**Note:** *The wakes option is a local setting and will therefore only affect the individual display on which you are working.*

### Displaying wakes

To switch on the wakes function:



### Specifying the wake period

You can select via the Radar Setup Menu, whether these wakes are shown for periods of 10 seconds, 30, seconds, 1 minute, 5 minutes or 10 minutes.

To specify the wake period:

1. Select **ENHANCED ECHOS** softkey.
2. Select **WAKES** softkey **ON**.
3. Select the time period you want to set.
4. Press **OK**.

### Removing wakes

When the currently displayed wakes are no longer required they can be remove from your screen by toggling **WAKES** to **OFF**.

## Tune

The tune function is used to fine tune the receiver in the scanner for maximum target returns on the display.

To Access the Tune Function:

1. Select **Menu**.
2. Select **Radar Setup**.
3. Select **Scanner Setup**.
4. Scroll with the directional pad to select **Tune Adjust**.
5. Select the **Tune** button to toggle to **Manual**, use the rotary control to manually adjust the tune setting to desired level.

### Auto mode

In AUTO mode, the radar tunes itself automatically on all range scales. **This is the default and it is recommended that you leave the TUNE function in AUTO mode, to ensure that the radar receiver is always tuned to receive the maximum signal.**

### Manual (MAN) mode

If you do set the TUNE function to MANUAL, you will need to adjust it about 10 minutes after you have turned on the radar, since the required setting will change after the magnetron has warmed up. You should adjust the control to obtain the maximum signal strength (indicated by the eight step horizontal bar.). If you cannot tune the radar successfully, refer to the Installation Guide.

## 7.8 Changing the displayed range

You can zoom in or out to view your radar picture at varying scales. The scale is measured from the centre to the top of the window and is displayed in the left-hand corner of the status bar.

The scale you will need is dependent upon where you are navigating and the level of detail that you wish to see:

- **Short range scales** - provide greater detail of radar echoes close to the vessel, and are most suited for use as you approach coastlines, harbors or other vessels in the area. The shortest range scale available is 1/8 nautical miles (or the equivalent in the chosen unit).
- **Long range scales** - provide the best overview of the vessel's relationship to landmasses, weather fronts and large ship targets in or beyond the field of vision. The longest range scale available is between 24 and 72 nautical miles (or the equivalent in the chosen unit) depending upon the scanner fitted.



The range of the radar is adjusted by pressing the **RANGE** button.

Press **IN** to decrease the range scale or 'zoom in'.

Press **OUT** to increase the range scale or 'zooms out'.

Each press of the button changes the range by one setting. Pressing and holding the button will change the range quickly in the required direction.

## Radar range and chart scale synchronization

The chart application includes an option to synchronize the radar range and chart scale.

When synchronization is switched on:

- The radar range in all radar windows, changes to match the chart scale.
- 'Sync' is indicated in the top left-hand corner of the chart window.
- If you change the radar range, in any radar window, all synchronized chart views change scale to match.
- If you change the scale of a synchronized chart window, all radar windows change range to match.

With a chart window active, set the radar range synchronization:



**Note:** Radar range synchronization is not available when the chart motion mode is set to Autorange.

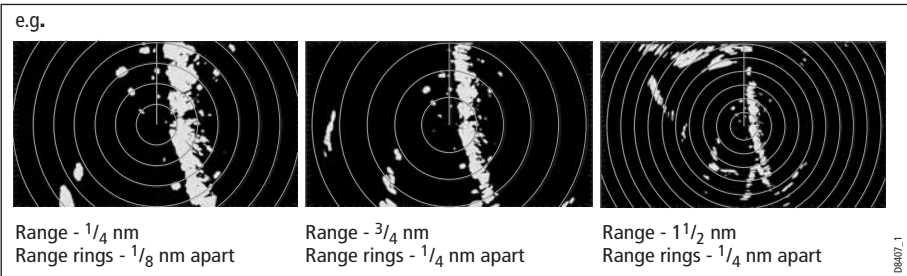
## 7.9 Measuring distances, ranges and bearings

When you are using the radar application, you can measure distances, ranges and bearings in a variety of ways. These options are detailed in the table below:

Functions	Distances between points	Range from your boat	Bearings
Range Rings	Yes (approx.)	Yes (approx.)	-
Cursor	-	Yes	Yes
Variable Range Markers (VRMs)	-	Yes	-
Electronic Bearing Lines (EBLs)	-	-	Yes
Floating VRMs	Yes	-	-
Floating EBLs	-	-	Yes

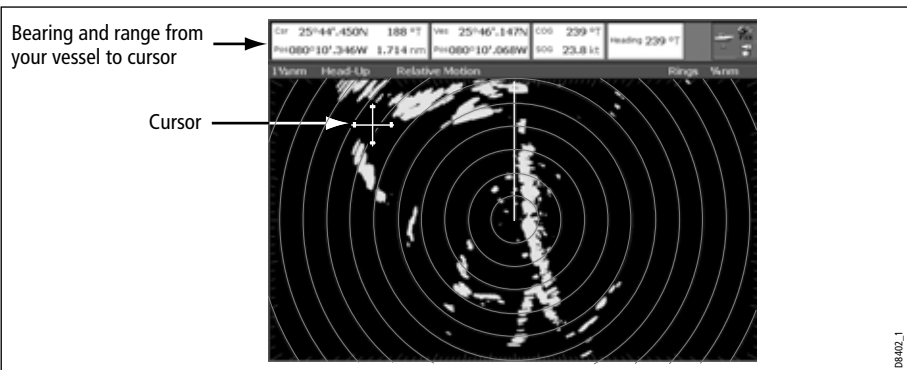
### ... Using the range rings

Use the range rings to gauge the approximate distances between points. Range rings are concentric circles displayed on the screen and centred from your boat at pre-set distances. The number and spacing of the rings changes as you range in and out.



### ... Using the cursor

To measure the bearing and range from your boat to a specified target, move the cursor to the appropriate position on the screen.



**Note:** If cursor data is not shown, refer to page 10 and page 293.

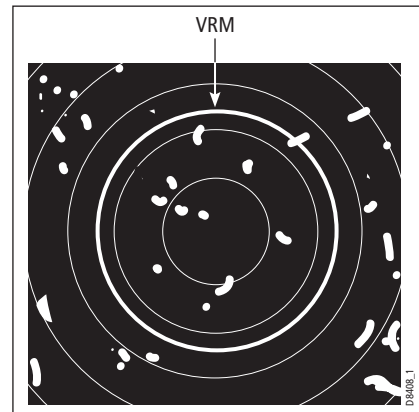
## ... Using VRMs and EBLs

### What is a VRM?

A Variable Range Marker (VRM) is a circle centred on your vessel's position and fixed with respect to the heading mode.

When this circle is adjusted to align with a target, its **range** from your boat is measured and displayed on the ADJUST VRM soft key.

The data is also displayed if you select the VRM with the cursor.

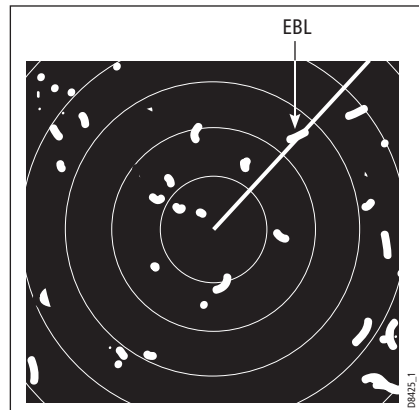


### What is an EBL?

An Electronic Bearing Line (EBL) is a line drawn from your boat to the edge of the window.

When this line is rotated to align with a target, its **bearing** relative to your boat's heading is measured and displayed on the ADJUST EBL soft key.

The data is also displayed if you select the EBL with the cursor.

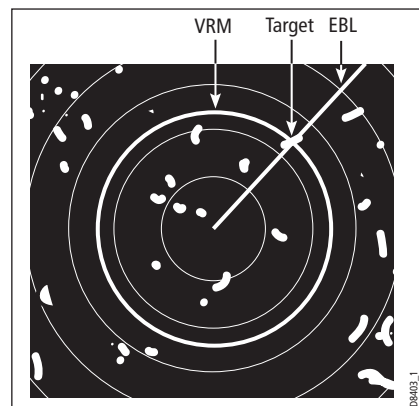


**Note:** To change the EBL reference from relative to magnetic or true, see page 160.

### Combined VRM and EBL

A VRM and an EBL can be combined to measure both the **range and the bearing** of the specified target.

**Note:** VRMs and EBLs are local settings and will therefore only affect the individual display on which you are working.





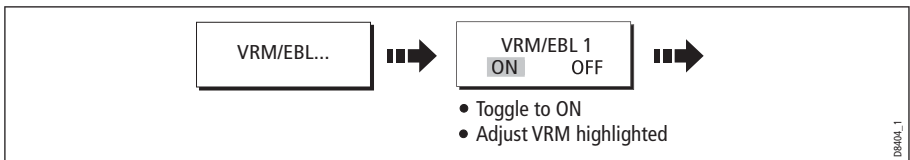
### Tracking a target with a VRM/EBL

You will be able to tell which way the target is traveling by watching how it moves in relation to the EBL. If it continues traveling directly along the EBL, it shows that it is on a possible collision course with your boat - take the appropriate action.

### Creating a VRM and/or EBL

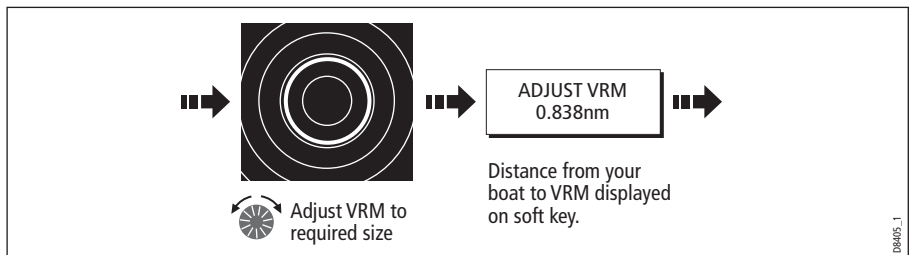
To use VRMs and EBLs to tell you the range and bearing of a target:

1. Select the VRM/EBL 1 option:

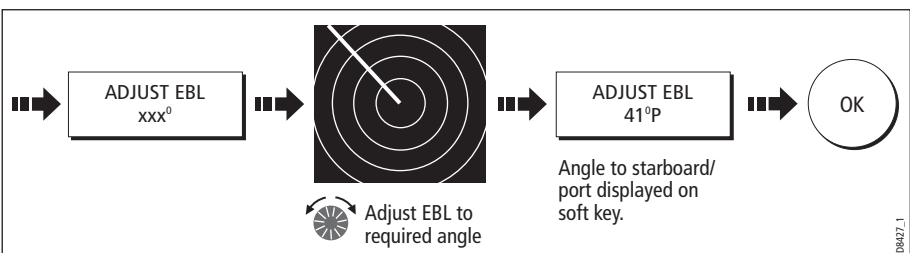


**Note:** The first VRM/EBL will be placed at a location of 1/3 of the current range and 030° relative to your boat's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next turned on.

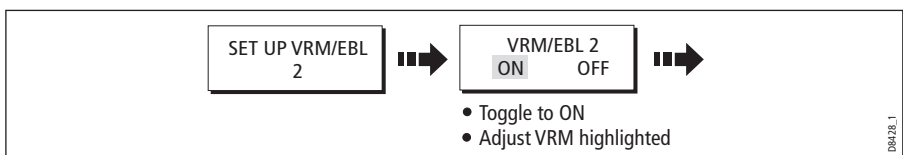
2. Adjust the VRM to the required size:



3. Adjust the EBL to the required angle:



4. Save the adjustment and remove control from the VRM/EBL:
5. To place a second VRM/EBL if required:

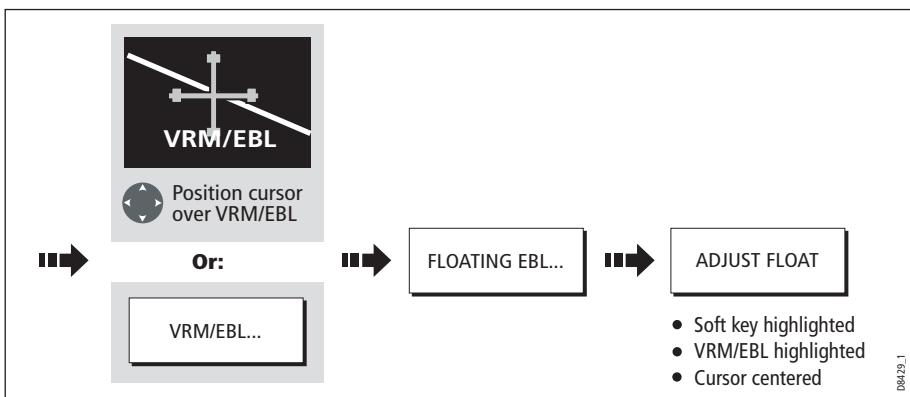


### ... Using floating VRMs/EBLs

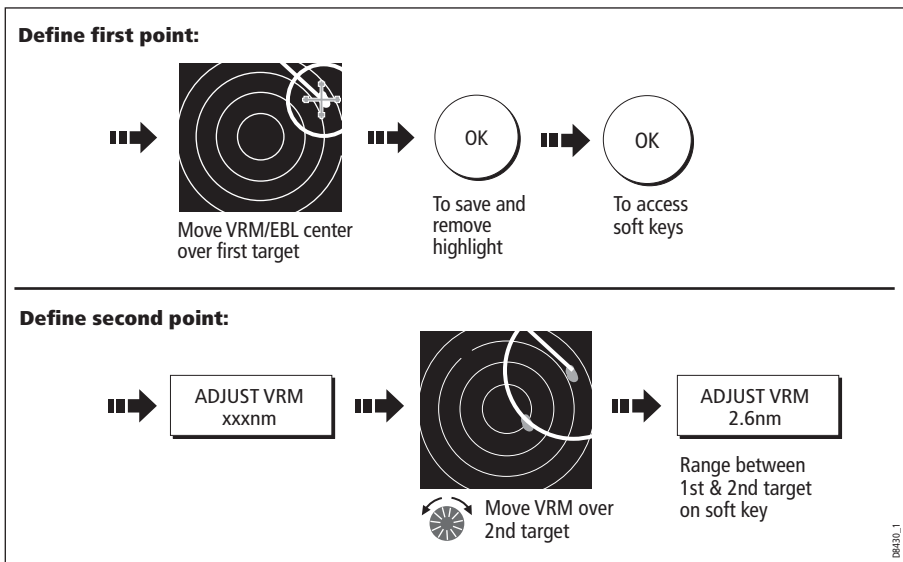
You can use the VRM/EBL float function to measure the range and bearing between any two points on the radar screen. This function allows you to move the VRM/EBL centre away from your boat's position and onto a target. You can then change the radius of the VRM to determine the distance between two points and change the angle of the EBL, relative to its new origin, to obtain the bearing.

#### Floating a VRM/EBL

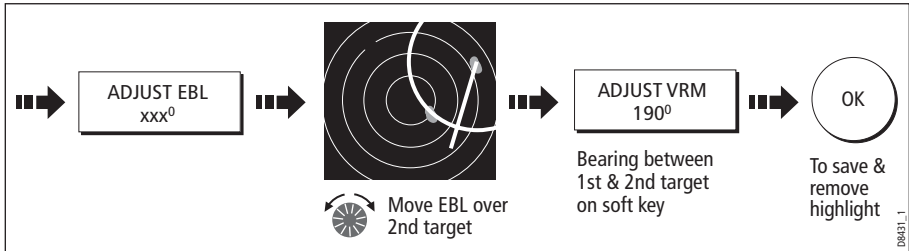
1. Create the VRM/EBL as described previously.
2. Select the floating option:



3. Measure the **range** between two points:



4. Measure the **bearing** between two points:

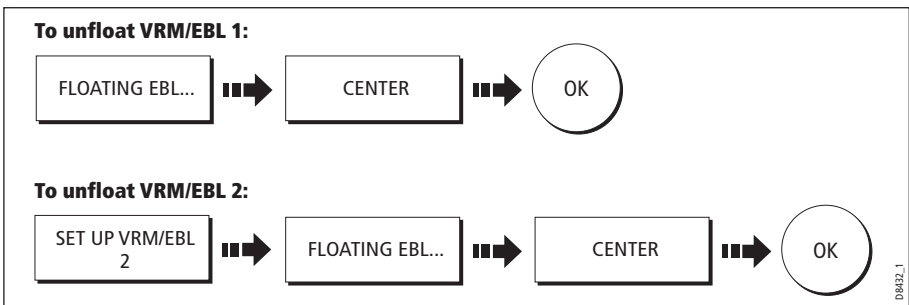


- 5. If required, you can float a second VRM/EBL:
  - i. Press SET UP VRM/EBL 2.
  - ii. Toggle the VRM/EBL 2 to ON.
  - iii. Repeat steps 1 to 8 above.

### Unfloating a VRM/EBL

To unfloat VRM/EBLs and return them to the central position:

- 1. Select the VRM/EBL option.
- 2. Unfloat VRM/EBL 1 or 2:



## 7.10 Using radar to avoid a collision

Your radar includes numerous functions to help you avoid a collision. You can:

- Assess how far away a target is and its bearing (VRMs/EBLs).
- Set an alarm to trigger when a target is within a specified zone (Guard Zones).
- Display detailed information on tracked targets (MARPA).
- Display the identity of other vessels and if broadcasted, their voyage information (AIS).
- Display the range and bearing of a target.

### Guard Zones

Guard zones are fixed with respect to the SHM, moving as it moves. They also move if the centre is offset or the range scale is changed, so that the pre-marked area is

maintained. A guard zone only operates when the whole zone is displayed on the screen. An audible alarm sounds to alert you when a target enters the zone.

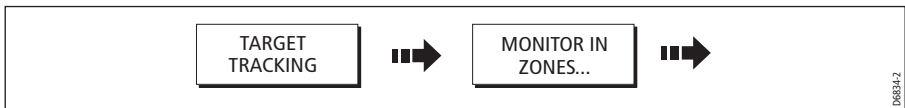
Guard zones are inactive for 10 seconds after being placed or re-sized, to avoid inappropriate alarms whilst they are being positioned.

You can set up guard zones to be either sector zones or 360° (circular) zones. Your radar can be set up using one or two zones.

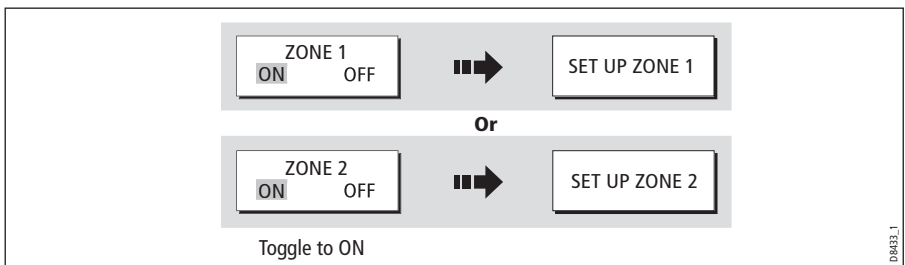
You can adjust the sensitivity of the guard zone via the Alarms Setup Menu described on *page 290*.

To set up a guard zone:

1. Select the guard zone option:

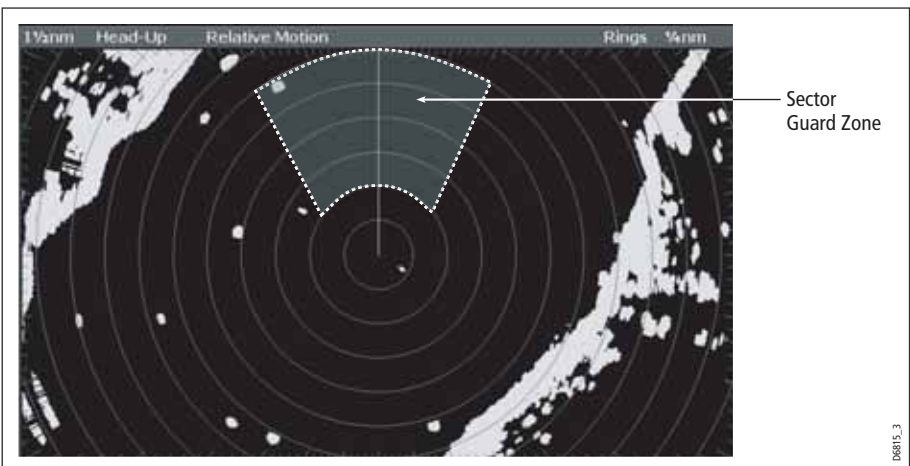


2. Select Zone 1 or 2:

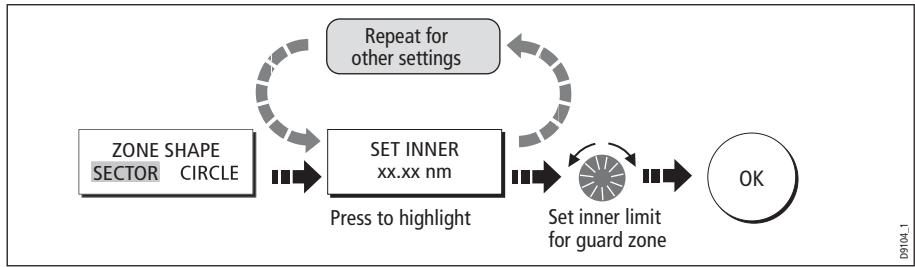


You can now select the guard zone to be either a sector or a circular zone.

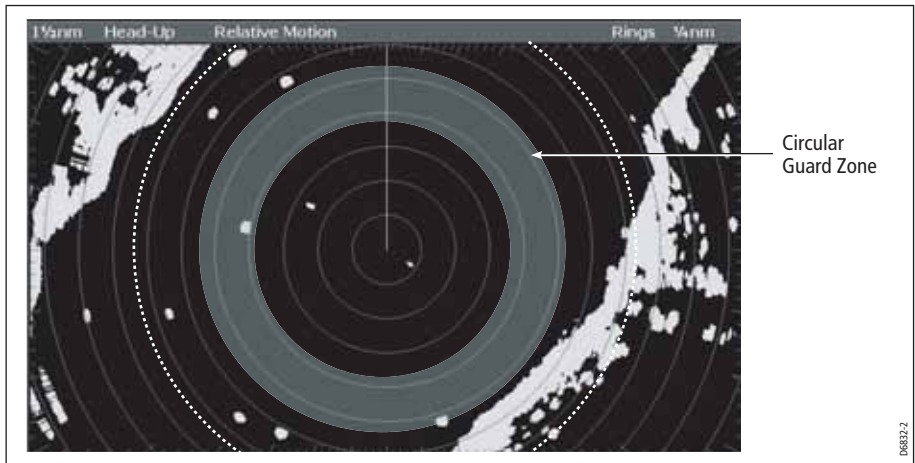
### Sector guard zones



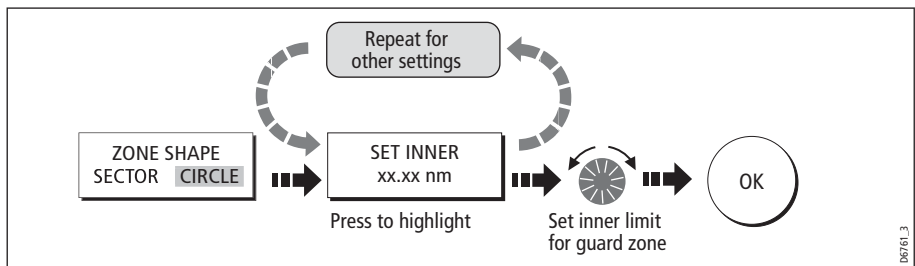
To set up a sector guard zone:



### Circular guard zone



To set up a circular guard zone:



## MARPA

### SAFETY NOTICES

MARPA can improve collision avoidance when used wisely. It is the User's responsibility to exercise common prudence and navigational judgements.

There are conditions where acquiring a target may become difficult. These same conditions may be a factor in successfully tracking a target. Some of the conditions are:

- The target echo is weak. The target is very close to land, buoys or other large targets.
- The target or your own ship is making rapid manoeuvres.
- Choppy sea state conditions exist and the target is buried in excessive sea clutter or in deep swells.
- Choppy sea state conditions exist yielding poor stability; own boat's heading data is very unstable.
- Inadequate heading data.

Symptoms of such conditions are that acquisition is difficult and the MARPA vectors are unstable; the symbol wanders away from the target, locks on to another target or changes to a lost symbol target.

If any of these conditions are present, acquisition and tracking may need to be re-initiated or, in some cases be impossible to maintain. Improving the quality of the heading data will reduce the effect of the other conditions.

### Introduction to MARPA

You can use the Mini Automatic Radar Plotting Aid (MARPA) functions for target tracking and risk analysis. MARPA improves collision avoidance by obtaining detailed information for up to 10 automatically tracked targets and provides continuous, accurate and rapid situation evaluation.

MARPA automatically tracks acquired targets, calculates target bearing and range, speed and course, Closest Point of Approach (CPA), and Time to Closest Point of Approach (TCPA).

Each target tracked can be displayed with a CPA graphic which shows the target vessel, course and speed (as a vector) and indicates the CPA. The calculated target data can also be shown on your screen. Each target is continually assessed and an audible alarm is sounded if a target becomes dangerous, or is lost.

Effective MARPA operation is dependant on accurate own-ship's heading and speed. Speed Over Ground (SOG) and Course Over Ground (COG) information are required to show true target course and speed. The better the quality of the heading and speed data, the better MARPA will perform. MARPA will function without SOG and COG in relative mode. For the best heading data a Raymarine SMART heading sensor or a gyro-stabilized autopilot is required.

### How is a risk assessed?

Each target is monitored to see if it will be within a certain distance from your boat within a certain time. If so, the target is designated as dangerous and an audible warning is sounded along with an on-screen warning being shown. The target symbol changes to the dangerous target symbol and flashes to indicate that it is a dangerous target. Pressing the appropriate soft key will silence the alarm and remove the warning.

If a target is lost, either because the MARPA software has lost contact with it, or because it has moved out of range, an audible alarm is sounded and an on-screen warning appears. The on-screen symbol will change to the target lost symbol. Pressing the appropriate soft key will silence the alarm and remove the on-screen warning and the target lost symbol.

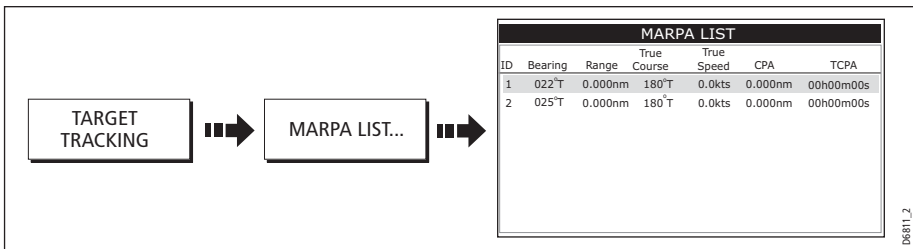
### How far from my boat does MARPA work?

MARPA target acquisition is only available at radar range scales of up to 12nm, although tracking continues at all ranges.

If you change to a smaller range scale, targets may be beyond the range of your scanner and will be lost. In such cases, an on-screen warning will indicate that the target is off-screen.

### What happens to target data?

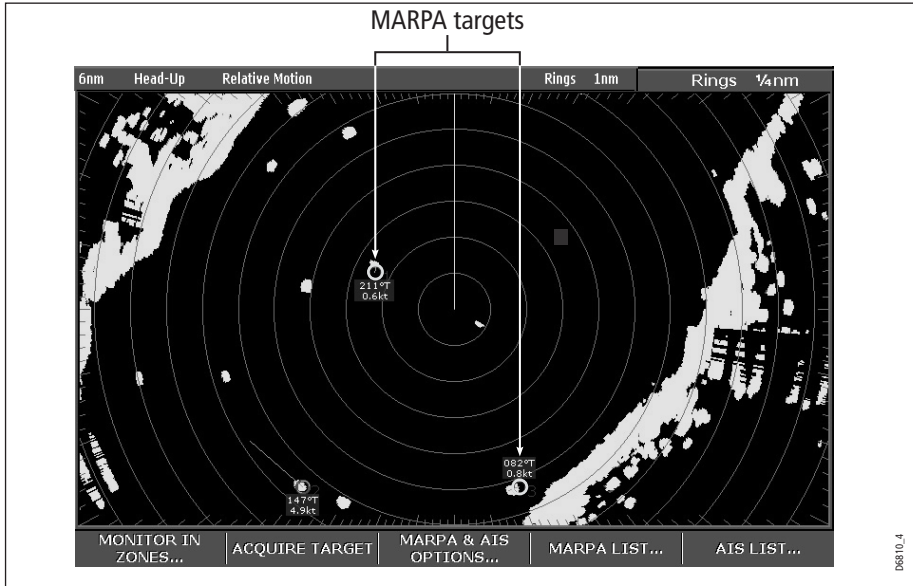
All MARPA targets are stored in a MARPA database list which shows the following information:



### Target display

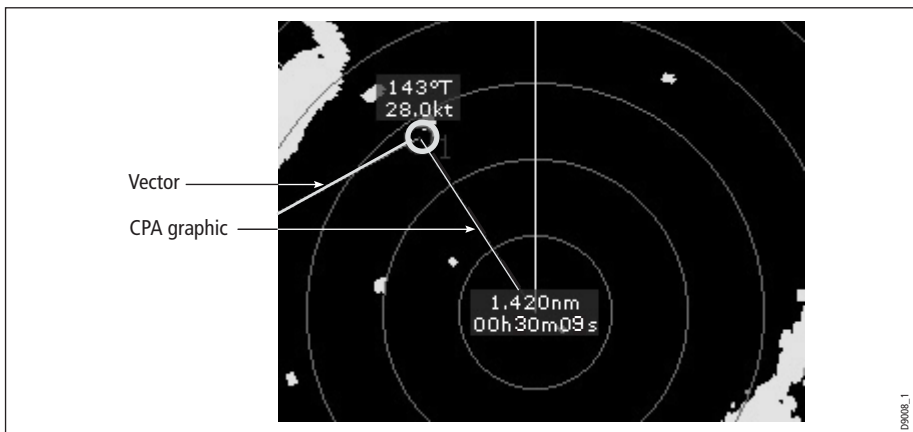
Each target is displayed as a symbol which indicates its status:






### CPA graphics

CPA graphics show vectors for your vessel and a selected target. A vector is a line on-screen showing the predicted courses of your vessel and the selected target if you both remain on your present course. These vectors vary in length due to boat speed and vector length set in the MARPA Setup menu.



To display the CPA graphic and associated soft keys:

 <p>Move cursor over target</p>	CPA GRAPHIC ON OFF AUTO	<b>ON</b> - The CPA graphic will be displayed for as long as the target is being tracked.
	CPA GRAPHIC ON OFF AUTO	<b>OFF</b> - No CPA graphic is shown.
	CPA GRAPHIC ON OFF AUTO	<b>AUTO</b> - When you place the cursor over any part of a MARPA symbol, the CPA graphic is displayed. This is the default setting.



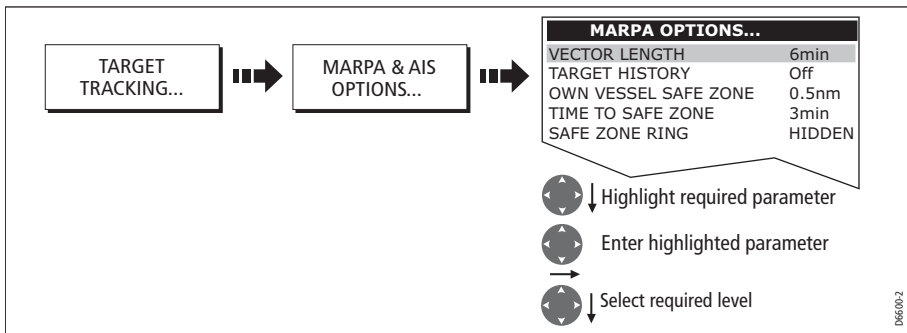
### True mode

With the display set in True mode, the vectors of your vessel and the target are shown extended to their intersection point. The CPA is shown as a line that is placed on your boat's vector at the point of the CPA. The length and direction of the line indicates the distance and bearing of the target at CPA. The text indicates CPA and TCPA. The text next to the target symbol indicates its true course and speed.

### Relative mode

With the display set in Relative mode, no vector extension of your boat is shown. The CPA line emerges from your own boat, with the target vector extension being shown as relative, not true. The text next to the target indicates its course and speed. Press SHOW DETAILS to display the calculated relative course and speed.

## Setting up MARPA

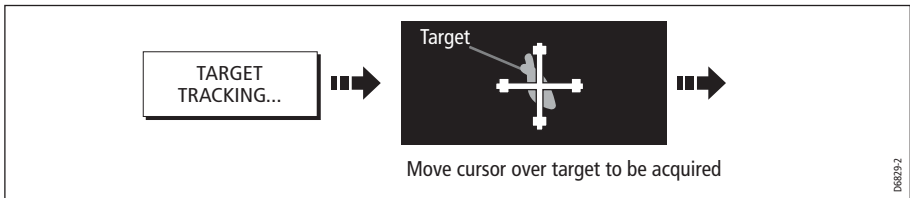


You can set up the following MARPA parameters:

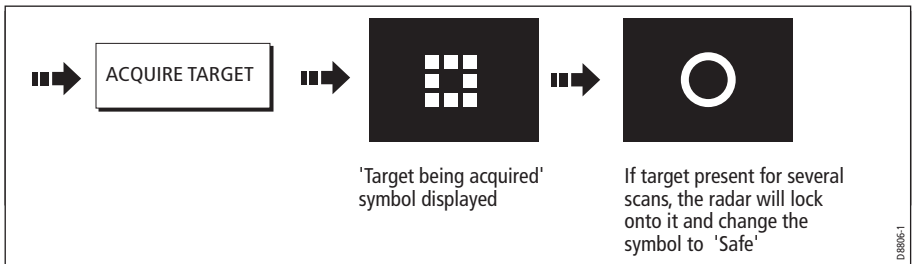
Parameter	Options (Default in bold)
<b>Vector Length</b> The time period specified for drawing length of vectors.	0.5min, 1 min, 3 min, <b>6min</b> , 12min, 30 min, 60 min
<b>Target History</b> Plots a target's previous position at specified intervals. The four most recent position points are displayed. If True target vectors are selected, the four most recent vessel position points are also displayed.	<b>OFF</b> , 0.5 min, 1 min, 3 min, 6 min
<b>Own vessel safe zone</b> The safe zone is a ring, centred on your boat. A target is considered dangerous if it is predicted to, or will reach your safe zone within the <i>time to safe zone</i> period.	0.1 nm, 0.2nm, <b>0.5nm</b> , 1.0 nm, 2.0nm
<b>Time to safe zone</b> If a target is either predicted, or enters your safe zone within this time period, it is considered dangerous.	<b>3 mins</b> , 6 mins, 12 mins, 24 mins
<b>Safe zone ring</b> Controls whether the safe zone ring is displayed or hidden on screen	Visible <b>Hidden</b>

## Acquiring a target to track

1. Select target to be acquired:



2. Acquire target:

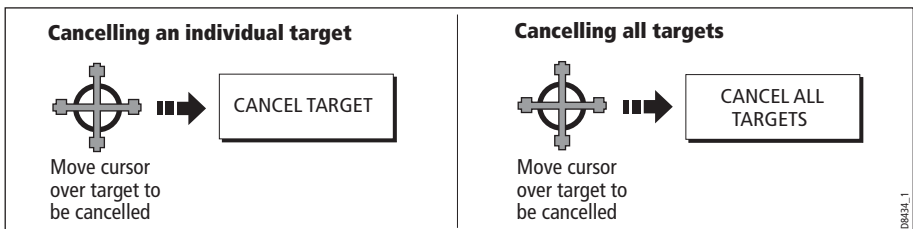


**Note:** *If set to ON, the CPA graphic is displayed.*

## Cancelling targets

### ... from the screen

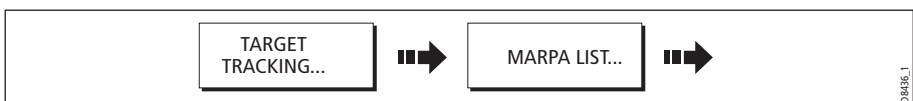
To cancel a target from the screen:



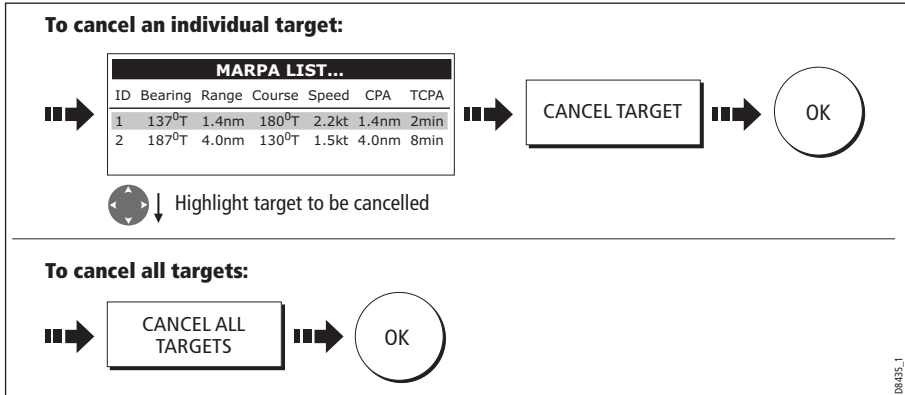
### ...from the MARPA list

To cancel a target from the MARPA list:

1. Display the MARPA List:



2. Cancel target/s:



### Displaying vessel identity (AIS)

If you have an AIS receiver fitted to your system, you can use the AIS feature to:

- Display a target for any other AIS equipped vessels within a specified range of your boat.
- Display voyage information being broadcasted by these targets i.e. their position, course, speed and rate of turn.
- Display basic or detailed information for each target vessel including safety critical target data.
- Set up a safe zone around your boat.
- View alarm and safety related messages.

