

C-Series Display

Reference Manual

Document number: 81221_5

Date: August 2007

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Software in this product is based in part on the work of the Independent JPEG Group.

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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 C-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 C-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 C-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 18* to remove the card.
- 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

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 C-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.

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

products manufactured by others, or by errors in chart data or information utilized by the product and supplied by third parties.

About this manual

This manual describes how to operate your C-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.

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>

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

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.

Multi-media chart cards

To use your C-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.

To check the current availability of Navionics® chart card types and the latest feature sets, visit www.navionics.com or **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 C-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.

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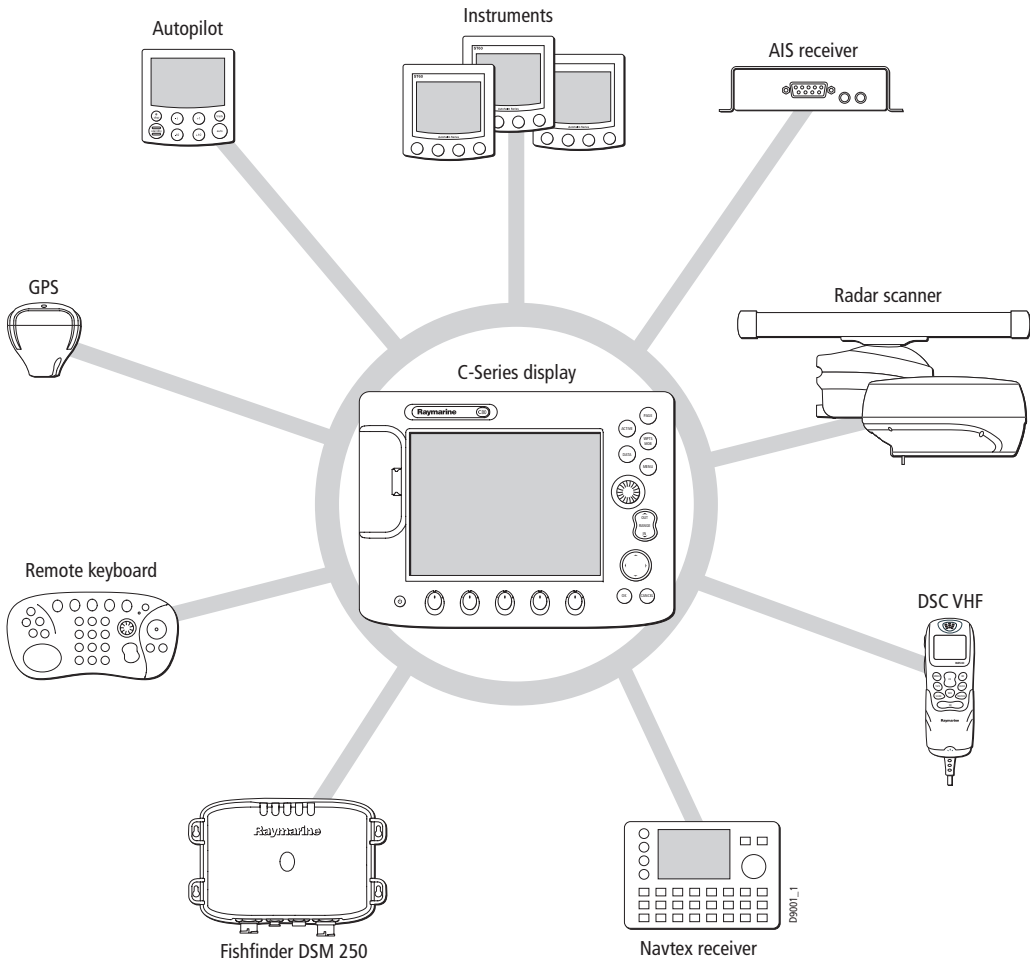
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Chapter 1: Overview

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

1.1 What will my C-Series integrate with?

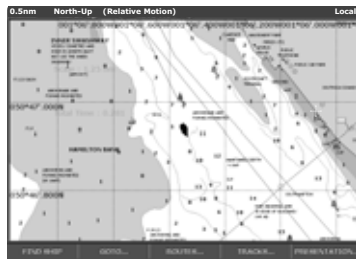


When used as part of a SeaTalk system it will display information from other SeaTalk and NMEA instruments. Information from the C-Series display can be transferred between applications and to other SeaTalk instruments within the system. For more detail on system integration, please refer to the Installation Guide.

1.2 What can the C-Series Display do?

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

Chart (Chapter 4)

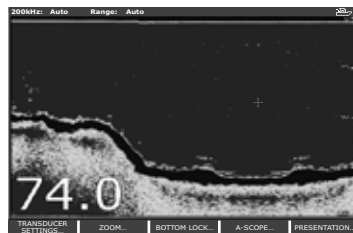


- Locate where you are.
- Interpret your surroundings.
- Monitor where you are going.
- Record where you have been.
- Navigate to a specified position (waypoint).
- Build and navigate routes.
- View details of nearby features & services.
- View details of boats equipped with AIS.
- Distinguish between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

Fishfinder (Chapter 5)

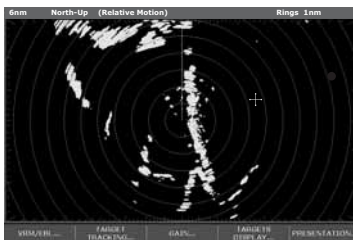


- Build a picture of what is below your vessel.
- Locate & distinguish underwater objects & targets.
- Distinguish the seabed and its texture.
- Obtain information about water depth, temperature.
- Mark a point of interest, fishing spot etc.
- Determine depths and distances of targets.

D7377-1

You will need position data, in addition to a DSM250, for your fishfinder to be fully functional.

Radar (Chapter 6)

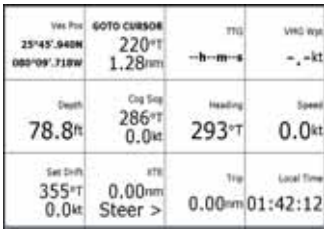


- Detect landmasses & navigation markers.
- Detect and measure the range and distance of other vessels.
- Acquire targets and track them for collision avoidance.
- Navigate to a specified position (waypoint).
- View details of boats equipped with AIS.

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 7)

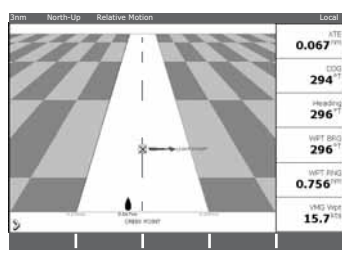


Yrs Pos 25°45'.940N 089°09'.710W	GOTO CURSOR 220°T 1.28nm	TTG -h-m-s	VMS Wpt -kt
Depth 78.8ft	Cog Sog 286°T 0.0kt	Heading 293°T	Speed 0.0kt
Set Drift 355°T 0.0kt	KTB 0.00nm Steer >	Trp 0.00nm	Local Time 01:42:12

- View data generated by the system or by instruments available on NMEA 0183, NMEA 2000 and SeaTalk or SeaTalk².

D7376-1

Course Deviation Indicator (Chapter 8)



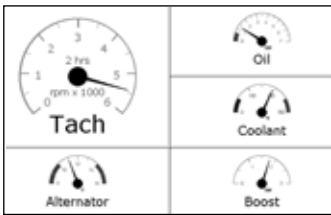
0.067
294
296
296
0.756
15.7

- 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 9)




Tach	Oil
Alternator	Boost

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

D7497-1

Navtex (Chapter 10)

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



Navtex Alert

ID: KA53 Date: 02/02/2006 Time: 02:37:36PM

Message:

AVRANAV CHERBOURG 001

PORTLAND

WRECK: CHEMICAL VESSEL, 'ICE'SUNK' IN POSITION: 4943.7 N 003 15.4 W

AT 030200Z FEB LENGTH: 126 METERS. NO FISHING AND ALL NAUTICAL

ACTIVITIES PROHIBITED ONE NAUTICAL AROUND POSITION OF WRECK

- 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 11)

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

1.3 The Simulator

The C-Series Display includes a simulator mode, which allows you to practice operating your display without data from a GPS antenna, radar scanner, fishfinder or AIS receiver. The simulator mode is switched on/off in the System Setup Menu (see *page 183*). 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 C-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.
- 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 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

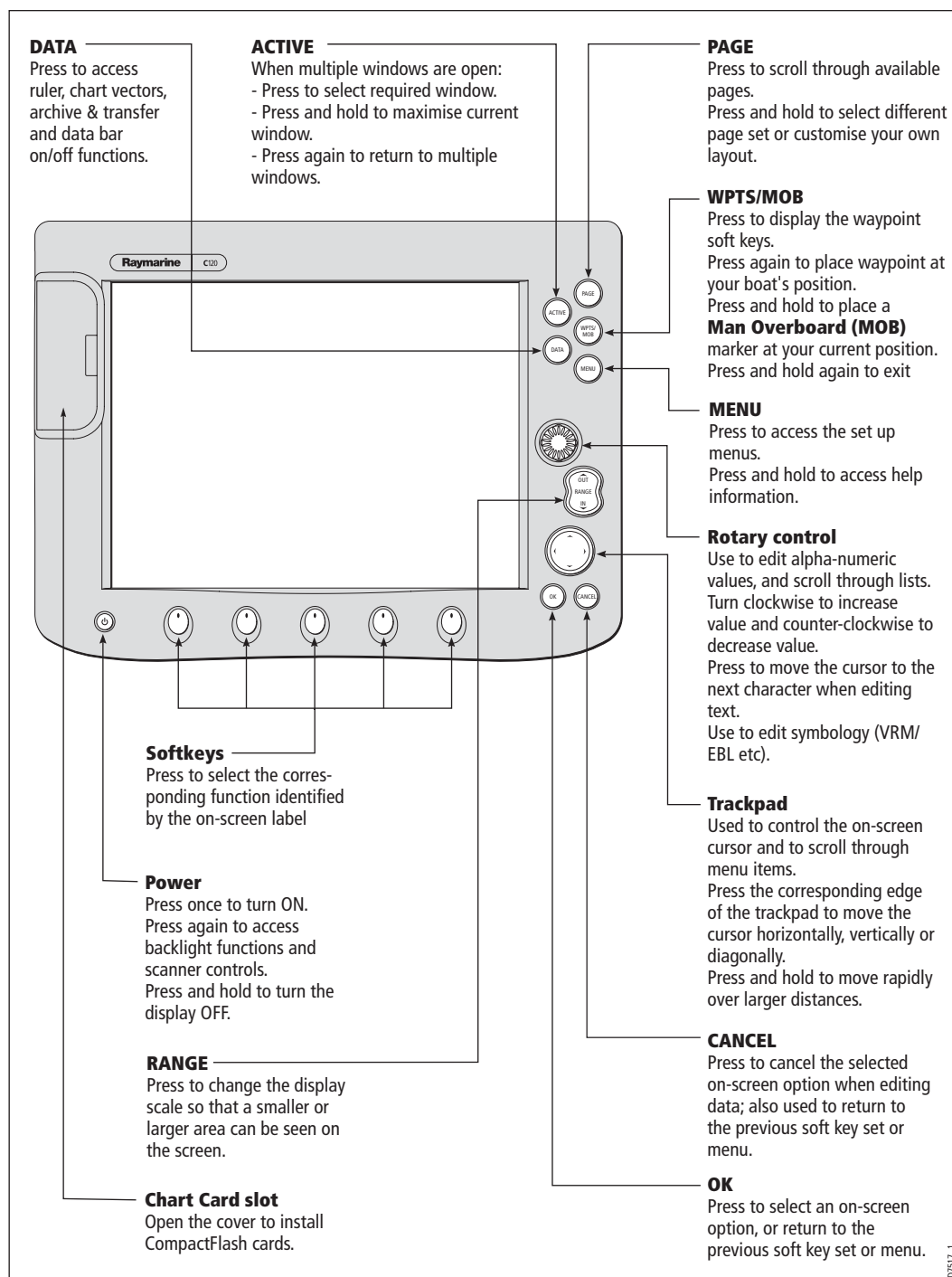


Press and hold the **POWER** button until the power down count reaches zero. If the **POWER** button is released within the countdown period, power off is cancelled.

Remember to replace the suncover to protect the display.

2.3 Using the controls

The control panel

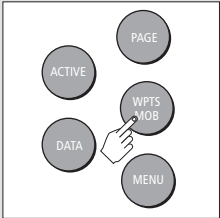


Buttons and soft keys

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

↓

ERASE WAYPOINT	SORT LIST	SET DEFAULT SYM & GROUP...	WAYPOINT GROUPS...	VIEW AND EDIT DETAILS...

↓

		SET UP DEFAULT SYMB GROUP		EDIT DEFAULT

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

D7364-2

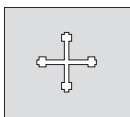
This process of pressing buttons and soft keys to navigate to the required function is simplified in this manual and represented by a strip e.g.



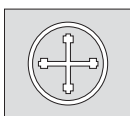
Note: The key beep that you hear whenever a button or soft key is pressed, can be switched off and the soft keys automatically hidden if required. For more details, please refer to the Display Setup Menu on page 191.

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.



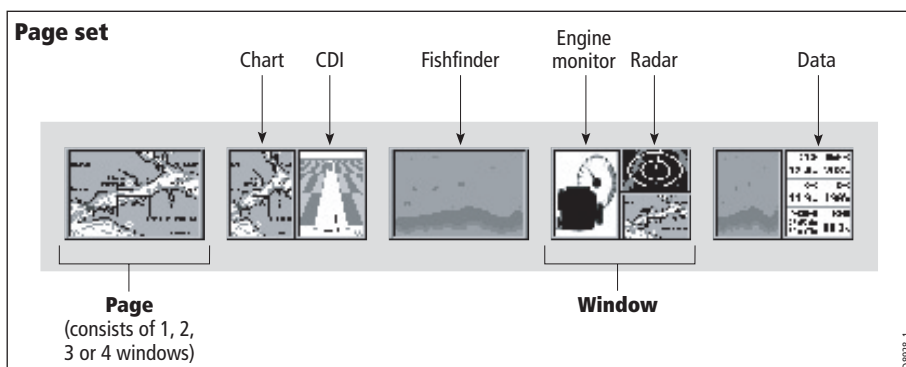
The cursor is context-sensitive - when it is placed over an object e.g. a waypoint or chart feature, it changes color and a label or information associated with the object is displayed. When you place the cursor over certain items, the soft keys change to enable you to access related operations.

Notes: (1) For a full list of cursor labels and their meanings, please see page 211

(2) For details of how to temporarily hide the cursor, please see page 191.

2.4 Displaying applications

The various applications that make up your C-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 177).

Note: For details of how to select page sets, pages and windows, please refer to page 14.

2.5 Additional screen information

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

The screenshot shows a marine electronic display with the following elements:

- Status bar:** Displays application-specific information like 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), and Rng (0.011 nm). It also shows range (3nm) and heading (Head-Up).
- Data bar:** Displays environmental data like Relative Motion and Rings (1/2nm).
- Status icons:** Includes icons for FIX, AIS, and a scanner.
- Waypoint List:** A list of waypoints with fields for Name, Group, Position, and Rng/Brg.
- Edit Waypoint:** A dialog box for editing waypoint details like Symbol, Name, Group, Position, and Comment.
- MARPA ALARM:** A pop-up message indicating "Target lost (on screen)".
- ACKNOWLEDGE:** A button at the bottom of the screen.

Callout boxes explaining 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 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.

D7456_2

* For details of how to adjust and edit the data bar, please see *page 180*

Note: To change the size of the text on screen, please see page 191.

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.

Menus for the active application

External equipment/
instruments

System-wide menus

Setup

Radar Setup ...

GPS Status...

Compass Setup...

AIS Layer Status...

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 12: 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)

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

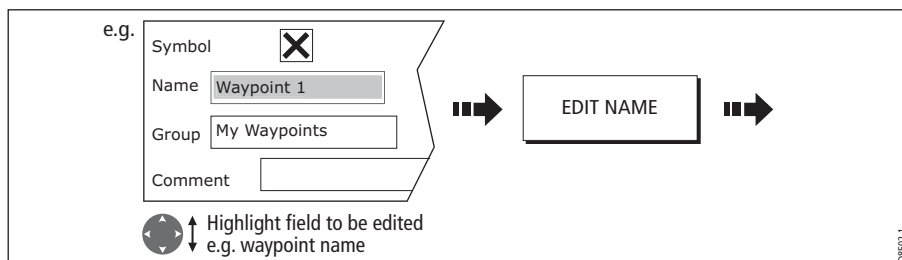
D8501_1

Editing the dialog box information

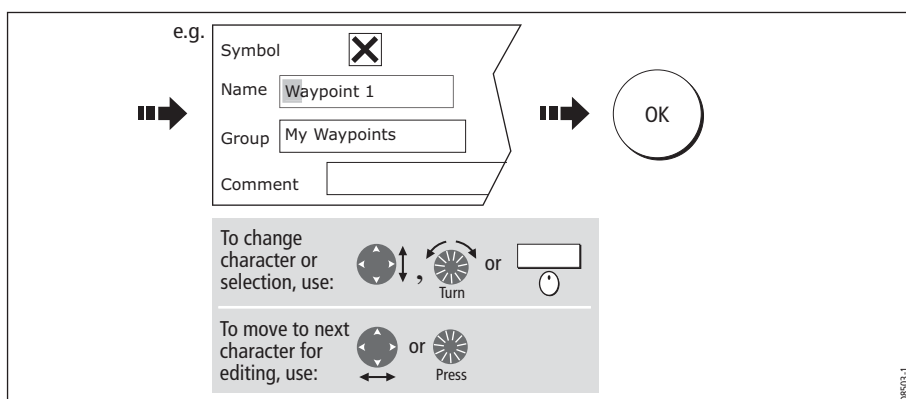
Dialog boxes enable data to be edited or entered into a list e.g. Edit Waypoint screen.

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 183).

Status icons

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

Status icon	Description
 <small>D6892-3</small> (animated icon)	The boat and fish icon indicates the current status of your fishfinder: 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.
 <small>D6892-2</small> (static icon)	The satellite icon indicates the current status of your GPS: FIX - your unit is successfully connected to a GPS receiver. NO FIX - your unit has been unable to connect to a suitable GPS receiver.
 <small>D6894-2</small> (static icon)	The scanner icon indicates the current status of your radar scanner: Icon rotates - the scanner is transmitting (TRANSMIT/TX mode). Icon static - the scanner is powered on but is not currently transmitting (STANDBY mode). Icon greyed out - this indicates that the scanner is currently powered off (OFF mode). Icon rotates and is then static - a power save mode in which the scanner powers on/off intermittently (TIMED TRANSMIT mode).
 <small>D6829_1</small>	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 C-Series Display after it has been commissioned (see Installation Guide), we recommend that you carry out the following:

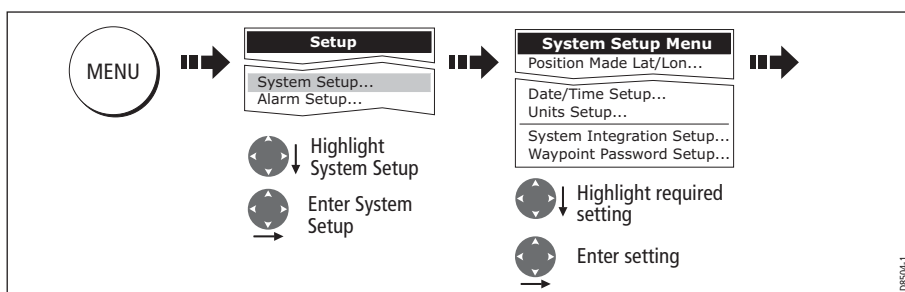
- Set the language, the date and time format and preferred units of measurement.
- Select a page set.
- Select an application page/window.
- Adjust the display lighting.

Note: For full details of all setup and customizing options, please refer to Chapter 12: System setup and customizing.