This information is displayed in the form of an overlay or as a dialog box on your radar screen. To overlay AIS on a radar window:



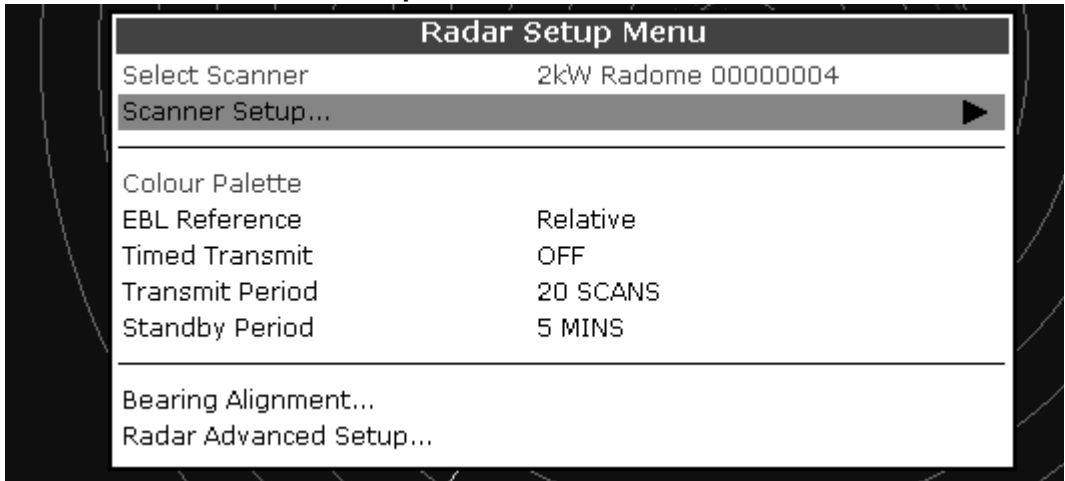
For more information on AIS, refer to *Chapter 17:Automatic Identification System (AIS)*.

## 7.11 Setting up your radar

The set up for your radar can be changed from the standard configuration to suit your particular needs. Although you will probably only do this when you first use the radar, you may decide to make subsequent adjustments once you become more familiar with the system. Any settings that you change are retained and become the default settings even when you power off.

To select the Scanner Setup menu from the Radar Setup menus when a radar window is active:

1. Select **MENU**
2. Select **Radar Setup**



Function Description	Options (Default in <b>bold</b> )
<b>EBL Reference</b> The EBL gives you a bearing to a target on the Radar display window.	<b>Mag/True</b> Relative
<b>Timed Transmit</b> Controls the radar's timed transmission power-save mode.	<b>OFF</b> ON
<b>Transmit Period</b> When ON, the scanner performs the number of scans specified and then shuts down for the number of minutes specified by the Standby Period.	<b>10 scans</b> 20 scans 30 scans
<b>Standby Period</b> Indicates the number of minutes that the system shuts down - the scanner does not rotate and the display is in standby mode.	<b>3 minutes</b> 5 minutes 10 minutes 15 minutes
<b>Sea Clutter Curve...</b> Adjusts the acuteness of the sea clutter curve when the sea clutter option is set to manual (see <i>page 152</i> ).	1-8
<b>Antenna Size</b> If an open array scanner is fitted, this specifies the size of the scanner.	Open array 48" 72"
<b>Bearing alignment</b> Correct for display azimuth error. Please refer to the E-Series installation guide.	
<b>Radar Advanced Setup</b> Please refer to the E-Series installation guide.	

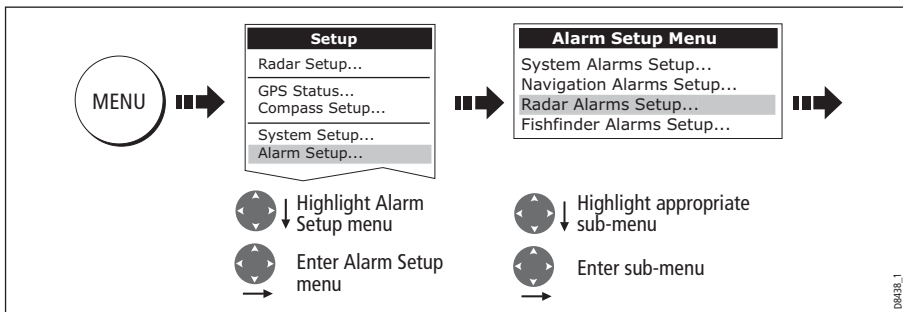
## 7.12 Warnings of potential dangers

If switched on, the following alarms will be triggered when you are in the radar application:

- System alarms - anchor, timer, alarm clock and temperature.
- Navigation alarms - arrival and off track.
- Radar alarms - guard zones.
- Fishfinder alarms.
- Weather alarms.
- AIS alarms.
- Depth alarms.
- Data alarms.
- External SeaTalk alarms.

When an alarm is triggered, a buzzer sounds and a pop-up window describing the alarm and how to clear it is displayed.

To switch these alarms on/off and set the limits:



**Note:** For more details of alarms, see page 33 and page 290.



# Chapter 8: Using the Radar (Digital)

The E-series can be used with digital radar scanners. Digital scanners offer:

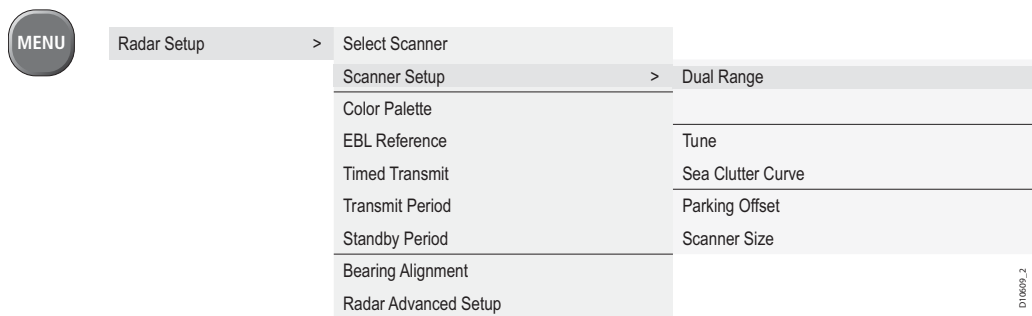
- Improved target definition.
- Full-color image.
- SuperHD option. Super HD effectively increases the transmitter power by a factor of at least two, and reduces the beamwidth by a similar amount.

**Note:** *You require a Super HD radar for the Super HD option to function.*

- Dual-range operation.

## 8.1 Radar setup

The Radar Setup Menu lets you customize the way the radar operates. Changes you make in this menu are kept when you remove power from the E-Series system.



**Note:** *The radar needs to be receiving heading and position data for full functionality.*

### Select scanner

Selects which scanner is displayed in active radar windows.

### Scanner setup

The scanner setup option lets you customize various aspects of the scanner's behavior, such as the 'Edit Name' softkey, which allows you to name individual scanners.

## Dual range

**Note:** *Dual Range operation:*

1. *Dual Range operation is not available if Marpa is ON.*
2. *With Dual Range switched on:*
  - *You cannot acquire MARPA targets.*
  - *Chart-Sync is temporarily disabled.*
  - *Chart overlay is temporarily disabled.*

If dual range is set to on, the system allows you to view two ranges simultaneously in separate windows.

Short range gives you a maximum range of 3 nautical miles; long range provides standard ranges. It is not possible for the long range to be set to a range less than the short range i.e. if Short range = 3nm then Long range cannot be less than 3nm.

**Note:** *The **SHORT** option for Super High Definition (SHD) radars in Dual range, operates in HD mode only. **LONG** operates in SHD for all ranges (see table below for definition of ranges and radar operation).*

Dual Range	Range Covered	Operation
LONG	1/8nm to 72nm	SHD
SHORT	1/8nm to 1 <sup>1</sup> / <sub>2</sub> nm	HD

## Tune adjust

The tune adjust function is used to fine-tune the scanner's receiver for maximum target returns on the display.

### Auto mode: recommended

In AUTO mode, the radar tunes itself automatically on all range scales.

This is the default mode and it is recommended that you leave the tune function in auto mode to ensure that the radar receiver is always tuned to receive the maximum signal.

### Manual mode

If you do set the tune function to MANUAL, you will need to adjust it about 10 minutes after you have turned on the radar, as the required setting will change after the magnetron has warmed up.

Adjust the control to obtain the maximum signal strength (indicated by the eight-step horizontal bar). If you cannot tune the radar successfully, refer to the Installation Guide.



## Sea clutter curve

Radar echoes from waves around your boat can clutter the centre of the radar picture, making it difficult to detect real targets. Several factors can effect the level of clutter you see, such as the mounting height of the radar, weather and sea conditions. The sea clutter curve settings adjust the system's sensitivity to sea clutter. The steepest setting is 1 and the shallowest is 8. The default setting is 1.

## Parking offset

The default parking offset is 0 degrees: the scanner aligns with the pedestal, facing forwards.

With parking offset selected you can use the rotary controller to adjust the parking offset from 0 to 358 degrees in steps of two degrees.

This setting change is only available when the digital radar is set to Off or Standby. The changes you make are applied at the end of the next transmit cycle.

### To open the radar setup menu

1. Make a radar application window active.
2. Press the **MENU** button.

## Antenna size

Antenna size selection is available under the radar setup menu. This should be set by the user.

1. Press the **MENU** button.
2. Select **Radar Setup**.
3. Select **Scanner Setup**.
4. Select **Antenna Size**, select your required antenna size from the list.
5. Press **OK**.

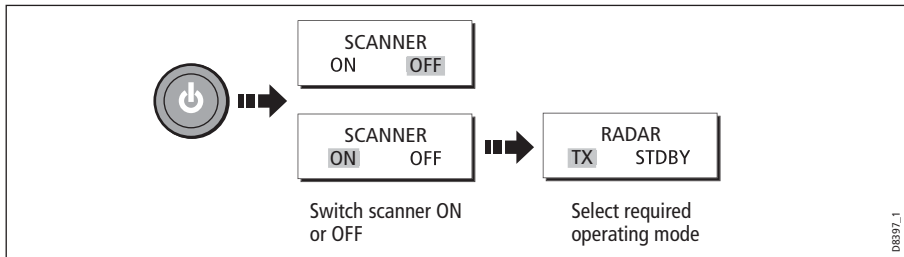
## 8.2 Radar alarms

For information about the radar-specific alarms you can configure, see *Alarm Setup Menu* on page 289.

**Note:** *Until you are familiar with interpreting the radar display, take every opportunity to compare the radar display with your physical surroundings. Note the location of boats, buoys and coastal structures and their corresponding echoes on the radar display. Practice harbor and coastal navigation during daylight hours and in clear weather conditions.*

### 8.3 Powering on/off the various scanner operating modes





To control the power to the radar:



**Notes: (1)** *When an open array antenna is fitted, the system stops the antenna in the forward facing position when Standby mode is selected.*

### Radar status

The following table summarizes the various scanner states and associated status icons.

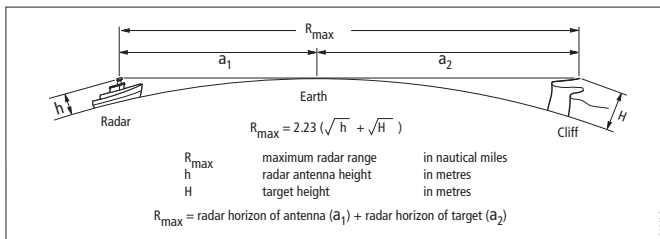
Status	Icon	Description
<b>Transmit (TX)</b>	 (Rotating icon)	<b>Scanner on and transmitting.</b> This is the usual mode of operation.
<b>Standby (STDBY)</b>	 (static icon)	<b>Scanner powered on but not transmitting; antenna not rotating.</b> This is a power-save mode used when radar is not needed for short periods. When you return to transmit mode, the magnetron does not need to warm up. This is the default mode.
<b>Off</b>	 (grayed-out icon)	<b>Scanner powered off.</b> When radar is not required.
<b>Timed transmit</b>	 (rotating/static icon)	<b>Scanner switches between on/transmitting &amp; standby mode.</b> Power save mode when constant use of radar not required. To set up this option, see <i>page 187</i>

## 8.4 Radar range and image quality

Radar operates by transmitting radio pulses, then detecting the reflections as the pulses bounce back from objects within radar range. The reflections are processed and displayed on-screen as 'echoes'.

### Range

Radar range is limited by the height of your scanner and the height of the target, as illustrated below:



The table below gives the approximate range for various antenna and target heights.

Antenna height (m)	Object height (m)	Range (nm)
3	3	7.7
3	10	10.9
5	3	8.8
5	10	12

### Image quality

Not all radar echoes are produced by valid targets. Spurious echoes may be caused by:

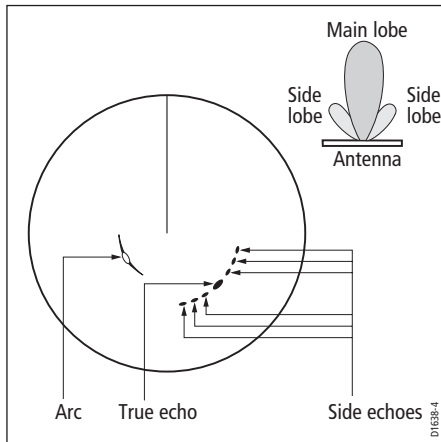
- Side lobes
- Indirect echoes
- Multiple echoes
- Blind sectors
- Sea, rain or snow clutter
- Interference

Through observation, practice, and experience, you can generally detect these conditions very quickly and use the radar controls to minimize them.

## Side lobes

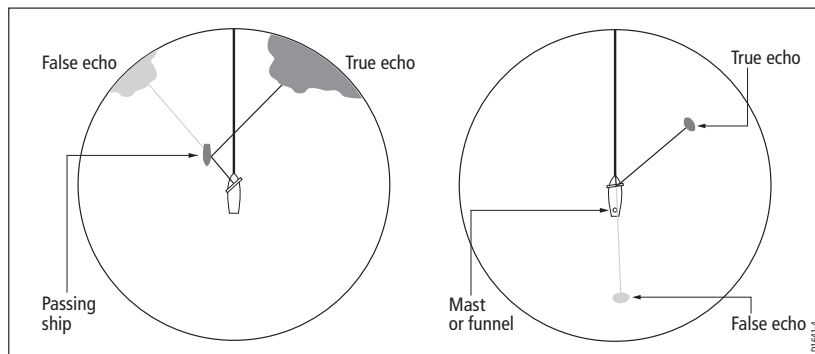
Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside the narrow main beam.

The effects of side lobes are most noticeable with targets at short range (normally below 3 nm) and with large objects. Side lobe echoes form either arcs on the radar screen similar to range rings, or a series of echoes forming a broken arc.



## Indirect echoes

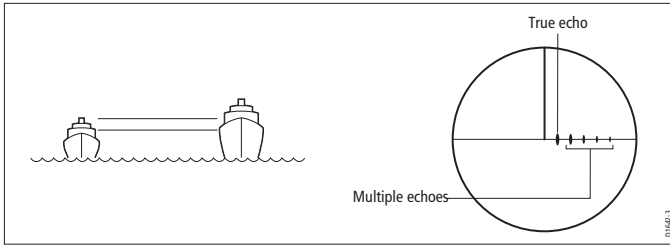
There are several types of indirect echoes, or 'ghost' images. These sometimes have the appearance of true echoes, but in general they are intermittent and poorly defined.



## Multiple echoes

Multiple echoes are uncommon but can occur if there is a large object with a wide vertical surface at a comparatively short range. The transmitted signal bounces between the object and your own vessel, producing multiple echoes. The false

echoes are displayed beyond the range of the true target echo, but on the same bearing.



### Blind sectors

Obstructions such as funnels and masts near the radar antenna can obstruct the radar beam and cause radar shadows or 'blind sectors'.

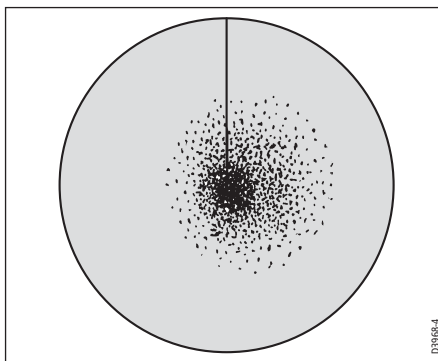
If the obstruction is relatively narrow, there will be a reduction of the beam intensity, though not necessarily a complete cut-off. However, with wider obstructions there can be a total loss of signal in the shadow area. There might also be multiple echoes which extend behind the obstruction.

Blind sector effects can normally be minimized by careful selection of the scanner site prior to installation.

### Sea clutter

Radar returns from waves around the vessel can clutter the centre of the radar picture, making it difficult to detect real targets. Such 'sea clutter' usually appears as multiple echoes on the display at short range, and the echoes are not repetitive or consistent in position.

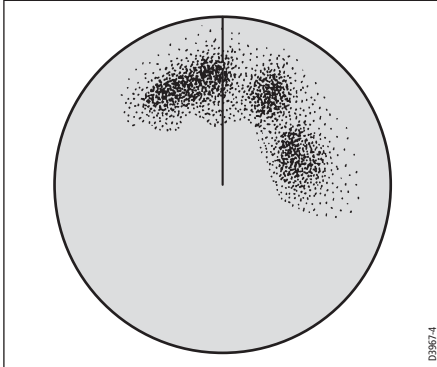
In high winds or extreme conditions, sea clutter can produce an almost solid disc on a radar display.



## Rain or snow clutter

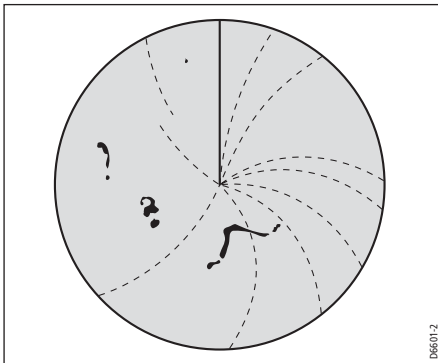
Radar detects rain and snow. Returns from storm areas and rain squalls consist of countless small echoes which continually change in size, intensity and position.

These returns sometimes appear as large hazy areas, depending on the intensity of the rainfall or snow in the storm cell.

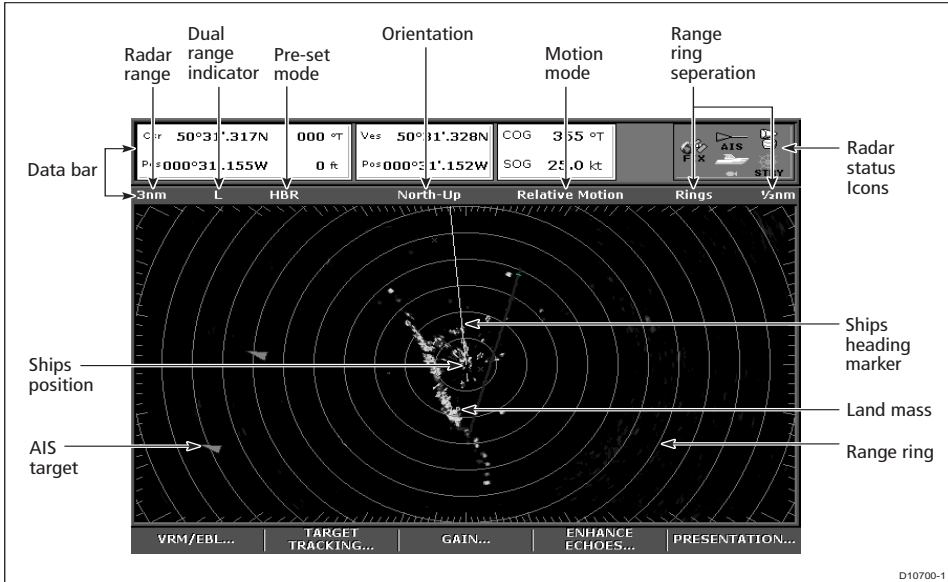


## Mutual radar interference

This can occur when two or more radar-equipped vessels are operating within range of each other. The interference usually appears as a spiral of small dots from the display centre, and is most marked at long ranges.



## 8.5 Radar window overview



### Your position

By default your boat is shown at the centre of the radar display and your dead-ahead bearing is indicated by a vertical line known as the Ship's Heading Marker (SHM).

### Operation modes

The radar gives excellent results in one of the four preconfigured operation modes under the **GAIN** softkey. Select the mode that best suits your circumstances: attempting to make manual adjustments to the settings could degrade your image. (However, this facility is available.)

See *page 197* for more information.

### Other vessels or objects

On-screen targets may be large, small, bright or faint, depending on the size of the object, its orientation and surface type.

Remember that the strength of an object's echo may not be proportional to the physical size of the object. For example, a nearby object might produce an echo of the same strength as a more distant, but larger object.

With experience, the approximate size of different objects can be determined by the relative size and brightness of the echoes.

## Factors affecting echo strength

- The physical size of the reflecting object.
- The material from which the object is made. Metallic surfaces reflect signals better than non-metallic.
- Vertical surfaces, like cliffs, reflect the radar signal better than sloping surfaces, like sandbanks.
- High coastlines and mountainous coastal regions can be observed at longer radar ranges. Therefore, the first sight of land may be a mountain several miles inland from the coastline. Although the coastline may be much nearer, it may not appear on the radar until the vessel is closer to shore.
- Some targets, such as buoys and small boats, can be difficult to discern, because they do not present a consistent reflecting surface as they bob about in the waves. Consequently, these echoes tend to behave erratically on the radar screen.
- Buoys and small boats often resemble each other, but boats can often be distinguished by their motion.
- Trees and shrubbery do not reflect radar. Thus, they can disguise the shape of nearby land.

## 8.6 Using waypoints with the radar

You can use waypoints in the radar application for navigation (just like in the chart application), using the **WPTS/MOB** button.

You can also edit waypoints from within the radar application.

For full details on using waypoints, see *Chapter 3* and *Chapter 4*.

## 8.7 Radar display options

The presentation softkey on the radar toolbar gives you control over:

- Waypoint behavior
- Radar mode and display orientation
- Range rings
- AIS

### Orientation

Radar *orientation* refers to the relationship between the radar display and your direction of travel. There are three orientation modes:

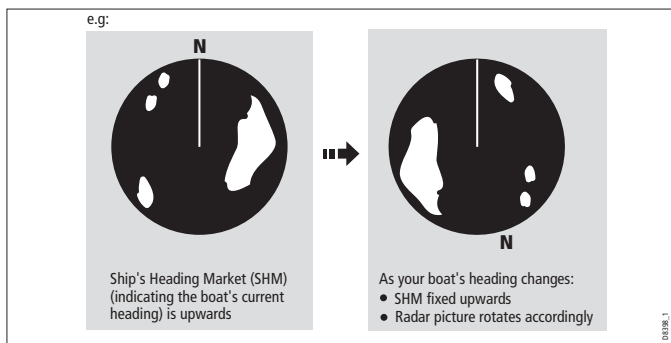
- Head up
- North up
- Course up



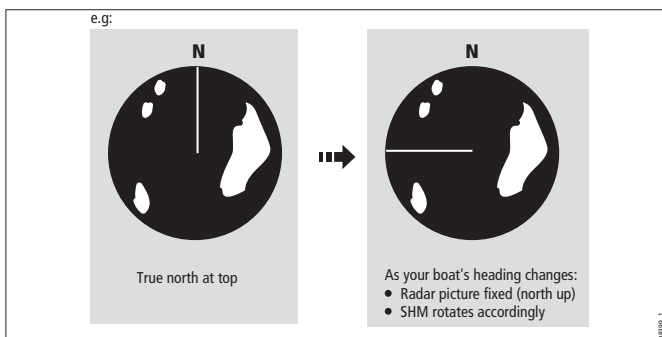
These orientation modes are used in conjunction with motion modes (see *page 194*) to control how your vessel's progress is shown on screen.

## Heading-Up (H-UP)

This is the default mode for the radar application.



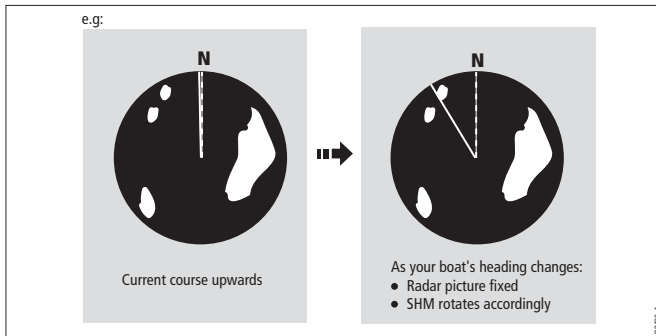
## North-Up (N-UP)



If heading data becomes unavailable while in this mode, a warning message will be shown, the status bar shows North-Up in brackets and the radar uses 0° heading in relative motion. When heading data becomes available once more, North-Up mode is reinstated.

It is not possible to select Head Up mode when the motion mode is set to True.

## Course-Up (C-UP)



If you select a new course, the picture will reset to display the new course upwards.

The reference used for Course-Up depends upon the information available at a given time. The system prioritizes this information in the following order:

1. Bearing from origin to destination (your intended course).
2. Locked heading from an Autopilot.
3. Bearing to waypoint.
4. Instantaneous heading.

If heading data becomes unavailable while in this mode a warning message is displayed; the status bar puts Course-Up in brackets to show it is suspended; and the radar uses 0° heading in relative motion mode.

When heading data becomes available again, Course-Up mode is reinstated.

### To select an orientation mode

1. Press the **PRESENTATION** softkey.
2. Press **RADAR MODE & ORIENTATION**.
3. Choose your preferred setting under the **ORIENTATION** softkey.

The selected orientation mode is displayed in the status bar.

## Setting the motion mode

Motion modes control how your progress is represented on the display. The selected motion mode is displayed in the status bar. If no position data is available, the status bar shows the motion mode in brackets.

There are two motion modes:

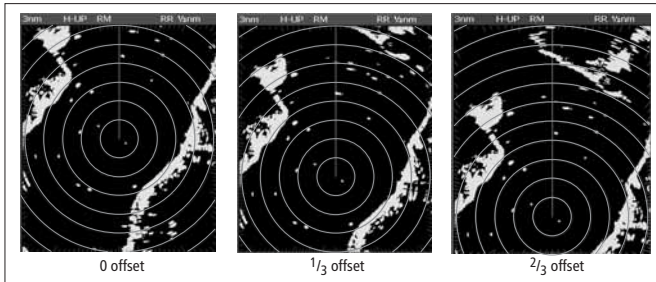
- Relative motion
- True motion

The default setting is relative motion.

## Relative motion (RM) with optional vessel offset

When the motion mode is set to Relative, the position of your boat is fixed on the screen and all the targets move relative to the boat.

You can specify whether the boat is fixed in the centre of the window (0 offset) or offset by 1/3 or 2/3:



The default vessel-offset value is zero.

## True Motion (TM)

When the motion mode is set to True, fixed radar targets maintain a constant position and moving vessels (including your boat) travel in true perspective to each other and to fixed landmasses on the screen. As the boat's position approaches the edge of the screen, the radar picture is automatically reset to reveal the area ahead of the boat.

If heading and position data become unavailable when true motion is selected: a warning message is shown; the display reverts to relative motion; the status bar indicates that True Motion is selected but suspended by showing it in parentheses (TM).

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

### To set the motion mode

1. Press the **PRESENTATION** softkey.
2. Press **RADAR MODE AND ORIENTATION**.
3. Toggle between True and Relative Motion on the **MOTION MODE** key.

### To change the vessel offset

1. Press the **PRESENTATION** softkey.
2. Press **RADAR MODE & ORIENTATION**.
3. Toggle to your desired offset using the **VESSEL OFFSET** softkey.

## Changing the bearing mode for EBLs

The default bearing mode for EBLs is relative to your vessel's heading. If heading data is available, you can set the bearing mode to be relative (REL) or magnetic/true (M/T).

When M/T is selected, the EBL bearings will be expressed as either true or magnetic, depending on the equipment connected. The current EBL bearing is given on the EBL label and on the ADJUST VRM/EBL softkey label.

### To change the EBL reference

1. Press **MENU**
2. Toggle to **RADAR SETUP** page
3. Toggle to **EBL REFERENCE**
4. Toggle between **MAG/TRUE** and **RELATIVE** on the **EBL REFERENCE** menu.
5. Press **OK** to select the desired option

## 8.8 Dual range

**Note:** *For Dual range to work you must first activate it from within the Scanner set up menu, also there are limiting factors enabling the use of dual range mode.*

The E-Series system allows you to view either a short- or a long-range image in separate radar windows. To allow this, dual range must be enabled in the Radar Setup Menu (*see Radar setup on page 183*). The default setting is long, which provides a standard scanner range. The short setting provides a maximum range of three nautical miles the long range can not be set to less than current setting of the short range i.e. if Short range is set to 3nm then Long range can not be less than 3nm.

### To set the range

1. Press the **PRESENTATION** softkey (within an active radar window).
2. Press **RADAR MODE & ORIENTATION**.
3. Toggle between **LONG** and **SHORT** on the **DUAL RANGE** softkey.

**Note:** *Dual Range operation:*

1. *Dual Range operation is not available if Marpa is ON.*
2. *With Dual Range switched on:*
  - *You cannot acquire MARPA targets.*
  - *Chart-Sync is temporarily disabled.*
  - *Chart overlay is temporarily disabled.*

## 8.9 Tuning the radar display:

### Gain

Gain reduces the effect of false echoes and clutter. For best results, it is recommended you retain the default AUTO setting. You can, however, adjust gain settings manually if required.

### Gain presets

There are four preset gain modes to give you the best picture in different circumstances.

**Harbor** is the default mode. This setting takes account of land clutter so that smaller targets, like navigation buoys, are not lost.

**Coastal** accounts for the slightly higher levels of sea clutter you might encounter out of harbor and adjusts the radar display accordingly.

**Offshore** automatically adjusts for high levels of sea clutter.

**Buoy** is a special mode to enhance the detection of small objects like mooring buoys. It is useful at ranges up to 3/4 nm.

### Manually adjusting gain settings

The gain settings function makes the radar picture clearer by changing the sensitivity of radar reception.

- **For long ranges** select a sensitivity level that gives a slight speckle in the background. Setting the gain too low can cause weak or small targets to disappear, however.
- **For shorter ranges** reduce the gain slightly to reduce speckle and improve target definition.

**Note:** *If you control gain manually, check it each time you change the range scale.*

### To manually adjust gain settings

1. Press the **GAIN** softkey.
2. Select a pre-set you want to adjust i.e. '**COASTAL MODE**'.
3. Press **ADJUST** to display the adjustment toolbar.
4. Press the softkey you want to change the value for.
5. Once **MAN** is shown, and the value percentage slider is displayed above the softkey, use the rotary control to change the value up and down.
6. Press **OK** or **CANCEL** to return to the top level.

The changes you make are applied to both the active window and any other radar windows displaying this preset. Gain setting changes are kept at system power-off.

## Gain

The gain control makes the radar picture clearer by changing the sensitivity of radar reception.

- **For long ranges** - select a sensitivity level that gives a slight speckle in the background. Be careful not to set the gain too low, or you may miss weak or small targets.
- **For shorter ranges** - reduce the gain slightly to reduce the speckle and therefore improve target definition.

**Note:** *If the gain settings are manually changed you should re-check it every time you change the range scale.*

## Color Gain

The Color Gain control adjusts the intensity (color) of displayed targets, but does not significantly adjust the number of targets displayed.

Increasing the color Gain will cause more targets to be displayed in the same color. This may avoid some confusion as to whether a return on the screen is a target or background noise.

Reducing the color gain may give better target detail, target discrimination and target detection within clutter.

## Rain clutter

Radar detects echoes from rain or snow. The strength of these echoes depends upon the altitude, range, density and size of the snow flakes or rain droplets and appear on screen as countless small echoes continuously changing size, intensity and position.

Turning the RAIN clutter function on suppresses the bulk effect of rain returns from around your boat, so that recognizing other objects is easier. Once Rain clutter is set to **ON** use the rotary control to fine tune the rain clutter control.

## Sea clutter

Radar echoes from waves around your boat can clutter the centre of the radar picture, making it difficult to detect real targets (see *page 187*).

Adjusting the sea mode will reduce this clutter for up to 5 nautical miles (depending on wave and sea conditions) from your boat. This reduces sea echoes to intermittent small dots, while small targets remain visible and persistent. Gain levels further from your boat remain unchanged. The sea clutter curve under Scanner Set up will effect the effectiveness of this control (see *Sea clutter curve on page 185*).

## Super HD adjustments

**Note:** *Only available if a 'Super HD' radar is fitted to your vessel.*

You can generally use the default AUTO settings for best results, but two manual controls allow you to explore Super HD's capabilities.

### Antenna boost

This scales the effective antenna size. At zero, the effective antenna size matches its actual size. At 95, the effective antenna size is doubled.

Increasing effective antenna size has the effect of separating targets that appear merged at lower settings.

In some circumstances, a larger effective scanner can be a drawback. In particular, if you are in a harbor or close to land, you may see more detail than is useful. For that reason, the AUTO settings for Harbor and Coastal modes provide lower scale factors of about 30% and 60%.

### Power boost

This adjusts effective transmit power. At zero, the radar operates at its standard power (4kW or 12kW). At 90, the effective power is increased by a factor of at least two.

Increasing power has the effect of making targets more distinct from noise. For maximum benefit, reduce power boost to prevent saturation of strong targets.

The default power boost setting for all AUTO modes is 90.

## 8.10 Tuning the radar display: ENHANCE ECHOES

The ENHANCE ECHOES softkey gives you access to further features for tuning the radar display.

### Interference rejection

Interference rejection automatically reduces mutual radar interference when two radar-equipped vessels are operating within range of each other. It is switched on by default.

Turning interference rejection off altogether allows you to detect the presence of other radars in the vicinity.

#### To turn interference rejection off

1. Press the **ENHANCE ECHOES** softkey from an active radar window.
2. Toggle the setting to **OFF** on the **INT REJECT** softkey.

## Expansion

The expansion function allows you to either override the pulse length or to give larger returns so targets are easier to see.

### To override the pulse length

1. Press the **ENHANCE ECHOES** softkey from an active radar window.
2. Select **EXPANSION** softkey to turn expansion function **ON** or **OFF**.

**Note:** *Selecting this option may compromise target resolution.*

## Wakes

When the wakes function is switched on, you can see the direction and speed of moving targets relative to your boat. Targets are displayed in blue, turning to paler shades of blue as the signal diminishes.

The wakes option is a local setting which applies only to the display on which you are working. You can choose to display wakes for a period of 10 seconds, 30 seconds, 1 minute, 5 minutes or 10 minutes.

### To switch wakes display on

1. Press the **ENHANCE ECHOES** softkey.
2. Toggle wakes to **ON** using the **WAKES** softkey.
3. Select your preferred wakes setting with the trackpad.
4. Press **OK**.

### To switch wakes display off

1. Press the **ENHANCE ECHOES** softkey.
2. Press the **WAKES ON/OFF** softkey.
3. Press **OK**

## 8.11 Radar range

You can zoom in or out to view the radar display at different scales. The scale is measured from the centre to the top of the window and is displayed in the left-hand corner of the status bar.

- **Short-range scales** show nearby objects in greater detail, and are most suitable as you approach coastlines, harbors, or other vessels. The shortest range available is 1/8 nautical miles.
- **Long-range scales** provide the best overview of the vessel's relationship to land-masses, weather fronts and large ships within or beyond your field of vision. The longest range available is 72 nautical miles, depending upon the scanner fitted.



**To change the radar range**

1. Zoom to your required scale using the **RANGE** button on the keyboard.

**Note:** *If Dual range is set to on, the Long range can not be set to less than the Short range value.*

**Synchronizing radar range and chart scale**

The chart application includes an option to synchronize the radar range with the chart scale.

When synchronization is switched on:

- The radar range in all radar windows changes to match the chart scale.
- 'Sync' is displayed in the top left-hand corner of the chart window.
- If you change the radar range, all synchronized chart views change scale to match.
- If you change the scale of a synchronized chart window, all radar windows update to match.

**To synchronize radar range and chart scale**

1. Make a **chart window** active.
2. Press the **PRESENTATION** softkey.
3. Press **CHART MODE AND ORIENTATION**.
4. Toggle to **RDR** on the **CHART SYNC** softkey.

(Also see *Distinguishing between fixed and moving objects* on page 92)

**Note:** *Radar - Chart range synchronization is not available when the chart motion mode is set to 'AR' (autorange), also the Radar - Chart range synchronization is temporarily disabled when the selected digital radar is set to dual range, (see note under Dual range on page 184).*

**8.12 Measuring distance, range and bearing**

You can measure distance, range and bearing in the radar application. Options for doing so are detailed in the table below.

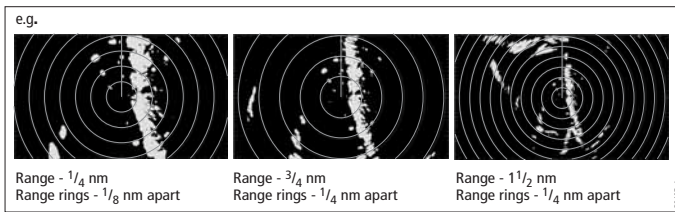
<b>Functions</b>	<b>Distances between points</b>	<b>Range from your boat</b>	<b>Bearings</b>
Range Rings	Yes (approx.)	Yes (approx.)	-
Cursor	-	Yes	Yes

Functions	Distances between points	Range from your boat	Bearings
Variable Range Markers (VRMs)	-	Yes	-
Electronic Bearing Lines (EBLs)	-	-	Yes
Floating VRMs	Yes	-	-
Floating EBLs	-	-	Yes

### Range rings

Range rings help you gauge the approximate distance between points at-a-glance. Range rings are centred on your position and displayed on the screen at pre-set intervals.

The number and spacing of range rings changes to suit the scale you have set.



#### To show or hide range rings

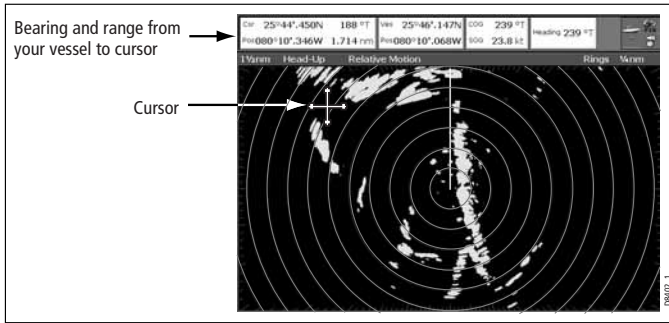
1. Press the **PRESENTATION** softkey.
2. Toggle to **ON** or **OFF** using the **RANGE RINGS** softkey.

### Bearing and range

The radar display shows you bearing and range data to any object you highlight.

#### To find the bearing and range to an object

1. Move the cursor to the object's position.
2. Read off the bearing and range in the databar.



## The Variable Range Marker (VRM) and Electronic Bearing Line (EBL)

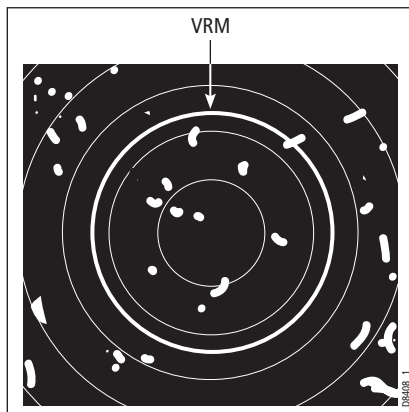
The VRM/EBL softkey opens the toolbars shown below:

### Variable Range Marker

A Variable Range Marker (VRM) is a circle of variable radius centred on your vessel's position.

You can use the VRM to measure the distance from your vessel to a selected object by adjusting the radius of the marker so that it intersects the object's position.

The range is displayed on the ADJUST VRM softkey label when you highlight the VRM.

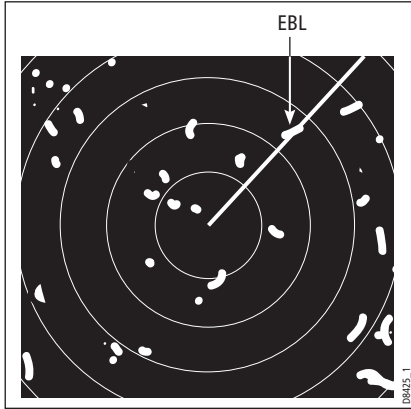


### Electronic Bearing Marker

An Electronic Bearing Line (EBL) is an on-screen marker drawn from your position to the edge of the window.

When this line is rotated to align with a target, the bearing relative to your current heading is measured and displayed on the ADJUST EBL softkey label.

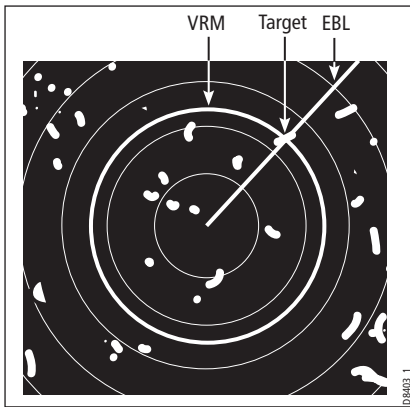
The data is also displayed if you select the EBL with the cursor.



To change the EBL reference from relative to magnetic or true, see *page 196*.

## Combined range and bearing

You can combine a VRM and an EBL to measure range and bearing simultaneously:



## Tracking a target with a VRM or EBL

You can tell which direction an object is travelling in by tracking its movement in relation to the EBL. If it continues travelling towards the EBL, it could be on a collision course with your boat.

### To create a VRM or an EBL

1. Press the **VRM/EBL** softkey.
2. Toggle to **ON** with the **VRM/EBL** softkey.

3. To adjust settings, press either the **ADJUST VRM** or **ADJUST EBL** softkey and make changes with the rotary controller.

#### **To place a second VRM or EBL**

1. Press the **SET UP VRM/EBL 2** softkey.
2. Proceed as with **VRM/EBL 1**.

### **Floating VRM and EBL**

The VRM/EBL float function allows you to measure range and bearing between any two points on the radar screen (rather than from your vessel's position).

First you move the VRM/EBL centre to the position you want to measure from. Then you change the radius of the VRM to measure distance, or change the angle of the EBL to take a bearing.

#### **To use floating VRM**

1. Create a standard VRM.
2. Highlight the VRM or press the **VRM/EBL** softkey.
3. Press the **FLOATING VRM** softkey.
4. Press the **ADJUST FLOAT** softkey.
5. Move the cursor to the point to **measure from**.
6. Press **OK**.
7. Move the cursor to the point to **measure to**.
8. The range between the two points is shown on the **ADJUST VRM** softkey label.

#### **To use floating EBL**

1. Create a standard EBL.
2. Highlight the EBL or press the **VRM/EBL** softkey.
3. Press the **ADJUST EBL** softkey.
4. Adjust the direction and start point of the EBL using the trackpad and rotary controller.
5. The bearing is shown on the **ADJUST EBL** softkey label.

#### **To use a second floating VRM or EBL**

1. Press **SET UP VRM/EBL 2**.
2. Toggle **VRM/EBL 2** to **ON**.
3. Repeat the steps for using a floating VRM (steps 1-8).

**To unfloat a VRM or EBL**

1. Press the **VRM/EBL** softkey.
2. Press the **FLOATING EBL** softkey (under **SET UP VRM/EBL 2** if you are using a second floating VRM or EBL).
3. Select **CENTER**.
4. Press **OK**.

## 8.13 Using radar to track objects

The **TARGET TRACKING** softkey opens the toolbars shown below:

Target tracking functions are used to help avoid collisions.

- **Guard zones** sound an alarm when an object comes within a specified range.
- **MARPA** displays information about tracked objects.
- **AIS** displays the identity and voyage information of other AIS-enabled vessels.

**To track a target**

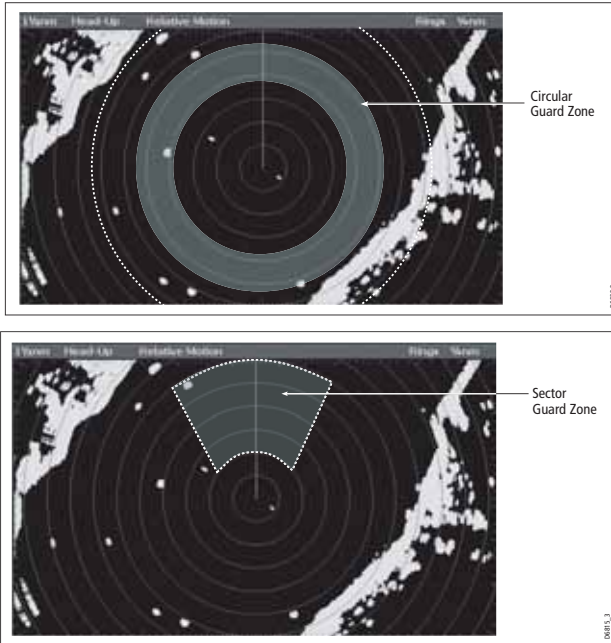
1. Press the **TARGET TRACKING** softkey.
2. Highlight the object you wish to track.
3. Press the **ACQUIRE TARGET** softkey.

The 'target being acquired' icon is displayed, followed by the appropriate MARPA status icon.

### Guard zones

A guard zone is a 'protected' area around your vessel: as soon as an object (like another vessel) enters the zone, it triggers an alarm on your Nav Station. Guard zones are managed from the Monitor in Zones toolbar.

Guard zones can be either circular- or sector-guards, and you can define up to two of them on your system.



You can adjust the sensitivity of guard zones on the Alarms Setup Menu. For more information, see *Alarm Setup Menu* on [page 289](#).

Guard zones only operate when the whole zone is displayed on the screen. To avoid inappropriate alarms, they become active ten seconds **after** being placed or edited.

### To place a guard zone

1. Press the **TARGET TRACKING** softkey.
2. Press the **MONITOR IN ZONES** softkey.
3. Toggle **ZONE 1** or **ZONE 2** to **ON**, as appropriate.
4. Press the corresponding **SET UP ZONE** softkey.
5. Choose your zone shape.
6. Set the limits of the guard zone using the rotary controller.
7. Press **OK**.

## MARPA

The Mini Automatic Radar Plotting Aid (MARPA) provides target-tracking and risk-analysis features. MARPA obtains detailed information for up to 25 automatically tracked objects (using a digital radar) and provides continuous, accurate and rapid situation analysis.

To use MARPA, you need a fast heading sensor.

**Note:** Marpa will **NOT** operate with dual range switched on.

## Setting up MARPA

You can customize the following parameters from the MARPA Options menu:

Parameter	Options
<b>Vector Length</b> The time period specified for drawing length of vectors.	0.5min, 1 min, 3 min, <b>6min</b> , 12min, 30 min, 60 min
<b>Target History</b> Plots a target's previous position at the specified intervals. The four most recent position points are displayed. If True target vectors are selected, the four most recent vessel position points are also displayed.	<b>OFF</b> , 0.5 min, 1 min, 3 min, 6 min
<b>Own vessel safe zone</b> The safe zone is a ring, centred on your boat, within which a target is considered dangerous if it will enter this zone within the <i>time to safe zone</i> period.	0.1 nm, 0.2nm, <b>0.5nm</b> , 1.0 nm, 2.0nm
<b>Time to safe zone</b> If a target is predicted to enter your safe zone within this time period, it is considered dangerous.	<b>3 mins</b> , 6 mins, 12 mins, 24 mins
<b>Safe zone ring</b> Controls whether the safe zone ring is displayed or hidden on screen	Visible <b>Hidden</b>

### To open the MARPA Options menu

1. Press the **TARGET TRACKING** softkey.
2. Press the **MARPA & AIS OPTIONS** softkey.
3. Change MARPA options as required.

### Safety notices

MARPA can improve collision avoidance when used wisely. It is the User's responsibility to exercise common prudence and navigational judgements.

There are certain conditions under which acquiring a target may become difficult. Some of those conditions are:

- The target echo is weak.
- The target is very close to land, buoys or other large targets.
- The target or your own ship is making rapid manoeuvres.
- Choppy sea state conditions exist and the target is buried in excessive sea clutter or in deep swells.



- Choppy sea state conditions exist yielding poor stability.
- Inadequate heading data exists.

Symptoms of such conditions are that acquisition is difficult and the MARPA vectors are unstable; the symbol wanders away from the target, locks on to the wrong target or changes to a lost symbol target.

If any of these conditions are present, acquisition and tracking may need to be re-initiated or, in some cases be impossible to maintain. Improving the quality of the heading data will reduce the effect of the other conditions.

### **To acquire a target**

MARPA automatically tracks acquired targets, calculates target bearing and range, speed and course, Closest Point of Approach (CPA), and Time to Closest Point of Approach (TCPA).

Each target tracked (up to 25 MARPA targets using a digital Radar) can be displayed with a CPA graphic which shows the target vessel, course and speed (as a vector) and indicates the CPA. The calculated target data can also be shown on your screen. Each target is continually assessed and an audible alarm is sounded if a target becomes dangerous, or is lost.

Effective MARPA operation is dependant on accurate own-ship's heading and speed. Speed Over Ground (SOG) and Course Over Ground (COG) information are required to show true target course and speed. The better the quality of the heading and speed data, the better MARPA will perform. MARPA will function without SOG and COG in relative mode. For the best heading data a Raymarine SMART heading sensor or a gyro-stabilized autopilot is required.

### **Risk assessment**

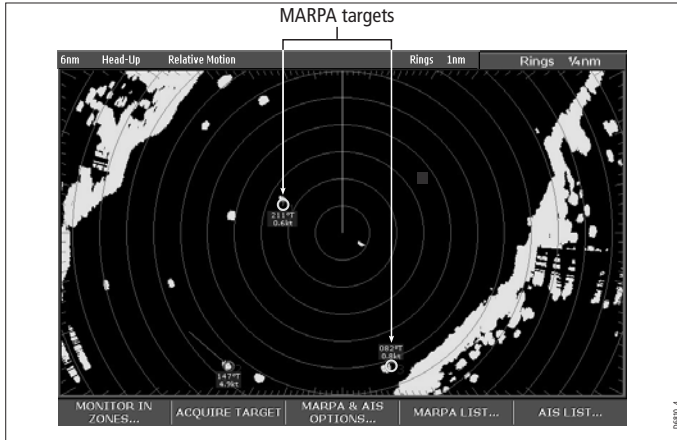
Each target is monitored to see if it will be within a certain distance from your boat within a certain time. If so, the target is designated as dangerous and an audible warning is sounded along with an on-screen warning being shown. The target symbol changes to the dangerous target symbol and flashes to indicate that it is a dangerous target. Pressing the appropriate soft key will silence the alarm and remove the warning.

If a target is lost, either because the MARPA software has lost contact with it, or because it has moved out of range, an audible alarm is sounded and an on-screen warning appears. The on-screen symbol will change to the target lost symbol. Pressing the appropriate soft key will silence the alarm and remove the on-screen warning and the target lost symbol.

### **MARPA range**

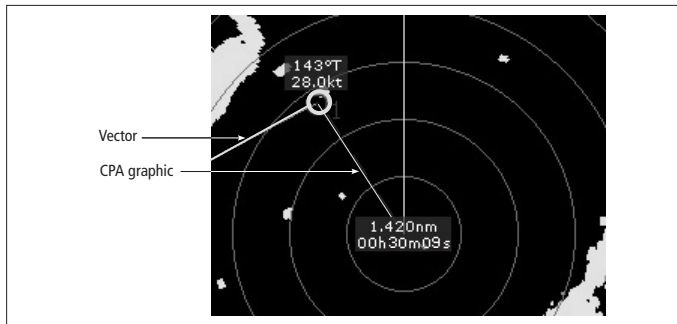
MARPA target acquisition is only available at radar range scales of up to 12nm, although tracking continues at all ranges.

If you change to a smaller range scale, targets may be beyond the range of your scanner and will be lost. In such cases, an on-screen warning will indicate that the target is off-screen.



### Closest point of approach

Closest point-of-approach (CPA) graphics show vectors for your vessel and a selected target. (A vector is a line showing a predicted course.) Vector length varies with speed (settings can be changed in the MARPA Setup Menu).



### To show or hide closest point-of-approach

1. Highlight the object with the cursor.
2. Toggle to the required CPA setting using the **CPA GRAPHIC** softkey.

### How motion modes affect CPA

In **true motion** mode, the vectors of your vessel and the target are shown extended to their intersection point. The CPA is shown as a line that is placed on your boat's vector at the point of the CPA. The length and direction of the line indicates the distance and bearing of the target at CPA. The text indicates CPA and TCPA. The text next to the target symbol indicates its true course and speed.

In **relative motion mode**, no vector extension of your boat is shown. The CPA line emerges from your own boat, with the target vector extension being shown as relative, not true. The text next to the target indicates its course and speed.

Press SHOW DETAILS to display the calculated relative course and speed.

**Displaying MARPA data**

All MARPA data is held in a list containing:

- MARPA ID
- Bearing
- Range
- True Course
- True Speed
- CPA
- TCPA

**Target display**

The position of MARPA objects is marked with an icon, which also indicates its MARPA status.



**To view the MARPA list**

1. Press the **TARGET TRACKING** softkey.
2. Press the **MARPA LIST** softkey.

**To cancel MARPA directly**

1. Highlight a tracked **MARPA** object.
2. Press either the **CANCEL TARGET** or **CANCEL ALL TARGETS** softkey, as appropriate.

**To cancel MARPA from the MARPA list**

1. Open the MARPA list.
2. Select a target and press **CANCEL TARGET** or **CANCEL ALL TARGETS**, as required.

## Displaying vessel identity (AIS)

If you have an AIS receiver fitted to your system, you can use it to:

- Show the position and display vessel data for other AIS-equipped vessels within a specified range of your boat.
- Display voyage data (position, course, speed and rate of turn) of AIS-equipped vessels.
- Display basic or detailed information for each target vessel including safety critical target data.
- Set up a safe zone around your boat.
- View alarm and safety related messages.

This information is displayed in the form of an overlay or as a dialog box on your radar screen. For more information about AIS, see *Chapter 17*.

### To overlay AIS on a radar window

1. Press the **PRESENTATION** softkey.
2. Toggle the **AIS LAYER** to **ON**.

(Also see *Selecting the AIS function on page 265*)

# Chapter 9: Using the data application

## 9.1 Introduction

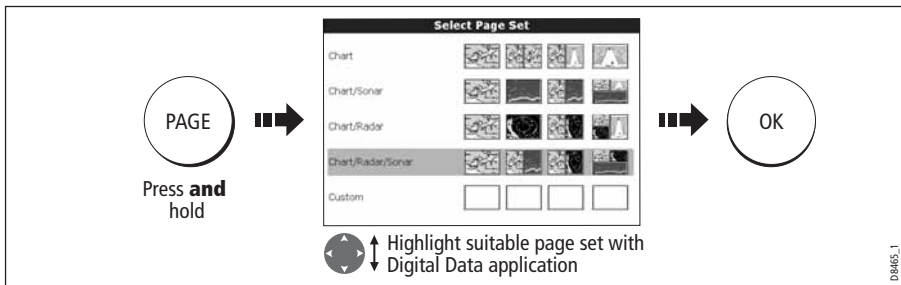
The data application enables you to view numeric data generated by the system or by instruments available on NMEA or SeaTalk.

Ves Pos <b>50°49'.595N</b> <b>001°12'.306W</b>	Cog Sog <b>071°T</b> <b>10.5kt</b>	Heading <b>074°T</b>	Speed <b>10.9kt</b>
		Waypoint TTG <b>00h13m18s</b>	VMG Wpt <b>10.5kt</b>
<b>GOTO CURSOR</b> <b>075°T</b> <b>2.324nm</b> <b>00h13m18s</b>	Set Drift <b>304°T</b> <b>0.9kt</b>	Depth <b>48.9ft</b>	XTE <b>0.000nm</b>
		Trip <b>73.48nm</b>	Local Time <b>04:16:41 AM</b>

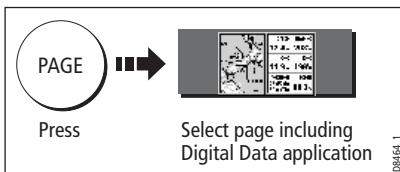
## 9.2 Selecting a data application

To select a data application:

1. Select a page set that includes a data application:



2. Select a page which includes a data window:



### 9.3 Selecting the data for display

You can either select a panel of pre-configured data or customize the application to display the data of your choice.

**Note:** *Panel selection is a local setting and will therefore only affect the individual display on which you are working.*

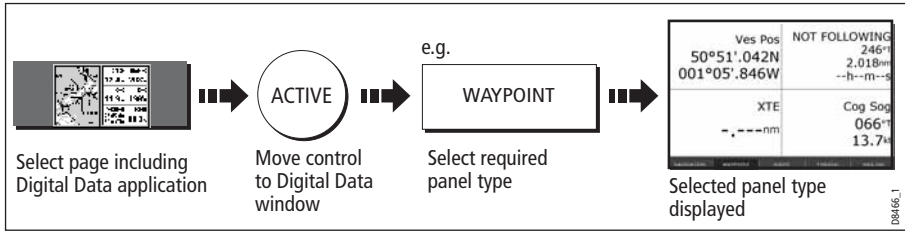
#### Pre-configured data panels

The pre-configured data panels include data associated with Navigation, Waypoint, Route, Fishing or Sailing:

		Panel Type				
		Navigation	Waypoint	Route	Fishing	Sailing
<b>Data content</b>	Vessel position	✓	✓	✓	✓	
	Active waypoint	✓	✓	✓	✓	
	TTG	✓				
	VMG - Waypoint	✓				✓
	Depth	✓		✓	✓	
	Cog Sog	✓	✓	✓	✓	✓
	Heading	✓		✓	✓	✓
	Speed	✓			✓	✓
	Set/Drift	✓			✓	
	XTE	✓	✓	✓		
	Trip	✓				
	Local time	✓				
	Sea temperature				✓	
	Ground wind					✓
	App wind					✓
	True wind					✓
VMG wind					✓	

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To select a pre-configured data panel:



## Customize the panels

You can customize each panel by changing:

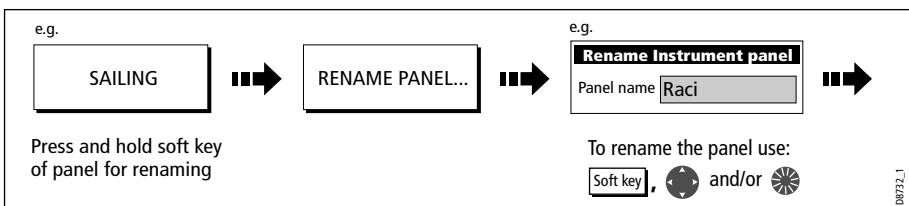
- The panel name.
- The size and number of data cells
- The data contained in each cell. This data can include any transducer or internally calculated navigation data that is available on NMEA or SeaTalk. Additional data includes a compass rose, a distance log and four resettable trip counters.
- How the data is displayed. You can control whether the data is displayed in numerical, digits, gauge or graphical format as appropriate to each data item.

**Note:** You can also configure the data panels in this way in the Engine Monitoring and CDI applications.

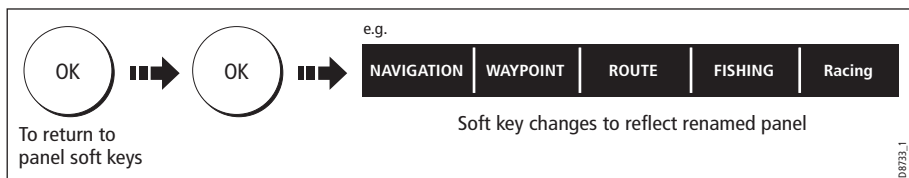
## Renaming a panel

You can customize the names of the panels as required e.g. the SAILING panel could be renamed RACING:

1. Select and rename the appropriate panel:



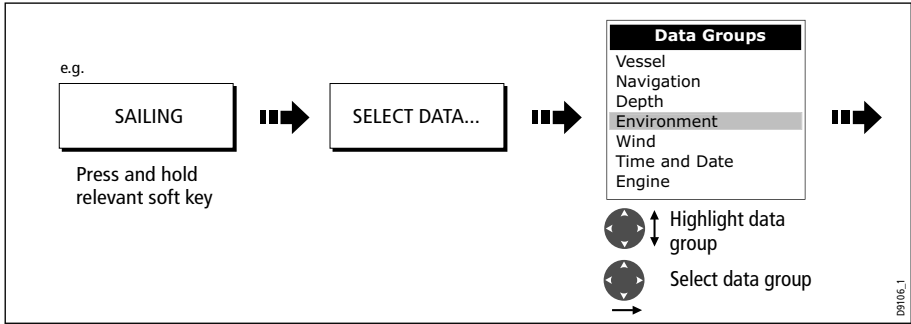
2. Save the changes:



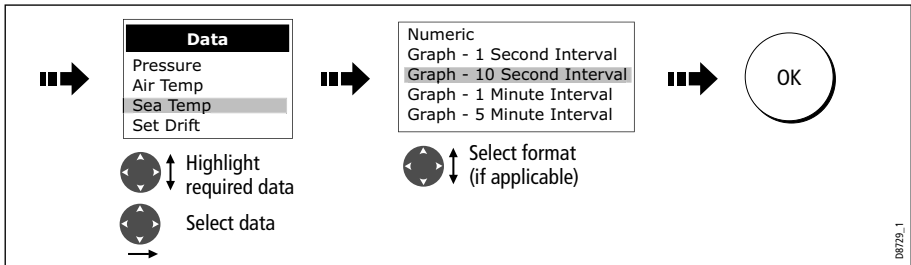
### Selecting cell data

To select the data that is to appear in each cell:

1. Select the data group for the relevant panel e.g.



2. Select the data to be inserted in the highlighted panel:



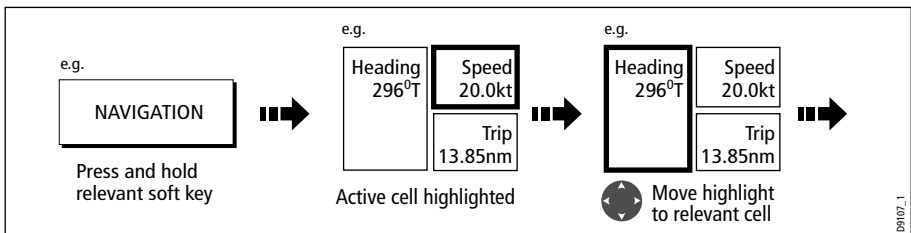
### Changing the size of the cells

You can change the size of the cells to meet your own particular requirements by using the MERGE CELLS or SPLIT CELL function.

#### Splitting a cell

Use the SPLIT CELL function to create two smaller data cells:

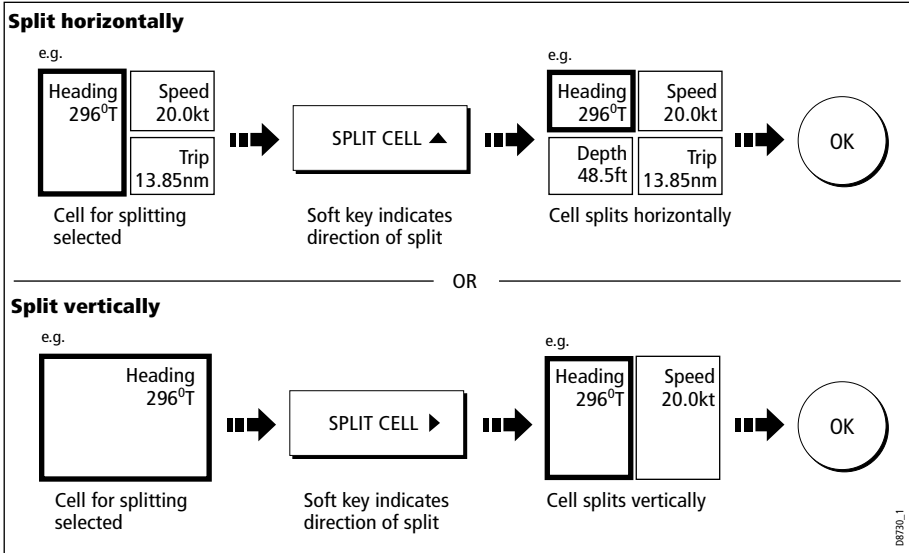
1. Select the relevant cell within the required panel:



The direction in which the selected cell can be split is indicated on the soft key.

2. Split the highlighted cell:

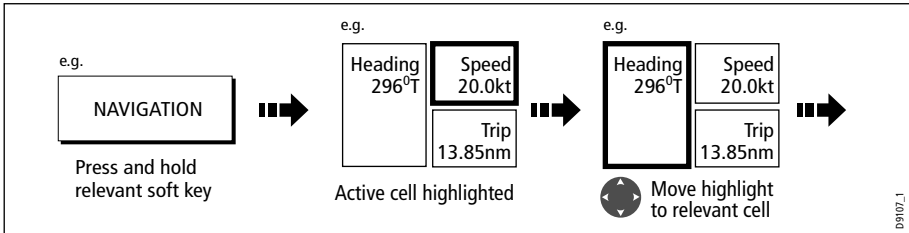




### Merging a cell

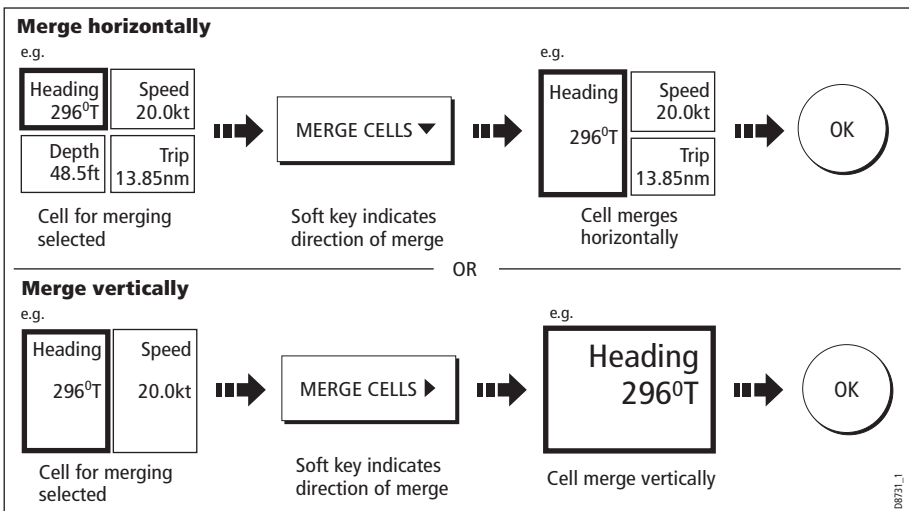
Use the MERGE CELLS function to make a cell larger and therefore easier to see:

1. Select the relevant cell within the required panel:



The direction in which the selected cell can be merged is indicated on the soft key.

2. Merge the highlighted cell (horizontally or vertically):





# Chapter 10: Autopilot Control

If you have a Raymarine autopilot installed, you can access some of its functions from the E-Series display unit.

**WARNING:**The autopilot functions available on the E-Series display unit do not replace the autopilot control head. You must have a pilot control head installed before you enable or engage the autopilot.

## 10.1 Emergency disengage

You can disable the autopilot using the power key.

1. Press and release the **POWER** button.
2. Press the **STANDBY** softkey.

This puts the autopilot into standby mode.

## 10.2 Enabling and engaging the autopilot

To allow the E-Series to control autopilot functions, you need to enable autopilot control on the display unit.

With autopilot control enabled, the unit lets you engage the autopilot whenever it has a target waypoint. You can see information for the target waypoint on the Pilot Control pop-up.

The default autopilot setting is *disabled*.

### To enable autopilot control

On the E-Series display:

1. Press the **MENU** button to open the Setup Menu.
2. Select **System Setup > System Integration > Autopilot Control > Enabled**.
3. Press the **OK** button.

### To engage the autopilot in normal operation

When the autopilot is enabled, the unit prompts you to engage the autopilot whenever you initiate a GOTO or FOLLOW ROUTE.

1. Select **GOTO** or **FOLLOW ROUTE** to display the Engage Pilot screen.
2. Select **ENGAGE PILOT** to display the Pilot Control screen.

If you press **OK** or **CANCEL** without engaging the autopilot, you go back to the navigation screen with the autopilot disengaged.

When the autopilot is engaged, or you hotspot an active route or waypoint, the toolbar gives you the following options:

Table 10-1: Active Navigation Toolbar

<b>STOP GOTO/FOLLOW</b>	Opens the Pilot Control screen. If the autopilot is in track mode, the route complete alarm sounds.
<b>ADVANCE WAYPOINT</b>	Opens the Pilot Control screen and provides the AUTO and TRACK softkeys. The screen stays open until you choose either AUTO or TRACK.

**Note:** *You can only perform individual advance waypoint operations: it is not possible to perform one track command for multiple advance waypoints.*

## To engage the autopilot from the Setup Menu

At any time, you can open the Pilot Control screen from the Setup menu:

1. Press **MENU**.
2. On the Setup Menu, select **Autopilot Control**.
3. Press the **ENGAGE PILOT -TRACK-** softkey.

Press **OK** or **CANCEL** to go back to the previous screen.

## To disengage the autopilot in normal operation

You can disengage the autopilot from the Pilot Control screen.

1. Press the **STANDBY** softkey.

## Emergency disengage

Alternatively, if the Pilot Control screen is not displayed, you can disable the autopilot using the power key.








1. Press and release the **power** button.
2. Press the **STANDBY** softkey.

This puts the autopilot into standby mode.

## Autopilot Status Indicator

An indicator in the top-right corner of the display unit tells you the current status of the autopilot.