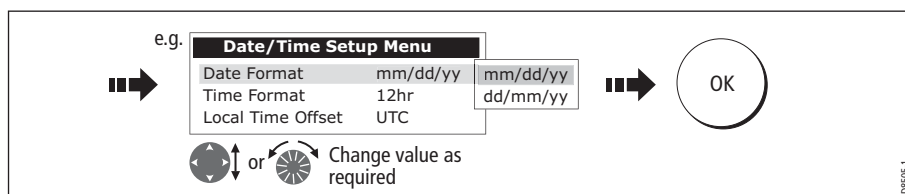
Setting the language, date/time format and units of measurement

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

1. Select the setting:



2. Adjust the setting:

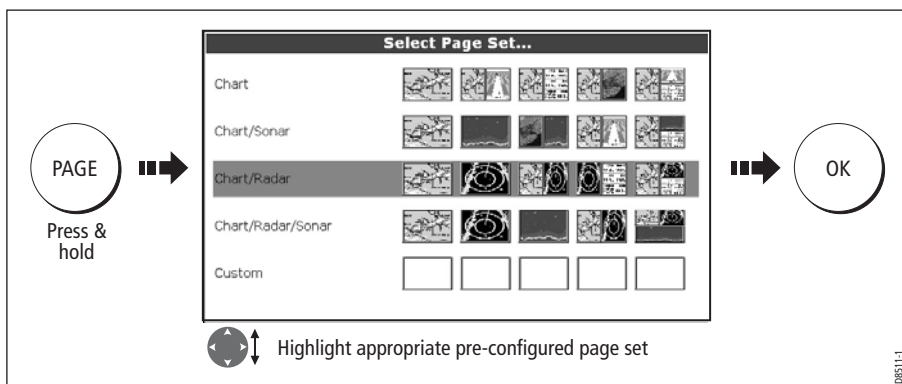


3. Repeat this process until you have changed all of these settings.

Note: For full details of all System Setup options, please refer to Chapter 12: System setup and customizing. For application specific set up options, please refer to the appropriate chapter.

Selecting a page set

Your Display has four pre-configured page sets and one empty set for you to choose from.

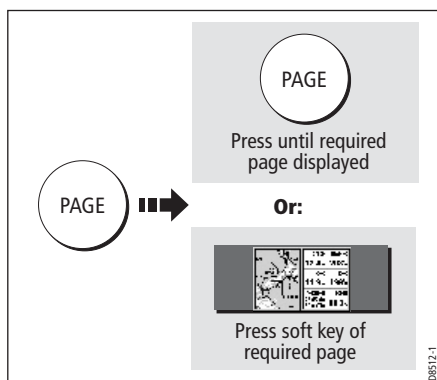


Note: Alternatively, you can access the Select Page Set screen via MENU.

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

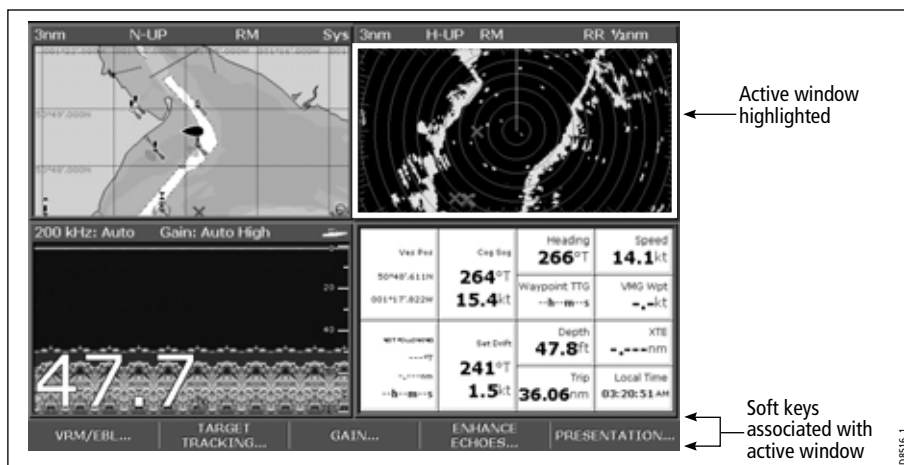
Selecting an application page

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



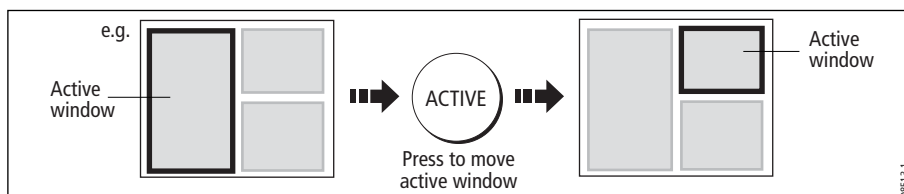
Selecting an application window

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



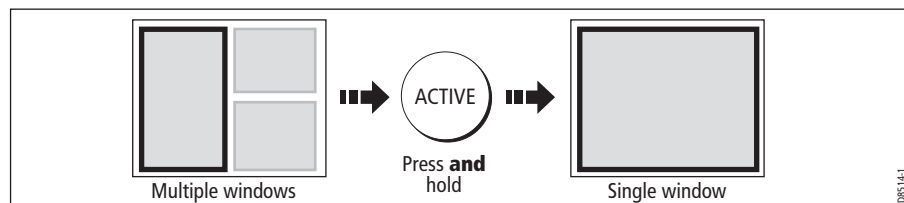
Changing the active window

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



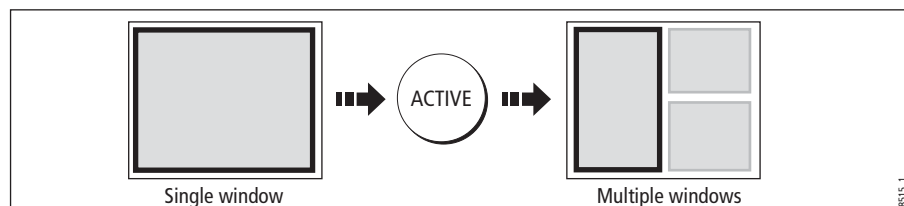
Multiple to single window

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



Single to multiple windows

To return to multiple windows:



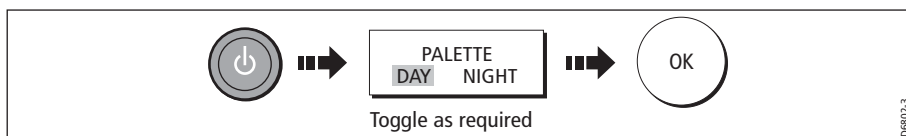
Adjusting the display lighting

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

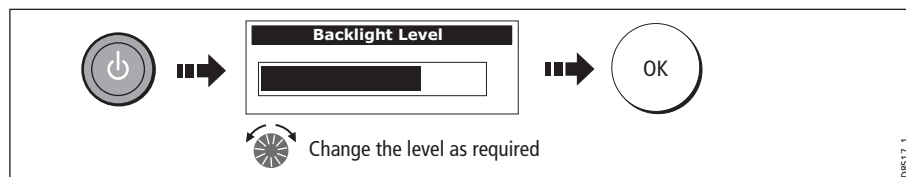
To select the day/night mode of operation:



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:



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** or **www.navionics.it**.

The amount of cartographic detail shown varies for different areas and for different scales. The chart scale in use is indicated 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**

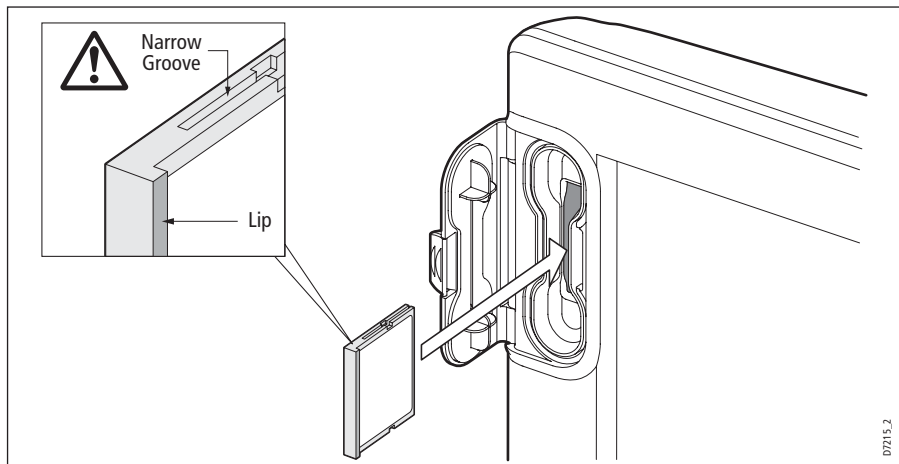
To save waypoint, route and track data for use by other equipment e.g. a PC.

You can remove and insert cards while a chart is displayed provided that you follow the correct procedure (see *page 18*). 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.

Inserting a card

To insert a card, refer to the illustration and:

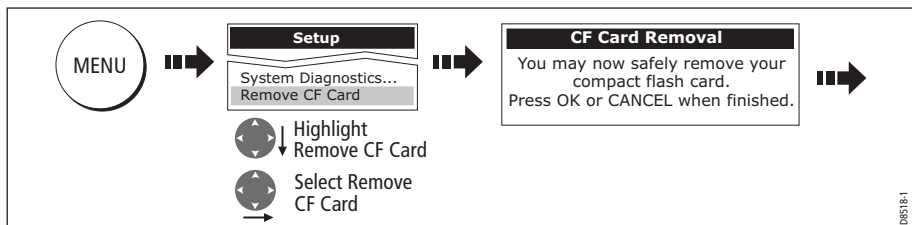
1. Check that you are using the correct type of card (see *Important Information*, at the beginning of this manual).
2. Open the chart card door, located on the front left of the display.
3. Insert the card as shown, with the lip of the card facing inwards. It should position easily. If it does not, 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.

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 C-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

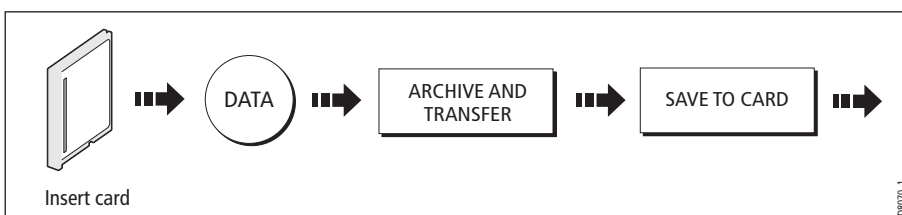
Your display can save up to 1,000 waypoints, 100 routes and 10 tracks in data base lists. Once this number is reached you will need to archive data to a CompactFlash card for safe-keeping or retrieval at a later date. Alternatively, you can transfer data to another instrument or PC using NMEA. When navigation is active, you can also receive waypoints, routes and tracks from a PC, SeaTalk and NMEA instruments (see *page 22*).

Saving information to a card

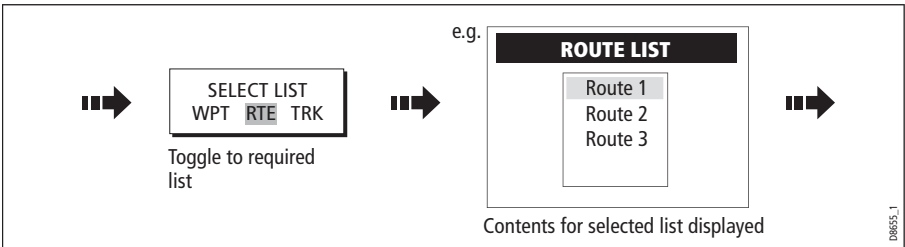
Important:

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

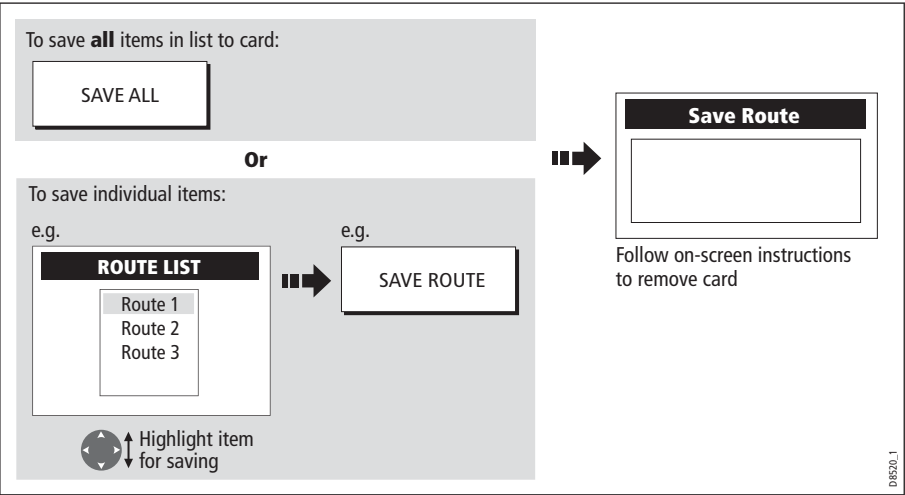
1. Insert card and select the SAVE TO CARD function:



2. Select list containing data for saving:



3. Define data for saving

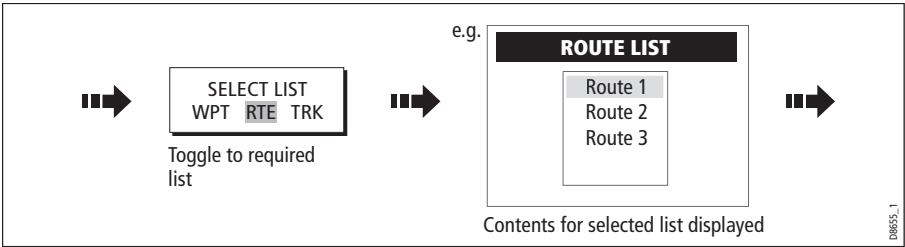


Retrieving information from a card

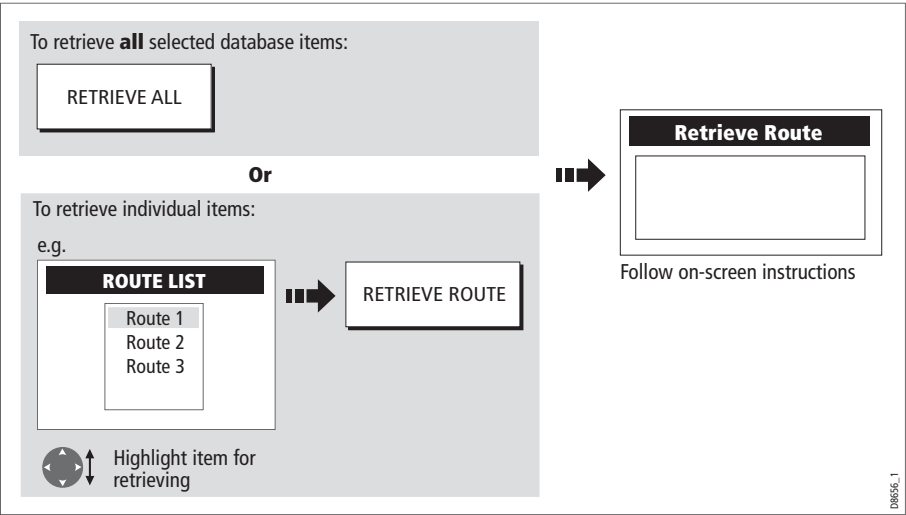
1. Insert card and select the RETRIEVE FROM CARD function:



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

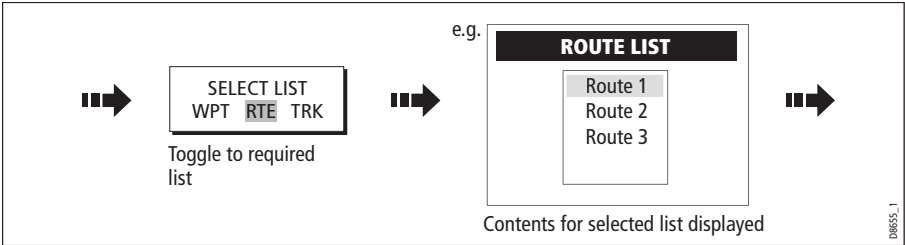
Erasing information from a card

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.

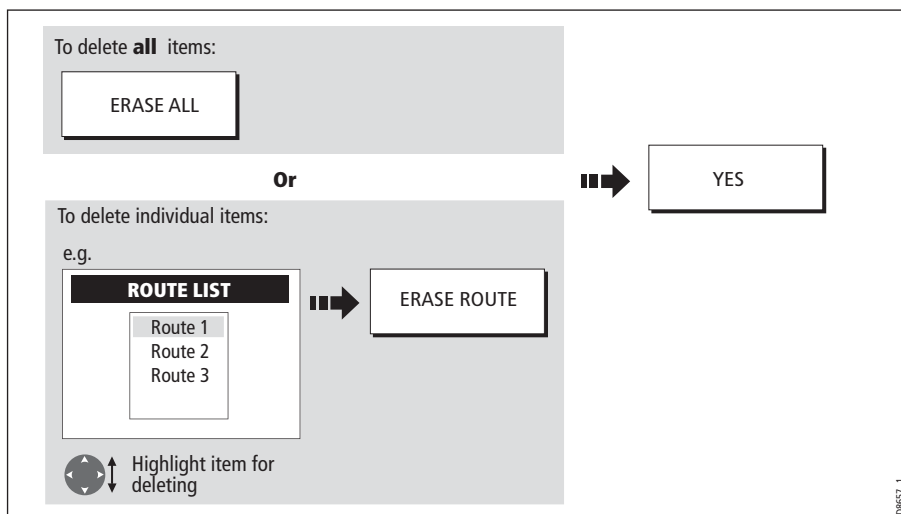
- 1. Insert the card and select the ERASE FROM CARD function:



- 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.

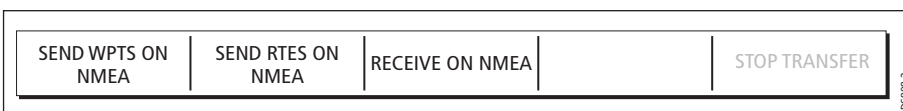
With a RayTech 6.0's planner you can transfer waypoints and routes via a CF memory card. Such transfers require that the PC be connected to the display's NMEA port via a serial data cable.

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:

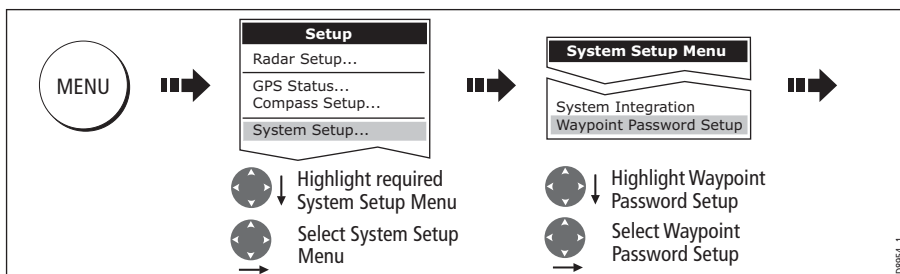
- View details of waypoint and route databases.
- Edit waypoints or routes.
- Goto an existing waypoint.
- Follow a route.
- View waypoints on screen (even when the SHOW/HIDE status is set to SHOW).
- View waypoint names on screen (even when WAYPOINT NAME is set to ON).

All other options including GOTO CURSOR are unaffected.

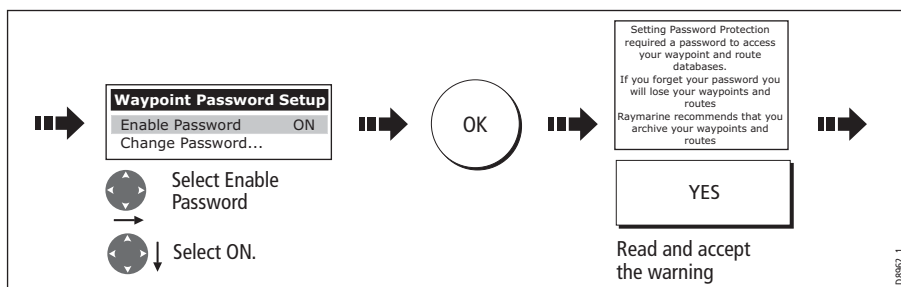
Setting up a password

To setup a password:

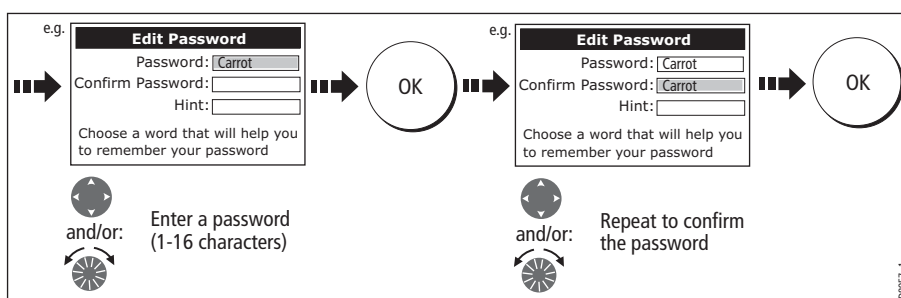
1. Select Waypoint Password Setup:



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

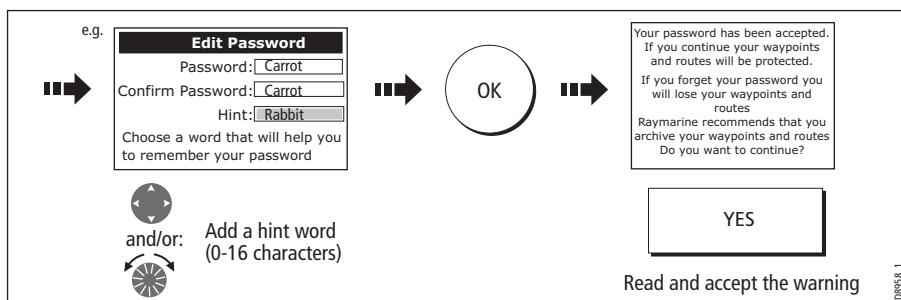


3. Enter a password and confirm it:



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.