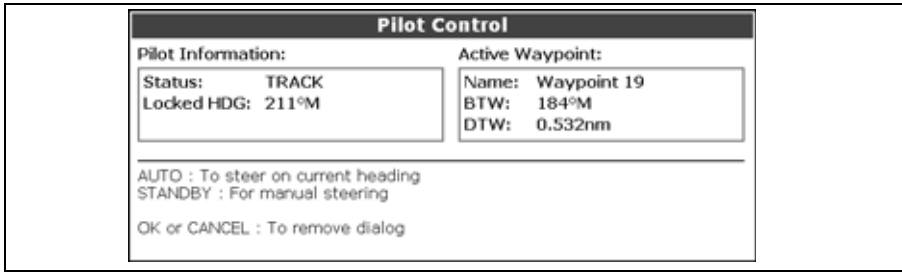
Table 10-2: Autopilot status indicators

Icon	Autopilot mode
	Standby.
	Track.
	Auto.
	No autopilot detected.
	Autopilot alarm is active.
	Power Steer
	Wind Vane

### 10.3 The autopilot control screen

The Pilot Control pop-up screen is displayed when you engage the autopilot in track mode, at waypoint arrival, or when you select it from the Setup Menu. It gives you:

- Autopilot status
- Live navigation information
- Toolbar with softkeys to control the autopilot



For a list of the softkeys available while the Autopilot Control screen is open, see *Table 10-3, Autopilot Control Toolbar*.

Table 10-3: Autopilot Control Toolbar

<b>AUTO</b>	Engage the autopilot and hold the current course (available when the autopilot is in Track or Standby mode).
<b>ENGAGE PILOT -TRACK-</b>	Track to the current target waypoint.
<b>STANDBY</b>	Disengages the autopilot (only available when the autopilot is engaged).

To go back to the Active Navigation screen without activating AUTO or TRACK, press **OK** or **CANCEL**.

**Note:** *The STANDBY key replaces the REVIEW AND EDIT THIS ROUTE key.*

## 10.4 Waypoint arrival

### ...when there are more waypoints in your route

The E-Series display:

- sounds the waypoint arrival alarm
- displays the Pilot Control screen, with information about the next waypoint

The toolbar gives you four options:

Press the **ENGAGE PILOT -TRACK-** softkey to engage the autopilot and continue to the next waypoint in your route.

Press the **CLEAR ALARM** softkey to silence the alarm and keep the autopilot engaged in auto mode, continuing on the current heading.

Press the **STANDBY** softkey to cancel the alarm and disengage the autopilot.

Press the **AUTO** softkey to cancel the alarm and engage the autopilot in auto mode.

**Note:** *If you make no selection within 30 seconds, the Next Waypoint alarm will sound.*

## ...when you reach the last waypoint in your route

The E-Series display:

- sounds the waypoint arrival alarm
- displays the Pilot Control screen with 'Last Waypoint' in the Next Waypoint field.

The toolbar gives you three options:

Press **CLEAR ALARM** to silence the alarm and keep the autopilot engaged in auto mode, continuing on the current heading.

Press **STANDBY** to silence the alarm and disengage the autopilot.

Press **AUTO** to silence the alarm and continue on the current locked heading with autopilot engaged.

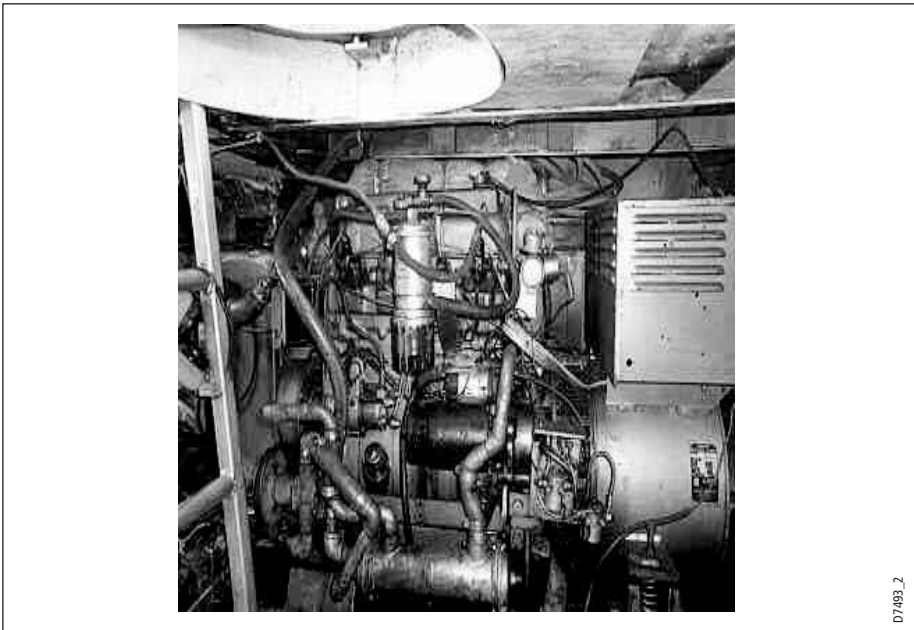




# Chapter 11: Video

## 11.1 Introduction

The video application allows you to use your E-Series Display to view images from a video player, on board camera or DVD player. Your Display is supplied with cabling to connect to equipment using a composite input source. You can also connect s-video inputs to your Display. Video images can only be seen by the Display they are connected to and are therefore not viewable across the E-Series network.



Up to four video inputs, dependent on the type, can be viewed on each E-Series display. You can set up the video application to cycle the display of each video input. You can also adjust the brightness, contrast, color and aspect ratio of the image.

**Note:** For details of how to connect such equipment to your E-Series display and the possible input configurations, please refer to your installation guide.

## 11.2 Setting up the video application

### Displaying a video application

Before you can use the video application, you will need to include a video application window in a page set. For details of how to select a particular window and application, please refer to *page 17*.

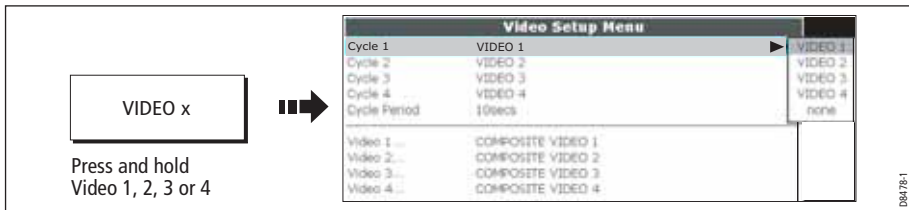
- Notes:**
- (1) *Only one video application can be viewed per page.*
  - (2) *The video application settings are locally applied and will therefore only affect the individual display on which you are working.*

## Customizing the video application

When you first use the video application, it defaults the input source type to *Composite*, labels the video images *Video 1, 2, 3 or 4* and sets the *Cycle Video* option to OFF. You will need to change these defaults in the following circumstances:

- If you have installed cabling for use with equipment using S-video.
- If you wish to give each video input a more meaningful name e.g. engine room, view stern etc., DVD player etc.
- If you wish to set up the option to cycle through the available images.

All these options are accessed via the Video Setup Menu:



You can now:

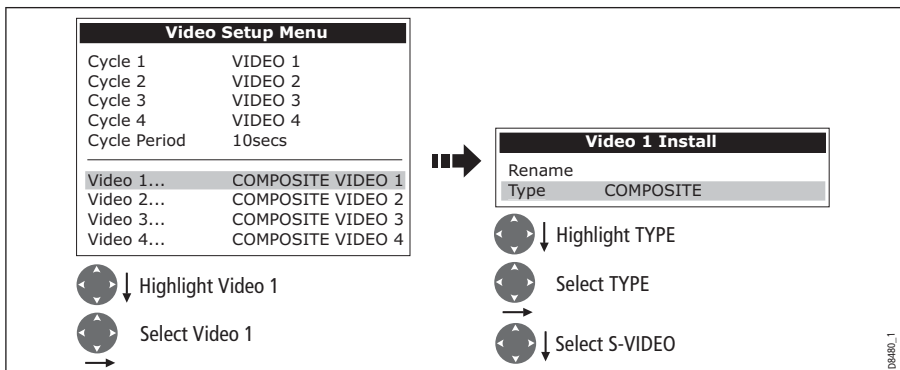
- Edit the input source type i.e. Composite to S-Video.
- Edit the video source name.
- Set up video cycling.

## Selecting the input source type

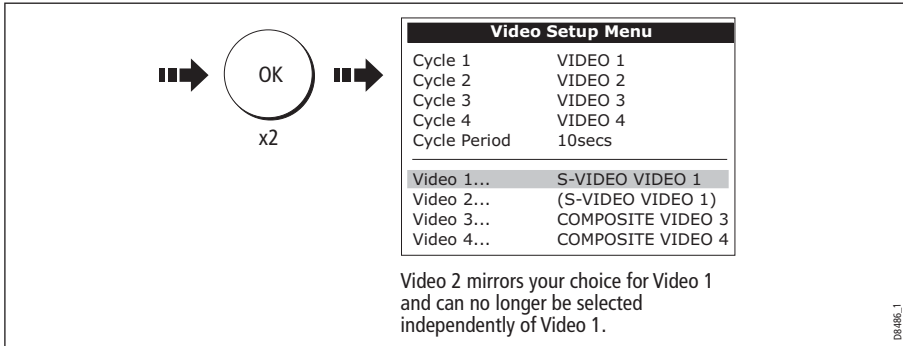
Your Display is supplied with cabling to connect to a composite input source. If your camera, DVD etc. uses S-Video input, you will need to purchase and fit the appropriate cabling in the configuration detailed in the Installation Guide.

Each item of S-video equipment uses 2 of the 4 video inputs i.e. Video 1/2 or Video 3 / 4. Once installed the Video Setup should be adjusted to reflect this alternative input:

1. Open the Video Setup Menu, as previously described.
2. Set Video 1 to S-Video:



3. Save and return to Video Setup Menu:



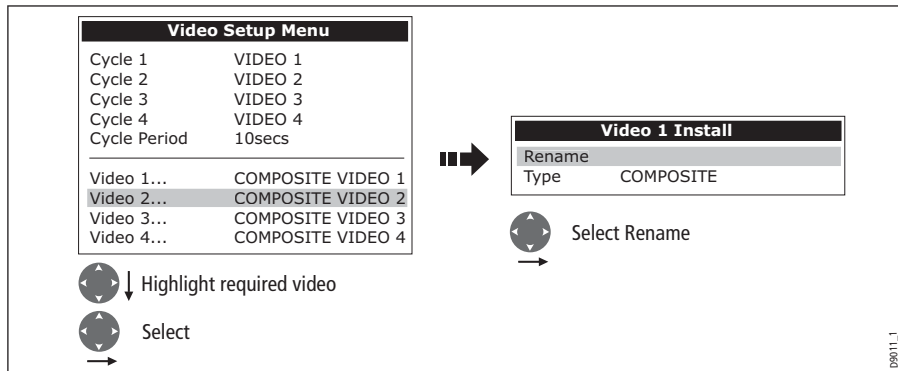
**Note:** Video 1 mirrors your choice for Video 2 and is no longer selectable.

4. Repeat steps 2 and 3 for Video 3. Video 4 mirrors your choice for Video 3 and is no longer selectable.

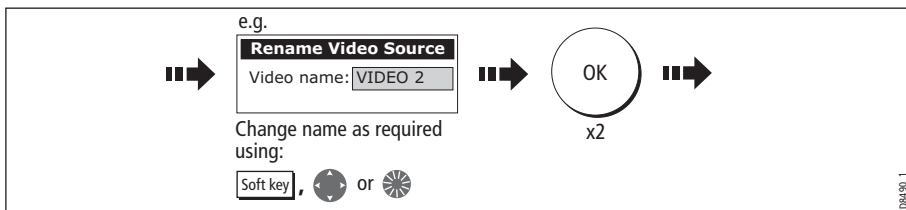
### Editing the video source name

By default your 4 video sources are labelled Video 1 - 4. If required, you can change these to a more meaningful name e.g. engine room, stern, bow etc.:

1. Open the Video Setup Menu, as described on page 226.
2. Select the video source whose name you wish to change:



3. Change the name and save:



**Note:** For details of how to edit a dialog box, please see page 13

4. Repeat if necessary for the videos 2, 3 and 4.

Any changes that you have made are reflected in the Video Setup Menu and on the video application's soft keys e.g.



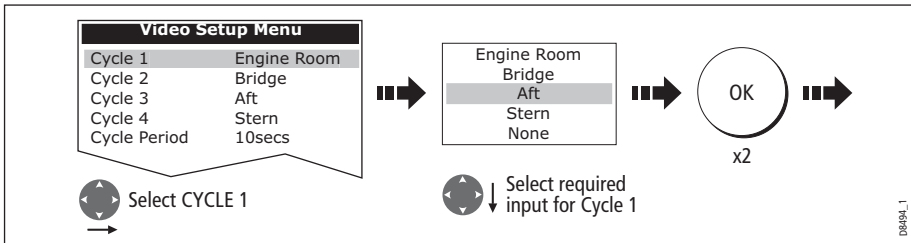
### Cycling through the video inputs

You can set up your video application to automatically cycle through the images being received. This is particularly useful if you have on-board cameras and wish to use them to obtain a regular overview of your boat, engine room etc.

### Setting up a video cycle

To specify which video inputs are to be included in the cycle and their order:

1. Open the Video Setup Menu, as described on *page 226*.
2. Highlight and select Cycle 1:



3. Repeat this process for Cycle 2, 3 and 4.

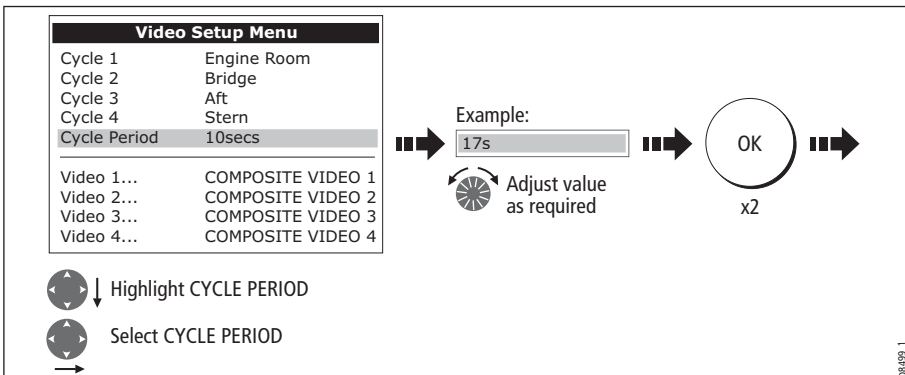
**Note:** *If you wish to exclude an input, switch its status to NONE.*

### Setting up the cycle period

By default the cycle period is 10 seconds. This can be changed (1 to 99 seconds) if required.

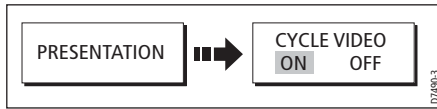
To specify the number of seconds between shots in the cycle:

1. Open the Video Setup Menu, as described on *page 226*.
2. Specify the cycle period:



### Running the video cycle

With a video application active:



**Note:** You will not be able to change the aspect ratio, contrast, brightness or color levels of any video image when the video cycle is running.

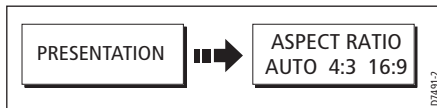
### Stopping the video cycle

You can stop the video cycle at any time by either pressing any of the 4 video soft keys or by toggling the CYCLE VIDEO option to OFF.

## Adjusting the image

### Correcting a distorted image

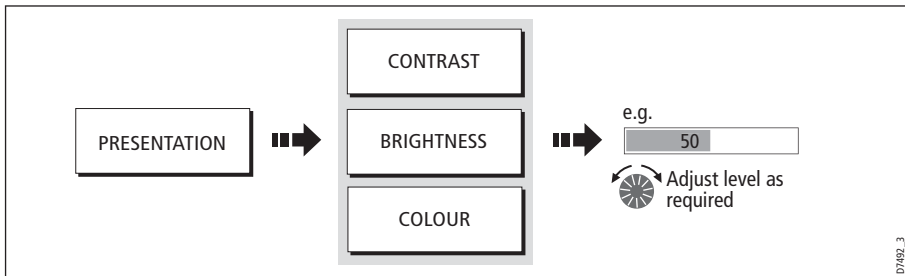
The video application should automatically detect the appropriate aspect ratio for each input source. If an image appears distorted (squashed or stretched) you should override this automatic setting and select the appropriate aspect ratio manually; 4:3 (standard format) or 16:9 (wide screen) to rectify the distortion.



**Note:** You will not be able to change the aspect ratio of any video image when the video cycle is running.

### Adjusting the contrast, brightness or color

If necessary you can adjust the level of contrast, brightness or color:



**Note:** You will not be able to change these settings for any video image when the video cycle is running.

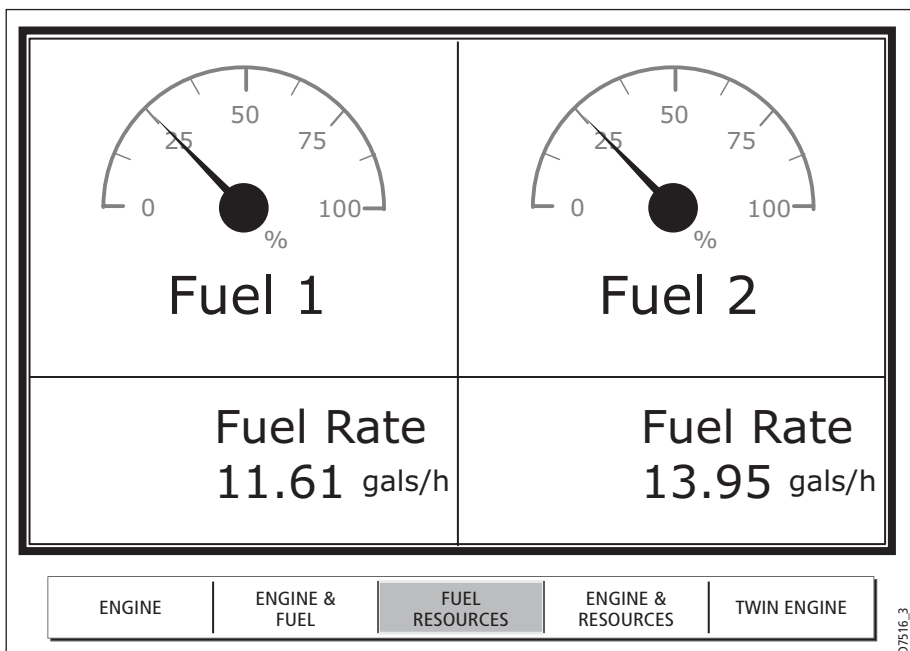


# Chapter 12: Engine Monitoring

## 12.1 Introduction

The engine monitoring application enables you to view information in the form of gauges and digital data, from up to three compatible engines. To provide a fast update rate, the engine data is transferred from the engine's serial interface to your E-Series display via NMEA2000/SeaTalk<sup>2</sup>.

**Note:** For details of compatible engines and related software updates, please refer to the Raymarine website on [www.raymarine.com](http://www.raymarine.com).



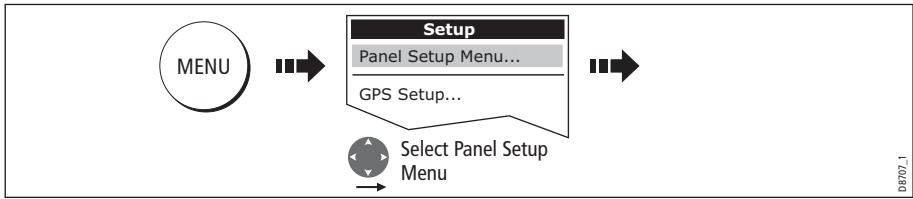
If the pre-configured content of these panels and/or the layout of the individual data boxes is not suitable, you can configure the system to display the data and layout of your choice - see *page 275*.

## 12.2 Displaying and setting up the engine monitor

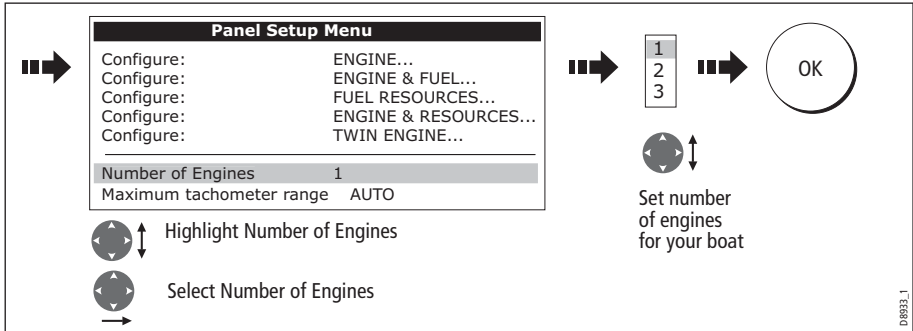
Before using the engine monitor application you should set up your system as follows:

1. Customize a page set to include an engine monitor application window. For details of how to select a particular window and application, please refer to *page 17*.
2. Set the number of engines and the maximum tachometer range to reflect your particular vessel:

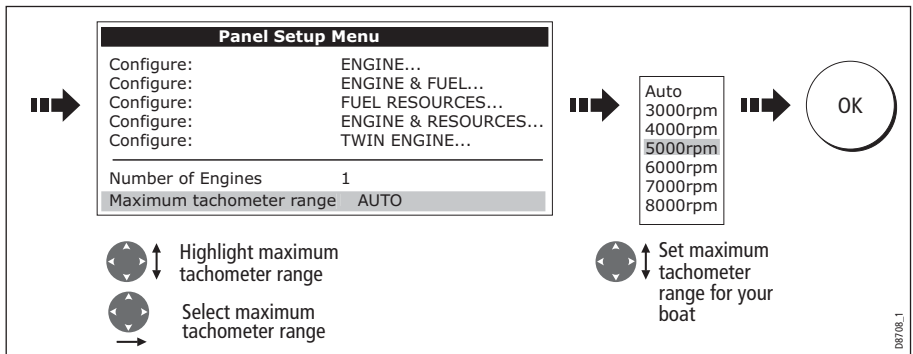
i. With an engine monitor window active, select the Panel Setup Menu:



ii. Set the number of engines:



iii. Set the maximum tachometer range:



**Note:** The engine temperature unit ( $^{\circ}F$  or  $^{\circ}C$ ) and the fuel unit (liters, imperial gallons or US gallons) is defined in the System Setup Menu (Units Setup) and is detailed on page 286.



### 12.3 The engine monitor display

Engine data is displayed in a series of pre-configured panels. Each panel contains a particular set of data. You can choose the panel that suits your requirements via the soft keys:

		Panel Type				
		Engine	Engine & fuel	Fuel resources	Engine & resources	Multi engines (3)
<b>Data content</b>	Tacho & engine hours	✓	✓		✓	✓
	Oil pressure	✓	✓		✓	✓
	Engine coolant temperature	✓	✓		✓	✓
	Boost pressure	✓	✓		✓	✓
	Alternator	✓	✓		✓	✓
	Fuel level (tanks 1 & 2)		✓	✓	✓	
	Fuel rate			✓	✓	
	Total fuel			✓	✓	

### 12.4 Configuring the engine panels.

You can configure each panel by changing the size and number of data cells and the data contained in each cell. You can also rename each panel.

**Note:** *Configuring engine panels is a local setting and will therefore only affect the individual display on which you are working.*

### 12.5 What should I do when an alarm is triggered?

Your engine monitoring application will trigger an alarm (via NMEA/SeaTalk<sup>2</sup>) and display an engine alarm warning message when a problem is detected. When this occurs, you should check your engine monitoring system and if necessary refer to the documentation supplied with your engine system. Press ACKNOWLEDGE to silence the alarm.

**Note:** *When engine monitoring is active, all other system alarms continue to trigger.*

## Graphical engine data

You can display engine tilt and trim data. You may need to set up a new page (or modify an existing page set) for this data as an engine application window is not included in the pre configured page sets.

### To set up an engine data page

1. Press and hold the **PAGE** button.
2. Select the page set you want to edit by pressing its corresponding softkey.
3. Highlight your preferred page layout and press **OK**.
4. In the application list, highlight **engine** and press **OK**.

Refer to the E-Series Reference Manual for more details on setting up page sets.

### Engine tilt and trim

To display engine tilt or trim data:

1. Press the **MENU** button to open the Setup screen from within the Engine monitoring page.
2. Select Panel Setup Menu.
3. Select a configuration.
4. Press the **SELECT DATA...** softkey.
5. In the Data Groups window, select **Engine**.
6. Select **Engine Tilt** or **Trim Tabs**.

# Chapter 13: Using the Course Deviation Indicator

## 13.1 Introduction

With your display receiving accurate heading and position information, you can use the Course Deviation Indicator (CDI) to monitor your course and accurately steer to a target waypoint.

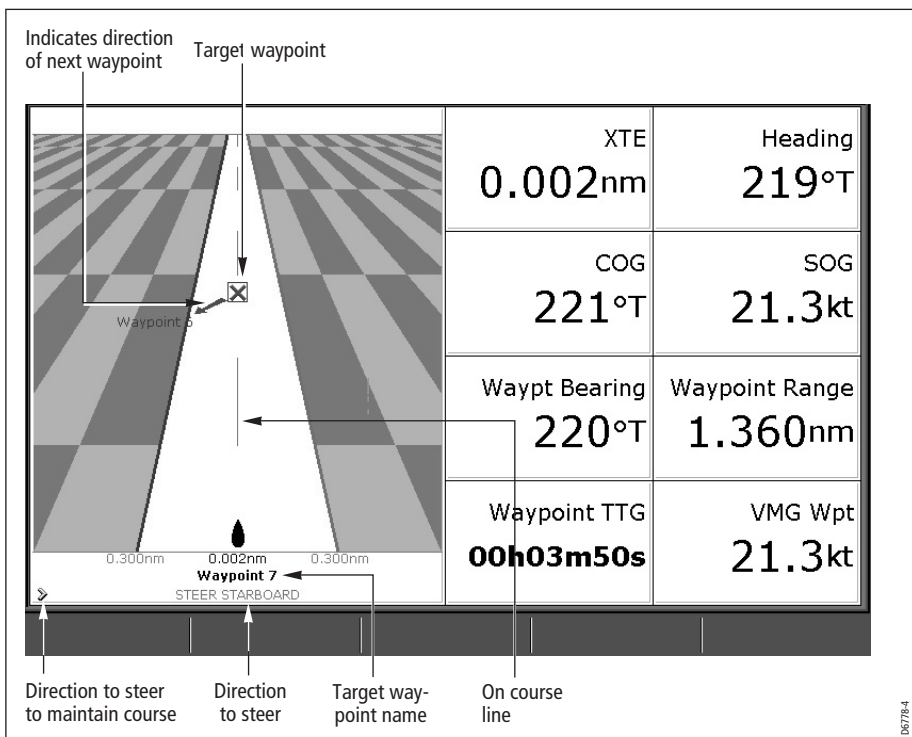
The CDI application is pre-configured to display the CDI graphic. You can customize the panel to display any available data.

## 13.2 The CDI screen

The CDI gives a graphical representation of your boat's course in a 'rolling road' format.

The 'rolling road' represents a width of sea equal to the Cross Track Error (XTE) limits that you have specified in the Setup menu. As you travel towards the target waypoint, the checkered pattern and the waypoint will move down the screen at a rate proportional to your boat's speed.

Navigation data is displayed alongside or below the rolling road.



### Steering instructions

The steering instructions below the rolling road tell you what correction is needed to maintain your course and arrive at the target waypoint.

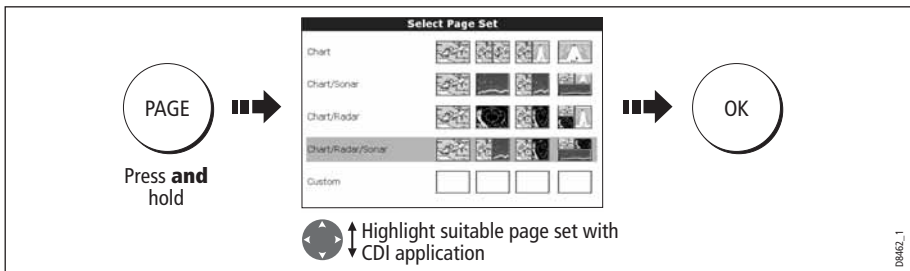
Instruction	Cause
STEER STARBOARD	XTE error to port is more than a 1/4 of the maximum XTE error limit in the Setup menu
STEER PORT	XTE error to starboard is more than a 1/4 of the maximum XTE error limit in the Setup menu

Indication arrows are placed either side of the steering instruction, pointing towards the centre line. The greater the error the more arrows appear. You should correct your course by steering in the direction indicated by the arrows.

### 13.3 Selecting the CDI application

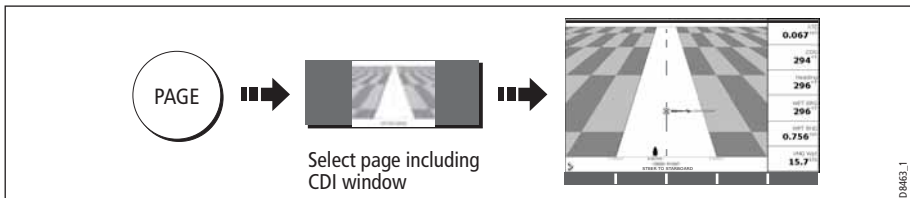
To select the CDI application:

1. Select a page set which includes a CDI application:



**Note:** If the CDI application is placed in multiple windows, the same data is displayed in each.

2. Select a page which includes a CDI window:



Once the CDI application is displayed, no use is made of the soft keys. You will therefore need to open a radar, chart or fishfinder window in order to access any functions activated via the soft keys.

### 13.4 Modifying the CDI application

If required, you can modify the information displayed in the CDI application window to meet your own particular requirements.

# Chapter 14: Weather (US only)

This application is only available for the United States. Weather information for the Rest of the World can be obtained via a Navtex receiver. Please refer to *Chapter 16: Navtex*.

## 14.1 Overview

The weather application superimposes historical, live and forecasted weather graphics on a world map. It also provides textual forecasts and warnings. These graphics and their associated weather data enable you to determine the actual conditions in your vicinity or at a particular location. Weather forecasts and warnings, detailing current and predicted conditions, are regularly updated.

For a basic weather glossary, please refer to the appendix at the rear of this manual. For types of warnings, watches and advisories, please refer to the NOAA website at [www.nws.noaa.gov](http://www.nws.noaa.gov)

## 14.2 Important information

### Disclaimer

All information presented by this service is advisory only. You acknowledge the risk of incomplete and erroneous information and assume complete responsibility and risks associated with this device, and accordingly release Raymarine, Sirius Satellite Radio Inc. and WSI Corporation from any and all claims arising from the use of this service. By using this service, you acknowledge and agree that you have read the terms of the subscription agreement for this service and agree to all of the terms contained therein. If you do not have the subscription agreement, you may view a copy on the internet at [www.Sirius.com/marineweatheragreement](http://www.Sirius.com/marineweatheragreement) or call 1-800-869-5480 for a copy to be sent to you.

The full disclaimer is detailed on the inside front cover of this manual. Each time you power on your E-Series Display, if weather data is being received this disclaimer will be displayed.

## 14.3 Setting up the weather application

Before you are able to use the weather application you will need to:

- Obtain a Sirius ID number. For full details, please refer to your Sirius Installation handbook.
- Check the pre-requisites for using this application (see below).
- Customize a page set to include a weather application.
- Specify the weather elements that you wish to display.

## Pre-requisites for using the weather application

For your E-Series to display weather data, your system must be connected to a Raymarine SR100 Sirius weather receiver which is supplying the appropriate data. For your vessel to be displayed and for weather reports to be available at your position, you will need a fix for your boat's position and be within US coastal waters.

**Note:** For further information on installing and commissioning a weather receiver, please refer to the *Weather Receiver Installation Guide*.

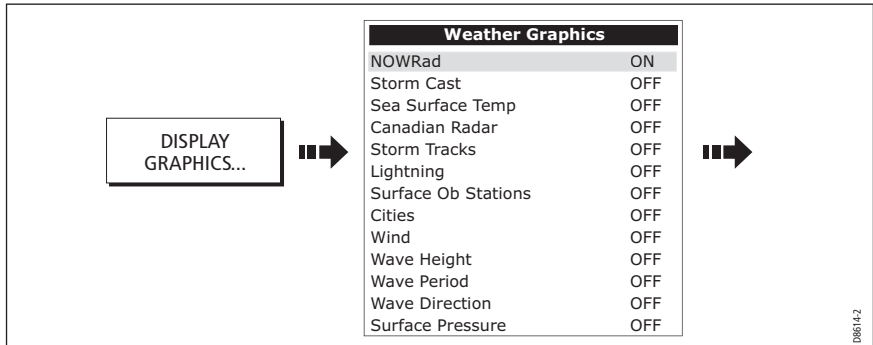
## Adding a weather application

A weather application does not appear in the pre-configured page sets. You will therefore need to customize a page set to include a weather application window. Please refer to *page 275* for details.

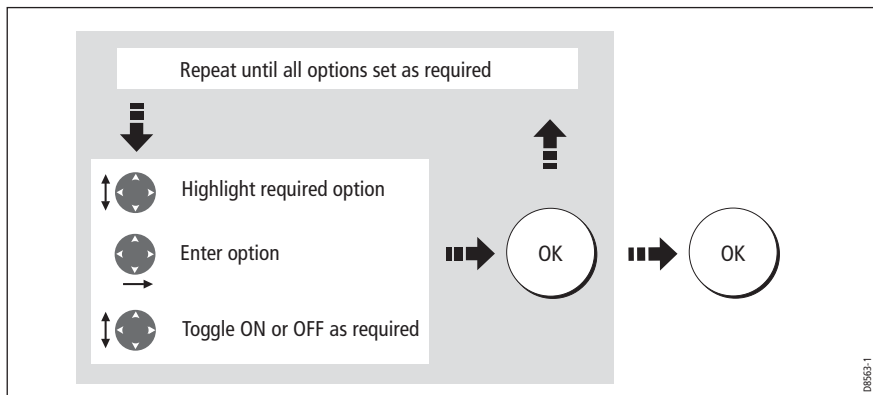
## Specifying the weather elements

You can view textual reports or animated graphics and specify the weather elements that you require:

1. Open a weather application window.
2. Display the weather graphics menu:

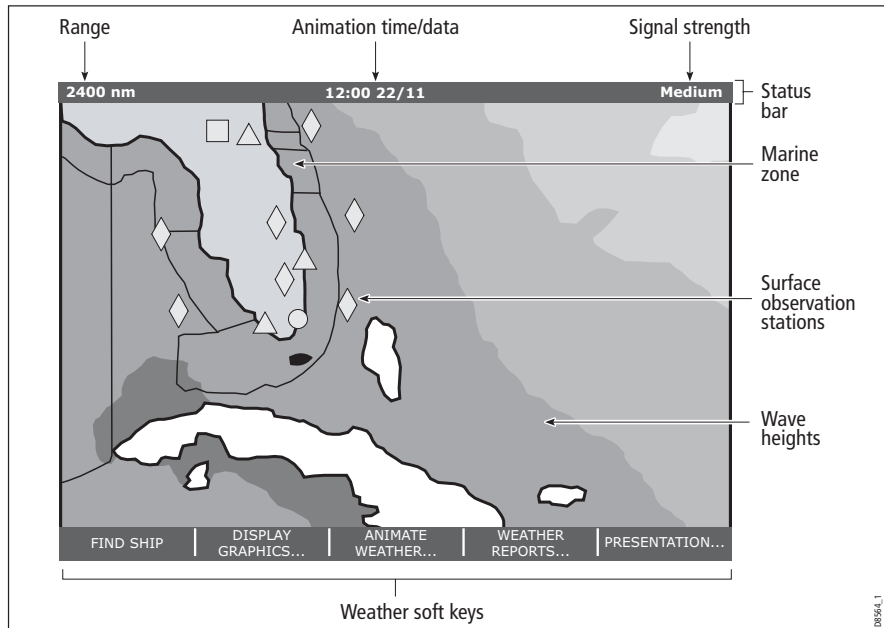


3. Select the weather elements for display:



## 14.4 The weather display

The main features of the weather display are as follows:



## 14.5 Moving around the weather map

When you open the Weather application, a world map is displayed. If the system has a position fix for your boat, the map will be centred on your boat.

As in the Chart application, use the cursor to move around the map and view different locations, and the range button to zoom in and out.

**Note:** *The resolution in displayed data is lost on some graphics when zoomed in to the lower ranges. To solve this, zoom out to a suitable range that does display the data in more detail.*

To re-centre the map on your boat, use the FIND SHIP soft key.

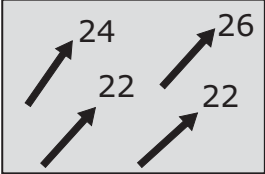

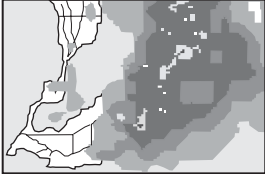
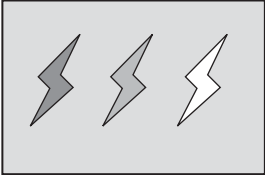
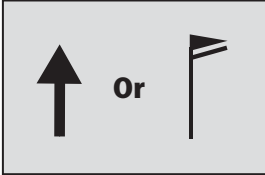

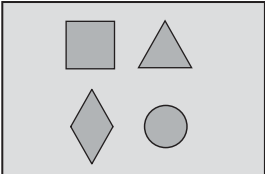
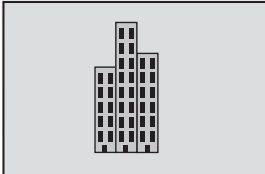









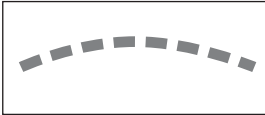
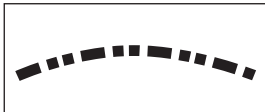
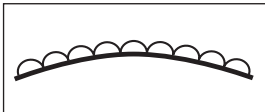
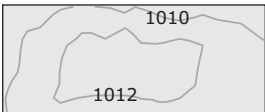
## 14.6 Placing waypoints

The waypoint button and its associated soft keys operate as normal when you are in the weather application but you will need to move the active window to a radar or chart application in order to see any waypoints that you have placed.

# 14.7 Weather graphics

This section summarizes the weather symbols used within the weather application. For details of each weather type, please refer to the appropriate section.

**Weather symbols**

		
Storm cast	Waves (See waves section)	Canadian radar (Dark greens-yellow)
		
Lightning	Wind	Sea surface temperature ( green-yellow-orange)
		
Surface observation stations (pink)	Cities (grey)	NOWRad (green-yellow-red) Snow (Blues),Mixture (Pinks)
<b>Storm Tracks symbols</b>		
		
Hurricane (Category 1-5)	Tropical storm	Tropical disturbance, tropical depression
<b>Surface pressure</b>		
		
High / low pressure (blue & red)	Warm front (red)	Cold front (blue)
		
Occluded front (purple)	Stationary front (red-blue)	Trough (brown)
		
Squall line (red)	Dry line (red)	Isobars (grey)



## Precipitation (NOWRad)

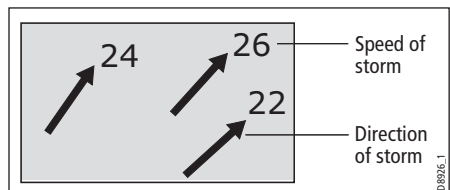
NOWRad displays the type and level of precipitation:

**Note:** *Dashes indicate that data is not available.*

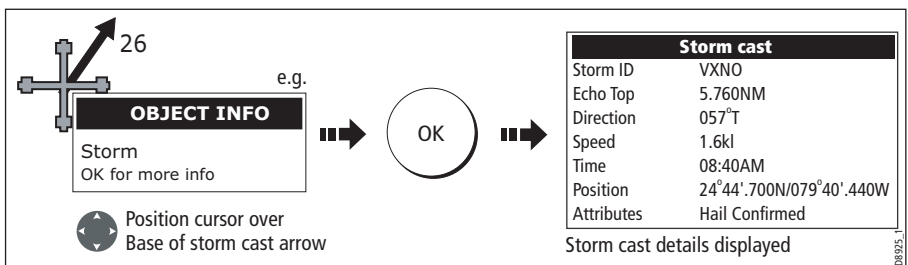
Color code	Precipitation type	Intensity
Light green	Rain	( 15-19 dBz )
Medium green	Rain	( 20-29 dBz )
Dark green	Rain	( 30-39 dBz )
Yellow	Rain	( 40-44 dBz )
Orange	Rain	( 45-49 dBz )
Light red	Rain	( 50-54 dBz )
Dark red	Rain	( 55 + dBz )
Light Blue	Snow	( 5-19 dBz )
Dark blue	Snow	( 20 + dBz )
Light pink	Mixed	( 5-19 dBz )
Dark pink	Mixed	( 20 + dBz )

## Storm Cast

Storm cast arrows indicate the direction and speed of a storm.



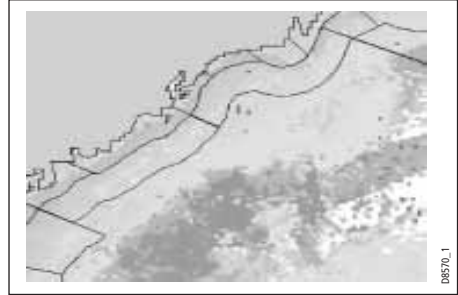
To display details of the storm:



### Sea surface temperature (SST)

The temperature range of the sea surface is indicated by shading. This shading ranges through blue/green/yellow/orange/red.

For details of how to view the sea surface temperature at a specific point, see *page 246*.



### Canadian radar

Canadian radar shows the intensity of precipitation for Canada. Unlike NOWRad, Canadian radar does not show the precipitation type.

Color code	Intensity in mm per hour
Transparent (nothing shown at very low precipitation)	0.00 to 0.20 mm/hr
Light green	0.21 to 1.00 mm/hr
Medium green	1.01 to 4.00 mm/hr
Dark green	4.01 to 12.00 mm/hr
Yellow	12.01 to 24.00 mm/hr
Orange	24.01 to 50.00 mm/hr
Light red	50.01 to 100 mm/hr
Dark red	100.01+ mm/hr


### Tracking storms

You can use the STORM TRACK function to monitor significant storms in your area. These include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons and super typhoons.


The system displays the track the storm has taken, its current and forecasted position, the wind radii (current position only), direction and speed of travel.

**Storm Tracks symbols**


These symbols are displayed on screen in three different colours:  
 Grey - historical, Red - current, Orange - forecast



Hurricane  
(Category 1-5)



Tropical storm



Tropical disturbance,  
tropical depression

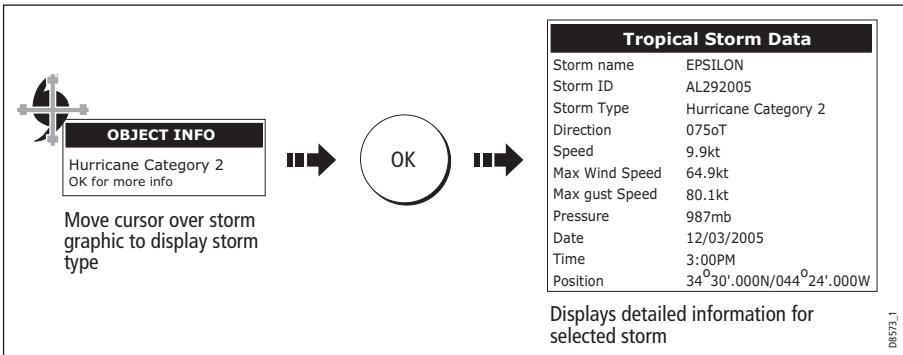
Move the cursor over the symbol for additional information.

### Tropical storm data

Tropical storm data can be displayed for a selected storm. This includes:

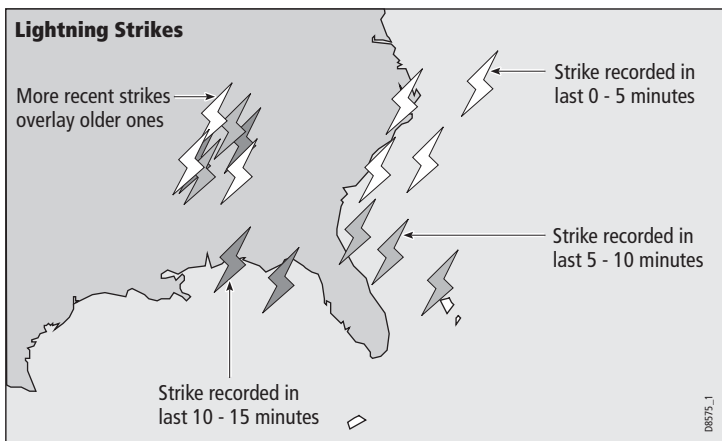
- The storm's name, type, date and time.
- The position, direction and speed of travel of the storm.
- The pressure and maximum wind speed and gusts.

To display tropical storm data:



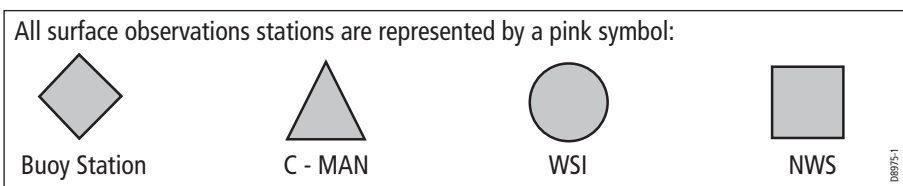
### Lightning

The system displays a lightning symbol at each cloud-to-ground strike recorded within the last 5, 10 and 15 minutes:

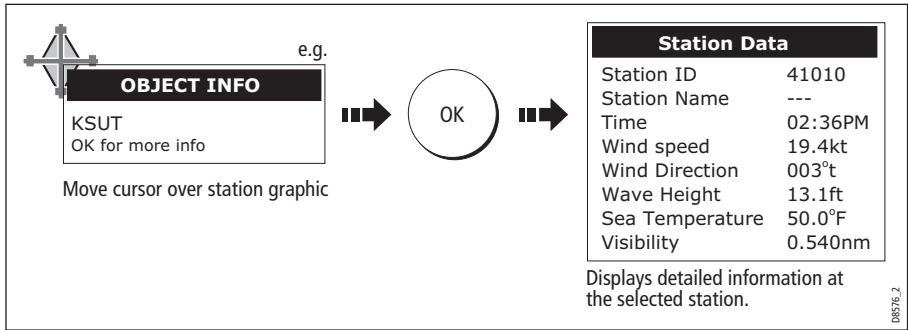


### Surface observation stations

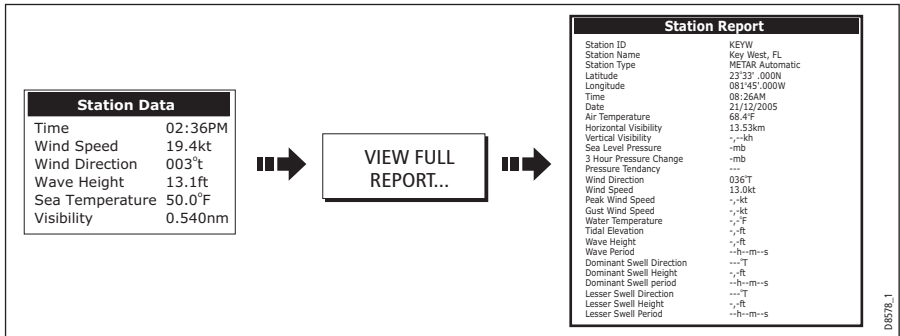
You can view current or historical weather data at surface observation stations.



To identify the station and display more associated weather data:



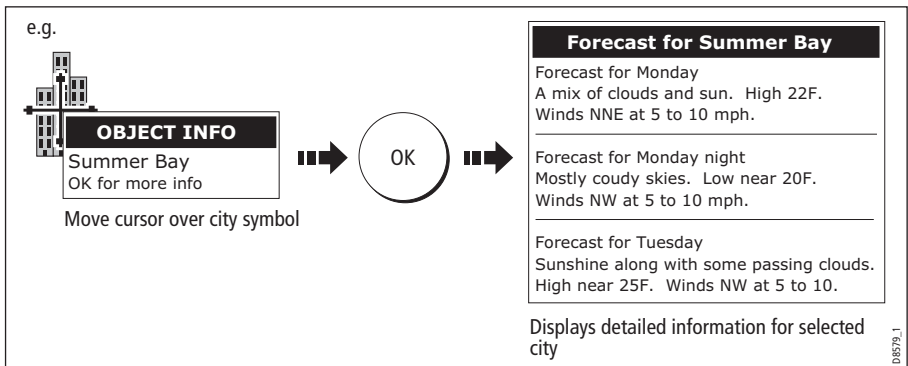
You can now select detailed live weather data for the selected observation station, if required:



Note: Not all data is available for all stations.

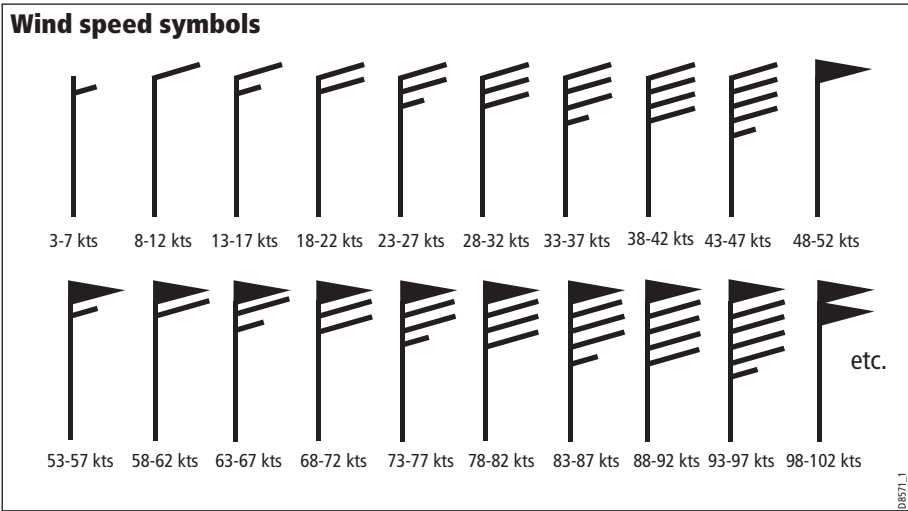
### City forecasts

The Cities option gives you access to details of city weather forecasts. Up to 3 forecasts can be displayed:



## Wind

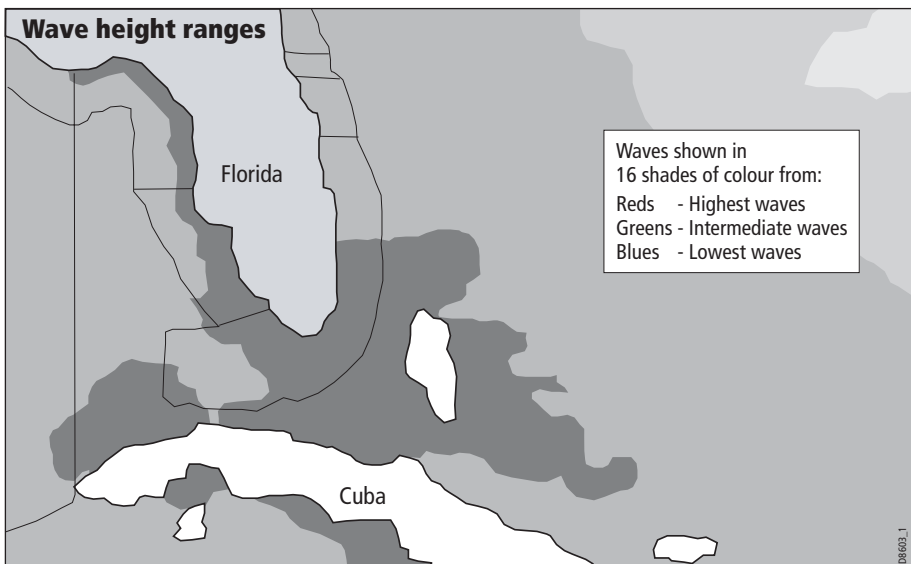
This option displays the current wind direction and magnitude. You can choose (via the Weather Setup Menu) to display the wind symbol as either an arrow or a wind barb. Wind arrows give an indication of wind speed - the larger the arrow the stronger the wind. Wind barbs give a more precise representation of wind speed:

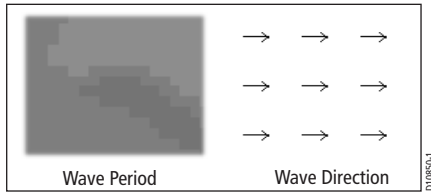


- Notes:** (1) For details of how to view actual wind data at a specific point, see page 246.  
(2) For details of how to change the wind symbol, please refer to page 251.

## Waves

This option displays the current wave height in 16 levels, the wave direction and wave period (see below).



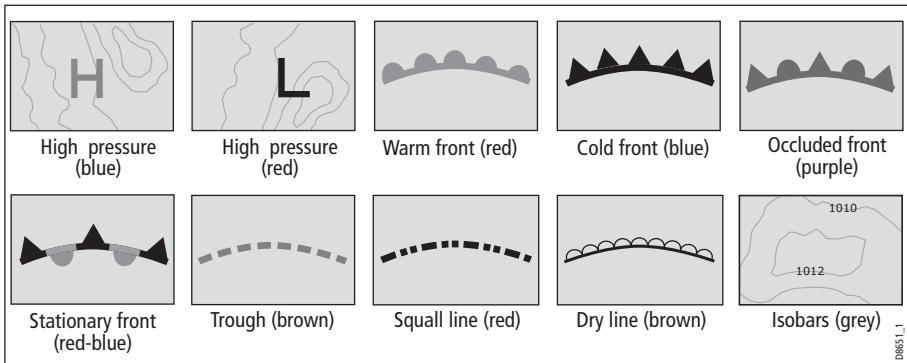


For details of how to view actual wave data at a specific point, see *Viewing data at a particular location (below)*.

**Note:** To view full numerical wave information, use the available information boxes. Move the cursor to the area or stations available, then use hot-spotting by pressing OK.

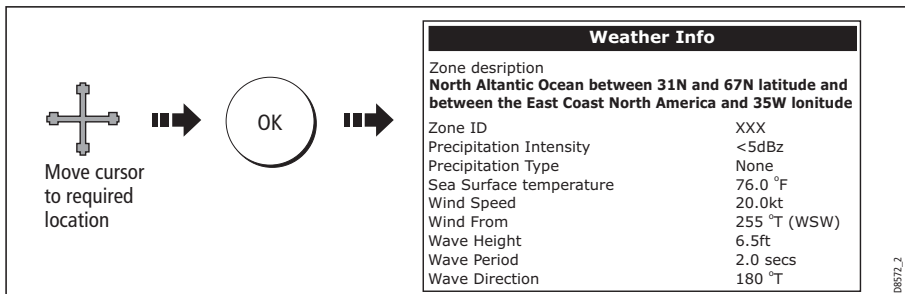
### Surface pressure

This option shows surface pressure data using standard meteorological symbols:



### Viewing data at a particular location

When required you can display the sea temperature, wind speed and direction, wave height, precipitation intensity and type for a particular location. This also shows the marine zone at the cursor position:



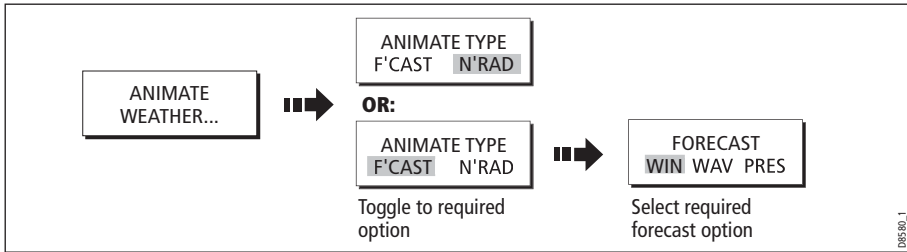
## 14.8 Animated weather graphics

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

- The forecast for wind, wave or surface pressure.
- The weather radar history loop (NOWRad).

### Setting up animation

To setup the animated weather graphic for forecasting (wind, wave or surface pressure) or for the weather radar history loop:



### Running animation

Once you have set the animation type (see previous section) you can run the animation feature:



The status bar indicates the time-frame displayed. The weather radar history, provides up to 8 images of data covering the last 2hours, at 15 minute intervals.

If at any time you need to pause the animation, for instance if you want to examine the displayed weather for a particular time frame, press PAUSE.

- Notes:**
- (1) *You cannot display information (by moving the cursor over a symbol) when animation is running. The range and trackpad controls do however remain operable provided the PAUSE option has not been selected. Ranging /panning will cause the animation to restart.*
  - (2) *The animation will be switched to OFF, whenever the ACTIVE, PAGE, DATA, WPS/MOB, MENU are pressed or when the animation screen is closed and you return to the default weather screen.*

## 14.9 Viewing weather reports

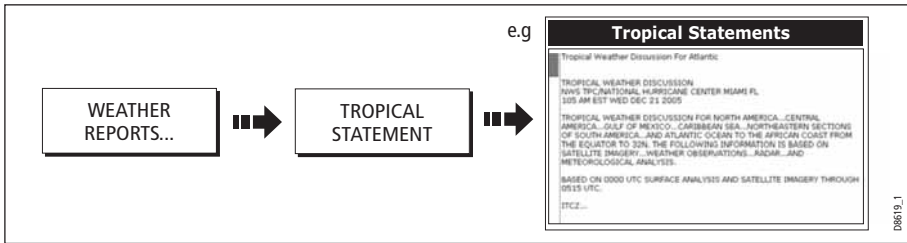
Your system will display reports for:

- Tropical statements.
- Marine warnings.
- Marine zone forecasts.
- Marine watchbox reports.

These weather reports are accessed via the WEATHER REPORTS soft key. Each report type may contain several bulletins; the window can be scrolled to view all the data.

### Tropical statements

To display the reports for the latest tropical weather statements:



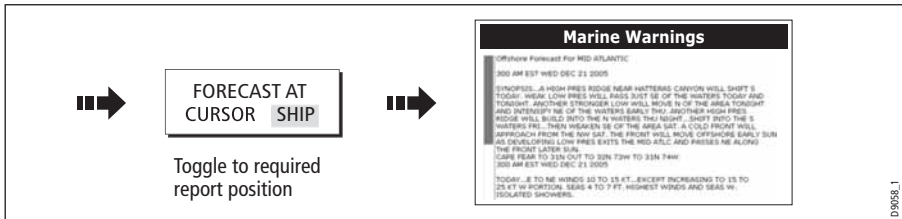
### Marine warnings

To display a report for the current warnings (US coastal or near shore):

1. Select the MARINE WARNINGS option:



2. Display the marine warnings for the zone around your cursor or boat:



### Marine zone forecasts

These forecasts cover:

- US Coastal Weather Forecasts and Offshore Forecasts and High Seas Forecast, or
- Great Lakes Forecast and Near Shore Forecast, or
- Canadian Coastal Weather Forecast.

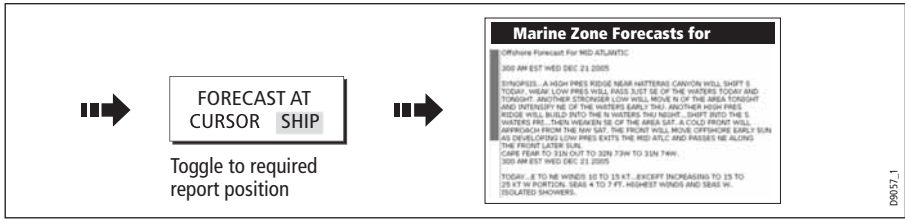
To display marine zone forecasts:

1. Select the MARINE ZONE FORECASTS option:



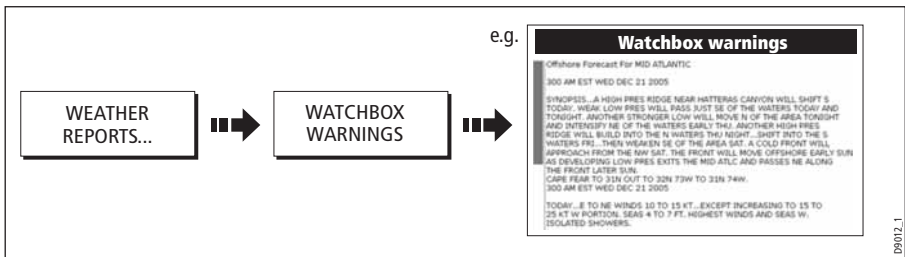
2. Display the marine zone forecasts for the area around your cursor or boat:





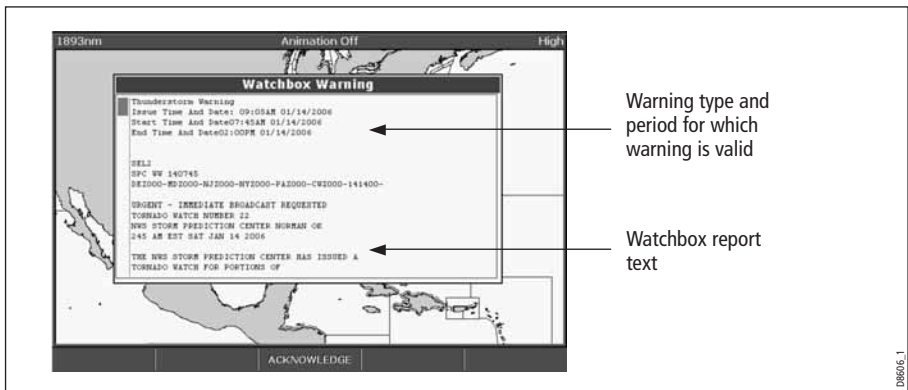
### 14.10 Watchbox warnings

To display available watchbox warnings:



### Watchbox warning alerts

When a tornado or thunderstorm warning is received within the specified range of your vessel (see *Setting up the weather application on page 237*), the system will generate a watchbox alert:



Use the trackpad or rotary control, to scroll through the report as necessary:

### Clearing the alert

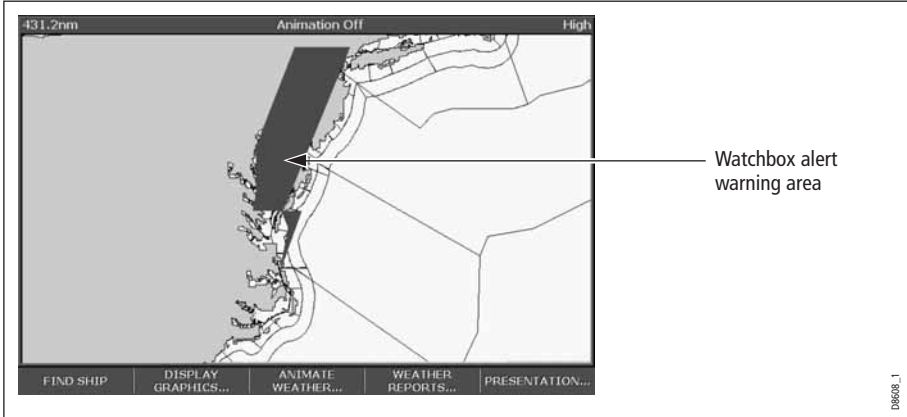
To clear an alert, press ACKNOWLEDGE. The alert is removed from the display. The watchbox warning can still be viewed via the Weather Reports soft keys

**Note:** If required, you can switch off the marine watchbox alarm (via the Weather Setup Menu see page 251) or set the watchbox status to hide. Reports continue to be added to

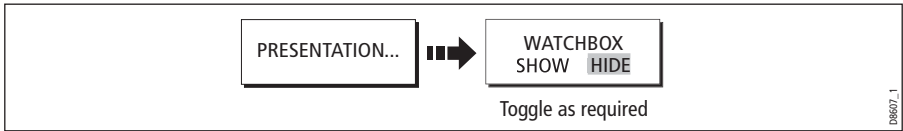
*and/or updated in the database irrespective of the status that you have the alarm or show/hide feature set to.*

## Displaying marine watchboxes

When the marine watchboxes feature is set to ON (default), any regions for which an alert is valid are highlighted on the weather map as a red polygon.

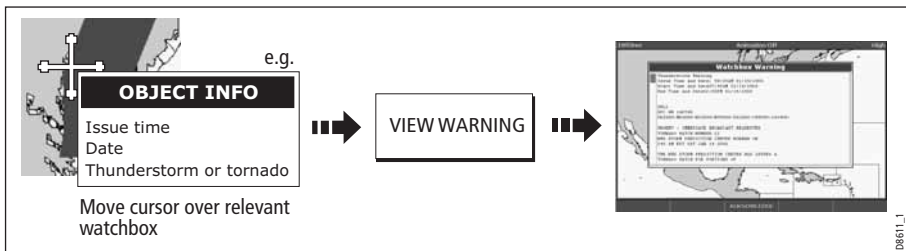


To show/hide watchboxes:



## Displaying watchbox data

To display the data relating to a particular watchbox:



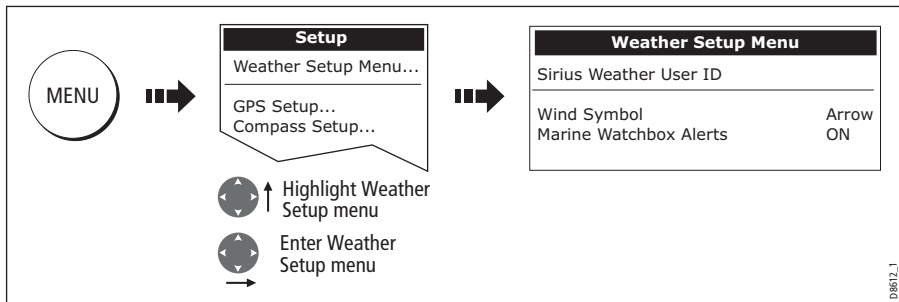
## 14.11 Weather application setup

When a weather application is the active window, the set up for your weather application can be changed from the standard configuration to suit your particular needs. Although you will probably only do this when you first use this application, you may decide to make subsequent adjustments once you become more familiar with the system. Any settings that you change are retained even when you power off.

The Weather Setup Menu also provides the User ID for your weather receiver.

### Selecting the Weather Setup Menu

To select the Weather Setup Menu:



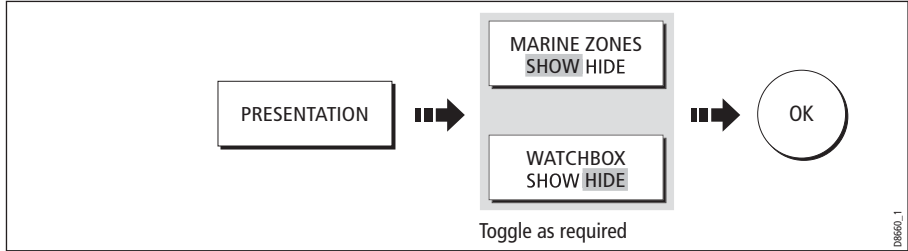
### Weather Setup options

FUNCTION Description	OPTION (Default in <b>bold</b> )
<b>Sirius Weather User ID</b> Details the Weather ID obtained from Sirius and keyed in on your display.	(as advised)
<b>Wind Symbol</b> Graphic used for wind symbol	<b>Arrow</b> Barb
<b>Marine Watchbox Alert</b> Enables alert when watchbox is issued.	OFF 50 <b>150</b> 300 500 ALL

**Note:** Distance units used here are the same as the system 's, i.e. If you have nm set as your system distance units, then the default watchbox alert units will be 150nm.

## Showing/hiding marine watchboxes and zone boundaries

By default your weather application displays marine zone boundaries and marine watchboxes. If required, you can hide these options:



### 14.12 Troubleshooting

Problem	Reason
Boat symbol not displayed	No position fix
On start up, weather map stays in last view and does not re-draw	No position fix
During use, weather map stays in last view and does not re-draw	<ul style="list-style-type: none"> <li>• FIND SHIP not pressed</li> <li>OR</li> <li>• Motion mode active.</li> </ul>
FIND SHIP soft key greyed-out	No position fix
Boat symbol drawn as a solid circle	No heading or COG available

**Note:** *If weather data is not being received, a warning is displayed. The soft keys, weather map and the ability to set the weather graphics status to show/hide continues to operate as normal.*

# Chapter 15: Sirius Audio (US only)

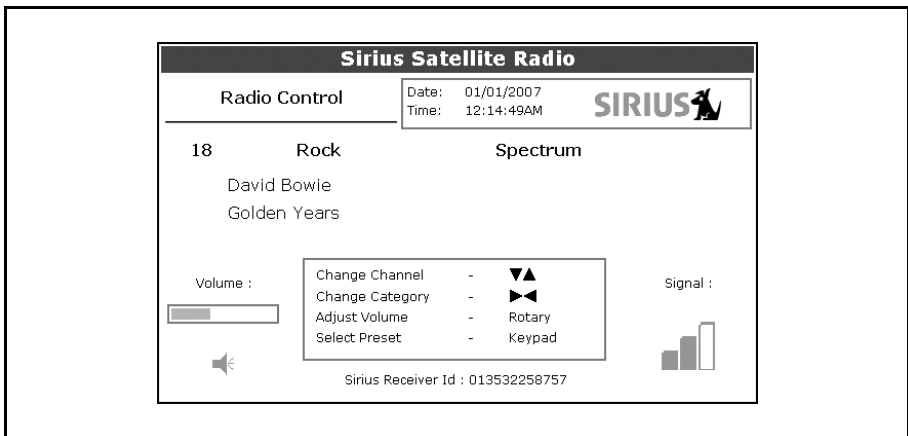
If you have a Sirius data receiver installed, you can use the E-Series display unit to control satellite radio broadcasts. Refer to the SR50/SR100 documentation for installation information.

The E-Series gives you access to basic and advanced audio functions. As well as listening to radio broadcasts and browsing or scanning channels, you can set up parental locks to limit access to selected channels and alerts to tell you when a favorite song is being played.

## 15.1 To start using Sirius Radio

1. Press **MENU**.
2. On the Setup Menu, select **Sirius Satellite Radio**.

The Sirius Radio Control screen opens:



Information contained on the Sirius Radio Control screen includes:

- Current channel name, number and category
- Play data for the current channel
- Date and time
- Receiver ID and signal strength

Use the softkeys and trackpad to control audio functions. Use the rotary controller to adjust volume.

The softkeys give you access to the functions outlined in *Table 15-1, Sirius Audio Toolbar*.

Table 15-1: Sirius Audio Toolbar

<b>MUTE ON/OFF</b>	Controls the mute setting.
<b>PRESETS...</b>	Displays a list of preset channels and the full channel list with modify options. Use the trackpad or rotary controller to scroll through the list of presets.
<b>SETUP CHANNELS...</b>	Gives access to the Edit Presets, Edit Alerts, Edit Channel Access, Scan Channels softkeys.
<b>ALERTS...</b>	Lets you set up an alert to tell you when favourite songs or artists are played on any channel.
<b>BROWSE...</b>	Scroll to view play data and to select channels, presets, or categories.

## 15.2 Tuning to a channel

From the Sirius Control screen, you tune to channels using the trackpad on the E-Series Display (or you can enter preset numbers directly using the alphanumeric keypad if you have one).

<b>Trackpad up</b>	Next channel.
<b>Trackpad down</b>	Previous channel.
<b>Trackpad left</b>	First channel in the previous category.
<b>Trackpad right</b>	First channel in the next category.

## 15.3 Browsing channels

The browse function allows you to view play data for channels without tuning to them.

### To browse channels

1. On the Sirius Audio Control screen, press the **BROWSE** softkey.  
Pressing this key displays the Channel List or Preset List for browsing. Toggle between the two lists with the **VIEW ALL/PRE** softkey.
2. Use the rotary controller or trackpad to scroll through the channels.
3. Press the **TUNE TO CHANNEL** softkey (or the rotary controller) to listen to the selected channel.

To go back to the Sirius Control screen, press **OK** or **CANCEL**.