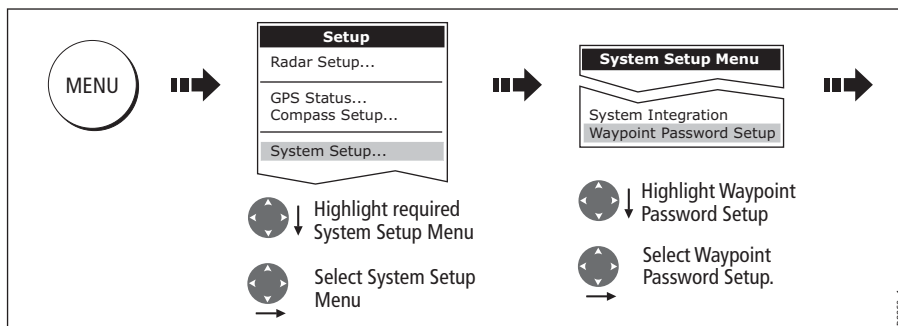
Note: *If required, this password can be changed by selecting the Change Password option on the Waypoint Password Setup Menu.*

Enabling/disabling password protection

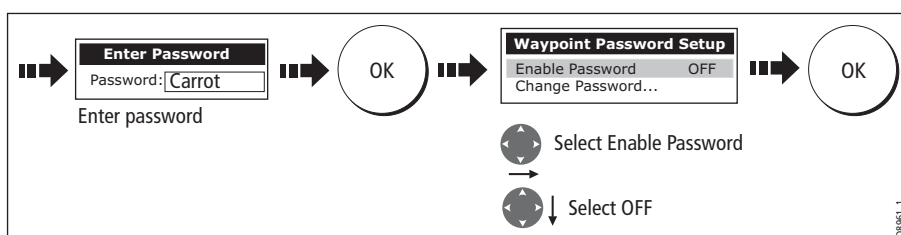
Once you have set up a password on your system (see previous section) you will need to key in this password whenever you want to change the status of the password protection feature.

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.



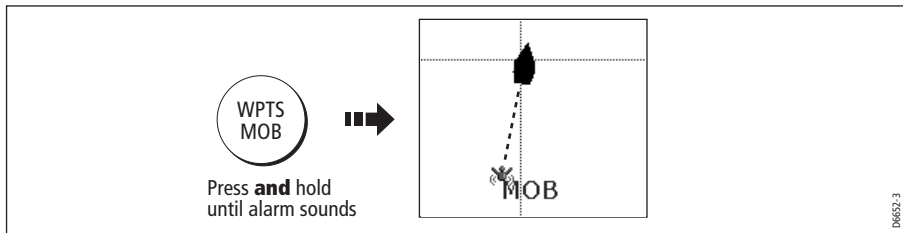
Important: If you enter an invalid password more than twice within one power cycle the system shall display the hint. There is no limit to the number of attempts to enter a valid password but if you forget your password, you will need to perform a Settings and Data Reset (see *page 184*) which will erase 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 Emergencies and warnings

You can use your C-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 183*). 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.
- **Autorange motion mode** - If radar/chart synchronization is set to OFF (see *page 76*), 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.

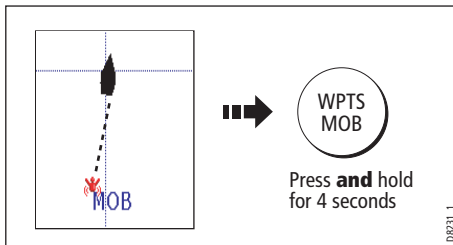
Silencing a MOB

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 187](#)).

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 C-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 C-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 35.

Waypoints are a core feature of the C-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.

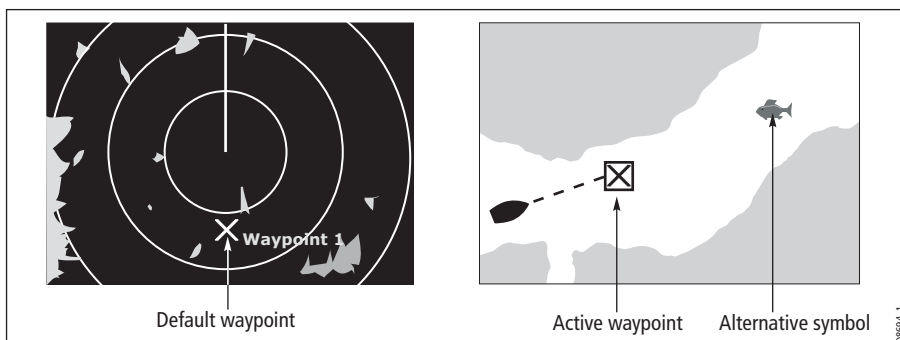
The details of all waypoints, irrespective of the application they were created in, are stored in a dedicated waypoint list which will hold up to 1000 waypoints. All waypoints are by default, placed in the MY WAYPOINTS group. If required, you can create new groups and change the default group. If necessary, 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 23.

3.2 How are waypoints represented?

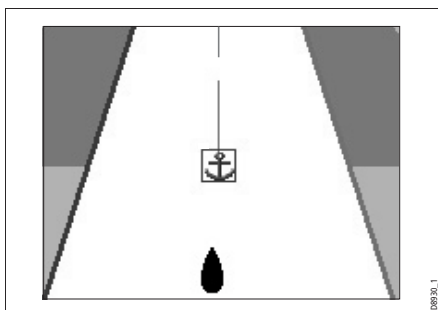
Waypoints on Chart and Radar windows

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



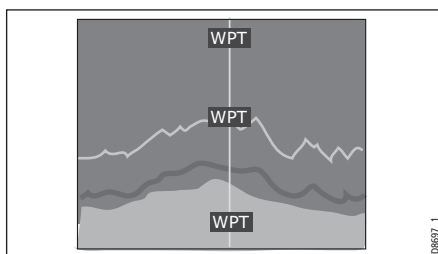
Waypoints on CDI windows

On 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.



3.3 Placing a waypoint

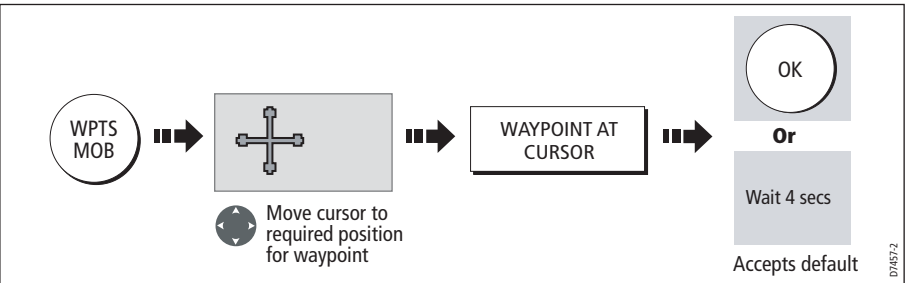
A waypoint can be placed at:

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

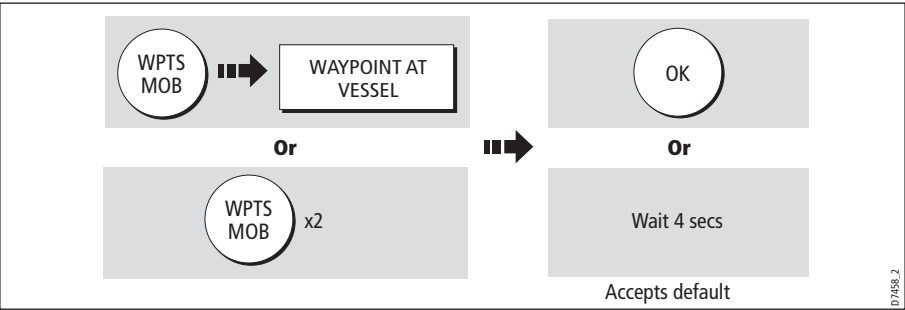
When you are placing a waypoint, you can either accept the default or customize its details. For more information see *page 34*.

Once a waypoint has been placed, you can view its details and edit them (if necessary). For more information, see *page 33* and *page 34*.

... at the cursor

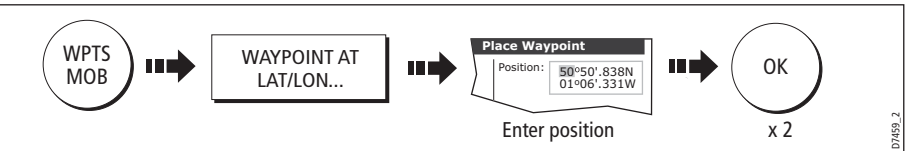


... at your vessel's position



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

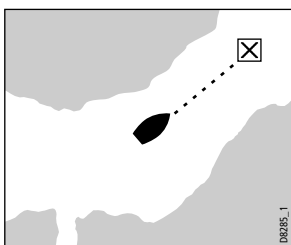
... at a known position



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 56*.

Start navigating to a waypoint



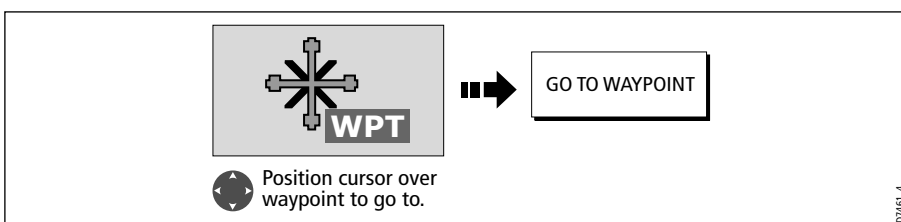
You can navigate to a waypoint using the cursor, via the **WPTS MOB** button or by selecting the **GOTO** option.

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 180*).

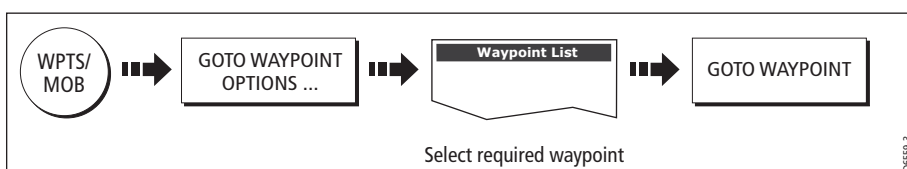
...using the cursor

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



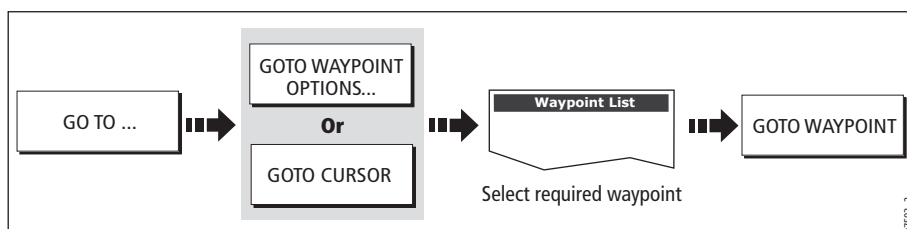
...via the WPTS MOB button

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



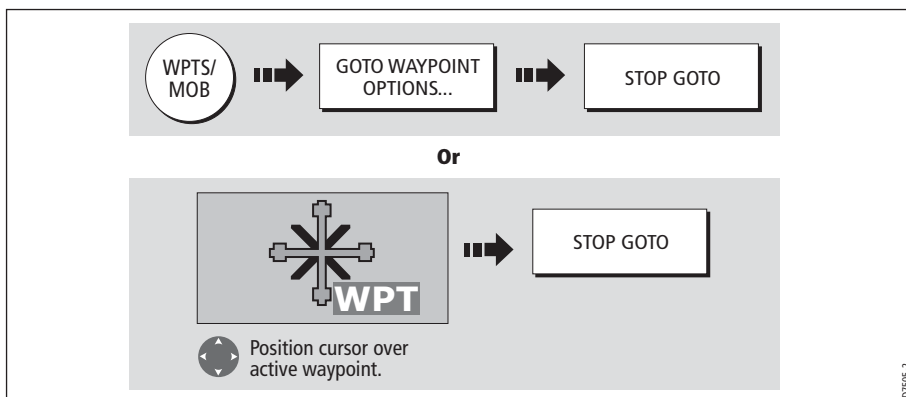
... by selecting the GOTO option

You can navigate to a waypoint using the GOTO option when a 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.

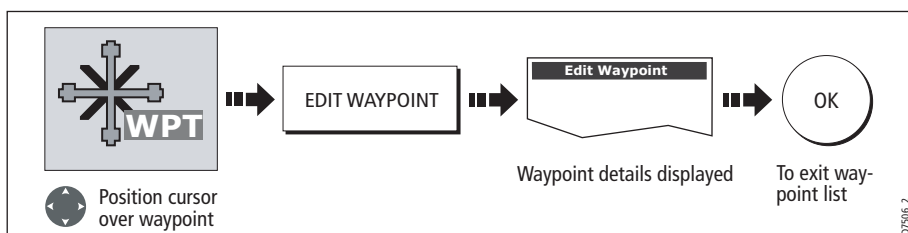
3.5 Viewing waypoint information

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 180*).

...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:

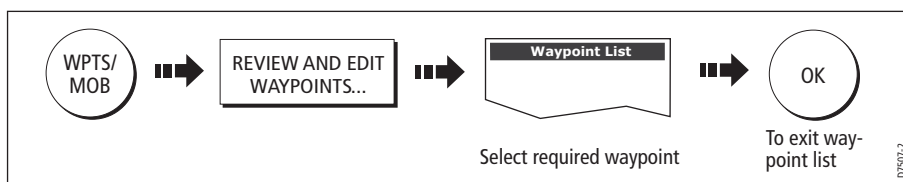
Note: *Temperature and depth are only captured (if available) for waypoints placed at your vessel's position.*

Waypoint List

Name:	Group:	My Waypoints
Waypoint 1	Position:	50°53'.826N 001°10'.963W
Waypoint 2	Rng/Brg:	284° 4.315nm
Waypoint 3		
	Temperature:	---.-°F
	Depth:	---.-ft
	Date:	05/11/2003
	Time:	14:59:11

D6560-2

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.

Edit Waypoint

Symbol:		Position:	50°50'.838N 001°06'.331W
Name:	Waypoint 1	BRG:	223°
Group:	My Waypoints	RNG:	3.978nm
Comment:			

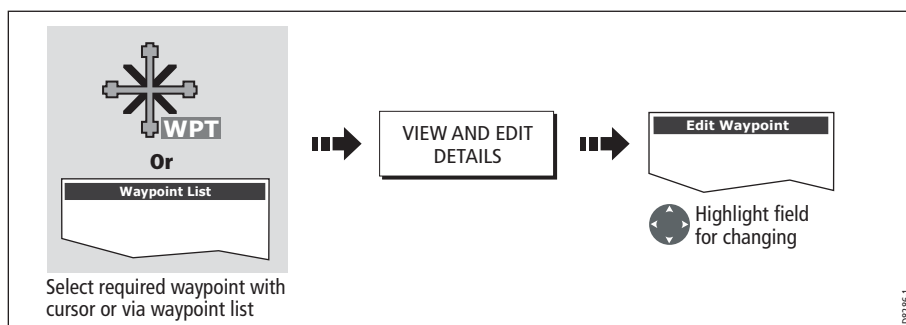
D6561-2

Changing waypoint details

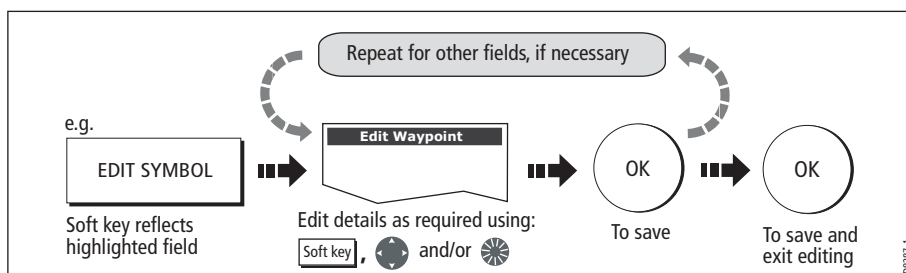
When a waypoint is created it is assigned a default name, symbol and group. You can change these details to suit your needs and add a comment if required. This is particularly useful when you are managing large numbers of waypoints.

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.

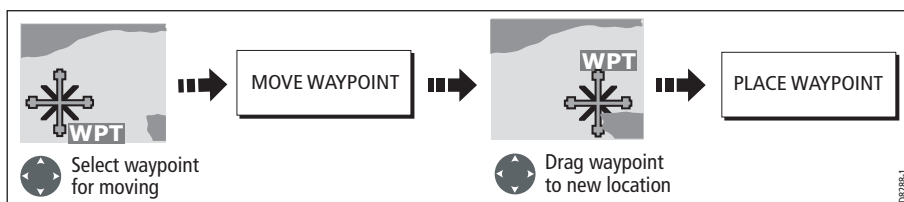
Moving a waypoint

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.

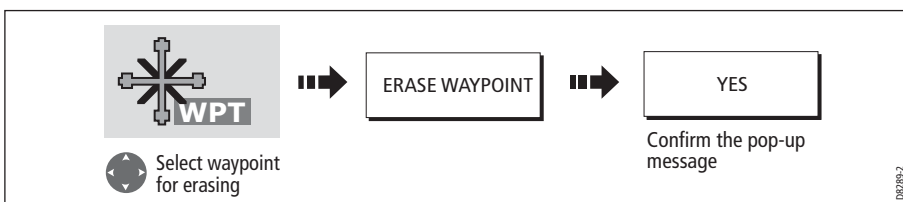
Notes: (1) *If a route is hidden its waypoints can still be displayed. If you attempt to erase a waypoint from a hidden route, a warning message will be displayed.*

(2) *For details of erasing groups of waypoints, see page 41.*

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:



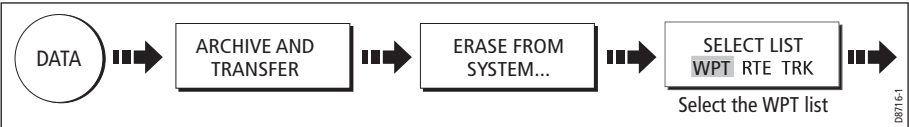
2. Erase the selected waypoint:



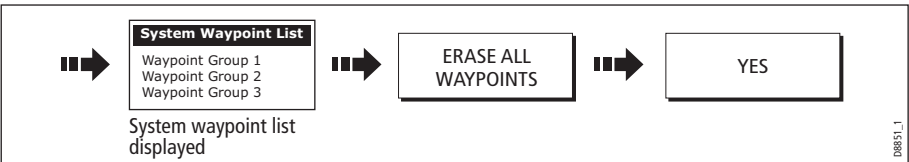
Erasing all waypoints

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

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

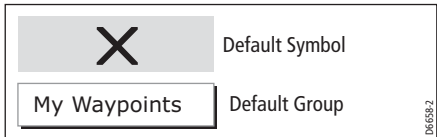


- 2. Erase all waypoints:



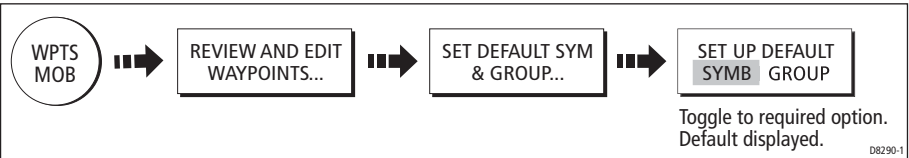
Changing the default symbol or group

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

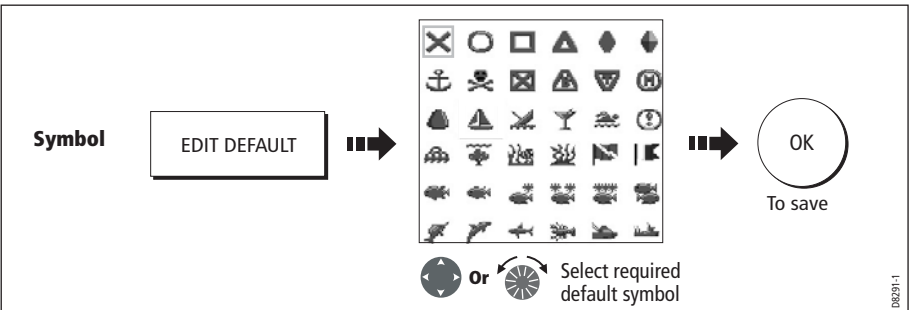


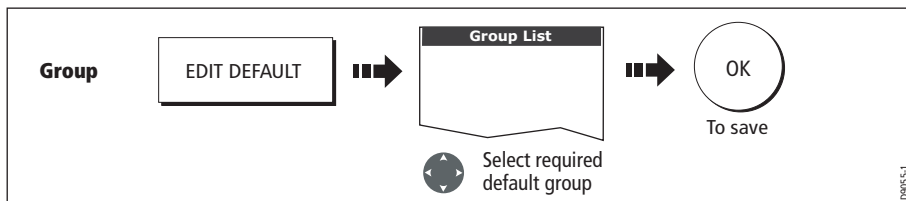
If these are not suitable, you can select an alternative symbol and group to be the default. For an alternative group to be selected for the default, it must first be created - see [page 39](#).