## Filtering categories from the browse

This feature allows you to choose a category from which to browse channels; other categories are excluded from the browse.

### To filter categories

1. On the Browse screen, press the **FILTER BY** softkey.
2. Press the **SELECT CATEGORY** softkey.
3. Using the trackpad or rotary controller, select the category you want to browse.
4. Press **OK**.

## 15.4 Scanning channels

The Scan function automatically tunes to all channels in turn.

### To scan channels

On the Sirius Radio Control screen:

1. Press the **SETUP CHANNELS...** softkey.
2. Select **SCAN CHANNELS**.
3. Use the **SCAN ALL/PRE** softkey to choose to scan all channels or only preset channels.
4. Press **SELECT** to stop the scan and listen to the active channel.

## 15.5 Hiding or showing channels and categories

You can select particular channels and categories to be excluded (hidden) from the Browse and Scan sequences.

### To hide or show a channel or category

On the Sirius Radio Control screen:

1. Press the **SETUP CHANNELS...** softkey.
2. Select **EDIT CHANNEL ACCESS**.
3. In the channel list, select the channel you want to hide. If you want to hide a category, select any channel in that category.
4. Toggle between hidden and shown states with either the **CHANNEL SHOWN/HIDDEN** or **CATEGORY SHOWN/HIDDEN** softkeys.

## 15.6 Presets

You can assign up to 18 channels to presets to make tuning, scanning and browsing easier. To assign a channel to a preset, use the **PRESETS** softkey from the main control screen or the **EDIT PRESETS** softkey from any of the following screens:

- Setup channels
- Browse channels

At the Edit Preset Channels screen you can select a preset and assign a channel to it, move the assigned channel to a different preset, or delete the assigned channel.

Toggle between the Preset Channels list and the Channel List either by using the trackpad (left/right) or by pressing the appropriate softkey.

### To assign a channel to a preset

1. Select an unused preset number from the Preset List.
2. Press the **ASSIGN NEW CHANNEL** softkey.
3. Select the target channel from the Channel List.
4. Press the **ASSIGN TO PRESET** softkey.

**Note:** *If the preset you want to use already has a channel assigned to it, delete the preset first.*

### To delete a channel from a preset

1. In the Preset Channels list, select the preset you want to clear.
2. Press the **DELETE CHANNEL** softkey.

### To move a channel to a new preset

1. Use the rotary controller or trackpad to select the preset you want to move.
2. Press **MOVE TO NEW PRESET**.
3. Scroll to the preset you want to move the channel to.
4. Press **MOVE TO NEW PRESET**.

**Note:** *You can overwrite a channel that has already been assigned to a preset, but you will be prompted to confirm the action.*

## 15.7 Parental locking

You can set up blocks on certain channels so that they can only be played if a correct password is entered. Parental locking must be enabled for the blocks on your selected channels to be effective.

By default, blocking is not enabled.



## To enable blocking

On the Sirius Radio Control screen:

1. Press the **SETUP CHANNELS** softkey.
2. Press the **PARENTAL LOCK ON/OFF** softkey so that **ON** is highlighted.

## To set up a password

On the Sirius Radio Control screen:

1. Press the **SETUP CHANNELS** softkey.
2. Press the **PARENTAL LOCK** softkey to highlight **ON**.
3. At the Password Setup screen, enter and confirm your password and hint.

Use the rotary controller (or trackpad) to select characters and press the rotary controller to accept them. Press **OK** to enter each field.

You can also access the password entry screen by pressing **EDIT CHANNEL ACCESS** then **CHANNEL ENABLED/LOCKED**.

## To change an existing password

1. Press the **EDIT CHANNEL ACCESS** softkey.
2. Press the **EDIT LOCKOUT PASSWORD** softkey.
3. Enter your old password, then the new password and hint.

## To block a channel

On the Sirius Radio Control screen:

1. Press the **SETUP CHANNELS** softkey.
2. Press the **EDIT CHANNEL ACCESS** softkey.
3. In the Channel List, select the channel you want to block.
4. Press the **CHANNEL ENABLED/LOCKED** to highlight **LOCKED**.
5. Repeat steps 3-4 for each additional channel you want to block.
6. When you blocked all the channels you want, press the **CLEAR** key.
7. Ensure the parental lock is on (**ON** is highlighted on the **PARENTAL LOCK ON/OFF** softkey).
8. At the prompt, enter your password.

Blocked channels remain visible in channel lists, but you cannot select them with the trackpad and they are ignored by the scan function. They are marked as locked by an icon next to the channel name.

## To enter a password

If you select a blocked channel from the channel list or want to block a channel when the parental lock is on, you will be asked to enter the password.

1. Use the rotary control or trackpad to enter the password in the entry field.
2. Press **OK** to enter password.

After three incorrect attempts, the system displays your password hint.

## 15.8 Favorite song alerts

The favorites feature lets you set the E-Series to alert you when a favorite song or artist is playing on any channel. You can define up to 10 favorites using the Alerts softkey.

### To enable favorite alerts

On the Sirius Radio Control screen:

1. Press the **ALERTS...** softkey to open the Edit Alerts screen.
2. Use the **ALERTS ON/OFF** softkey to toggle favorite alerts on and off.

### To set up a song or artist alert

Press the **ALERTS** softkey to open the Edit Alerts screen. This screen shows ten favorites and the song playing currently.

You can delete a favorite from the list, add the current song or artist to the list or switch the favorites alert off.

1. Use the trackpad or rotary controller to select a favorite from the list.
2. If necessary, press **DELETE** to remove a favorite from the list.
3. Press **ADD SONG** or **ADD ARTIST** to assign the song or artist playing to the selected favorite.

If a song or artist is already assigned to the Favorite selected, you will be prompted to overwrite the existing favorite or cancel.

You can also mark a channel or song as a favorite by pressing the **ASSIGN TO ALERT** softkey while scanning.

When alerts are on and the system detects one of your favorites being played on any channel, it will display an alert and sound the alarm.

- To tune to the channel playing the song, press **TUNE TO CHANNEL**. To ignore the alert, press **CLEAR ALERT**.

# Chapter 16: Navtex

## 16.1 Overview

The display can be used to view marine safety information including weather forecasts and marine warnings received from a Navtex receiver. You can select the type of warning message that will trigger this alert on your display. Once you have read the received message you can either erase or save it. Your system can store up to 100 messages. Once capacity is reached the oldest messages are automatically deleted to allow for new incoming messages.

Major areas of NAVTEX coverage include the Mediterranean Sea, The North Sea, coastal areas around Japan and areas around the North American continent.

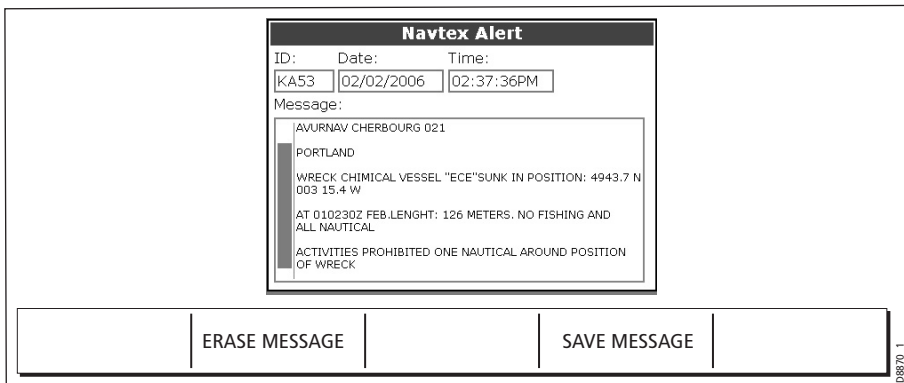
## 16.2 Setting up Navtex weather

Before you are able to view Navtex messages you will need to:

1. Specify for the communicating NMEA port, the baud rate (4,800 or 9,600) applicable to your Navtex receiver (see *page 287*).
2. Enable the category of Navtex messages that you wish to receive alerts for (see *page 260*).

## 16.3 Incoming message alerts

Once correctly connected to the Navtex unit, your system will display an alert containing the message details for any incoming messages it receives from your chosen categories e.g:



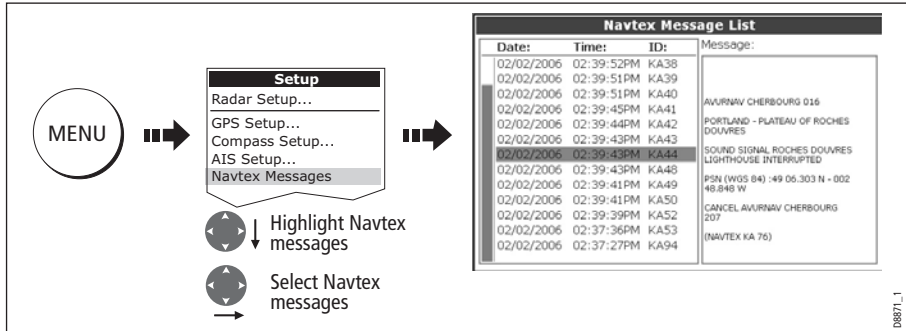
Proceed as follows:

- To remove the alert from the screen, press ERASE, or
- To add the message to the stored list of messages and then remove the alert from the screen, press SAVE MESSAGE.

## 16.4 Viewing messages

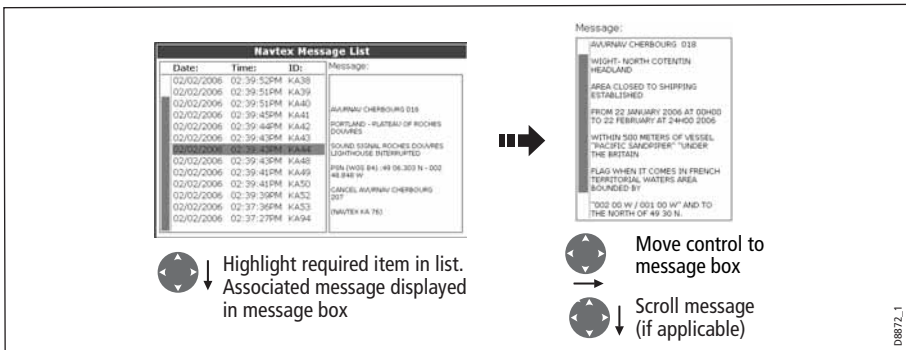
### Displaying the Navtex Message List

To view messages stored in your system:



You now have the option to SORT LIST (by date, station or category), erase a message or set up the message alerts

### Displaying and scrolling through a message



## 16.5 Managing Navtex messages

You can manage your messages by:

- Selecting the message categories for which the E-Series system will provide alerts.
- Erasing messages that you do not need.
- Sorting the message list.

### Selecting message alert categories

On initial power up, the system provides alerts for all message categories listed in the Navtex Alert Menu. If required you can switch off any categories that you do not need except Navigation Warnings (Category A), Meteorological Warnings (Category B) and Search and Rescue information (Category D).

To select the message alert categories:

Date:	Time:	ID:	Message:
02/02/2006	02:39:52PM	KA38	
02/02/2006	02:39:51PM	KA39	
02/02/2006	02:39:51PM	KA40	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA41	ANAMANU-CHERBOURG 030
02/02/2006	02:39:46PM	KA42	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA43	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA44	ANAMANU-CHERBOURG 030
02/02/2006	02:39:41PM	KA49	ANAMANU-CHERBOURG 030
02/02/2006	02:39:41PM	KA50	ANAMANU-CHERBOURG 030
02/02/2006	02:39:36PM	KA52	ANAMANU-CHERBOURG 030
02/02/2006	02:37:36PM	KA53	ANAMANU-CHERBOURG 030
02/02/2006	02:37:27PM	KA54	ANAMANU-CHERBOURG 030

SETUP ALERTS

Navtex Alert Menu	
A - Navigational warnings	ON
B - Meteorological warnings	ON
C - Ice reports	ON
D - Search and rescue information	ON
E - Meteorological forecasts	OFF
F - Pilot service messages	OFF
G - Decca messages	OFF
H - Lorax messages	ON
I - Omega messages	OFF
J - Satnav messages	ON
K - Other electronic navaid messages	ON
L - Additional navigational messages	ON
V - Notice to fisherman (US only)	ON
W - Environmental (US only)	OFF
X - Special services	ON
Y - Special services	ON
Z - No message on hand (QRU)	ON

Highlight category  
 Select category  
 Toggle to required status

## Sorting the message list

By default the message list sorts by the date and time the message was received (DATE) with the most recent message at the top. If required, you can sort the list by station identifier (STN) or by message category (CAT).

Date:	Time:	ID:	Message:
02/02/2006	02:39:52PM	KA38	
02/02/2006	02:39:51PM	KA39	
02/02/2006	02:39:51PM	KA40	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA41	ANAMANU-CHERBOURG 030
02/02/2006	02:39:46PM	KA42	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA43	ANAMANU-CHERBOURG 030
02/02/2006	02:39:45PM	KA44	ANAMANU-CHERBOURG 030
02/02/2006	02:39:41PM	KA49	ANAMANU-CHERBOURG 030
02/02/2006	02:39:41PM	KA50	ANAMANU-CHERBOURG 030
02/02/2006	02:39:36PM	KA52	ANAMANU-CHERBOURG 030
02/02/2006	02:37:36PM	KA53	ANAMANU-CHERBOURG 030
02/02/2006	02:37:27PM	KA54	ANAMANU-CHERBOURG 030

List sorted by DATE (default)

SORT LIST  
DATE STN CAT

Toggle to required sort option e.g. station

e.g.

Date:	Time:	ID:	Message:
02/02/2006	02:52:46PM	EL59	19 28
02/02/2006	02:52:37PM	EA92	
02/02/2006	02:52:02PM	EL56	
02/02/2006	02:51:56PM	EL59	ANAMANU-CHERBOURG 030
02/02/2006	02:51:52PM	KA29	ANAMANU-CHERBOURG 030
02/02/2006	02:51:46PM	KA34	ANAMANU-CHERBOURG 030
02/02/2006	02:51:43PM	KA35	ANAMANU-CHERBOURG 030
02/02/2006	02:52:39PM	KA59	ANAMANU-CHERBOURG 030
02/02/2006	02:52:42PM	KA54	ANAMANU-CHERBOURG 030
02/02/2006	02:51:09PM	CA27	ANAMANU-CHERBOURG 030
02/02/2006	02:52:58PM	TA37	ANAMANU-CHERBOURG 030
02/02/2006	02:52:38PM	TA36	ANAMANU-CHERBOURG 030
02/02/2006	02:52:31PM	TA35	ANAMANU-CHERBOURG 030

List sorts accordingly



# Chapter 17: Automatic Identification System (AIS)

## 17.1 Introduction

This chapter details the AIS system and how it can be used as a safety aid. Once set up you can overlay the AIS on chart or radar windows and use it to:

- Display a target (with heading/speed vectors and rate of turn) for any other AIS equipped vessels.
- Display basic or detailed information for each target vessel including safety critical target data.
- Set up a safe zone around your boat.
- View alarm and safety related messages.

## 17.2 What is AIS?

AIS uses digital radio signals to broadcast 'real-time' information between vessels and shore based stations via dedicated VHF frequencies. This information is used to identify and track vessels in the surrounding area and to provide fast, automatic and accurate collision avoidance data. AIS will augment your radar application, as it can operate in radar blind spots and can detect smaller AIS fitted vessels.

### **WARNING:**

**Smaller vessels do not have to be fitted with AIS and whilst it is mandatory for larger commercial vessels to carry AIS, its use is not. You should not therefore assume that your AIS will display ALL vessels in your area. Due prudence and judgement should be exercised.**

**AIS should be used to complement not substitute radar.**

## Classes of AIS data

AIS data is defined as Class A or Class B. The sending and receiving of Class A data is compulsory for larger vessels. You will therefore be able to view all larger vessels on your AIS display. Class B data is applicable to smaller vessels and is not compulsory. You should not therefore assume that your AIS is displaying all smaller vessels in your area.

*Note: Not all AIS receivers will decode all information and not all of the Class A vessels input all of the required AIS data. For example, some inexpensive AIS Class B receivers do not decode and output the ship's name, IMO number and vessel draft/beam/length, destination etc.*

<b>Data details</b>	<b>Class A</b> (Sends and receives)	<b>Class B</b> (receives only)
<b>Static Data</b> <ul style="list-style-type: none"> <li>• Ship's name</li> <li>• Type</li> <li>• Call sign</li> <li>• IMO number</li> <li>• Length and beam</li> <li>• Antenna location</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li></li> <li></li> <li>✓</li> <li>✓</li> </ul>
<b>Voyage Related Data</b> <ul style="list-style-type: none"> <li>• Draft</li> <li>• Cargo information</li> <li>• Destination</li> <li>• ETA</li> <li>• Other relevant information</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li></li> <li>✓</li> <li></li> <li></li> <li>✓</li> </ul>
<b>Dynamic Data</b> <ul style="list-style-type: none"> <li>• Time</li> <li>• Ship's position</li> <li>• COG</li> <li>• SOG</li> <li>• Gyro heading</li> <li>• Rate of turn</li> <li>• Navigational status</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li></li> </ul>
<b>Dynamic Reports</b> <ul style="list-style-type: none"> <li>• Ship's speed</li> <li>• Ship's status</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>
<b>Messages</b> <ul style="list-style-type: none"> <li>• Alarm</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>

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*Note: To change the specified AIS targets and range see page 270.*



### 17.3 What do I need to run AIS?

In order to run AIS, you will need:

- A receive only unit or a full transponder.

**Note:** A receiver will allow you to receive data about other vessels in your area but will not allow other vessels to 'see' you. A full transponder transmits and receives AIS data and therefore allows you to receive data about other vessels and for other AIS equipped vessels to see and receive information about your vessel. This could include position, course, speed and rate of turn data.

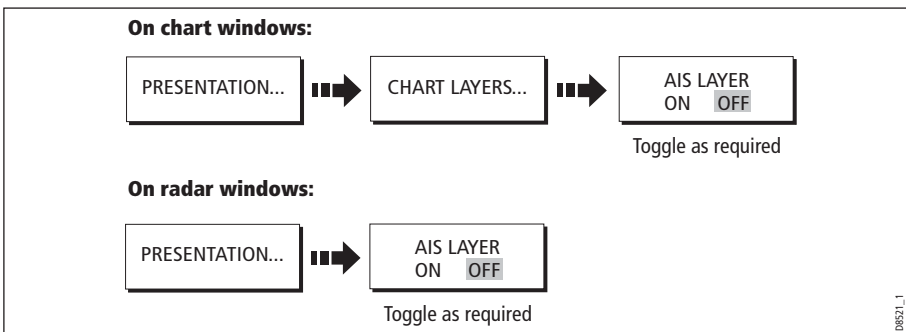
- A VHF antenna - this is usually supplied with the AIS system.
- A GPS - to provide position data.
- A Compass - although not essential, will improve speed calculations.

When the AIS unit is connected to the E-Series display, the status of the unit is indicated by an AIS icon in the transducer data box.

You will now need to specify the 38,400 baud for the NMEA port that communicates with the AIS transceiver or receiver (see page 287).

### 17.4 Selecting the AIS function

AIS is a selectable layer of the chart or radar application. To switch on AIS:



### AIS status

	AIS unit not available i.e. not connected or off.
	AIS unit switched on and operating.
	AIS unit on with active alarm.
	AIS unit switched on and operating but dangerous & lost target alarm disabled.

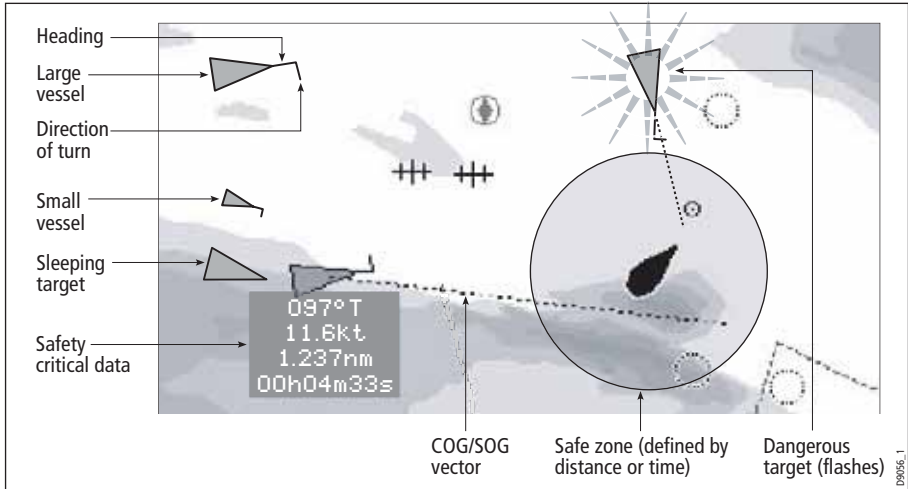
The status of the AIS is displayed in the data bar on your display.

If your own boat's position is lost the display will disable the AIS functionality and will display the 'No AIS' icon.

Once your own boat's position returns and the AIS display is switched on, the display will re-enable the AIS function.

*Note: The 'No AIS' symbol will be shown after 7 minutes if no valid AIS signals are received.*

## 17.5 How is AIS data displayed?



The AIS system displays other AIS equipped vessels in the surrounding area as triangular targets overlaid on a chart or radar window. Up to 100 targets are displayed. As the vessel's status changes, the symbol for the target will change accordingly.

Vectors can be displayed for each target. These vectors indicate the direction of travel and rate of turn of the vessel and the distance it will travel over a specified period of time (COG/SOG vector). Targets displayed with their vectors are referred to as 'active targets' and are scaled according to the size of the vessel. The larger the vessel the larger the target. You can either display all targets or just dangerous targets (*page 274*).

### AIS Target symbols

<p><b>Sleeping target</b></p> <ul style="list-style-type: none"> <li>Target not activated, dangerous or lost.</li> </ul>	
<p><b>Activated target</b></p> <ul style="list-style-type: none"> <li>Target activated i.e. AIS vector displayed.</li> <li>Vector line (optional) shows predicted distance travelled within given time.</li> </ul>	<p>COG/SOG vector → Direction of turn → Heading</p>
<p><b>Selected target</b></p> <ul style="list-style-type: none"> <li>Target selected with cursor.</li> <li>Can activate the target and view detailed data.</li> </ul>	<p>AIS</p>
<p><b>Dangerous target</b></p> <ul style="list-style-type: none"> <li>Targets within specified distance (CPA) or time (TCPA).</li> <li>Dangerous target alarm sounds if en-abled.</li> <li>Target flashes.</li> </ul>	
<p><b>Uncertain target</b></p> <ul style="list-style-type: none"> <li>Calculated CPA/TCPA value uncertain.</li> </ul>	
<p><b>Lost target</b></p> <ul style="list-style-type: none"> <li>When signal of dangerous target not received (see table below for timings).</li> <li>Target in latest predicted position.</li> <li>Alarms sounds if enabled.</li> <li>Target flashes.</li> </ul>	

Timings for AIS Lost Target alarm
20 secs=SOG >23kt
30 secs=SOG 14-23kt
60 secs=SOG 3-14kt
6mins if SOG less than 3kt

### Viewing target information

You can display information relating to individual AIS targets. When a target is highlighted with the cursor, the soft keys change to allow you to select the following options:

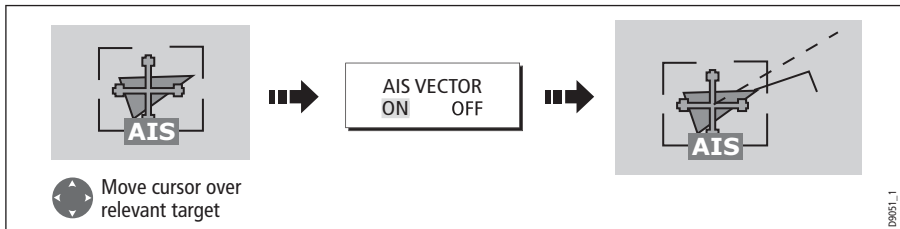
- AIS vectors.
- AIS safety critical data.
- AIS List.
- Full AIS data.

### Displaying AIS vectors

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

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

To switch the AIS VECTOR option ON/OFF:



When a target is activated, its symbol is scaled according to the size of the vessel.

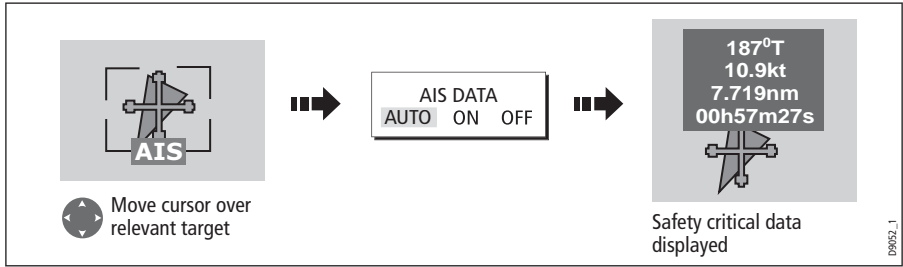
*Note: AIS vector mode is derived from the same motion mode settings as your Chart application.*

*Note: The safe zone settings apply to both Radar MARPA and AIS targets.*

### Displaying safety critical AIS data

Safety critical target data i.e. COG, SOG, CPA and TCPA can be displayed in the tag alongside each target. You can switch this data ON, OFF or display it automatically (AUTO) when the cursor is over the target.

To switch the AIS DATA option to AUTO/ON/OFF:



### AIS List

You can also view a list of AIS targets. The list provides collision avoidance data for the highlighted target:

AIS Target List			
No.	Name/MMSI	Rng	Brg
1	Sim Target 12	7.231nm	1.9°S
2	Sim Target 17	7.684nm	78.1°P
3	Sim Target 6	9.619nm	24.8°P
4	Sim Target 1	10.43nm	125.7°P
5	Sim Target 18	11.59nm	16.8°P
6	Sim Target 9	12.27nm	47.6°S

MMSI	12	Position	50°35'.985N
Last seen	01/01/2004		001°11'.536W
	12:52:55AM	Heading	208°T
Vessel	-----	ROT	+000°/min S
		COG	221°T
		SOG	16.9kt

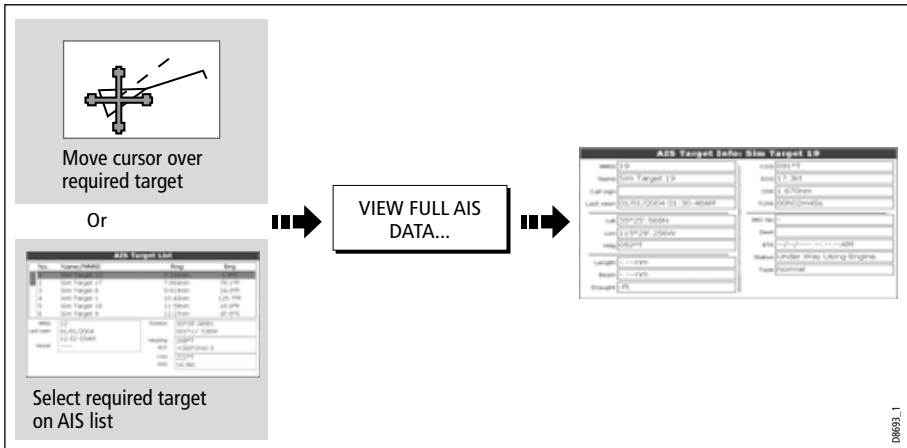
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To display the AIS List:



### Viewing full AIS data

To display detailed AIS data for an individual target e.g. static and dynamic and voyage related data:



## 17.6 Using AIS for collision avoidance

You can use your AIS for collision avoidance by using the safe zone and safety message functions.

### Safe zones

#### What is a safe zone?

The safe zone is a ring, centred on your boat. A target is considered dangerous if it is predicted to, or will reach your safe zone within the set time period. It is displayed on radar or chart windows as a red ring.

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

When your system recognizes a dangerous AIS target:

- The target symbol changes to red and flashes.
- An alarm pop-up is displayed.
- An alarm sounds.

#### Disabling the dangerous target alarm



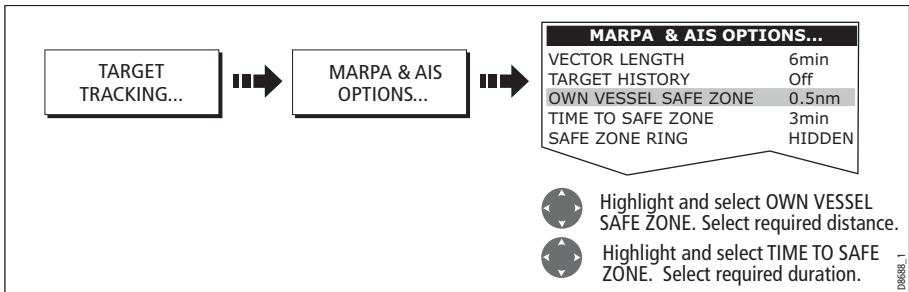
If required, the dangerous target alarm can be disabled. Once disabled any dangerous targets that are detected, will turn red and flash but the alarm **will not** sound and the pop-up **will not** be displayed. The AIS status icon reflects that the alarm is disabled.

To disable the dangerous target alarm:

1. Select Menu.
2. Select Alarm Setup.
3. Select AIS Alarms Setup.
4. Switch Dangerous Targets Alarm to **OFF**.
5. Press **OK**.

### Setting up an AIS safe zone

To set up a safe zone around your vessel and specify the time to safe zone:



*Note: If required you can also hide the safe zone ring via this menu.*

### Important

When the AIS receiver is connected and functioning, the system will check for dangerous targets within the safe zone and if enabled issue an alarm whenever necessary. Dangerous target alarm operates irrespective of the ON or OFF status of the AIS target display (see *page 270*) or the VISIBLE/HIDDEN status of the safe zone ring

## MARPA and AIS options

Parameter	Options (Default in bold)
<b>Vector Length</b> The time period specified for drawing length of vectors.	0.5min, 1 min, 3 min, <b>6min</b> , 12min, 30 min, 60 min
<b>Target History</b> Plots a MARPA target's previous position at specified intervals. The four most recent position points are displayed. If True target vectors are selected, the four most recent vessel position points are also displayed.	<b>OFF</b> , 0.5 min, 1 min, 3 min, 6 min
<b>Own vessel safe zone</b> The safe zone is a ring, centred on your boat, within which a target is considered dangerous if it comes within a specified distance (CPA).	0.1 nm, 0.2nm, <b>0.5nm</b> , 1.0 nm, 2.0nm

Parameter	Options (Default in bold)
<p><b>Time to safe zone</b> If a target enters your safe zone within this time period, it is considered dangerous.</p>	<p><b>3 mins</b>, 6 mins, 12 mins, 24 mins</p>
<p><b>Safe zone ring</b> Controls whether the safe zone ring is displayed or hidden on screen</p>	<p>Visible <b>Hidden</b></p>

### Safety messages

When the status of the AIS Safety Messages function is set to ON in the AIS Layer Setup Menu (see *page 274*), any incoming safety messages from surrounding vessels, shore stations and mobile stations, are displayed in a pop-up box. If known, the message will include the sending vessel's position in lat/lon.

You now have the option to:

- Remove the message (ACKNOWLEDGE)
- Place a waypoint on your chart/radar to mark the sending vessel's position.
- Select to GOTO the sending vessel's position.

*Note: When the simulator is operating you will not be able to receive any safety messages.*

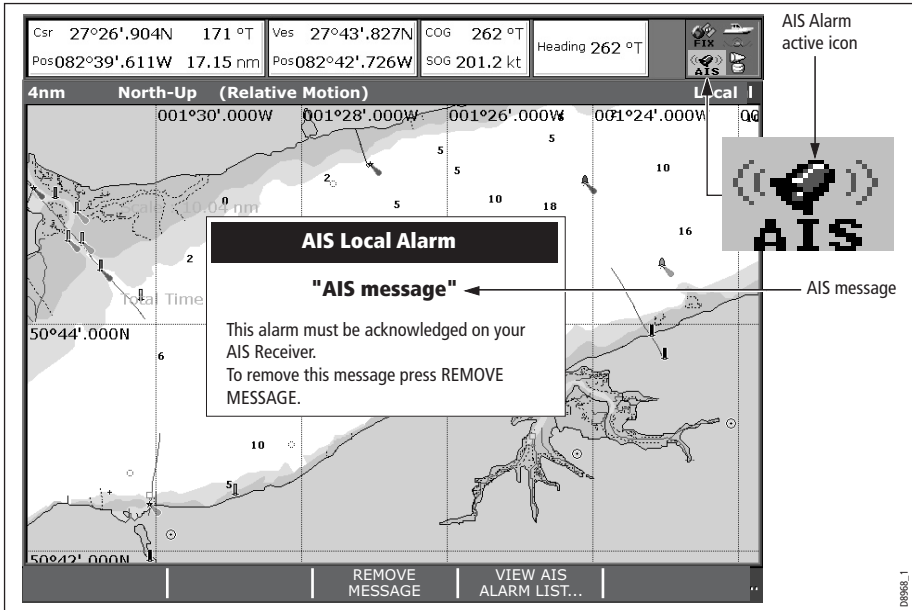
## 17.7 AIS Alarms

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

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

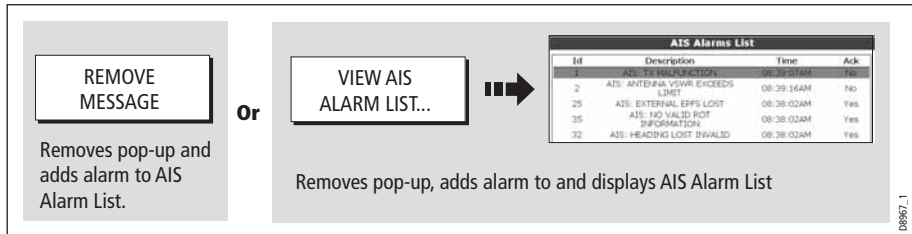
### Local AIS alarms

When the connected AIS unit generates an alarm, your E-Series displays a local alarm message and indicates the alarm status in the data bar icon:



To proceed:

1. Remove the message pop-up/display active alarm list:



2. Acknowledge the message at your AIS unit.

**Important:** An alarm remains active until it is acknowledge on the AIS unit.

### Active alarm list

The active alarm list shows the status of each local alarm. This list can either be accessed via the AIS Layer Setup Menu (see *page 274*) or from the Alarms Setup Menu (see *page 289*).

*Note: The local AIS alarms must be acknowledged at the AIS receiver. Removing the message or adding it to the Alarm list on your E-Series display does not cancel the alarm.*



## 17.8 Simulator

We recommend that you use the simulator to familiarize yourself with the AIS function.

When the system simulator is switched on (see *page 285*), it displays 20 AIS targets within a 25nm range. These targets are displayed using the appropriate AIS targets status symbol (see *page 266*) and move around the screen as if they were real targets.

**Important:** Incoming safety messages cannot be displayed while the simulator is switched on.

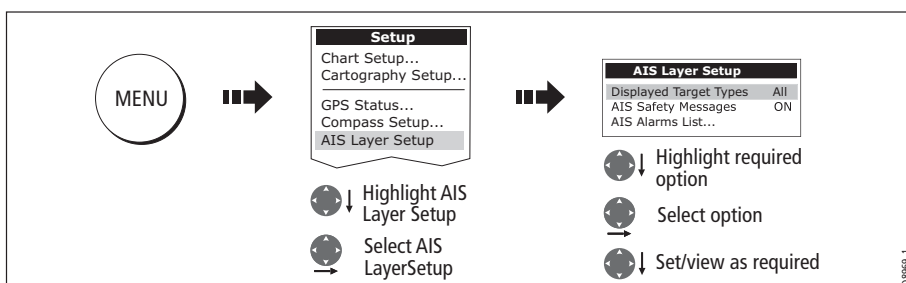
## 17.9 AIS Layer Setup Menu

The AIS Layer Setup Menu allows you to:

- Select the target types displayed (ALL or DANGEROUS).
- Switch the display of AIS safety messages ON/OFF.
- View the list of active AIS unit alarms.

To display the AIS Layer Setup Menu:

1. Set the AIS LAYER status to ON ((see *page 265*).
2. Select the AIS Layer Setup:





# Chapter 18: System setup and customizing

This chapter describes how to setup and customize your E-Series display. Any settings that you change will be stored by the display and shown each time you power on. You can, of course change these settings as many times as you wish.

## 18.1 Changing the data master

**For Networked E-Series systems only:** To change the data master from that already specified, please see *page 30*.

## 18.2 Customizing the page sets

Each page set provides access to 5 different pages. Each page can display up to four application windows. With the exception of Video, you can view multiple windows of the same application. For example you could have two chart application on one page - one to view a large scale chart, the other for a detailed view of your immediate surroundings.

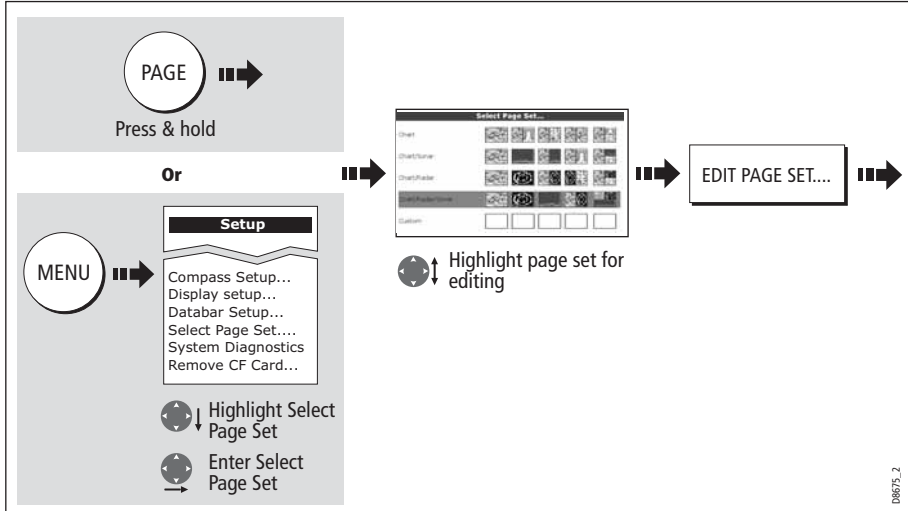
If none of these meet your particular requirements you can edit the page sets to display the application and page layout that suits your particular needs. This process should also be used if you wish to run a video, engine monitor or weather application.

In addition, you can rename of any of the page sets to a title that is more meaningful. A control is also provided to reset the selected page set to the factory default configuration.

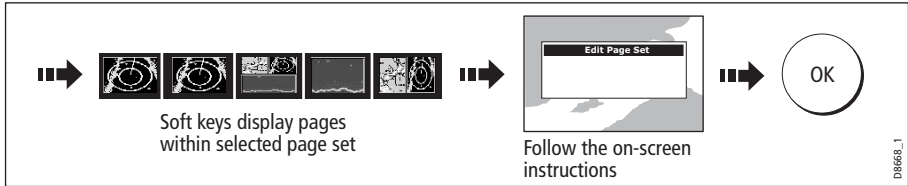
## Re configuring the application and page layout

To change the configuration of applications and/or page layout or switch off pages:

1. Select the edit page set option:



2. Edit the page set:



*Note: Only one video application can be viewed per page.*

The page, window and application layout that you have defined will now be available each time you open the Select Page Set screen.

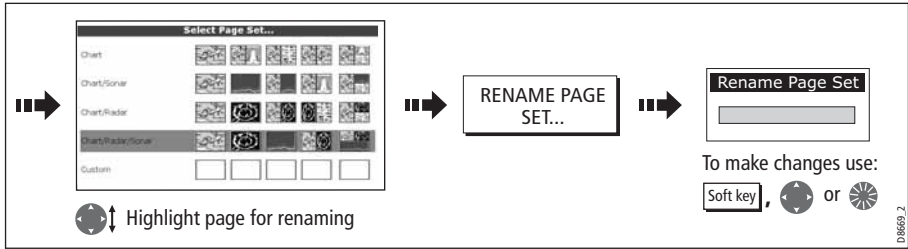
If you do not want to use all 5 pages in a page set, you can switch off individual pages. When you use PAGE to cycle through the pages, the system will now skip any pages that are set to OFF.

*Note: A red cross will be overlaid on soft keys associated with pages set to OFF.*

## Rename a page set

If required, you can customize the names of the page sets:

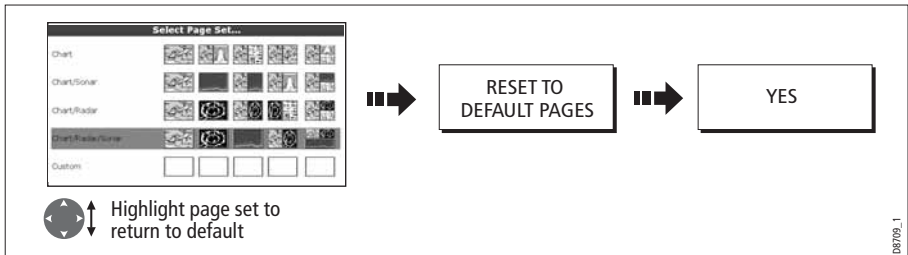
1. Display the Select Page Set Menu, as described on *page 276*
2. Rename the page set:



## Return to default setting

To return a page set to the default configuration and name:

1. Display the Select Page Set Menu, as described on *page 276*.
2. Reset the page set to the default:



## 18.3 Changing the databar

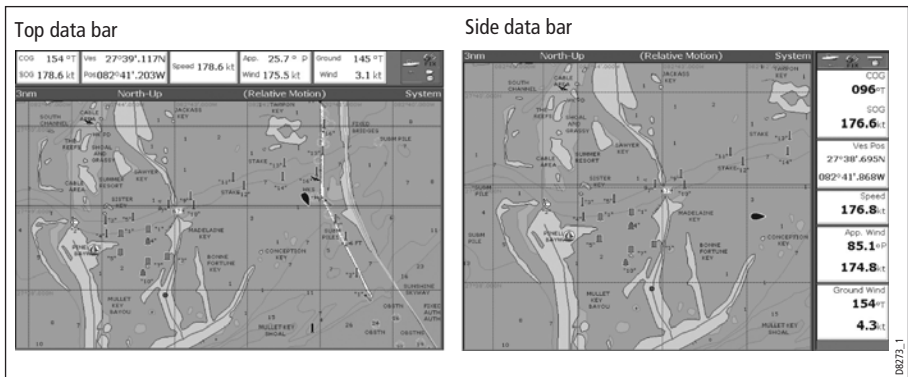
You can change the data bar to meet your own particular needs. This includes:

- Position - top or side.
- Size (top position only).
- Data displayed
- Compass bar (top position only).

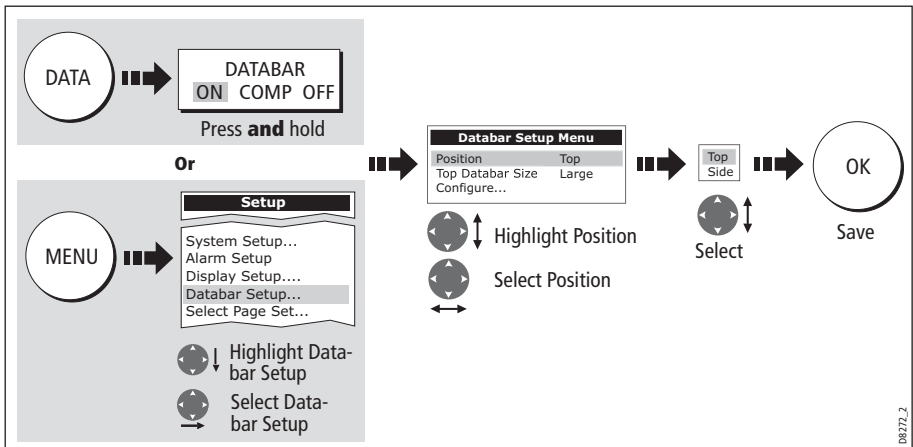
The databar configuration is a local setting and will therefore only affect the individual display on which you are working.

### Databar position

The data bar can either be displayed vertically at the right-hand side of your screen or horizontally across the top:

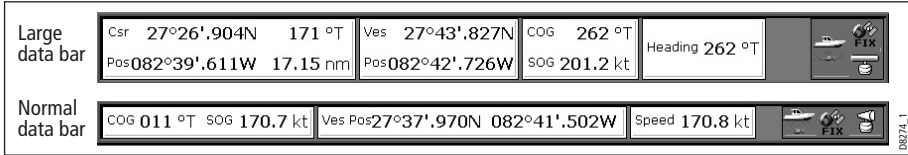


To change the data bar position:

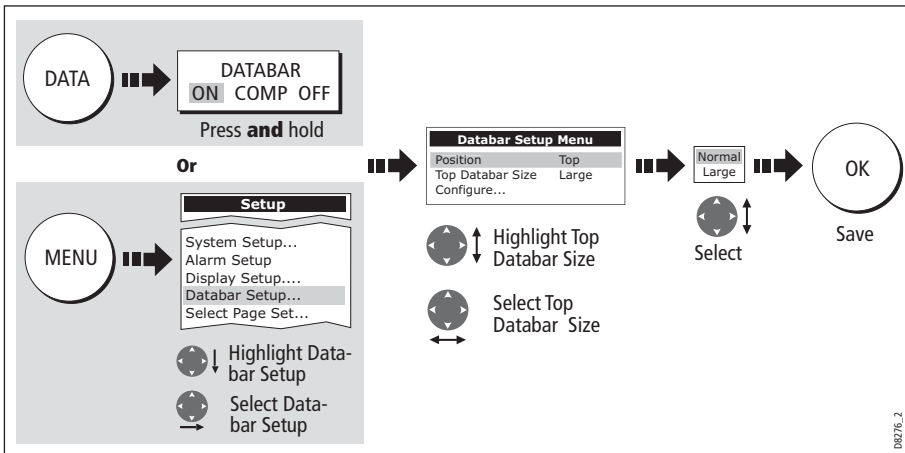


## Data bar size

When the data bar is positioned at the top of your screen, you have the option of displaying the bar in either a Large or Normal format. The large bar provides more data:

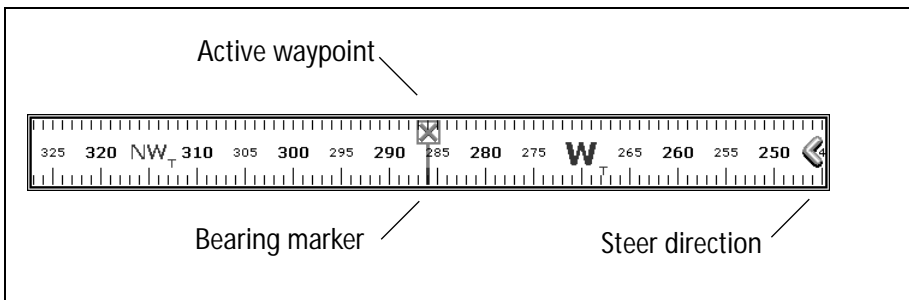


To change the data bar size:



## Compass bar

The compass bar gives you a continuous readout centred on your current heading or course over ground (COG). Arrows at either end of the bar indicate current steer direction.



- In heading mode, the bearing marker is **RED**.
- In COG mode, the bearing marker is **GREEN**.

- When you use the compass bar with an **active waypoint**, the bearing marker is **BLUE** and the active waypoint symbol indicates the bearing to your waypoint.

## Turning the compass bar on and off

You turn the compass bar on and off from the data toolbar.

- Press the **DATA** button.

Use the **DATABAR** softkey to turn the compass bar on or off.

Table 18-1: DATABAR Softkey Options

<b>ON</b>	Displays the standard databar, at the top or side of the screen depending on your setup options.
<b>COMPASS</b>	Replaces the standard databar with the compass bar, displayed along the top of the screen.
<b>OFF</b>	Removes both the databar and the compass bar from your display.

**Note:** *When the compass bar is displayed the transducer icons remain visible in the top-right section of the screen.*

## Compass bar setup

The compass bar is set to open in heading mode. To change this setting, press the **MENU** button and go to the Databar Setup menu where you can select either Heading or COG.

**Note:** *If MOB is activated while the compass bar is open, the compass is replaced with the MOB toolbar. The compass bar returns when you cancel the active MOB.*



## Customizing the contents of the data bar

You can customize your data bar so that it contains the particular information that you require. The table that follows, shows the available data.

Data groups	Data (abbreviations in brackets)
VESSEL	Vessel position (Ves Pos) Course over ground/Speed over ground (COG/SOG) Heading Speed Wind velocity made good (VMG Wind) Waypoint velocity made good (VMG Wpt) Log trip* Log Trip Ground Log/Trip 1 Ground Log Ground Trip 1 Ground Trip 2 Ground Trip 3 Ground Trip 4 Rudder
NAVIGATION	Cross track error (XTE) Waypoint (WPT)
DEPTH	Depth
ENVIRONMENT	Pressure Air temperature (Air Temp) Sea temperature (Sea Temp) Set drift
WIND	True wind Apparent wind (App Wind) Ground wind
TIME AND DATE	Local time Local date
CURSOR POSITION	Cursor position (Csr Pos)
TRANSDUCER STATUS	Transducer status

### \* Trip log

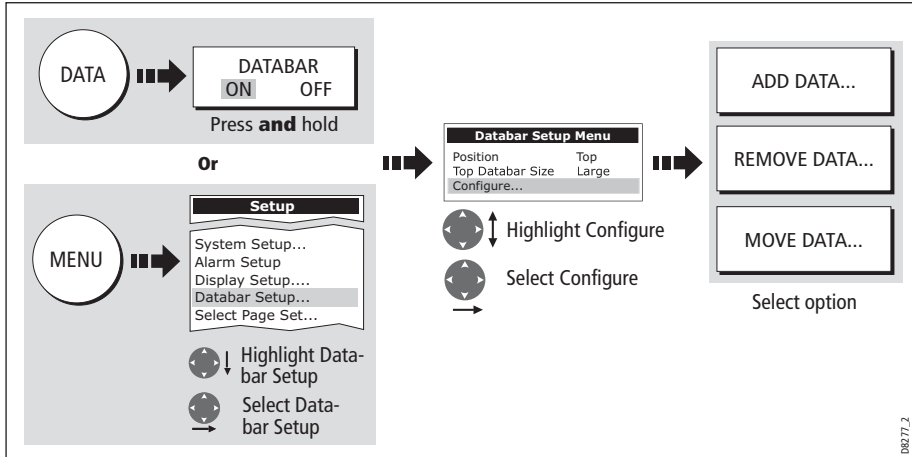
You can view the total distance travelled (Log) and the distance since you last applied a reset (Trip) based on your speed through water (STW).

In addition you can include in your data application or databar, ground log and four ground trip counters based on your GPS position. These counters are updated every minute.

If the GPS fix is lost or if the system simulator is switched on, the system will pause the ground log and trip counters. When the GPS fix returns, or the system simulator is switched off, the ground log and trip counters resume.

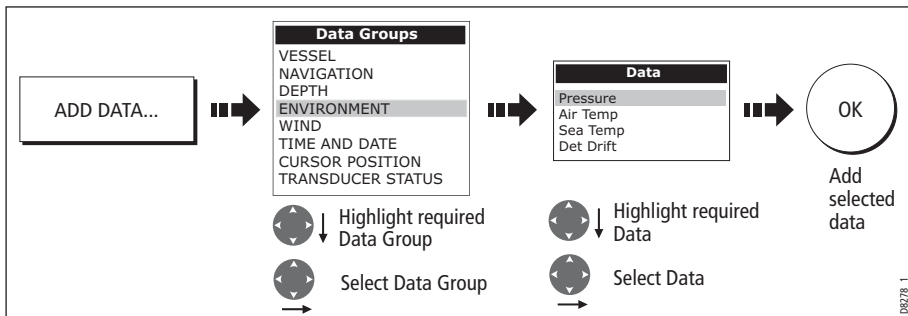
### Selecting the configure options

To select the configure options for the data bar:



### Adding data

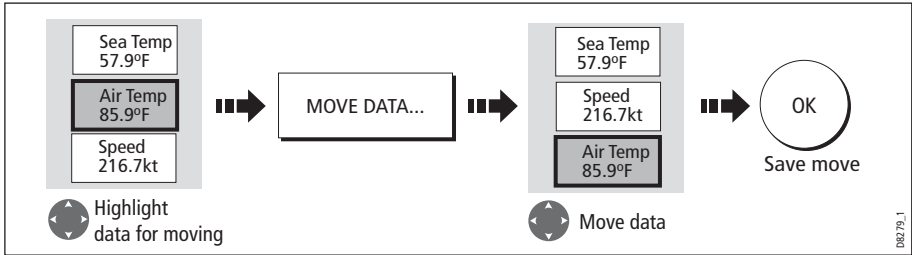
Once you have selected the configure option (see above), you can add new data:



When the data bar is positioned to the side of your screen, a new selection is added at the top of the bar. When the data bar is positioned across the top of your screen, a new selection is added on the left. Existing data moves down as new data is added.

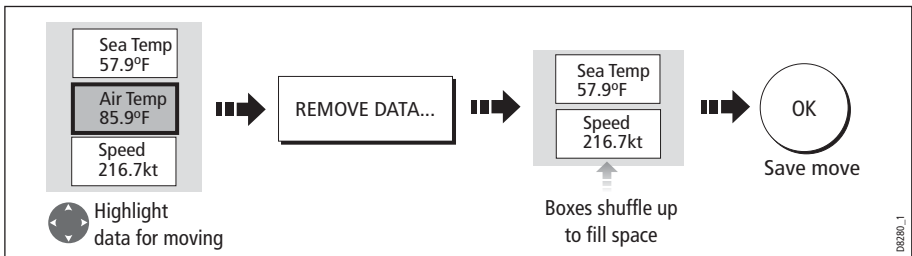
### Moving data

Once you have selected the configure option (see above), you can move data within the bar.

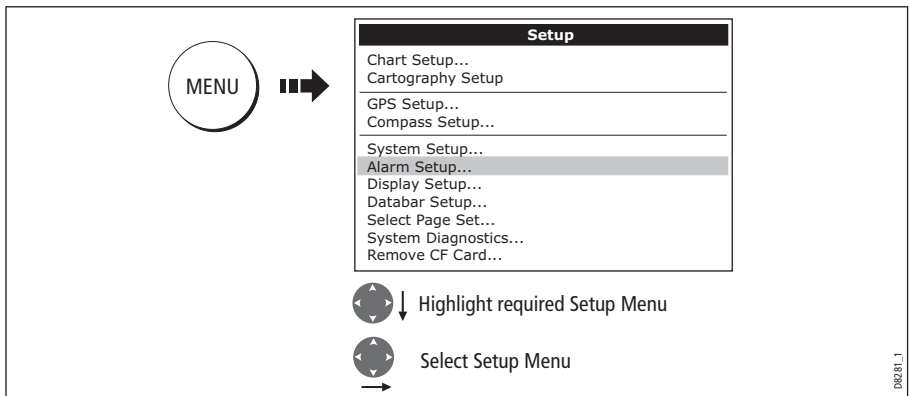


### Removing data

Once you have selected the configure option (see above), you can remove data within the bar.



## 18.4 Changing the set up menu options



The Setup Menu contains application specific and system-wide menus:

### Application specific

These menus relate to the application for the active window i.e. Chart, Cartography, Weather, Radar, Fishfinder, Video and Engine Monitor Setup.

For further details please refer to the appropriate chapter.

### External equipment menus

These menus provide options to set-up external equipment that is connected to your system. They include AIS, Navtex, GPS and Compass setup.

The options that are available depend on what is connected to your system.

## **System-wide menus**

These menus control functions throughout the system.

When you first power on your display the default values are used. The tables that follow show the sub-menus, default settings and options available.

In an E-Series Networked system, changes you make on one display affect all displays in the network, with the exception of Display Setup, Databar Setup and Select Page set.

## System Setup

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<p><b>Position Mode</b> Controls whether the position is expressed in latitude and longitude co-ordinates or Loran TDs.</p>	<p><b>Lat/Long</b> TD's</p>
<p><b>TD Setup</b> If the <i>Position Mode</i> is set to TD's, this function controls the selected chain identifier, slave and ASF.</p>	<p>Various</p>
<p><b>Simulator</b> ON - allows operation of display without data from antenna and/or external data sources. Demo - a series of slides with descriptions to demonstrate the various system functions.</p>	<p><b>OFF</b> ON Demo</p>
<p><b>Bearing Mode</b> Mode of all bearing and heading data displayed. This does not affect how the chart or radar are drawn.</p>	<p><b>True</b> Magnetic</p>
<p><b>MOB Data Type</b> Selects whether position data or dead reckoning displayed on screen. Assuming your boat and the MOB are subject to same tide and wind effects, dead reckoning normally gives a more accurate course.</p>	<p><b>Dead Reckoning</b> Position</p>
<p><b>Variation Source</b> This allows you to compensate for the naturally occurring offset of the earth's magnetic field. When set to AUTO, the value the system would use (or is using) is noted in the menu e.g. 4°W. To enter your own variation value, set to MANUAL.</p>	<p><b>Auto</b> Manual</p>
<p><b>Manual variation</b> If Variation Source is set to MANUAL then use this setting to enter the variation value. This value is transmitted to any other SeaTalk instruments.</p>	<p><b>0°E</b> Range 0 - 30° east/west</p>
<p><b>Language</b> Selected language used for screen text, labels, menus, options and display format for lat/lon position information.</p>	<p>Selection available will vary according to your location.</p>
<p><b>Extended Character Set</b> Controls whether additional accented characters are made available when you are entering text.</p>	<p><b>OFF</b> ON</p>
<p><b>Ground Trip Reset...</b> Resets the chosen ground trip distance counter to zero.</p>	<p>Ground Trip 1 - 4 Reset</p>

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<p><b>Settings Reset</b> Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are NOT removed.</p>	
<p><b>Settings and Data Reset</b> Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are deleted. <i>Networked systems only</i>- On the data master, the complete system database is deleted. On other displays, only routes, waypoints and tracks entered on that display are deleted. However, they will be restored by the Data Master display if available.</p>	
<p><b>Date /Time Setup</b></p>	See sub-menu below
<p><b>Units Setup</b></p>	See sub-menu below
<p><b>System Integration</b></p>	See sub-menu below
<p><b>Waypoint Password Set-up...</b> Allows you to set up a password to protect access to your waypoint and route databases.</p>	See <i>page 26</i> .

**Date/Time Setup Menu**

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<p><b>Date Format</b> Displays date as day/month/year or month/day/year</p>	mm/dd/yy <b>dd/mm/yy</b>
<p><b>Time Format</b> Displays either 12 or 24 hour clock</p>	<b>12hr</b> 24hr
<p><b>Local Time Offset</b> Specify local time in increments of 0.5 hours (+/- 13) from the Universal Time Constant. Use rotary control for 0.5hr increments and trackpad to individually adjust the value of the tens, units, and tenths - system rounds to nearest 0.5 hr.</p>	+/- 13hrs from UTC

**Units Setup Menu**

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<p><b>Distance Unit</b> Choose the units you require distances to be displayed in.</p>	<b>nm</b> Miles km

<b>MENU ITEM</b>	<b>OPTIONS</b> (Default in <b>bold</b> )
<b>Speed Units</b> Choose the units that you require speed to be measured in.	<b>Knots</b> MPH KPH
<b>Depth Units</b> Choose the units that you require depths to be measured in.	Meters <b>Feet</b> Fathoms
<b>Temperature Units</b> Select required temperate unit.	<b>Fahrenheit</b> Celsius
<b>Pressure Units</b> Select required pressure unit.	Bar <b>Psi</b> Kpa
<b>Volume Units</b> Select required volume unit.	US Gallons <b>Imp Gallons</b> Litres

*Note: When data figures are displayed at ranges of less than 1000 units, and with the distance units set to **NM** or **SM** the system changes default display units to **feet (ft)**, apart from **KM**, which defaults to **meters (m)**.*

### System Integration Setup Menu

<b>MENU ITEM</b>	<b>OPTIONS</b> (Default in <b>bold</b> )
<b>DSC Message</b> When set to ON, details of distress DSC messages are displayed on screen	ON <b>OFF</b>
<b>SeaTalk Alarms</b> When set to enabled, all SeaTalk system alarms are received and displayed on the chartplotter.	<b>Enabled</b> Disabled
<b>Data Master</b> When set to ON, the display you are working on is defined as the master.	<b>ON</b> OFF
<b>Bridge NMEA Heading</b> Used to prevent NMEA heading data being bridged onto the SeaTalk bus. Switch this function off if you are using MARPA with an external fast heading sensor.	ON <b>OFF</b>
<b>NMEA Output Setup</b> Allows you to switch off individual NMEA out sentences	APB, BWC, BWR, DBT, DPT, GGA, GLL, MTW, RMA, RMB, RMC, RSD, RTE, TTM, VHW, VLW, VTG, WPL, ZDA

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<p><b>NMEA Port Setting</b>                      Select the appropriate setting dependent on the equipment attached to the NMEA port for each individual display. When Navtex 4,800 or 9,600 selected, the option to view the Navtex message list is available.</p>	<p><b>NMEA 4,800</b>                      Navtex 4,800                      Navtex 9,600                      AIS 38,400</p>
<p><b>ST290 System</b>                      Select ON if your E-Series is connected to a SeaTalk<sup>2</sup> system.</p>	<p><b>OFF</b>                      ON</p>
<p><b>SeaTalk<sup>2</sup> Keyboard</b>                      When connecting a SeaTalk<sup>2</sup> keyboard to your system select ALL or ONE. When ONE selected press button on required keyboard - display beeps to indicate keyboard selected.</p>	<p><b>OFF</b>                      ALL                      ONE</p>

*Note: Networked displays - If AIS or Navtex has been set on any display in the system, the menu options will be available on all displays. Navtex and AIS are available simultaneously.*



## Alarm Setup Menu

The Alarm Setup Menu is divided into these sub-menus:

- System Alarms Setup.
- Navigation Alarms Setup.
- Radar Alarms Setup.
- Fishfinder Alarms Setup.
- AIS Alarms Setup.

*Note: To silence any alarms, press **ACKNOWLEDGE**.*

### System Alarms Setup

System alarms will sound in all applications.

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<b>Anchor Alarm</b> Switches the anchor alarm on or off.	<b>OFF</b> ON
<b>Anchor Alarm Radius</b> If the <i>Anchor Alarm</i> is set to ON, an alarm is triggered when you drift from your anchor position by more than the specified distance.	0.01 - 9.99 nm <b>0.10nm</b> (or equivalent in the selected <i>Distance Unit</i> )
<b>Timer</b> Switches the countdown timer alarm on or off	<b>OFF</b> ON
<b>Timer Period</b> If the <i>Timer</i> is set to ON, the system counts down from the time you specify. An alarm is triggered when zero is reached.	00h01m - 99hrs 59mins <b>00h00m</b>
<b>Alarm Clock</b> Switches the alarm clock on or off.	<b>OFF</b> ON
<b>Alarm Clock Time</b> If the <i>Alarm Clock</i> is set to ON, an alarm is triggered when the time you specify is reached.	00.01 - 24:00hrs <b>00:00</b>
<b>Temperature Alarm</b> If this alarm is set to ON, an alarm is triggered if the temperature moves into or out of the range that you have specified in <i>Lower Temperature Limit</i> / <i>Upper Temperature Limit</i> .	<b>OFF</b> ON
<b>Lower Temperature Limit</b> Specifies the lower limit of the temperature range that is to trigger the <i>Temperature Alarm</i> .	<b>60°F</b> 0° - 99.8°F
<b>Upper Temperature Limit</b> Specifies the upper limit of the temperature range that is to trigger the <i>Temperature Alarm</i> .	<b>75°F</b> 0.2° - 99.9°F

### Navigation Alarms Setup

Navigation alarms will sound in any application when you are navigating.

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<b>Arrival Alarm Radius</b> The distance from the target waypoint or the closest point of approach to the target waypoint that triggers the arrival alarm to sound.	<b>0.1nm</b> 0.01 - 9.99nm
<b>Offtrack Alarm</b> Switches the off-track alarm on or off	<b>OFF</b> ON
<b>Offtrack Alarm XTE</b> If the <i>Offtrack Alarm</i> is set to ON, an alarm is triggered when the XTE for any current navigation, exceeds the value that you have specified.	<b>0.3nm</b> 0.01 - 9.99nm (or equivalent in the selected <i>Distance Unit</i> )

### Radar Alarms Setup

These alarms will only sound when you are in the radar application.

MENU ITEM	OPTIONS (Default in <b>bold</b> )
<b>Guard Zone Sensitivity</b> Ensure that this is not set too low or targets will be missed.	<b>50%</b> 0 - 100%

*Note: If a radar is not detected, the alarm setup windows are greyed out.*

### Fishfinder Alarms Setup

MENU ITEM	OPTION (Default in <b>bold</b> )
<b>Fish Alarm</b> Switches the fish alarm on or off.	<b>OFF</b> ON
<b>Fish Alarm Sensitivity</b> If the <i>Fish Alarm</i> is set to ON, an alarm is triggered when the fish return strength reaches the sensitivity that you specify.	<b>5%</b> 10% - 100%
<b>Fish Alarm Depth Limits</b> If the <i>Fish Alarm</i> and this alarm is set to ON, an alarm is triggered (2 beeps) if any target meets the sensitivity level and is within the <i>Shallow Fish Limit</i> and <i>Deep Fish Limit</i> that you specify.	<b>OFF</b> ON
<b>Shallow Fish Limit</b> Specifies the lower value for the <i>Fish Alarm Depth Limit</i> .	<b>2ft</b> (0002ft - 1000ft)

MENU ITEM	OPTION (Default in <b>bold</b> )
<b>Deep Fish Limit</b> Specifies the upper value for the <i>Fish Alarm Depth Limit</i>	<b>1000ft</b> (0002ft - 5000ft)
<b>Shallow Depth Alarm</b> Switches the shallow depth alarm on or off. If a DSM is not connected, this cannot be set.	<b>OFF</b> ON
<b>Shallow Depth Alarm Value</b> If the <i>Shallow Depth Alarm</i> is set to ON, an alarm is triggered if the depth drops below the value you specify.	<b>5ft</b> (0002ft - maximum range of transducer)
<b>Deep Depth Alarm</b> Switches the deep depth alarm on or off. If a DSM is not connected, this cannot be set.	<b>OFF</b> ON
<b>Deep Depth Alarm Value</b> If the <i>Deep Depth Alarm</i> is set to ON, an alarm is triggered if the depth exceeds the value that you specify.	<b>3000 ft</b> (DSM with 600W transducer attached) <b>5000 ft</b> (DSM with 1kW transducer attached)

*Note: If a fishfinder is not detected, the alarm setup windows are greyed out.*

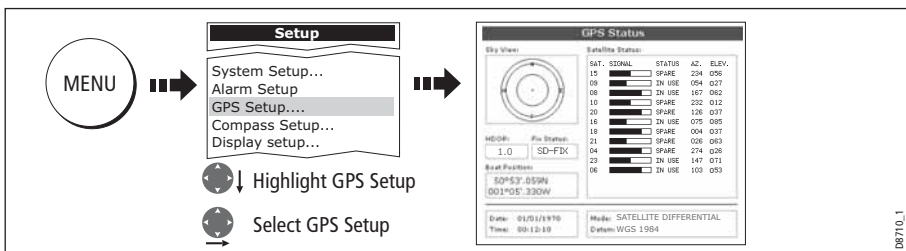
### AIS Alarms Setup

<b>Dangerous Targets Alarm</b> Switches the alarm for dangerous targets to on or off. When OFF, the AIS alarm off icon is displayed in the status bar.	OFF <b>ON</b>
<b>AIS Alarm List</b> Details the identity, description, time and acknowledgement of alarm messages received from an AIS receiver.	See "AIS Alarms" on page 271.

### GPS Status

The GPS is used to position your boat on the chart. You can set up your Global Positioning System (GPS) and check its status using the GPS status icons and the GPS Status page of the Setup menu.

To access the GPS Status page:



This screen provides, for each tracked satellite, the satellite number, a graphical signal strength bar, status, azimuth angle and its elevation angle from your vessel. The sky view graphic shows the position of these satellites.

Actual mode GPS reporting (No Fix, Fix, D Fix or SD Fix)

Mode selected by GPS

Only available if connected to Raymarine landbased GPS e.g. 114

D6802\_3

Positional accuracy is dependent upon these parameters; in particular, the azimuth and elevation angles are used in a triangulation process to calculate your position. Horizontal Dilution of Position (HDOP) is a measure of this accuracy; a higher figure signifies a greater positional error. In ideal circumstances, the figure should be in the region of 1.0.

**Selecting the satellite differential system**

You should select the satellite group(s) appropriate to your area, via the Other Set Up soft key:

- WAAS - United States
- EGNOS - Europe
- MSAS - Japan
- GAGAN - India

*Note: The EGNOS, MSAS and GAGAN systems may not currently be active. Check with your local government for operational status.*

OTHER SET UP

GPS Setup Menu

Datus: WGX 1984  
COG/SOG Filter: Medium

WAAS: ON  
EGNOS: OFF  
MSAS: OFF  
GAGAN: OFF

ON/OFF

OK

Highlight satellite group

Select group

Highlight ON or OFF as appropriate

D8715\_1

### Selecting the COG/SOG filter

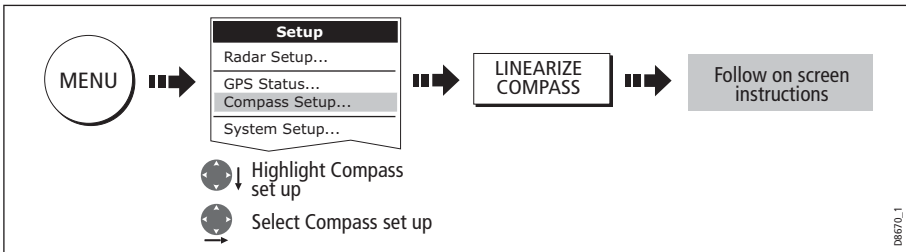
The COG/SOG filter should be set to the level appropriate to your boat’s use and to the level of oscillation being experienced by the GPS:

- HIGH - for use when trawling or when there is a high level of oscillation.
- MEDIUM - for general use
- LOW - for use when travelling at speed

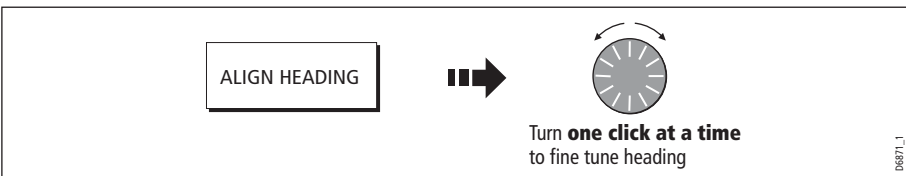
### Compass Setup

This option can be used to linearize a Raymarine ST80 active compass or Smart Heading sensor connected on SeaTalk. To linearize ('swing') your compass proceed as follows:

1. Select the LINEARIZE COMPASS option:



2. When instructed to align heading:



### Display Setup

MENU OPTION	OPTIONS (Default in <b>bold</b> )
<b>Soft key Autohide</b> Controls whether the soft key bar is automatically hidden if not used for a period of 10 seconds. Pressing any key re-displays the soft key bar.	<b>OFF</b> ON
<b>Cursor Autohide</b> Controls whether the cursor is automatically hidden if not used for 10 seconds. Pressing any key re-displays the cursor.	<b>OFF</b> ON
<b>Key beep</b> Controls whether a noise is made when you press a key.	<b>OFF</b> ON
<b>Text size</b> Controls the size of the text on the screen	<b>Small</b> Large

## Databar Setup

This sub-menu accesses the Configure Data Bar Menu - refer to *page 277* for full details.

## Select Page Set

This sub-menu accesses the Select Page Sets Menu. For details of how to reconfigure the page sets, please see *page 276*.

## System Diagnostics

This sub-menu is for diagnostic use by authorized dealers.

## Remove CF Card

This sub-menu allows you to safely remove the Compact Flash card that is currently in use.