- 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**.

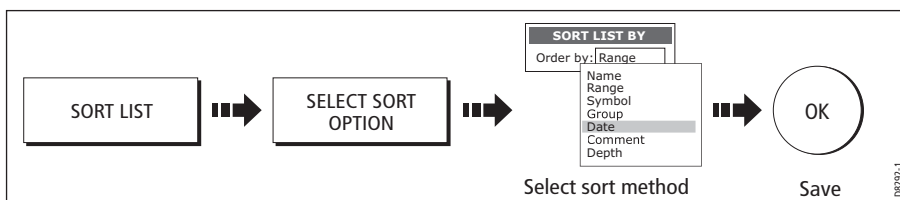
3.7 Sorting the waypoint list

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:



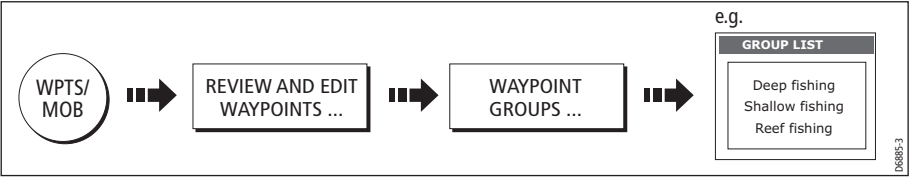
3.8 Organising waypoints into groups

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:

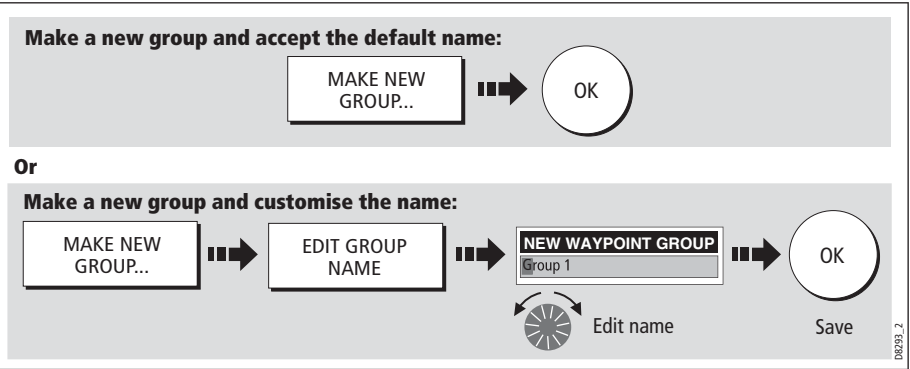


You can now make a new waypoint group, or erase, move or rename existing groups.

Making a new waypoint group

To create a new waypoint group:

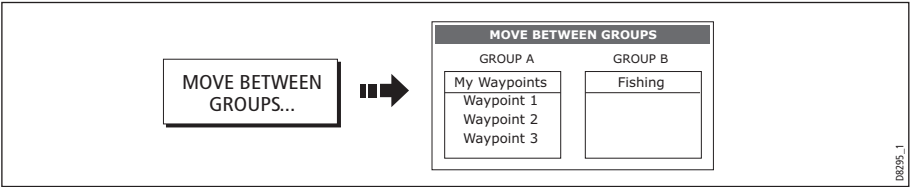
1. Display the group list (see above).
2. You can now either:



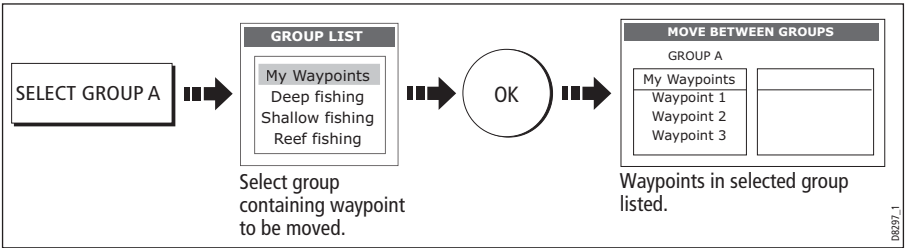
Moving waypoints between groups

Waypoints can be easily moved between groups:

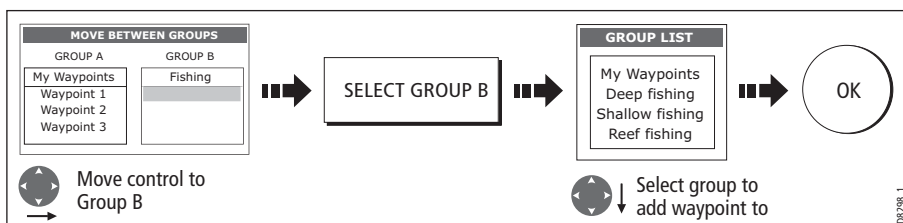
1. Display the group list (see *page 38*).
2. Display the MOVE BETWEEN GROUPS option:



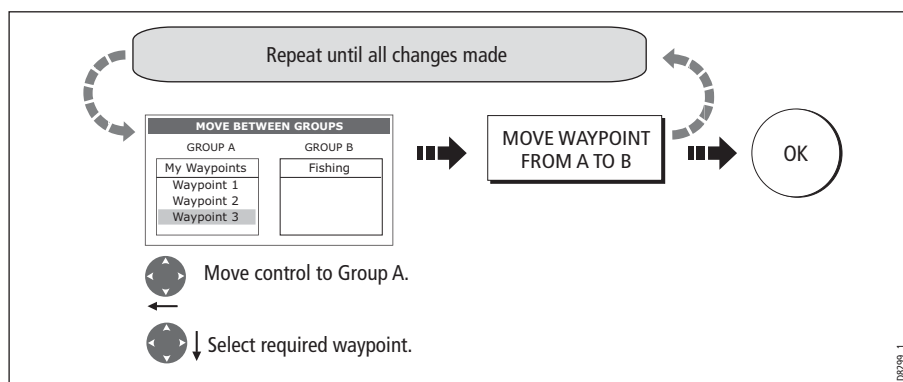
3. Determine the group that contains the waypoint to be moved:



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



5. Select waypoint to be moved:

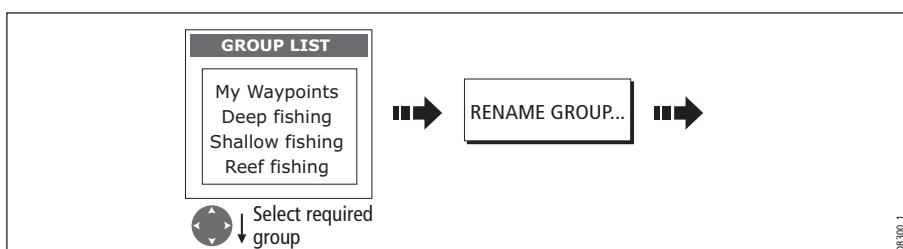


Note: Alternatively, waypoints can be moved from Group B to Group A if required. The soft keys reflect this accordingly.

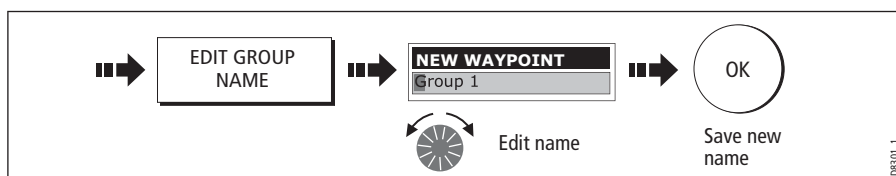
Renaming an existing group

You can change the name of an existing waypoint group:

1. Display the group list (see *page 38*).
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 38*).
2. Select and erase the group:



Note: Waypoint groups can also be erased via the *ARCHIVE AND TRANSFER* function as described on *page 37*. For details of how to erase waypoint groups from a card, see *page 21*.

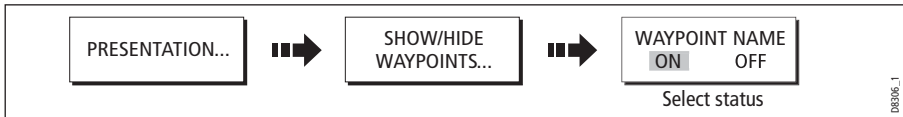
3.9 Controlling waypoint display

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 waypoints with a particular symbol.
- Show or hide waypoints belonging to a specific group.
- Show or hide all of the waypoint names.
- Show or hide the index of a waypoint within a route - chart only (see *page 87*).

Show/hide waypoint names

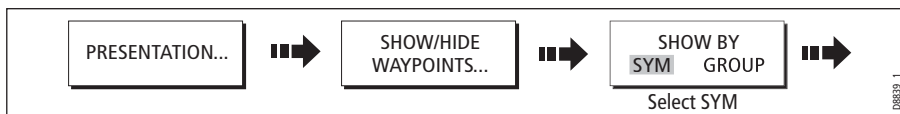
You can show or hide all waypoint names if required:



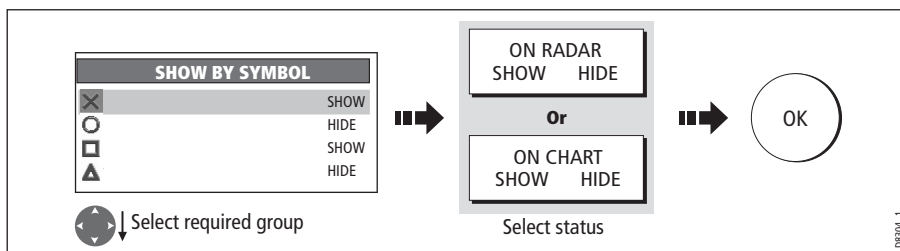
Showing/hiding waypoint symbols

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:

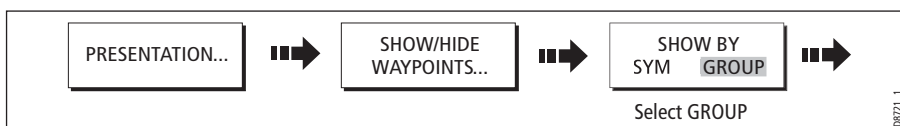


Note: Waypoints in an active route are always displayed, regardless of whether the display is set to show or hide.

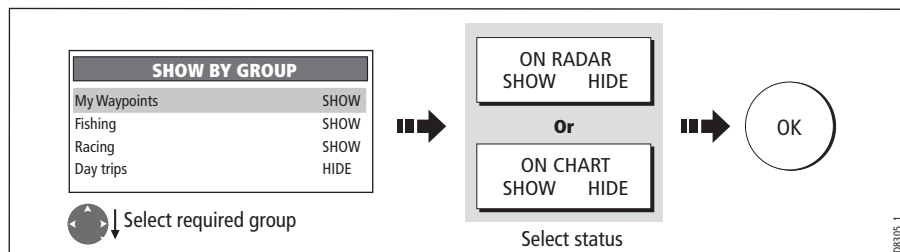
Showing/hiding waypoint groups

You can define which waypoint symbol types are shown/hidden in radar or 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

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 C-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 17*.
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 91*). When you adjust the datum of the C-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 C-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. Details of these cards and how to obtain them is given on *page iii*.

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 C-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 46*).
- Interpret your surroundings (see *page 47*).
- Measure the distance and bearing between two points (see *page 55*).
- Place waypoints at specific locations (see *page 56*).
- Navigate to a specific point (see *page 56*).
- Build and follow a route (see *page 59*).
- Monitor where you are going (see *page 74*).
- Distinguish between fixed and moving objects using radar overlay (see *page 76*).
- Record where you have been (see *page 78*).
- Manage and edit routes and tracks (see *page 68* and *page 81*).
- View AIS data (see *page 54*).

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 179.*

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.

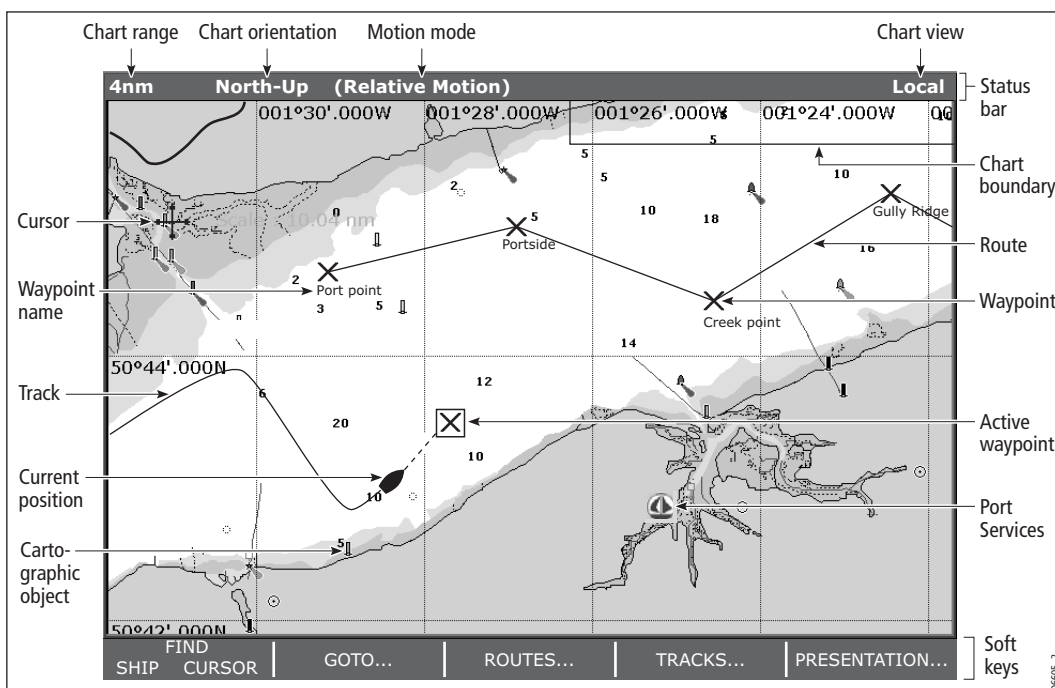
Alternatively, you may be planning a journey and do not want the chart to redraw as your vessel moves. You can suspend the active motion mode by using the cursor to pan the chart (see *page 46*) or by selecting FIND CURSOR.

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.

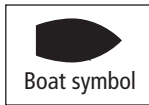
Provided the necessary data to ascertain your vessel's position is available, you can activate the motion mode, by selecting FIND SHIP.

4.4 The chart display

The main features of the chart display are as follows:

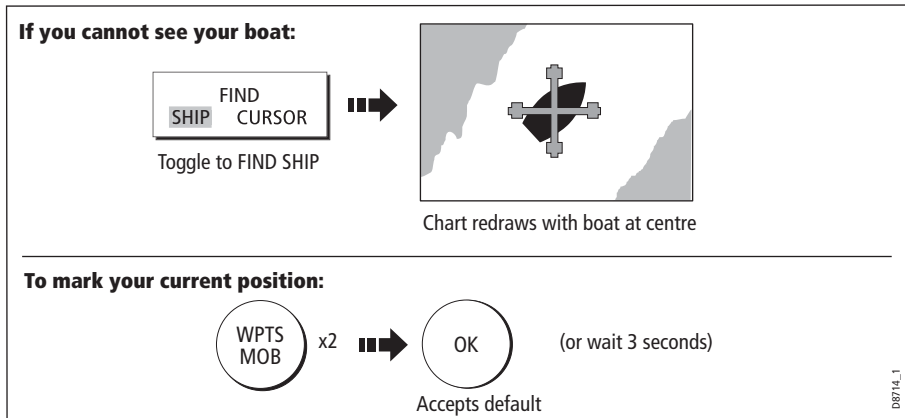


4.5 Where am I on the chart?



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 (see *page 180*), your position will be displayed in the data bar under VES POS.



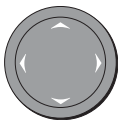
Note: For more information on waypoints, please refer to the Waypoint Chapter.

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 45 and page 85.*

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

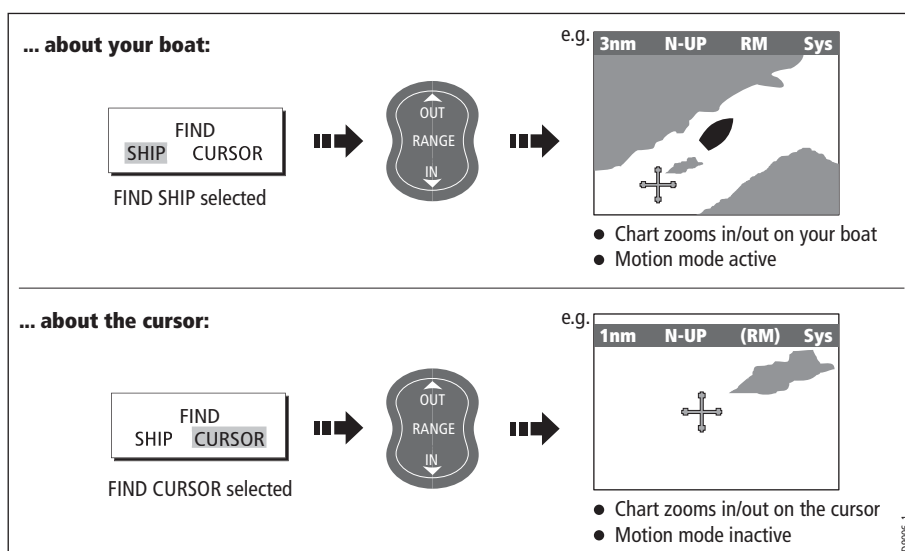


When you zoom in, the chart scale changes to show a smaller area in more detail. Conversely, if you zoom out the chart area displayed is increased but the detail is reduced.

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.

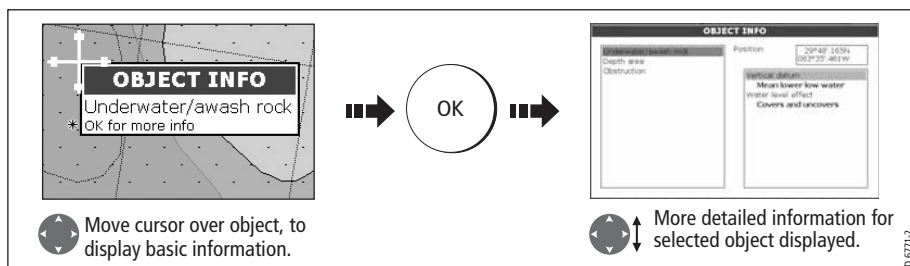
Note: For full details of the features available with each chart card type, please refer to the Navionics website:

www.navionics.com or navionics.it.

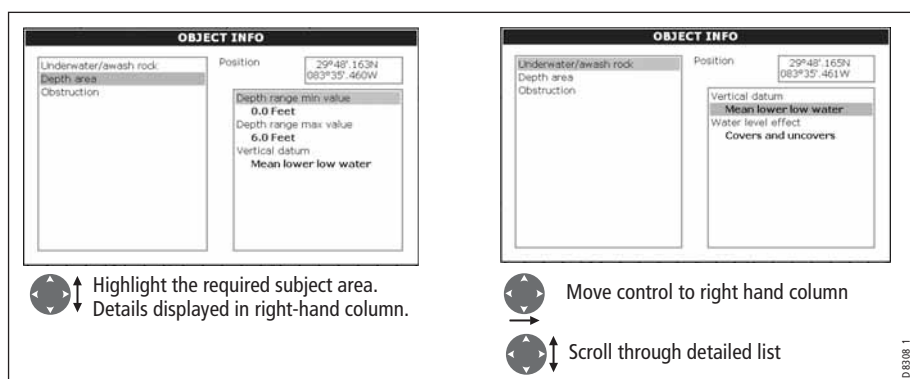
To change the set up options to control how selection of object information operates - see page 90.

Displaying details of objects and features

To view details:



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



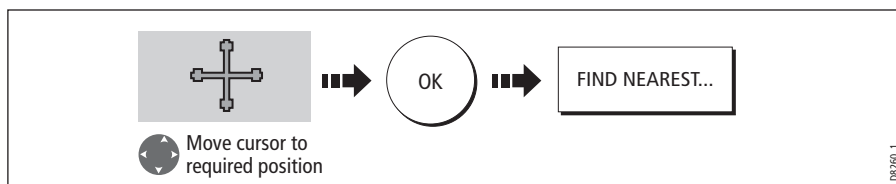
The soft keys provide controls to:

- 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.

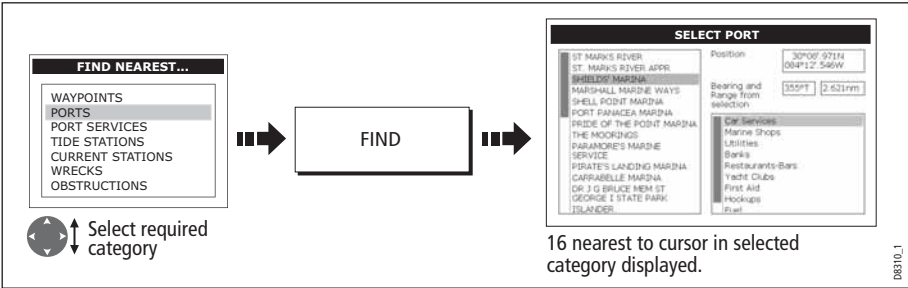
Finding nearby features and services

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.

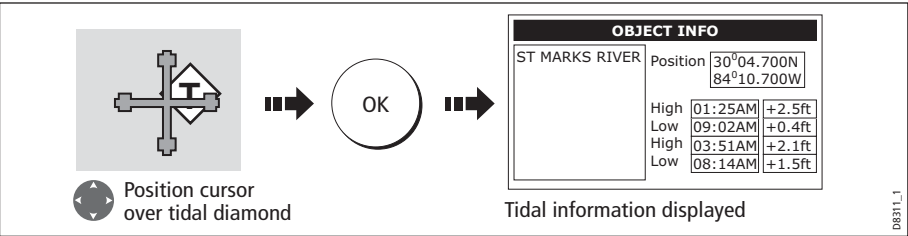
Displaying details of tides

You can display details of tides by:

- Selecting the appropriate tidal diamond (see below) or
- Via the FIND NEAREST function (see *page 48*).

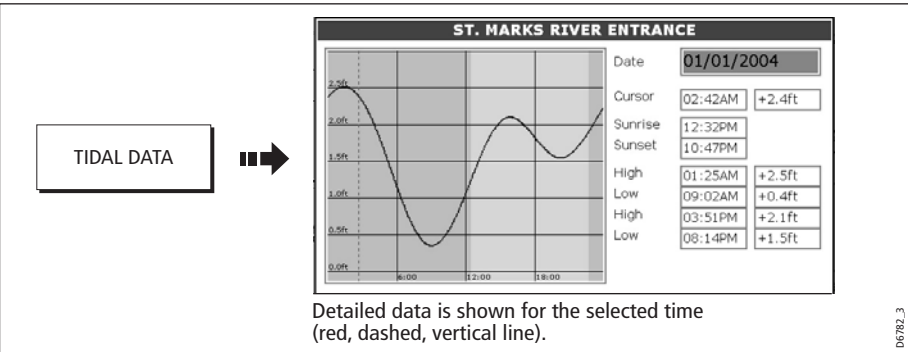
...Using the tidal diamond

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.

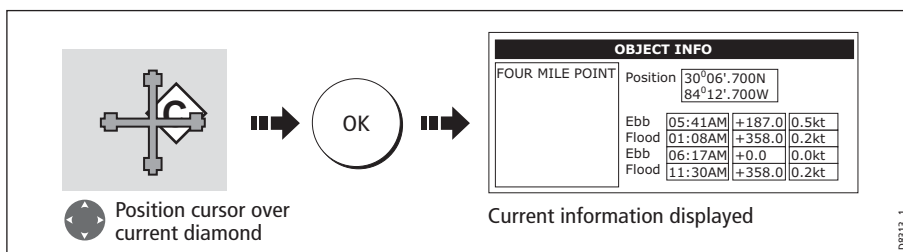
Displaying details of currents

You can display details of currents by:

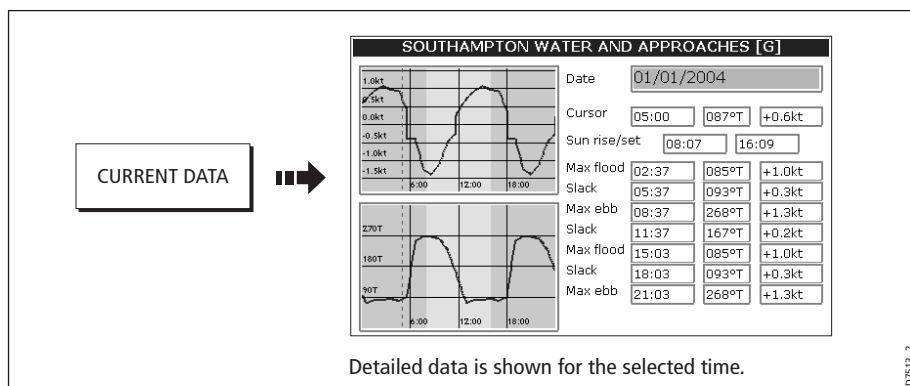
- Selecting the appropriate current diamond (see below) or
- Via the FIND NEAREST function (see *page 48*).

... 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 52*).
- Using the FIND NEAREST function (see *page 48*).

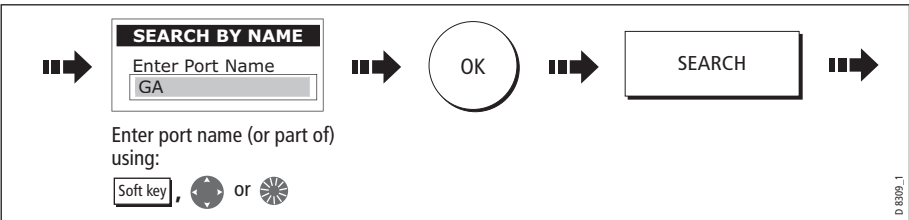
... using the port search option

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

- 1. Select the edit name option:

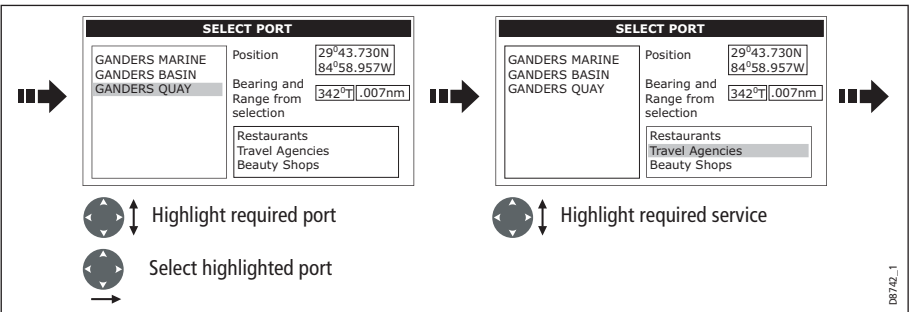


- 2. Enter the port name (or the first few characters of the port name) and search:

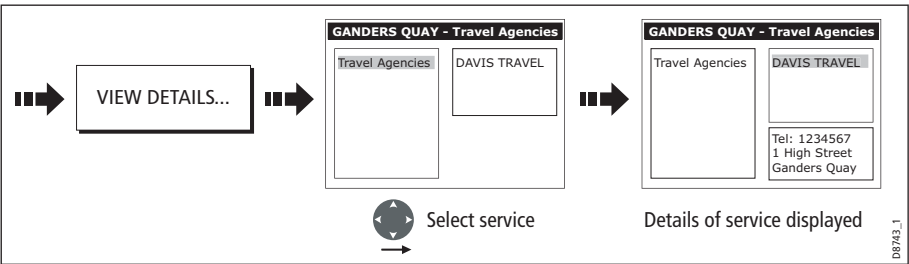


Note: For help with entering text into a dialog box, please refer to page 11.

- 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:



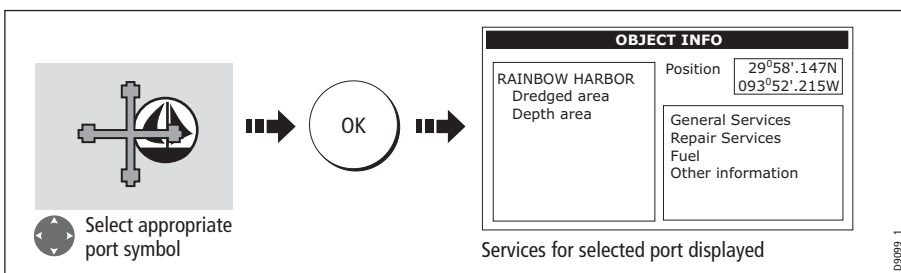
- ii. Display details of the selected service:



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

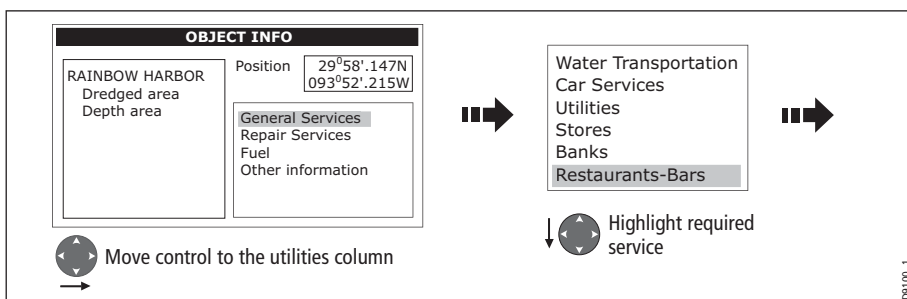
... using the port symbol

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

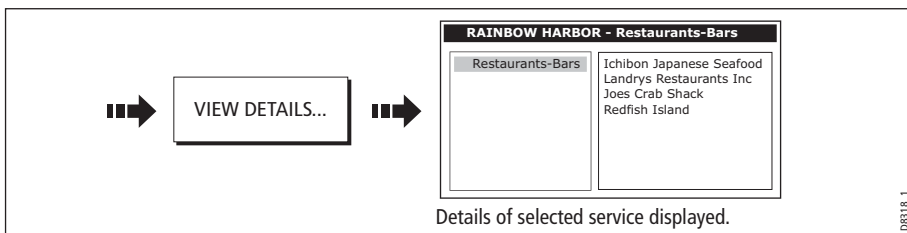


You can now view details of individual services:

1. Select required service:



2. Display service details:





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


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

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


Select business service symbol
e.g restaurant

OK

OBJECT INFO

Point of Interest
Land area

Position

xxx

Eating places

Name
The Haven
Address
20 High Rd
Seaview
Isle of Wight
Phone
0123 45678

Additional information displayed

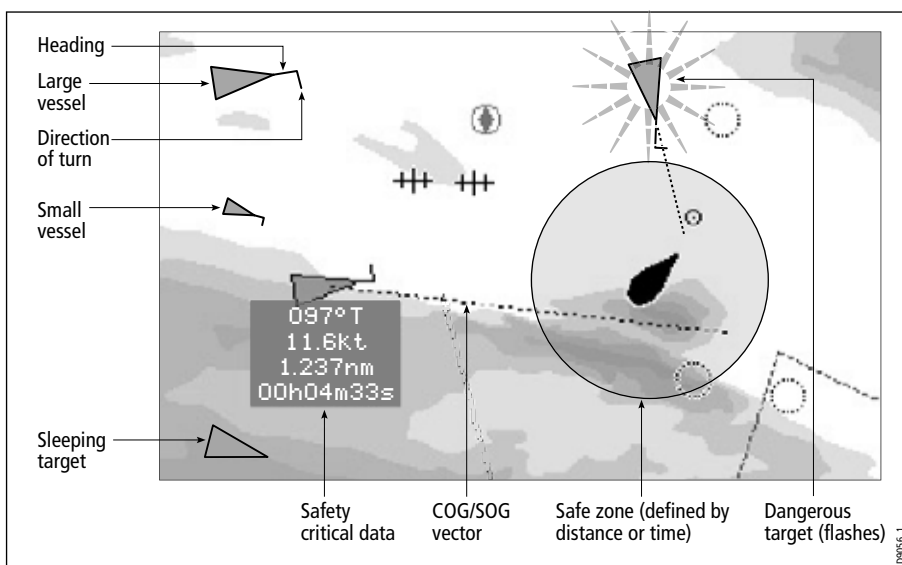
Note: If required, you can declutter your chart by either switching off the business services symbols (via the Cartography Setup Menu) or by switching on the DECLUTTER option (via the PRESENTATION soft key).

Displaying 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 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 11: Automatic Identification System (AIS)*.

4.8 Measuring distances and bearings

... from your boat

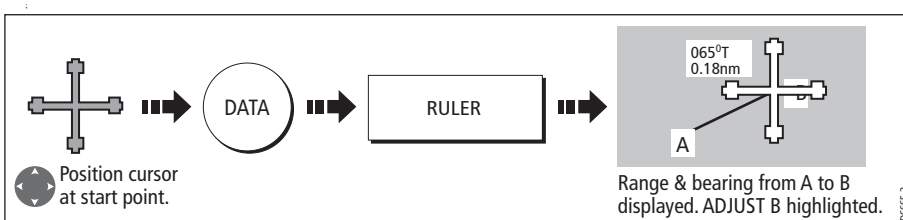
You can determine the position, distance and bearing from your boat to the position of the cursor by referring to the cursor position (Csr Pos) data in the databar.

... between two points on your chart

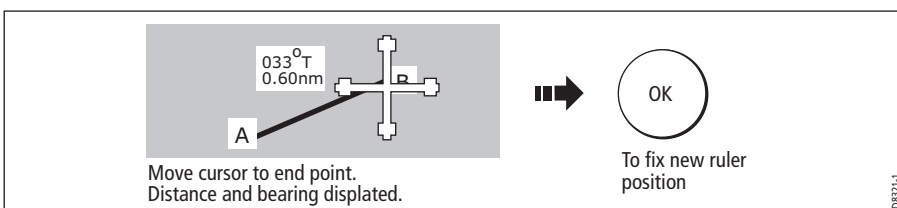
The ruler option of your chart application can be used to obtain an accurate measurement of the distance and bearing between two points on your chart.

To position the ruler

1. Position the ruler starting point:

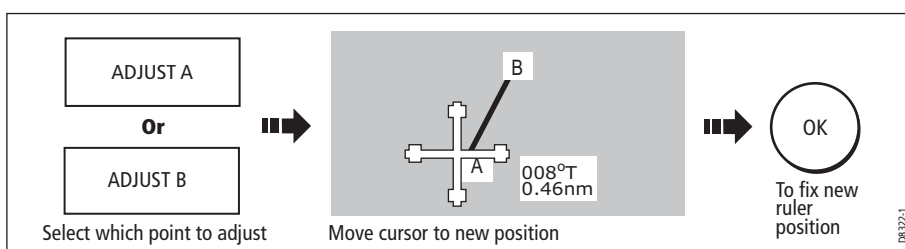


2. Position the ruler end point:



To reposition the ruler

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



To clear the ruler

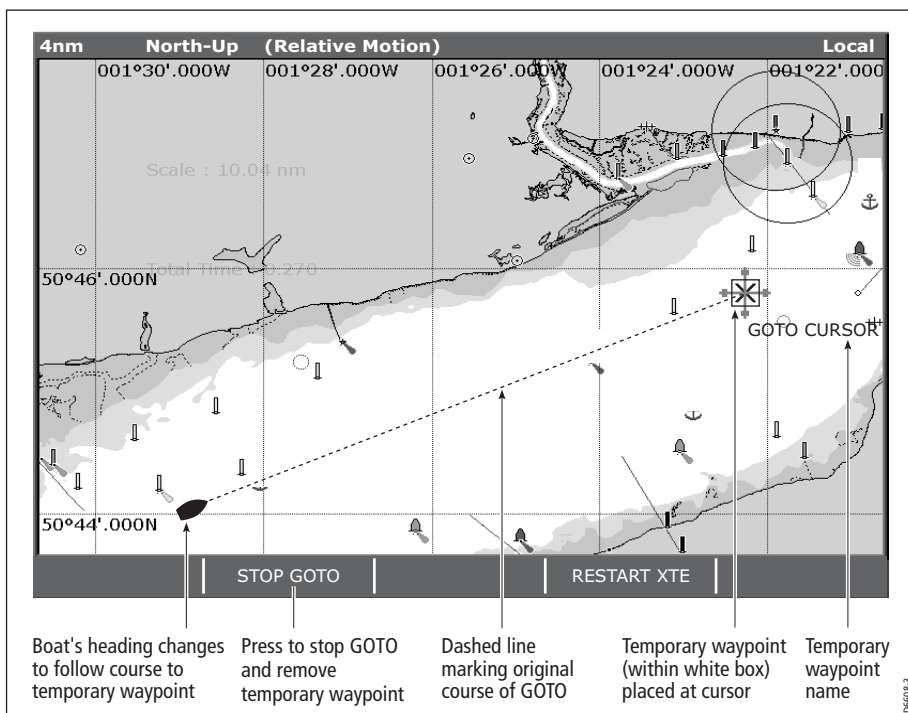


4.9 Navigating to a specific point

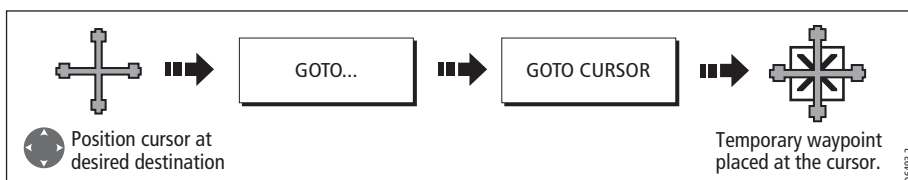
You can use your chart to navigate to a specific point marked by the cursor (temporary waypoint) or to a waypoint. If required you can display the largest chart scale possible that will display both your boat and the target waypoint. When you navigate to a waypoint or to the cursor position, the data 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*

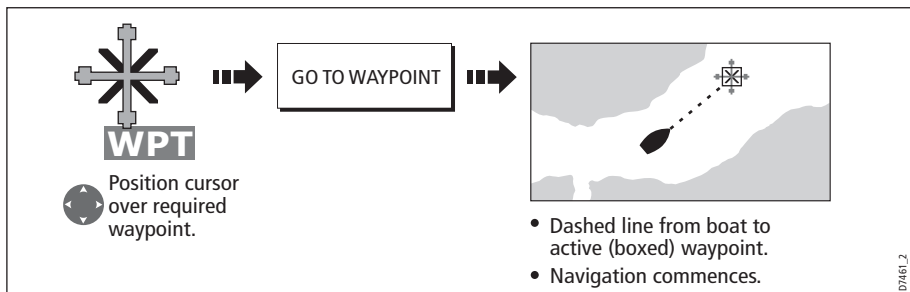
Go to an existing waypoint

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.*

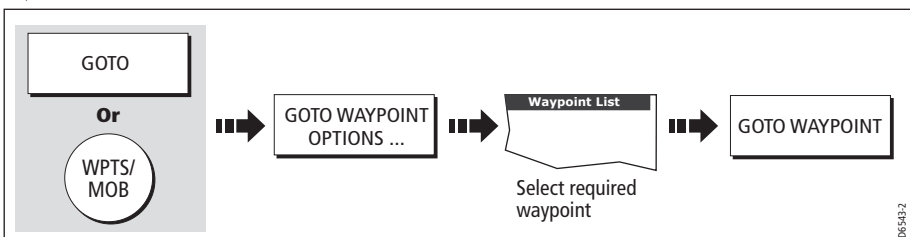
... selected with the cursor

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)

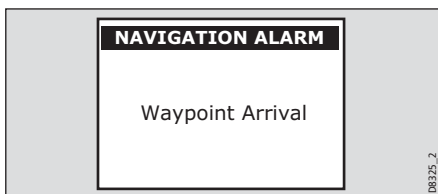
When you are following a waypoint, you can restart the XTE. This results in a new course from the current vessel position to the current target waypoint.