**CAUTION: Improper use of this setting may cause loss of data or damage to the card. Ensure you have read the instructions on *page 20* thoroughly before attempting to remove or insert a CF card.**

# Chapter 19: Maintenance & Troubleshooting

## 19.1 Introduction

This chapter provides information on maintaining and troubleshooting your E-Series Display, and also information on how to get assistance from Raymarine.

## 19.2 Maintenance procedures

At regular intervals, carry out the following servicing procedures:

- Routine checks.
- Cleaning the Display.

Do not attempt any other servicing procedures.

### Servicing and Safety

- Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and any replacement parts used will not affect performance. There are no user serviceable parts in any Raymarine product.
- Some products generate high voltages, so never handle the cables or connectors when power is being supplied to the equipment.
- When powered on, all electrical equipment produces electromagnetic fields. These can cause adjacent pieces of electrical equipment to interact with one another, with a consequent adverse effect on operation. In order to minimize these effects and enable you to get the best possible performance from your Raymarine equipment, guidelines are given in the installations manual, to enable you to ensure minimum interaction between different items of equipment, i.e. ensure optimum Electromagnetic Compatibility (EMC).
- Always report any EMC-related problem to your nearest Raymarine dealer. We use such information to improve our quality standards.
- In some installations, it may not be possible to prevent the equipment from being affected by external influences. Generally this will not damage the display, but it can lead to spurious re-setting action, or momentarily may result in faulty operation.
- At the end of the useful working life of this product, it should be disposed of in accordance with local regulations.

### Routine checks

Carry out the following tasks on a regular basis:

- Examine all cables for signs of damage, such as chafing, cuts or nicks.
- Check that all cables are securely connected.

## Cleaning the display

### Cleaning instructions for display windows

**Caution:**  
Please read these instructions carefully. Failure to follow the recommended cleaning procedure may damage your display window and invalidate your warranty.

#### Window coating

A coating is applied to the plastic window of your display. This makes it water repellent and prevents glare. To avoid damaging this coating, the recommended cleaning procedure must be followed.

- X Do not** use any abrasive materials including a dry cloth.
- X Do not** use any **unapproved** cleaning solutions, polishes or sprays.
- X Do not** use a jet wash.

#### Recommended cleaning procedure

For improved cleaning, use Marine Shield™ Marine Electronics Screen Cleaner, which has been approved and tested by Raymarine for use with Raymarine electronic displays (if Marine Shield™ is not available, use fresh water).

1. Power off the supply.
2. Rinse the window with fresh water, to remove all dirty particles and salt deposits.
3. Allow the window to dry naturally.
4. For improved cleaning apply Marine Shield™ Marine Electronics Screen Cleaner and wipe the window with a clean microfibre cleaning cloth (provided with the display, or available from opticians).



DD146-2



## 19.3 Resetting the Display

You can reset the E-Series Display in several ways:

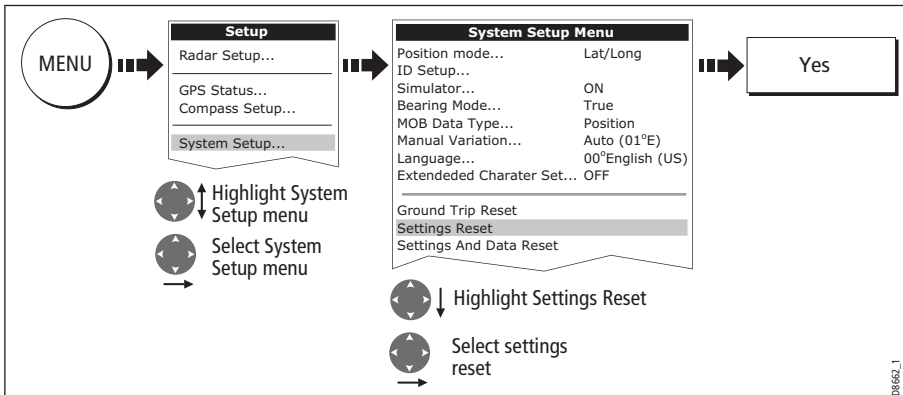
- Settings reset.
- Settings and data reset.

### Settings reset

All system set-up menus, including page sets and the data bar are reset to the factory default, when you apply a settings reset. Your waypoints, routes and tracks are NOT removed.

### Applying a settings reset

To apply a settings reset:



The system resets and returns you to the power on procedure.

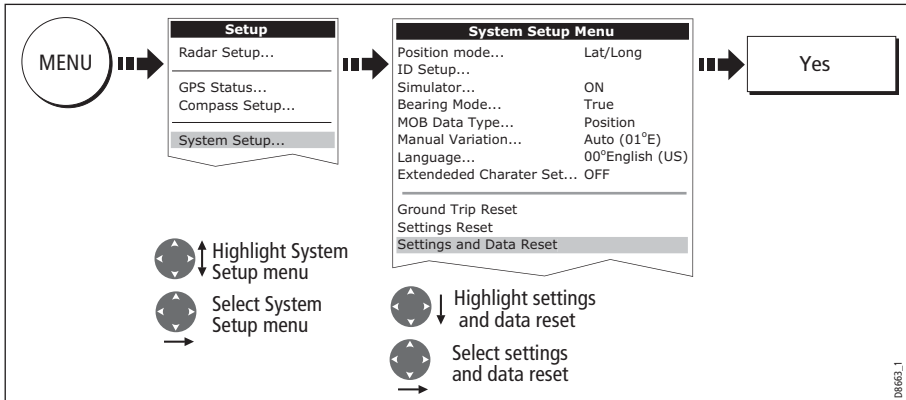
### Settings and data reset

All data set-up menus, including page sets and the data bar, are reset to the factory default when you apply a settings and data reset.

**Important:** Applying a settings and data reset will remove all waypoints, routes and tracks.

## Applying a settings and data reset

To carry out a settings and data reset:



The system resets and returns you to the power on procedure.

## 19.4 Troubleshooting your Display

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if your E-Series Display unit should develop a fault, this section will help you to identify the most likely cause and show the corrective action required to restore normal operation.

If, after referring to this section, you are still having problems with your Display, contact your local dealer, national distributor or Raymarine Technical Services Department for further advice.

Always quote the product serial numbers which are printed on the back of the unit.

### Common problems and how to solve them

This section is divided into problems associated with:

- Installation/Display.
- Chart application.
- Weather receiver.
- Fishfinder application.
- Radar application.

### Installation/Display

<b>Problem</b>
Solution
<p><b>Display does not power up</b></p> <ul style="list-style-type: none"> <li>• Check power supply cable is sound and that all connections are tight and free from corrosion.</li> <li>• Check relevant fuses.</li> <li>• Check power source is of the correct voltage and sufficient current.</li> </ul>
<p><b>My display switches off</b></p> <ul style="list-style-type: none"> <li>• Check power input connection is secure at the rear of the Display(s).</li> <li>• Check power cable for damage or corrosion.</li> <li>• Check your boat's power supply for faulty connections or insufficient cable diameter.</li> </ul>
<p><b>No link between E-Series Displays</b></p> <ul style="list-style-type: none"> <li>• Check all units are switched on.</li> <li>• Check SeaTalk High Speed cable is not of third party manufacture.</li> <li>• Check SeaTalk High Speed cable is connected to both displays and free from damage or corrosion.</li> <li>• Check SeaTalk High Speed switch or Crossover Coupler correctly connected (see Installation Guide).</li> </ul>
<p><b>How do I upgrade my Display software?</b></p> <p>Visit <a href="http://www.raymarine.com">www.raymarine.com</a> and click on Support to download the latest software. Follow the instructions included with these downloads.</p>

**Problem**  
Solution

**How do I reset my display?**

Via the system setup menu. For details see *page 297*.

**Display very dull/hard to view**

- Check PALETTE set to DAY (see *page 19*).
- Check backlight level (see *page 19*).

**No fix displayed against GPS status icon**

- Check GPS status (see *page 297*).
- Check the GPS antenna has a clear view of the sky.
- Check connections/operation of the GPS antenna.

**No instrument navigational or engine data displayed**

- Check instruments/engine interface are operating correctly.
- Check SeaTalk/NMEA correctly connected to Display (see System Integration chapter of the Installation Guide).
- Check all SeaTalk/NMEA cables are free from damage and corrosion.

**Display continuously resets/re-boots, or turns itself on/off**

- Check no buttons are stuck under the front bezel (fascia)
- If possible save your data (waypoints, routes and tracks). A factory reset is required, this will erase all stored data and system settings
- Factory reset:
  1. Press and hold (5 seconds) the first soft key next to the power button until the 3 second count down is complete, once complete you will hear a long beep and the display will return to the 'limitation on use' screen as default.
- Perform a software upgrade as described above or re-install the current software level if not surpassed by a new version.

**Display occasionally reboots itself, crashes or performs erratically**

- Check no buttons are stuck under the front bezel (fascia)
- If possible save your data (waypoints, routes and tracks). A factory reset is required, this will erase all stored data and system settings
- Perform a 'Settings and Data' reset (see *Resetting the Display on page 297*)
- If the menu's are not available then follow the Factory reset a per point 1 above.
- Perform a software upgrade as described above or re-install the current software level if not surpassed by a new version.

## Chart

<b>Problem</b> Solution
<b>Vessel not shown in correct geographical position on Display</b> <ul style="list-style-type: none"><li>• Check GPS status (<i>page 291</i>).</li><li>• Check that the Display is not in Simulator mode (<i>see page 285</i>).</li><li>• Check the SDGPS setting is switched OFF.</li><li>• Perform the chart offset operation (<i>see page 109</i>).</li></ul>
<b>Display does not show enough chart detail</b> <ul style="list-style-type: none"><li>• Check that the chart card for the appropriate area is installed.</li><li>• Set the Declutter option to OFF (<i>see page 110</i>).</li><li>• In the Cartography Setup Menu switch the appropriate feature(s) to ON.</li></ul>
<b>Display will not read chart correctly</b> <ul style="list-style-type: none"><li>• Check the Chart Card has been inserted correctly with the display switched off.</li><li>• Check this is the correct compact flash cartography for the unit. Software version 2.30 or later required for Platinum compatibility.</li><li>• Ensure all Displays have the same software installed (<i>see page 303</i>).</li></ul>

## Weather receiver

<b>“No connection”</b> Check that the cable connecting to the weather receiver is securely connected and undamaged.
<b>Display not showing weather data</b> Check the weather graphics are switched on in the weather graphics menu ( <i>see page 238</i> ).

## Fishfinder

<b>Problem</b> Solution
<b>How do I upgrade my DSM software?</b> Visit <a href="http://www.raymarine.com">www.raymarine.com</a> and click on Support to download the latest software. Follow the instructions included with these downloads.

<b>Problem</b> Solution
<p><b>'No data source' for my fishfinder</b></p> <ul style="list-style-type: none"> <li>• Check the DSM power cable is free from damage and corrosion.</li> <li>• Check DSM is receiving the correct voltage and current.</li> <li>• Check status LED of the DSM unit - refer to Maintenance and problem solving section of the DSM owner's handbook.</li> <li>• Check the DSM's SeaTalk High Speed connections are sound and connected correctly - refer to the System Integration chapter of your E-Series Installation Guide.</li> </ul>
<p><b>No depth readings available from the DSM</b></p> <ul style="list-style-type: none"> <li>• Check status LED of DSM unit - refer to the Maintenance and Problem solving section of your DSM Owner's manual</li> <li>• Check Gain setup and Transducer frequency - refer to the Fishfinder chapter in your Reference Manual.</li> <li>• Check the DSM power cable is free from damage and corrosion</li> </ul>

## Radar

<b>Problem</b> Solution
<p><b>'No data' message</b></p> <ul style="list-style-type: none"> <li>• Check that cable connecting the scanner to the Display is securely connected and undamaged.</li> </ul>
<p><b>'Scanner software incompatible' message</b></p> <ul style="list-style-type: none"> <li>• Check software revisions by contacting your local Raymarine dealer.</li> </ul>
<p><b>"Invalid scanner software: Version xx.x, Version xx.x required"</b> Incorrect software version installed. Contact your local Raymarine dealer.</p>
<p><b>"Scanner not responding" message</b> Check that the cable connecting the scanner to the radar display unit is securely connected and undamaged.</p>
<p><b>"Open array cannot be powered from the display"</b> Scanner not compatible with E-Series Display - refer to 'Compatibility' in the System Integration chapter of your Installation Guide.</p>
<p><b>"Scanner hardware fault"</b> Scanner not functioning - refer to the 'Commissioning the stem' chapter of the Installation Guide.</p>
<p><b>The bearing displayed on the radar picture is not the same as the actual bearing</b> Perform the bearing alignment procedures described in the Installation Guide.</p>

## 19.5 Getting Technical Support

This section details how you can obtain technical support for your E-Series display or for your Navionics cartography.

Raymarine provides a comprehensive customer support service, on the world wide web, through our worldwide dealer network and by telephone help line. If you are unable to resolve a problem, please use any of these facilities to obtain additional help.

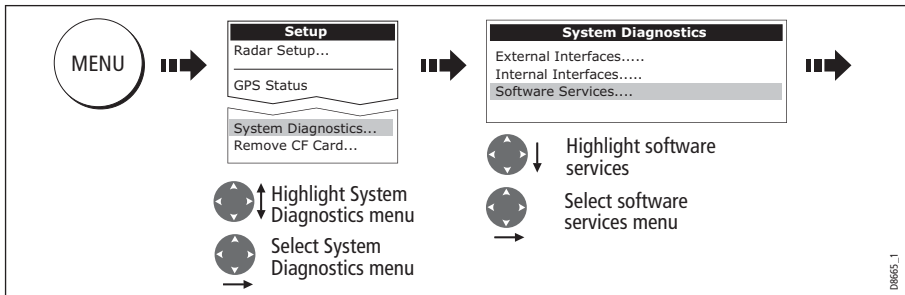
## Help us to help you

When requesting service, please quote the following product information:

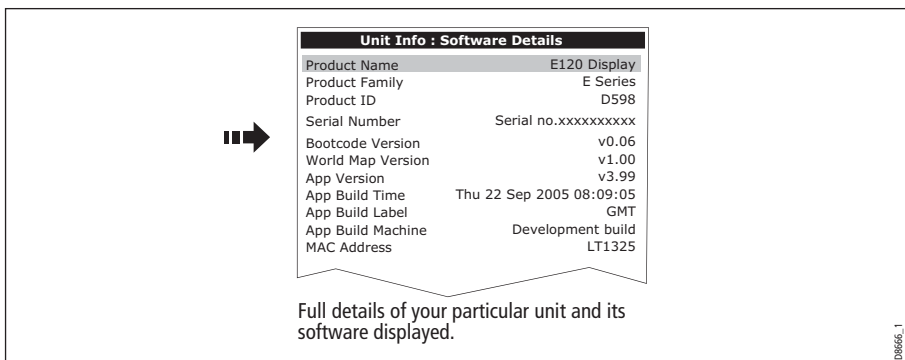
- Product name.
- Product identity.
- Serial number.
- Software application version.

To access this information:

1. Select the Software Services menu:



2. Note down the Product Name and ID, Serial Number and App Version from the menu:



## World wide web

Please visit the Customer Support area of our website at: **[www.raymarine.com](http://www.raymarine.com)**

Visit the Customer Support area of our website for Frequently Asked Questions, servicing information, e-mail access to the Raymarine Technical Support Department and details of Raymarine agents, worldwide.

If you don't have access to the world wide web, contact Technical Support where specialists are available to answer questions about installing, operating and troubleshooting all Raymarine products.

## Contacting Raymarine in the US

You can contact Raymarine in the US either using the Raymarine world wide web as detailed above or by calling one of the telephone numbers below.

### For accessories and parts

Contact your authorized Raymarine dealer or Raymarine Technical Services on:

1-800-539-5539 extension 2333 or (603)-881-5200

Opening hours: Monday through Friday 0815 - 1700, Eastern Standard or Eastern Daylight Savings Time.

### For product repair and service

In the unlikely event that your Raymarine unit should develop a problem, contact your authorized Raymarine dealer for assistance. The dealer is best equipped to handle your service requirements and can offer timesaving help in getting your equipment back into normal operation.

If repairs cannot be obtained conveniently, product service can be obtained by returning the unit to:

Raymarine Inc.  
21 Manchester Street  
Merrimack, NH,  
03054 - 4801  
US

The Product Repair Centre is open Monday to Friday 0815 to 1700 Eastern Standard Time or Eastern Daylight Savings Time.

All products returned to the Repair Centre are registered upon receipt and a confirmation letter is sent to acknowledge the repair status and the reference number of the product. We will make every effort to carry out the repair and return your unit as quickly as possible. If you wish to enquire about the repair status of your unit, contact the Repair Centre at:

1-800-539-5539



## Contacting Raymarine in Europe

You can contact Raymarine in Europe either using the Raymarine world wide web as detailed above or by calling the telephone number below

### For technical support, service and accessories:

Contact your authorized Raymarine dealer or Raymarine Technical Support at:

Anchorage Park  
 Portsmouth  
 PO3 5TD  
 England  
 Tel: +44(0)23 92714713  
 Fax: +44(0)23 92661228

## For Navionics cartography

For questions about Navionics cartography, please contact Navionics directly through their web site, [www.navionics.com](http://www.navionics.com) or contact Navionics customer support:

<b>Navionics customer support</b>		
Navionics Italy	Via Fondacci, 269 Z.I. Montramito 55054 Massarosa Italy	Tel: +39-0584-329111 Fax: +39-0584-962696 <a href="mailto:sales@navionics.it">sales@navionics.it</a>
Navionics USA	6 Thatcher Lane Wareham MA 02571 USA	Toll Free: 800-848-5896 Tel: 508-291-6000 Fax: 508-291-6006 <a href="mailto:sales@navionics.com">sales@navionics.com</a>
Navionics Australia	134/85 Reynolds Street Balmain NSW 2041 Australia	Tel: +61-2-9555-2522 Fax: +61-2-9555-2900 <a href="mailto:sales@navionics.com.au">sales@navionics.com.au</a>
Navionics UK	PO Box 38 Plymouth, PL9 8YY England	Tel: +44-1752-204735 Fax: +44-1752-204736 <a href="mailto:sales@navionics.co.uk">sales@navionics.co.uk</a>

If you wish to file a report of an error or omission on a Navionics chart, please provide the information to Navionics web site, Discrepancy Report section at [www.navionics.com/DiscrepancyReports.asp](http://www.navionics.com/DiscrepancyReports.asp)

## For Sirius weather

For questions about the Sirius weather service, please contact Sirius directly through their web site, [www.Sirius.com](http://www.Sirius.com) or call 1-800-869\_5480.



# Appendix A: Specification for the E80 and E120 Displays

## General

Approvals CE - conforms to FCC - compliant with	Essential requirements of: Europe: R&TTE 1999/5/EC, EMC 2004/108/EC. USA: CFR47 Parts 2 & 80. Canada: RSS - 138.
Size: E80 E120	283 x 210 x 154 (including cabling) 356 x 264 x 154 (including cabling)
Weight: E80 E120	4.18 kg 7.35 kg
Mounting	Either trunnion or flush mount option
Supply voltage	12V or 24V DC nominal (10.7-32V DC maximum)
Power consumption: E80 E120	20W (full brightness) 32W (full brightness)
Environmental: Operational/Non-operational temperature range Humidity limit	Waterproof to CFR46 & IPX6; suitable for external mounting -10° C to +50° C up to 95% at 35°C non-condensing
Controls	9 defined keys, 5 soft keys, trackpad and rotary control
Cursor	Context sensitive, provides range/bearing or lat/lon or depth/range on fishfinder
Display type	High brightness color TFT LCD
Resolution: E80 E120	640 x 480 pixels (VGA) 800 x 600 pixels (SVGA)
Display size: E80 E120	8.4 in 12.1 in
Display Windows	Chart, Radar, Fishfinder, CDI, Video, Data, Weather and Engine Monitor.
Illumination	Screen and keypad: 0 to 100% in 64 steps Day/Night Mode
Languages	The selection available will vary according to your location.

System Alarms	Alarm clock, Anchor, Arrival, Deep depth, MOB, Offtrack, Shallow depth, Temperature, Timer
Navigation Alarms	Arrival alarm, offtrack XTE alarm.
Connectors	13 pin Radar scanner 3 pin SeaTalk + 3 pin alarm out 5 pin NMEA 0183 5 pin SeaTalk2/NMEA 2000 3 pin Power SeaTalk High Speed 15 pin VGA out 9 pin Video in
Interfaces	Pathfinder Radar scanner 1 x SeaTalk High Speed/ethernet 1 x SeaTalk, receive and transmit 1 x NMEA0183, receive and transmit 1 x SeaTalk <sup>2</sup> / NMEA2000 1 x Video In 1 x VGA out CompactFlash card slot Video in
Configurations	Single, dual or multiple configurations.
Network	Supports 8 devices/displays.
Waypoints	1200 waypoints entered via cursor, lat/lon, range and bearing from present position or at boat's position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards.
Waypoint Transfer	Waypoints database via NMEA and CompactFlash cards. Software also available to convert waypoints to Excel file.
Man Overboard (MOB Mode)	Mark placed with course line; readout shows range, bearing, lat/lon of MOB and time elapsed since MOB.
Screen functions	Full, half and quarter screens available dependant on function. Also 3 window page with 2 x 1/4 page windows and 1 x 1/2 page window.
Information	Displayed in horizontal or vertical data bar and includes boat data, navigation data, depth, environmental data and Wind data. Data and engine monitor windows also available.

\* See your boat dealer for details.

## Chart features

Cartography	Navionics Charts on CompactFlash cards Chart of the world built in.
Chart scaling	$1/_{32}$ nm (if cartographic detail is available to 4000nm).
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic). Relative, Autorange or True Motion. Screen offset. Radar or 3D synchronization.
Waypoints	1200 waypoints entered via cursor, lat/lon, range and bearing from present position or at boats position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards
Waypoint Transfer	Waypoints database via NMEA
Routes	A route plan may contain up to 50 waypoints. Up to 150 routes can be stored in the units internal memory. Additional storage available on CompactFlash cards. SmartRoute to create a route from track history.
Track History	10 tracks with up to 1000 points in each can be stored in the units internal memory. Track optimization reduces number of points used or user selectable time or distance interval. Additional storage available on CompactFlash cards
Radar/Chart overlay	Radar image can be overlaid on all screen charts.
Radar/Chart synchronization	To synchronize radar range and chart scale
3D/Chart synchronization	To synchronize 3D and 2D chart scales and orientation.
Aerial overlay	Overlay of aerial photograph on the chart
AIS overlay	Switch AIS symbols on/off. Display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.
Navigation information	Own boats position in lat/lon, XTE, TTG and SOG/COG selectable. Bearing and distance to waypoint. Bearing and distance to cursor and ETA.
Pilot Integration	Set Raymarine Autopilot to Track, AUTO and Stby modes
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual

### 3D Chart features

Cartography	Navionics Charts on CompactFlash cards Chart of the world built in.
Presentation Modes	Active motion mode, planning mode, Adjust rotation and pitch, port, starboard, forward and aft view, multiple views, Vessel offset
Waypoints	Waypoints entered at vessel or lat/lon position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards
Display	Declutter, Transducer cone, Depth scale, Waypoint name, Adjust exaggeration, 3D view locator
Aerial overlay	Overlay an aerial photography on the chart

### Radar features (Analogue radar)

Range Scales (Range Rings)	1/8 (1/16)nm to 72 (12) nm dependant on scanner Performance limited by scanner type and position.
Range Ring Accuracy	Better than +/- 1.5% of the max. range scale in use, or 22m (72 ft.), whichever is the greatest.
Bearing accuracy	+/- 1°
Variable Range Markers	2 x VRM's, readout nm, sm, km
Electronic Bearing Lines	2 x EBL's, floating if required, resolution 1°
Bearing scale	360° graduated at 10° intervals 2° small ticks 10° large ticks
Minimum range	23m (25 yds)
Range Discrimination	23m (25 yds)
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic) Relative or True Motion
Scanner Control	Interference rejection, standby/transmit modes, pulse selection, Tune, Rain, FTC and Sea controls, with selection of manual or automatic control of gain, sea clutter and tune (Auto GST™)
Magnetic Sensor	NMEA (required for fast heading data, suitable for MARPA), or SeaTalk
Waypoint Display	Create waypoints and target waypoint displayed with User control of symbols and groups

MARPA	Manual acquisition of 10 targets, automatic tracking, dangerous target alarms, safe zone, target history, true or relative vectors, CPA graphics and indication of target speed/course, bearing/range, CPA and TCPA.
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual
Guard Zone Alarm	2 guard zones, selectable sensitivity level, audible alarm
Auto GST	Auto control of gain, sea clutter and tune.
Off Centre function	In Relative Motion, $\frac{1}{3}$ or $\frac{2}{3}$ selectable)
Wakes	10s, 30s, 1 min, 5 min, 10 min, OFF
Target Expansion	Operator selectable with 2 levels available, OFF
Timed TX	Rotation periods: 10, 20 or 30 scans Repetition periods: 3, 5, 10 or 15 minutes
AIS overlay	Switch AIS symbols on/off. Display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.

### Radar features (Digital radars)

Digital Features	Full color radar images(256 colors) - Full color pallets (choice of 5), Color Gain, Dual range (short range up to 3Nm range) Super High Definition (4 & 12Kw options).
Range Scales (Range Rings)	1/8 (1/16)nm to 72 (12) nm dependant on scanner Performance limited by scanner type and position.
Range Ring Accuracy	Better than +/- 1.5% of the max. range scale in use, or 22m (72 ft.), whichever is the greatest.
Bearing accuracy	+/- 1°
Variable Range Markers	2 x VRM's, readout nm, sm, km
Electronic Bearing Lines	2 x EBL's, floating if required, resolution 1°
Bearing scale	360° graduated at 10° intervals 2° small ticks 10° large ticks
Minimum range	23m (25 yds)
Range Discrimination	23m (25 yds)
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic). Relative or True Motion.
Scanner Control	Interference rejection, standby/transmit modes, pulse selection, Tune. Selection of automatic and user configurable modes; Buoy, Harbour, Costal and Offshore with options to configure Gain, Color Gain, Rain clutter and Sea clutter controls in each option.

Magnetic Sensor	NMEA (required for fast heading data, suitable for MARPA), or SeaTalk
Waypoint Display	Create waypoints and target waypoint displayed with User control of symbols and groups
MARPA	Manual acquisition of 25 targets, automatic tracking, dangerous target alarms, safe zone, target history, true or relative vectors, CPA graphics and indication of target speed/course, bearing/ range, CPA and TCPA.
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual
Guard Zone Alarm	2 guard zones, selectable sensitivity level, audible alarm
Auto GST	Auto control of gain, sea clutter and tune.
Off Centre function	In Relative Motion, $\frac{1}{3}$ or $\frac{2}{3}$ selectable)
Wakes	10s, 30s, 1 min, 5 min, 10 min, OFF
Target Expansion	User selectable ON or OFF
Timed TX	Rotation periods: 10, 20 or 30 scans Repetition periods: 3, 5, 10 or 15 minutes
AIS overlay	Switch AIS symbols on/off. Display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.

### Fishfinder features (DSM300)

Transducer	Transom-mount, in-hull or thru-hull
Digital Sounder Module	Uses DSM 300 & DSM 400
Output power: Standard transducer High performance transducer	Adjustable to 600 watts RMS Adjustable to 1000 watts RMS
Frequency	Dual 50 kHz and 200 kHz
Pulse length	100 usec to 4 msec
Sonar display	A-scope real time.
Maximum Transmit Rate	1580 pulses/ min at 50 ft range
Depth: Standard transducer High performance transducer	3 ft (1m) to 3000 ft (1000m) 3 ft (1m) to 5000 ft (1700m)
Alarms	Fish alarm, fish alarm depth, shallow and deep fish limit



## Fishfinder features (DSM400)

No Data available for DSM400 at time of print

### Data features

Panel type	5 panels available. Pre-defined (Navigation, Waypoint, Route, Fishing or Sailing) or user-configured.
Data available	Vessel position, active waypoint, TTG, VMG - Waypoint, depth, COG SOG, heading, speed, set/drift, trip, log, ground log, ground trip, rudder, local time and date, sea temperature, app wind, true wind, VMG wind, ground wind, XTE, compass, locked heading, waypoint data, pressure, air temperature, sea temperature, local data.

### Engine monitor features

Visit [www.raymarine.com](http://www.raymarine.com) for a list of compatible engines.

Panel type	5 panels available. Pre-defined (engine, engine and fuel, fuel resources, engine and resources, twin engines or triple engine support) or user-configured.
Data available	Tacho, boost pressure, alternator, oil pressure, coolant temperature, engine hours, fuel level (tanks 1 & 2), fuel rate, total fuel, load, engine tilt and trim tabs data.

### Video features

Input source type	Composite (PAL/NTSC) and S-Video.
VGA output	For connection to remote PC or flat screen monitors.

### Weather features (USA only)

Weather elements	Storm cast, waves, Canadian radar, lightning, wind, sea surface temperature, surface observations stations, city weather, NOWRad, storm tracks, surface pressure.
Animated weather graphics	Weather forecast, weather radar history
Weather reports	Tropical statements, marine warnings, marine zone forecasts, marine watchbox.

### Navtex features

Alerts	Incoming message (selectable categories)
Message list	Sorting

## AIS features

Target symbols	Sleeping, activated, selected, dangerous and lost.
Target information	AIS vectors, safety critical data and full AIS data.
Collision avoidance	Safe zones and safety messages.
Alarms	Local alarm messages, lost targets

## Interfacing

DSM connection	for communication with DSM High Definition Fish Imaging (HDFI)
NMEA 0183 Input	GLL, GGA, GLC, GTD, VTG, BWC, BWR, RMA, RMB, RMC, XTE, VHW, HDG, HDM, HDT, DBT, DPT, APB, VLW, MWV, WPL, RTE, DSC and ZDA. Selectable to 4800, 4800 Navtex, 9600 Navtex or 38,400 AIS
NMEA Output - User selectable	APB, BWC, BWR, DBT, DPT, GGA, GLL, MTW, RMA, RMB, RMC, RSD, TTM, VLW, VHW, VTG, WPL, VHF/DSC and ZDA
SeaTalk Input	Depth, SOG, COG, Position, Waypoint number, range/ bearing, TTG, Boat speed, Time, XTE, Heading, Wind, data, Log/Trip, Pilot status, Temperature, MOB and cursor position
SeaTalk Output	Cursor data, guard zone and navigational data bridged from NMEA
SeaTalk <sup>2</sup> Input	
SeaTalk <sup>2</sup> Output	
Scanners	Two digital radar's can be connected but only a single analogue radar should be connected.

## Appendix B: List of Abbreviations

<b>Abbrev.</b>	<b>Description</b>	<b>Abbrev.</b>	<b>Description</b>
°C	Degrees Centigrade	kpa	Kilo pascals
°F	Degrees Farenheit	kt	Knots
AIS	Automatic Identification System	ky	Kiloyards
ALR	Alarm	l	Liters
amp	Amperes	Lat	Latitude
Auto	Automatic	Lon	Longitude
CAT	Category	m	Metres
CCFL	Cold Cathode Fluorescent Lamp	Man	Manual
CDI	Course Deviation Indicator	MMSI	Marine Mobile Service Identity
COG	Course over ground	MARPA	Mini automatic radar plotting aid
CPA	Closest point of approach	MOB	Man overboard
C-up	Course up orientation	MPH	Miles per hour
DC	Direct current	nm	Nautical mile
DSC	Digital selective calling	NMEA	National Marine Electronics Association
DSM	Digital sound module	N-up	North up orientation
EBL	Electronic bearing line	OSH	Automatic offshore mode
EMC	Electromagnetic compatibility	PSI	Pounds per square inch
ETA	Estimated time of arrival	RM	Relative motion
fa	Fathoms	RTE	Route
ft	Feet	ROT	Rate of turn
FTC	Fast time constant	s	Seconds
gal	Gallons	SHM	Ship's heading marker
GPS	Global positioning system	sm	Statute miles
HBR	Automatic harbor mode	SOG	Speed over ground
HDFI	High definition fish imaging	SRM	Safety related message
HDG	Heading	STDBY	Standby
H-up	Head up orientation	STN	Station
KHz	Kilohertz	TCPA	Time to closest point of approach
km	Kilometer	TM	True motion
KPH	Kilometers per hour	TTG	Time to go

<b>Abbrev.</b>	<b>Description</b>	<b>Abbrev.</b>	<b>Description</b>
TVG	Time variable gain	VRM	Variable made good
TX	Transmit	WPT	Waypoint
UTC	Universal time constant'	XTE	Cross track error
VMG	Velocity made good		

## Appendix C: List of cursor labels

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



# Appendix D: Glossary of weather terms

**Note:** For types of warnings, watches and advisories, please refer to the NOAA website at [www.nws.noaa.gov/glossary](http://www.nws.noaa.gov/glossary).

Term	Definition
Cold front	The boundary between two different air masses where cold air pushes warm air out of the way and brings colder weather.
Cyclone	A large area of low atmospheric pressure, characterized by inward-spiralling winds. A "low" - also called a "depression". Also the name used for a hurricane in the Indian Ocean and Western Pacific.
Depression	An area of low pressure. Also called a cyclone.
Dry line	A region where there is a strong gradient in dew point temperatures. It is often found in a region where strong thunderstorms develop.
Forecast	Something that tells us what the weather is probably going to be like.
Front	The boundary between two masses of air with different temperatures (i.e.: a mass of cold air and a mass of warm air).
High	Also known as an 'anticyclone' - an area of high air pressure with a system of winds rotating outwards. This usually means dry weather. It is the opposite of a 'low'.
High Pressure	A mass of air that presses down strongly on the surface of the Earth because it is being cooled and is therefore more dense.
Hurricane	A violent, spiralling storm that forms over the Atlantic Ocean, with winds over 120 kph. Such storms usually have a lifespan of several days. Also known as a typhoon or tropical cyclone. There are 5 levels of hurricane: <p><b>Category 1</b> Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.</p>

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Term	Definition
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**Category 2**

Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane centre. Small craft in unprotected anchorages break moorings.

**Category 3**

Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the centre of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required.

**Category 4**

Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the centre of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).

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Term	Definition
	<p><b>Category 5</b>  Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the centre of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.</p>
Isobar	A line on a weather map linking areas with equal air pressure.
Lightning	Discharge of static electricity in the atmosphere, usually between the ground and a storm cloud.
Low	Also called a 'depression' - this region of low pressure can mean wet weather - it is the opposite of 'high' pressure or 'anticyclone'.
Low Pressure	A mass of air that presses down only weakly on the surface of the Earth because it is being warmed and it therefore less dense.
Millibar	A unit used to measure atmospheric pressure.
Occluded Front	An area where warm air is pushed upwards as a cold front overtakes a warm front and pushes underneath it.
Precipitation	Moisture that is released from the atmosphere as rain, drizzle, hail, sleet or snow, as well as dew and fog.
Pressure Centre	A region of high or low pressure.
Squall line	A non-frontal band, or line, of thunderstorms.
Super typhoon	A typhoon that reaches maximum sustained 1-minute surface winds of at least 65 m/s (130 kt, 150 mph). This is the equivalent of a strong category 4 or 5 hurricane in the Atlantic basin or a category 5 severe tropical cyclone in the Australian basin.
Tornado	A funnel-shaped whirlwind which extends to the ground from storm clouds.

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<b>Term</b>	<b>Definition</b>
Tropical cyclone	A low pressure system that generally forms in the tropics. The cyclone is accompanied by thunderstorms and, in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface.
Tropical depression	An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 kt) or less.
Tropical storm	An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 39-73 mph (34-63 kt).
Tropics	An area on the Earth's surface that lies between 30° north and 30° south of the equator.
Trough	An elongated area of relatively low atmospheric pressure, usually extending from the centre of a low pressure region.
Typhoon	The name for a tropical storm originating in the Pacific Ocean, usually the China Sea. They are basically the same as the hurricanes of the Atlantic Ocean and the cyclones of the Bay of Bengal.
Wave cyclone	A storm or low-pressure centre that moves along a front.

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