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.

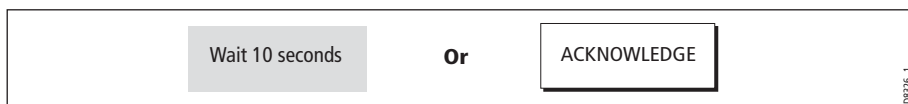
Arriving at your target waypoint

When you arrive at the target (active) waypoint:

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

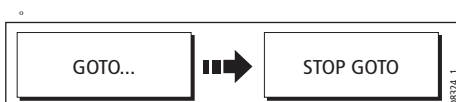


To de-activate the arrival alarm



Stop navigating to your target waypoint

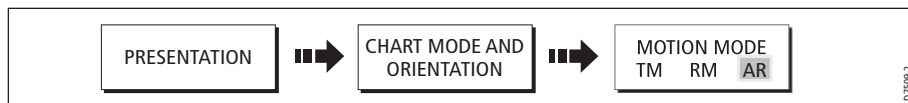
To stop navigating towards the selected waypoint:



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 85.

4.10 Building and following a route



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

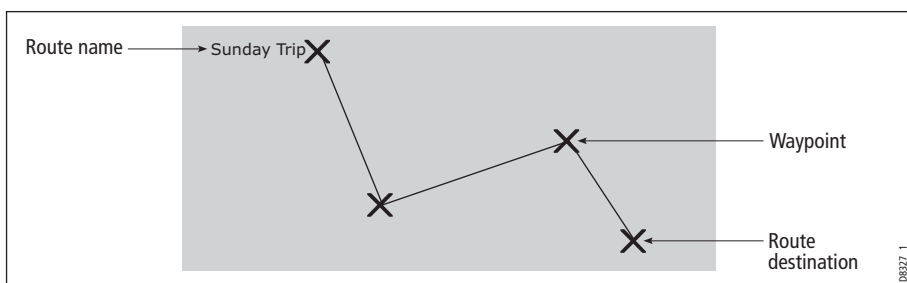
- What is a route?
- What can I do with a route?
- Building and saving a route.
- Following a route.
- Viewing details of routes.

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.



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 80*).

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 80 for details.

Up to 100 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:

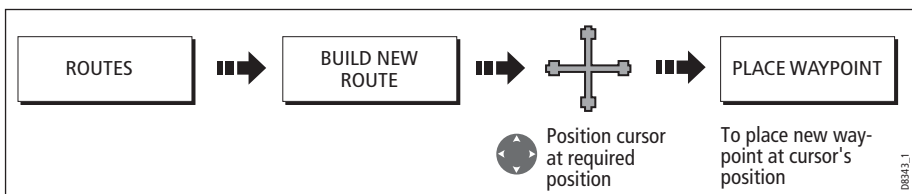
- When a route is being built it is not active and does not affect any current navigation.
- You can include a waypoint more than once in a route, but the same waypoint cannot be placed consecutively.
- You can create a new route when the route list is full but on saving this, you will be prompted to 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

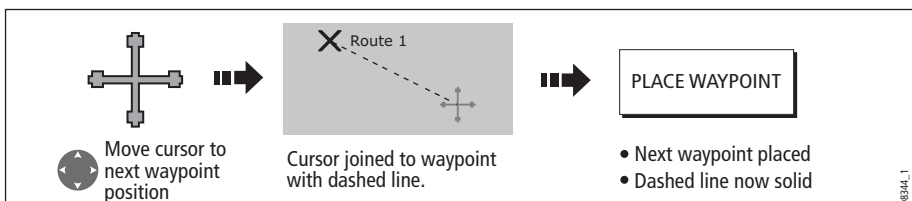
You can build a route on screen that consists of either new or existing waypoints or a combination of both.

... using new waypoints

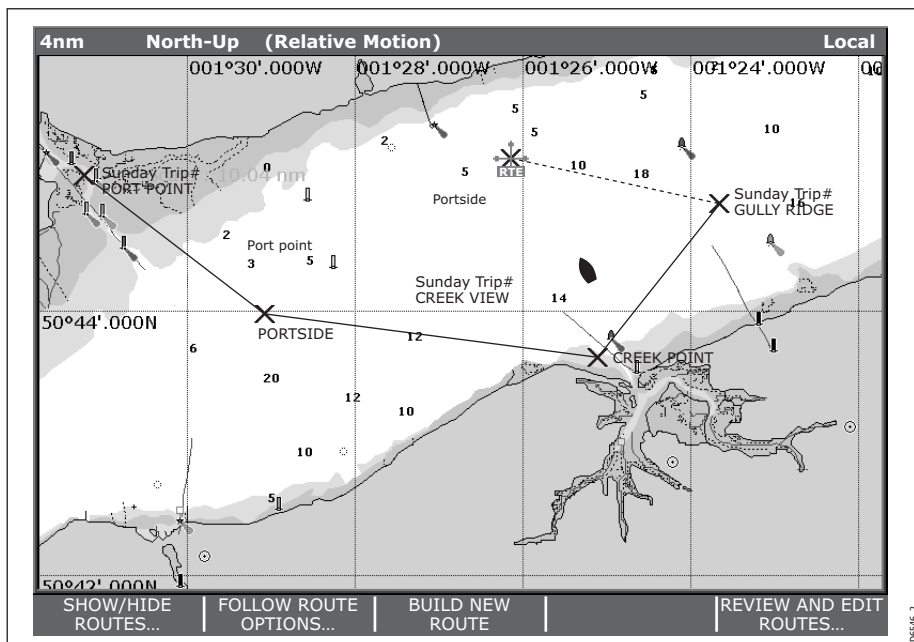
1. To place the first waypoint in a route:



2. To place subsequent waypoints in the route:



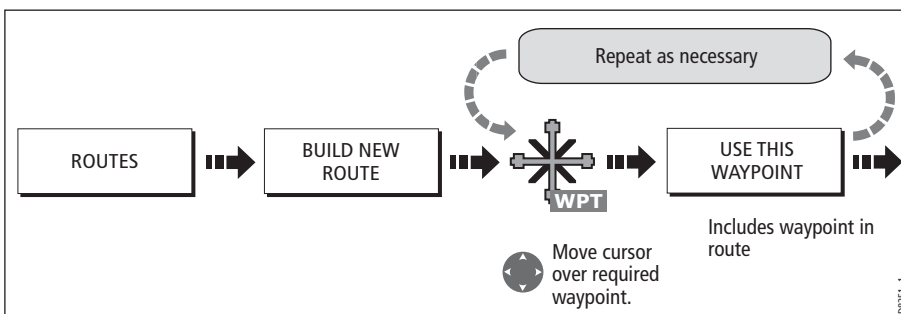
3. Continue entering waypoints. If you make an error, you can remove the last waypoint (see *page 62* for details).
4. Save your route when it is complete (see *page 63* for details).



... 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 62* for details).

2. Save your route when it is complete (see *page 63* for details).

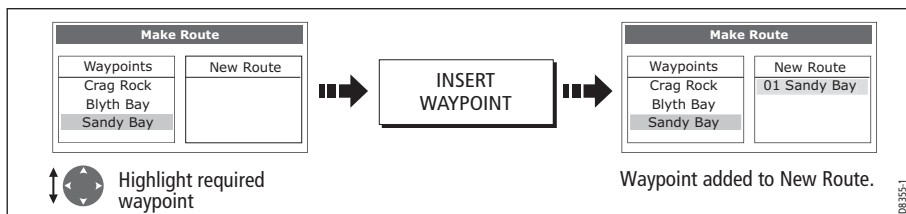
Building a route using the waypoint list

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:



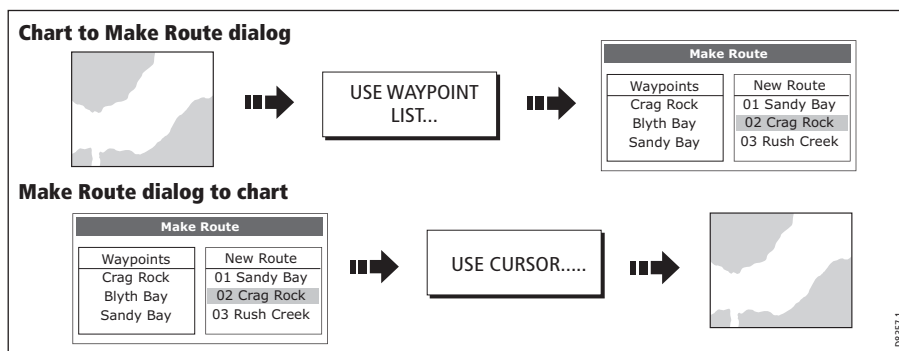
3. Continue entering waypoints until your route is complete.

Note: If you make an error, you can delete the waypoint from the new route list (for details see page 63).

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



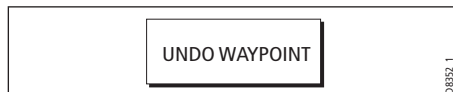
Making changes to the route being built

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

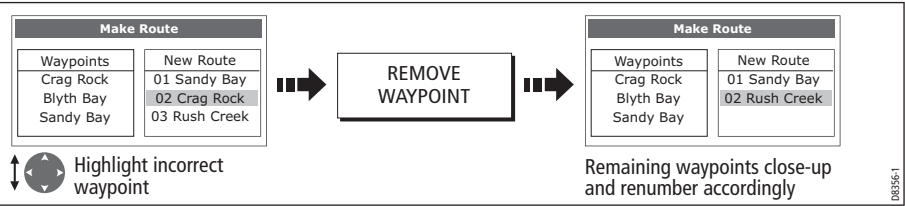
To remove the last waypoint when you are building a route on-screen:



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.

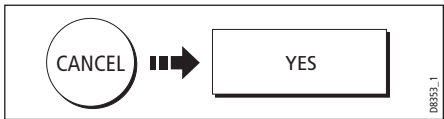
Delete a waypoint from the new route list

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):



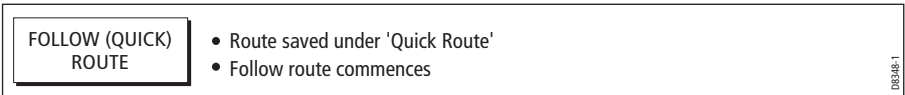
Saving routes

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

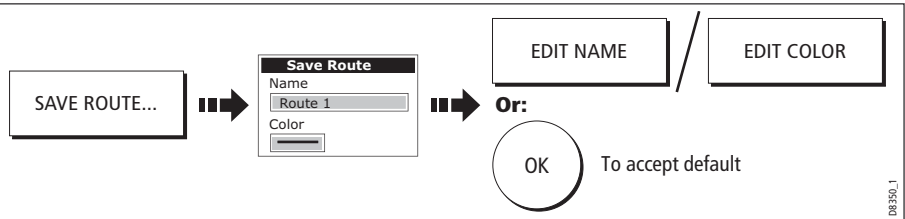
- Save and immediately follow the built route (Quick Route) *Or:*
- Save the built route for later use (and rename it if required).

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 82*).



To save the built route for later use



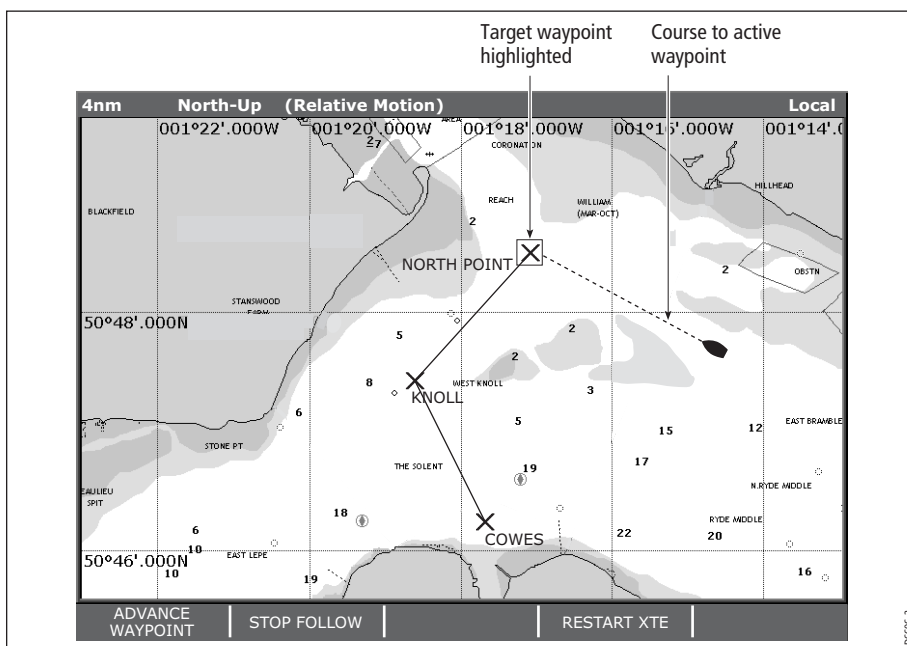
Note: For further details on editing a dialog box, please refer to *page 11*

Following a route

When you are following a route the active route is shown on all chart windows. When the distance to the next waypoint in the route is less than that specified for the arrival alarm radius (see *page 188*), 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 57*). 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:

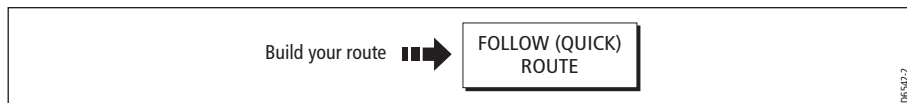
- Using Quick Route.
- Using the cursor.
- Via the route list.
- In reverse order.



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

Follow using Quick Route

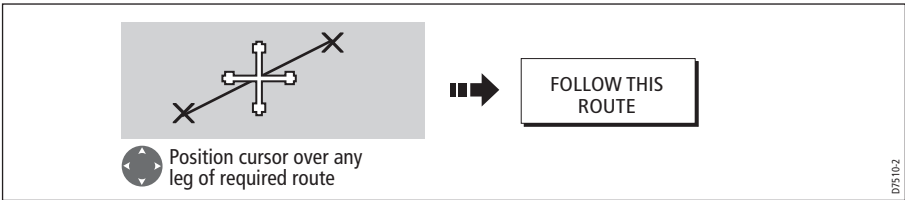
This option follows a route as soon as it is built. For more details see *page 60*.



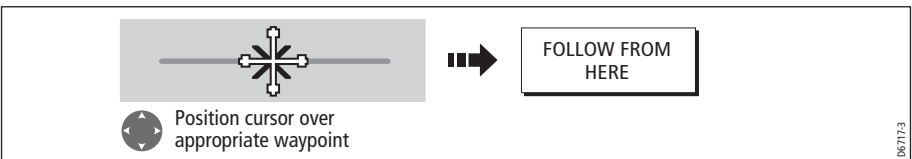
Follow using the cursor

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

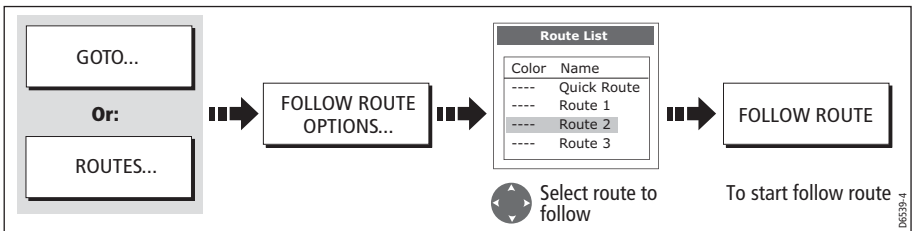


... from a selected waypoint within the route



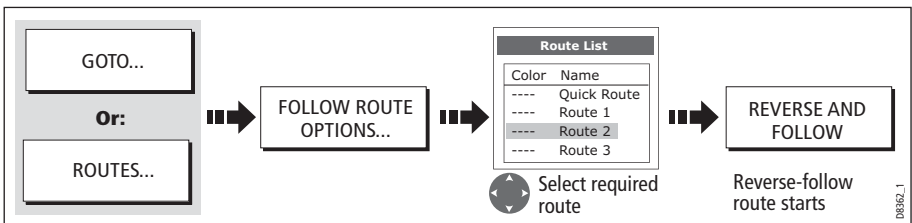
Follow using the route list

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

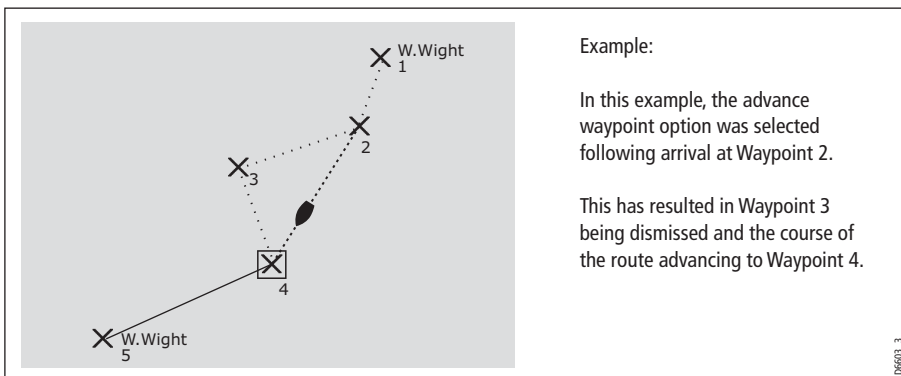
This option reverses the waypoint order (i.e. the last waypoint of the original route is now the first) and renumbers the waypoints accordingly. The route name moves to the reassigned first waypoint and then the system automatically activates the reverse-follow route function.



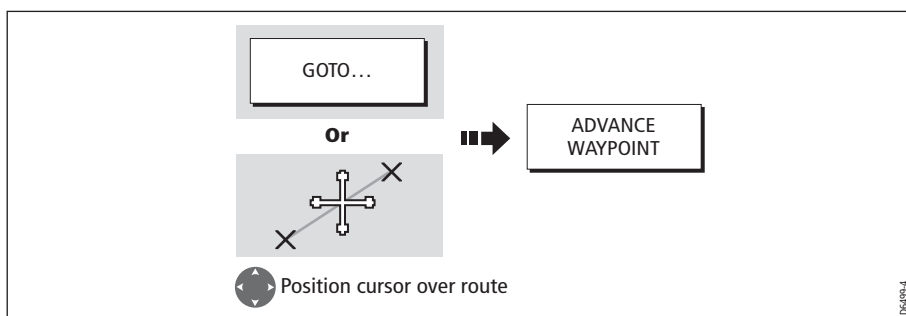
Note: To stop following an active route at any time, press STOP FOLLOW.

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.



To advance to the next waypoint in a route:



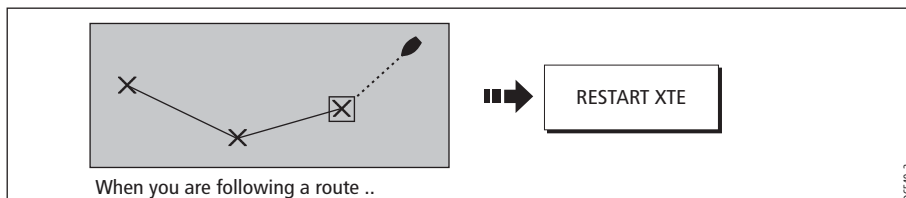
Note: If the current destination is the last waypoint, then it advances on to the first waypoint in the route.

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.



Viewing details of routes

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

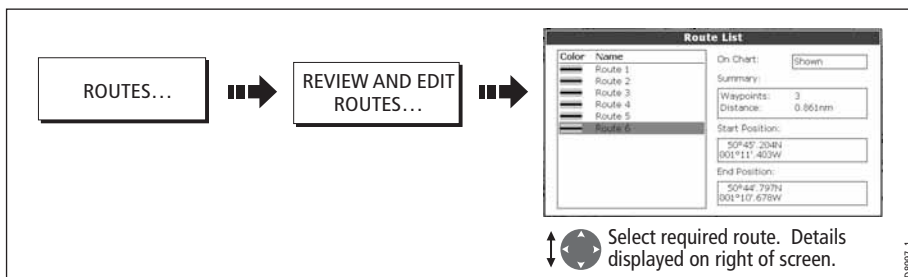
- View the route list and then select the required route, or
- Select the required route on-screen.

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.

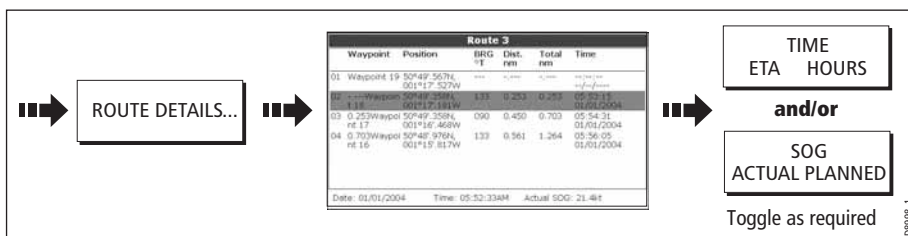
If the route is currently being navigated to (active), the data is updated to show bearing, distance and time from your current position.

... via the route list

1. Display the Route List:

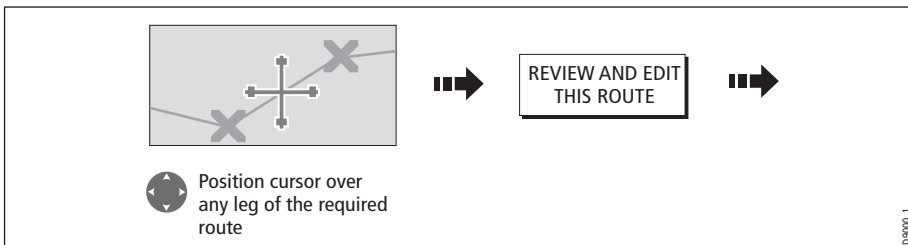


2. Display details of the selected route:

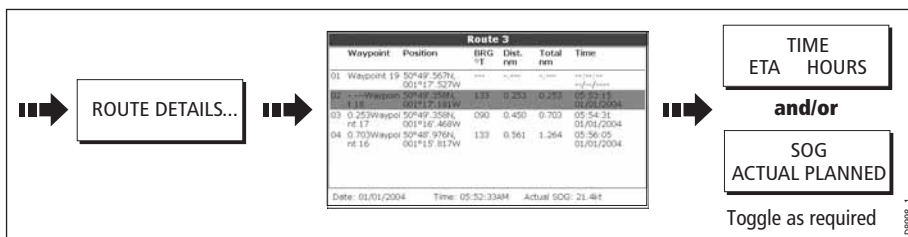


... with the cursor

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



2. Display details of the selected route:

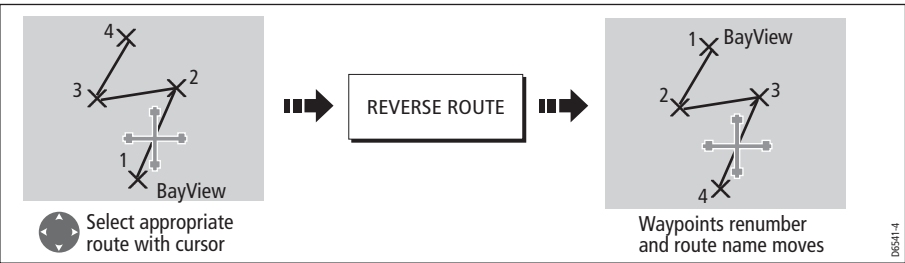


Editing the selected route

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 65.

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.

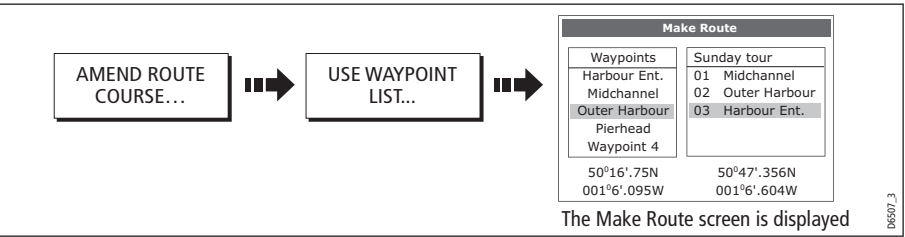
You can effect these changes either via the Make Route dialog box or by selecting the route on screen and then using the appropriate soft keys (not applicable when adding a waypoint at the beginning of a route).

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

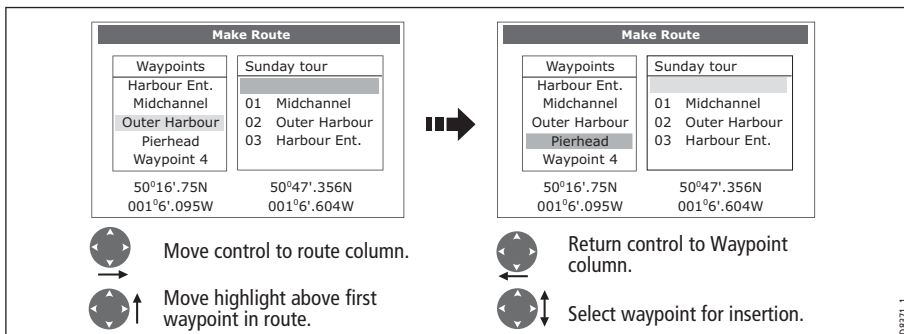
Add a waypoint at the beginning of a route

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

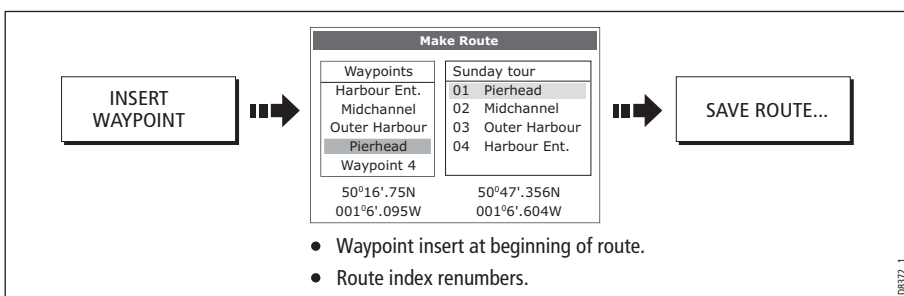
1. Select the appropriate route for editing (see page 68).
2. Display the Make Route screen:



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

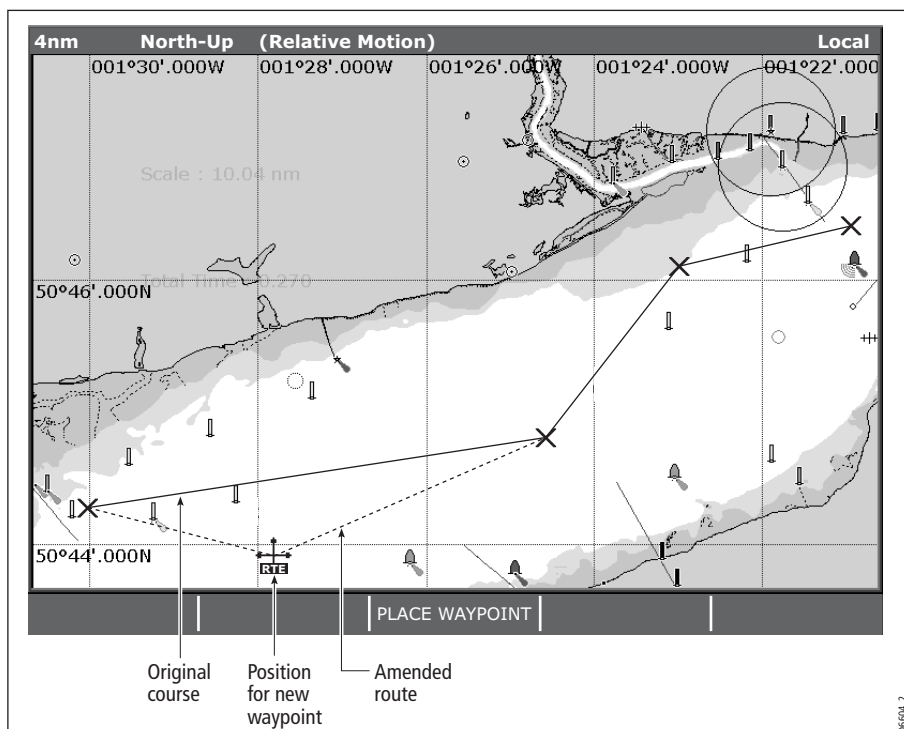


4. Insert waypoint and save route:

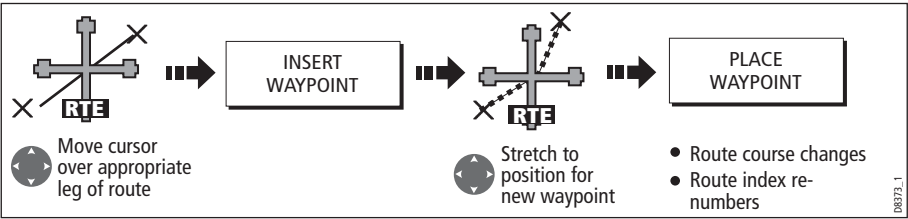


Add a waypoint within a route

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



To add a waypoint within a route:

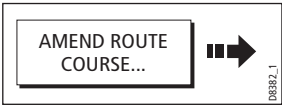


Note: You can also use the method described on page 69, to add a waypoint within a route.

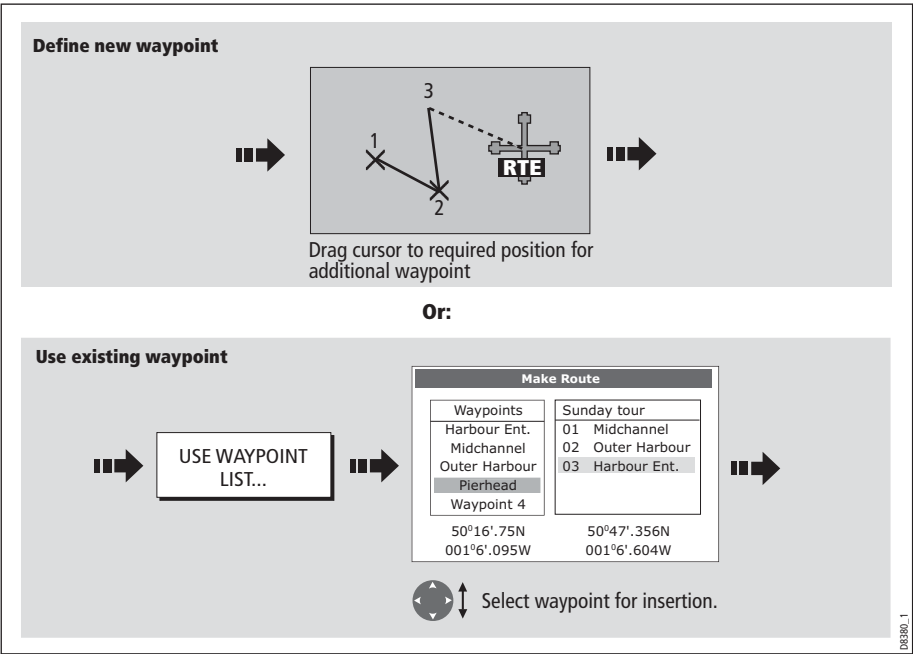
Add a waypoint(s) to the end of a route

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.

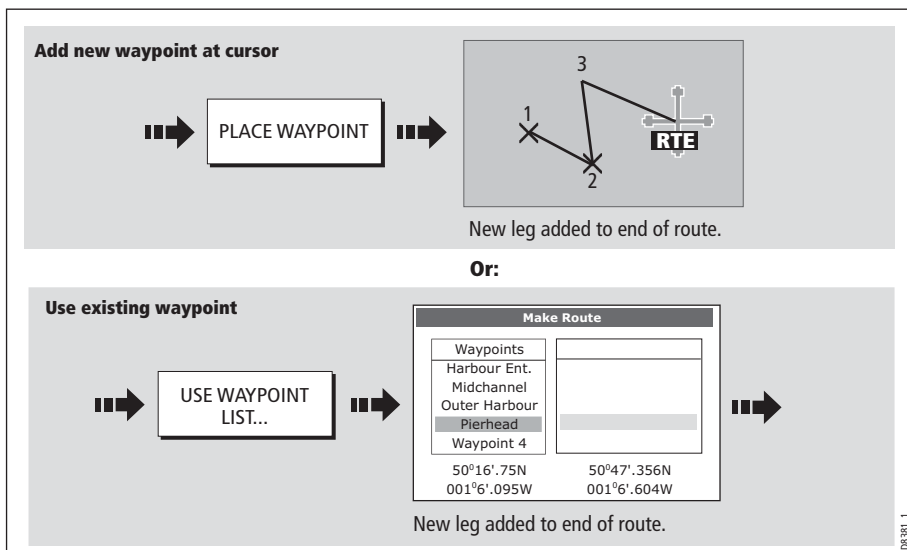
1. Select the appropriate route for editing (see page 68).
2. Select the amend route course option:



3. Define new or existing waypoint:



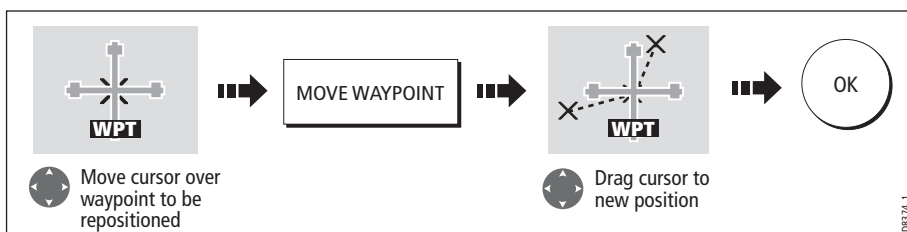
4. Select waypoint to be added:



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 62).

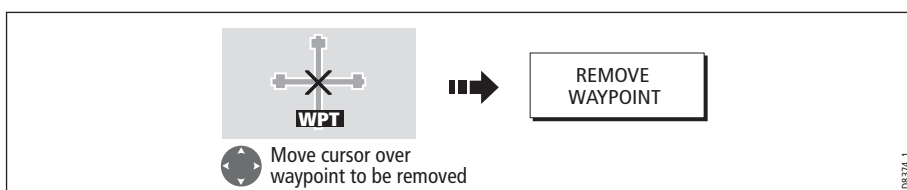
Move a waypoint within a route



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

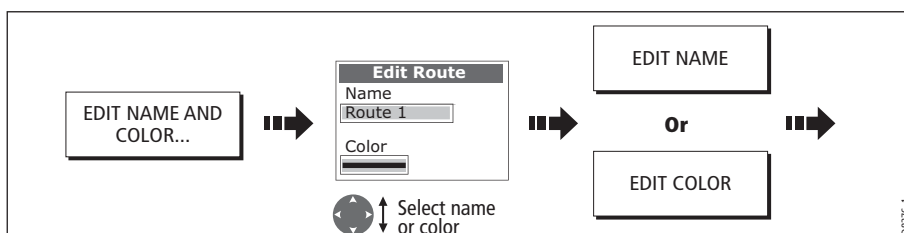
You can remove a waypoint from within a route provided that it has not been used in another route. If you try to remove a waypoint that is used in another route, the system will warn you that it cannot be removed.



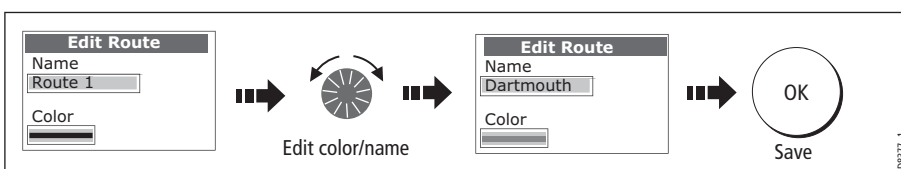
Changing the name or color of a route

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 68*).
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 68*).
2. Erase the track or route:



You can also erase all or selected routes, using the ARCHIVE & TRANSFER function as described on *page 19*.

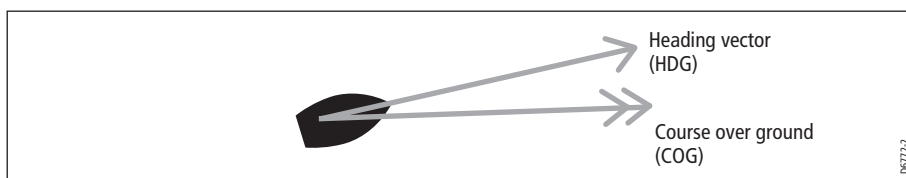
4.12 Monitoring where you are going

... using chart vectors

You can display a variety of graphical indicators to help monitor where you are going:

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.

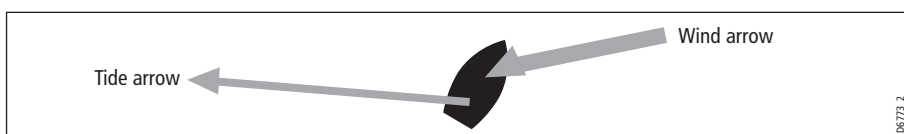
The course over ground (COG) indicates the boat's actual course and is displayed as a line with two open arrow heads.

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 90*) 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.

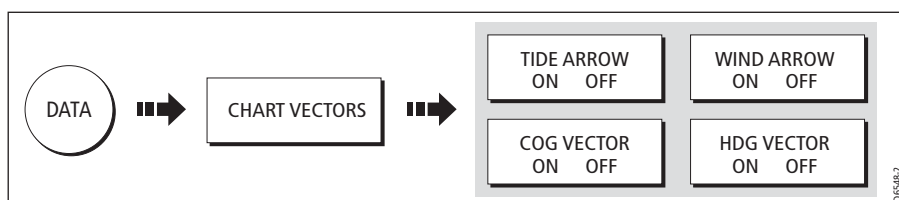
Note: If neither the speed over ground (SOG) or heading are available, vectors cannot be displayed.

Wind and tide arrows



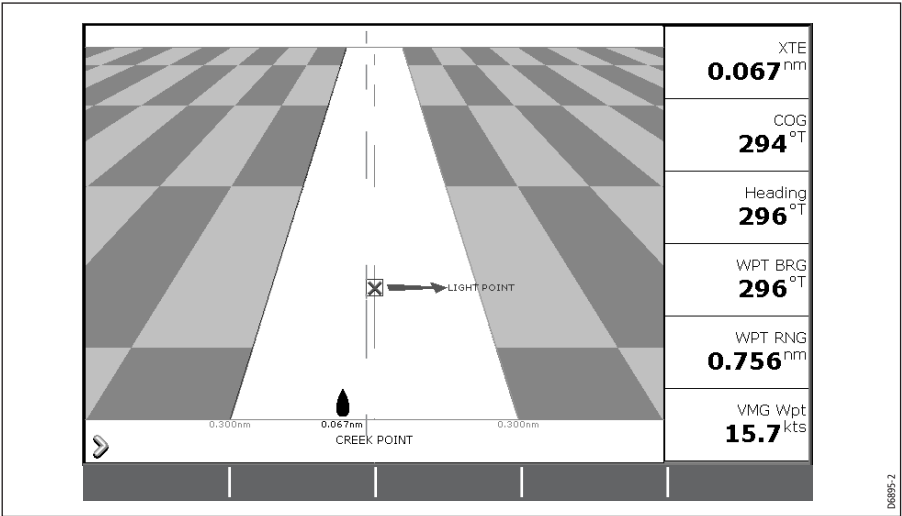
Winds and tides are displayed as lines with solid arrow heads in the direction of the wind or tidal set. Winds arrows point into your boat and tidal arrows point away. The width of the arrow indicates its strength.

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 8: Using the Course Deviation Indicator* for more information.



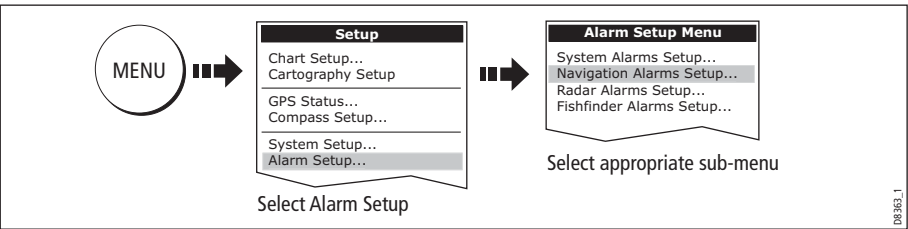
4.13 Warnings of potential dangers

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.

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 187.

4.14 Using the radar with the chart

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

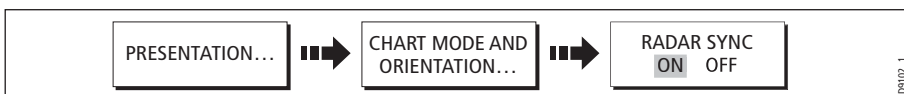
- Radar range synchronization
- MARPA.
- Radar overlay.

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:

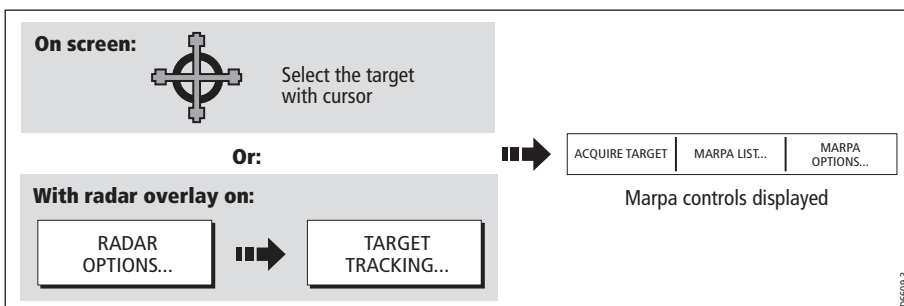


Note: Radar range synchronization is not available when the chart motion mode is set to Autorange.

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 143*.

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



Distinguishing between fixed and moving objects

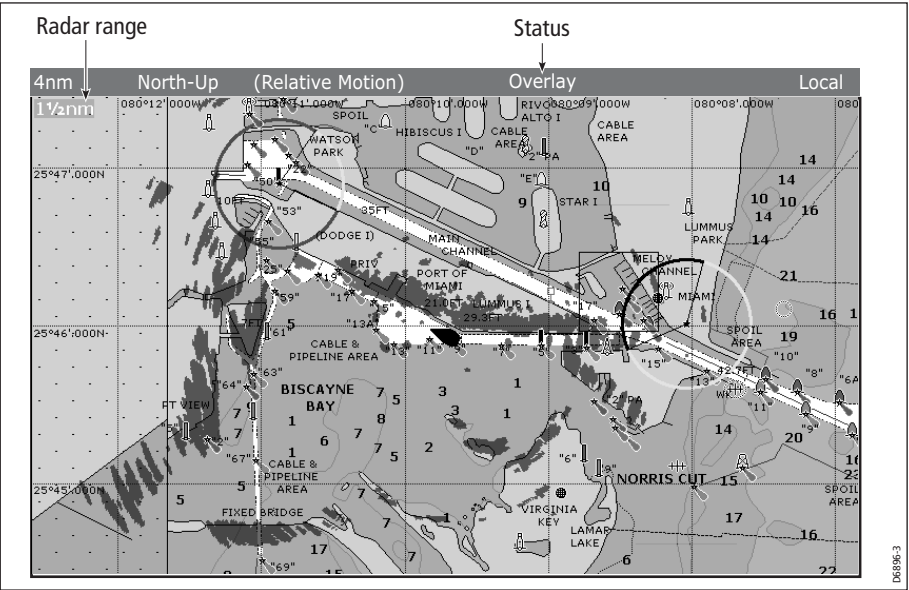
You can overlay radar image data over your chart image allowing better distinction between fixed objects and other marine traffic. For best results, switch on Radar-Chart synchronization (see *page 76*) to ensure radar range and chart scale are synchronized.

To switch radar overlay on:

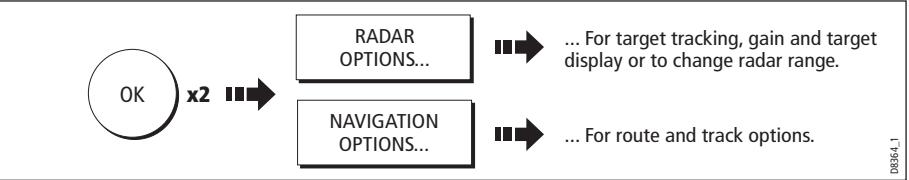
- 1. Select radar overlay:



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:



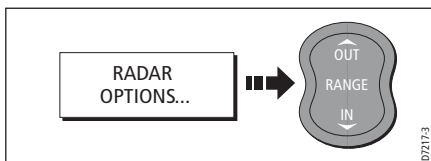
Note: If radar overlay is applied to a chart window that is set to system view, the overlay will be displayed in all other system view chart windows.

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:

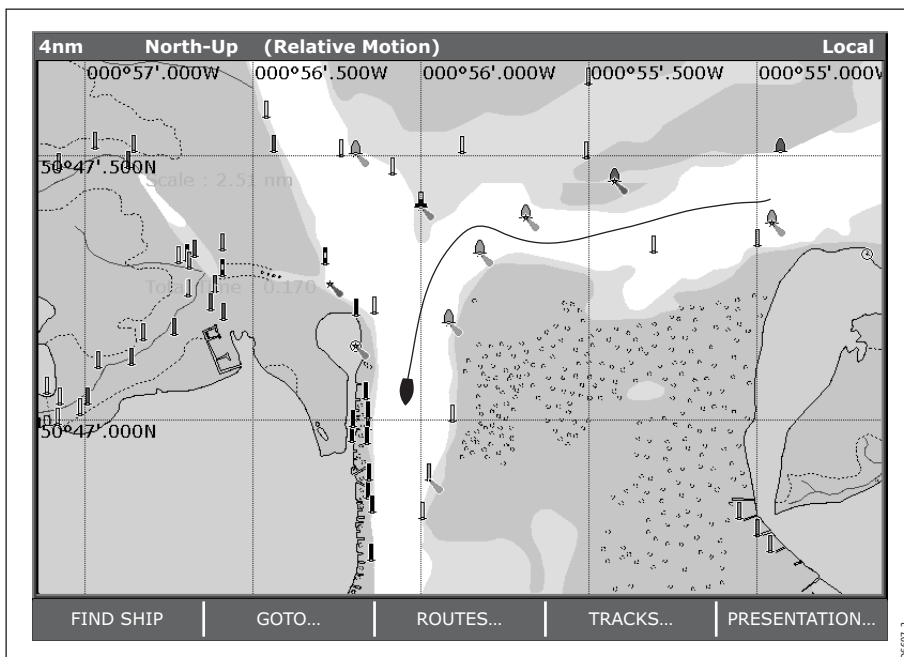


Note: If RDR RNG SYNC is set to ON (see page 76), the chart scale also changes

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:

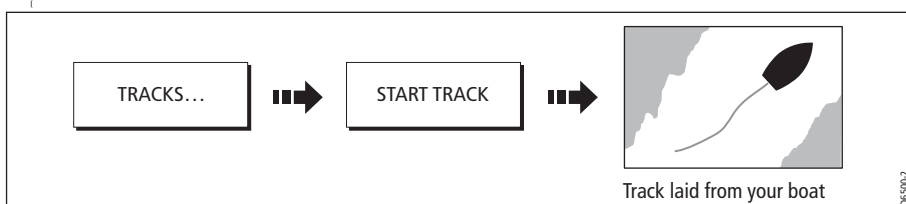
- Review where you have been.
- Retrace your original journey by converting the track to a route and automatically reversing it.

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 90*).
- Specify the distance between each track point (see *page 90*).

Creating a track

To start a track...

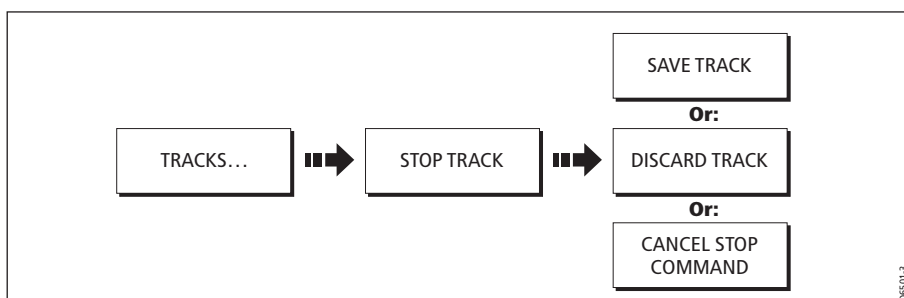


If the power fails whilst a track is being recorded or the position fix is lost, a break will occur in the track. Only the last segment of a track can be converted into a route.

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...

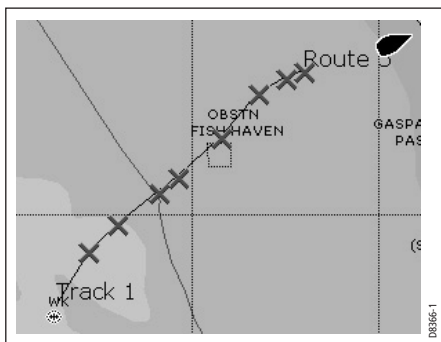
Stop the tracking process:



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.

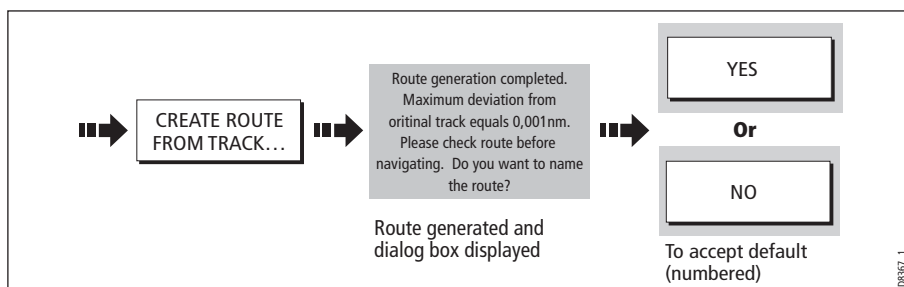
... from the current track

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:



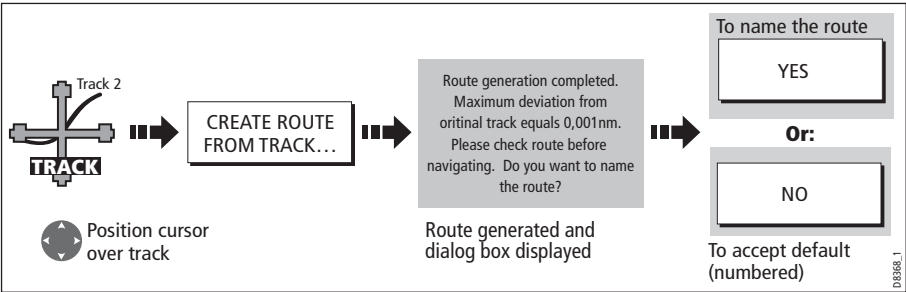
2. Create a route from current track:



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 80.

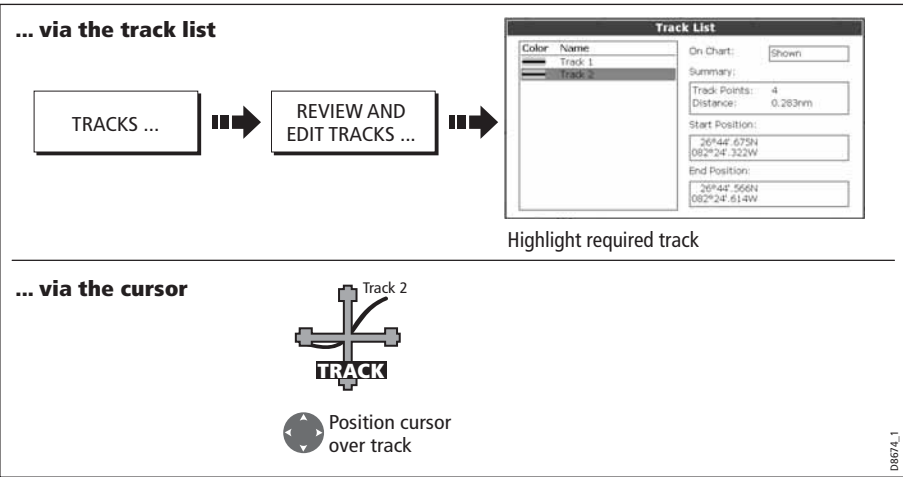
4.16 Editing tracks

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 82*).
- Change the color of a track (see *page 82*).
- Erase a track (see *page 82*).

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.



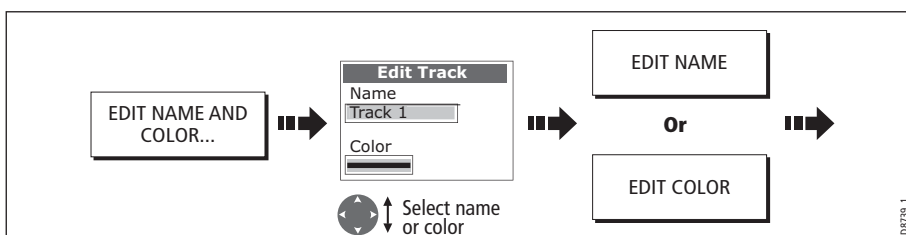
Editing the selected track

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

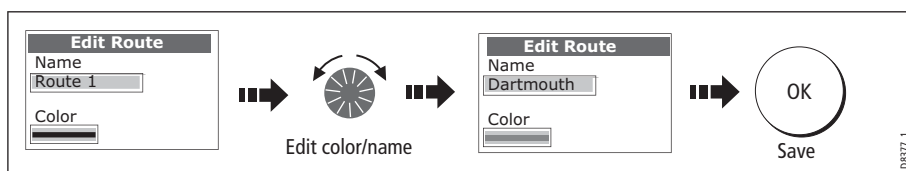
Changing the name or color of a track

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 81*).
2. Select the Edit Name or Edit Color option:



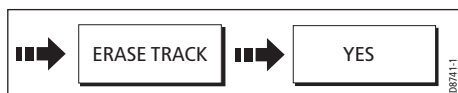
3. Edit and save:



Erasing a track

You can delete any track in your system:

1. Select the appropriate track for editing (see *page 81*).
2. Erase the track:



You can also erase all or selected tracks, using the ARCHIVE & TRANSFER function as described on *page 21*.

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 84*).
- Change the way your chart is drawn in relation to your boat movement (see *page 85*).

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.

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 - radar and AIS.
- Radar/chart synchronization.
- Show/hide waypoints, routes and tracks.
- Declutter.
- Vectors.

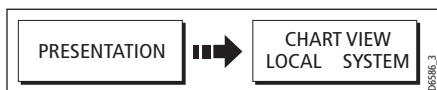
If you change any of these options in one window, ALL system windows will update.

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 85*) 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)

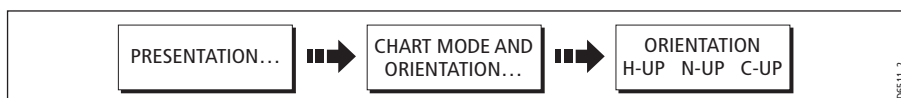
In Course Up mode, the chart picture is stabilized and shown with your current course upwards. As your boat's heading changes, the ship symbol moves accordingly. If you select a new course, the picture will reset to display the new course upwards.

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:



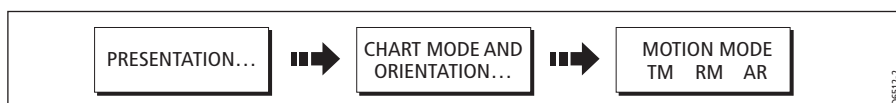
Setting the motion mode

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.

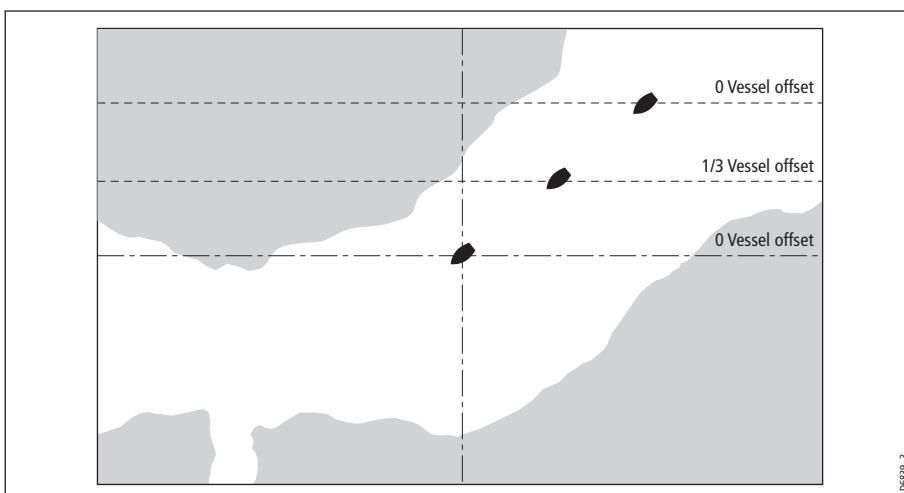
The default setting is relative motion with zero offset. The mode that you select is restored at power up. When a chart window is set to SYSTEM view the motion mode will be set but not synchronized across other system view windows.



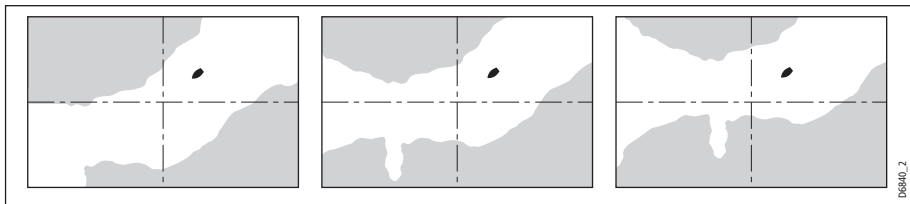
Relative motion (RM) with optional vessel offset

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.



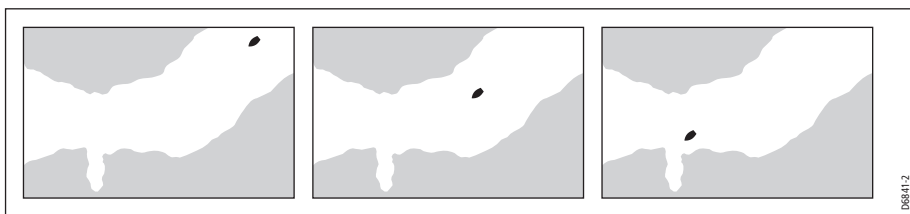
In the following example the motion mode has been set to Relative with a vessel offset of 1/3. The boat is fixed in the offset position and the chart moves accordingly:



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:

- Waypoints.
- Waypoint index of a route.
- Individual routes and tracks.
- Cartographic features.
- Chart vectors for COG, heading, tide and wind (see page 74)

Note: *You can also specify the level of detail on the chart display (simple, detailed or extra detailed). For more details, see page 93.*

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.

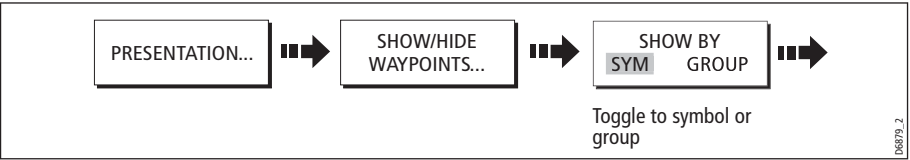
These options are particularly useful when you have placed a large number of waypoints in a small area and rendered your chart difficult to interpret.

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.

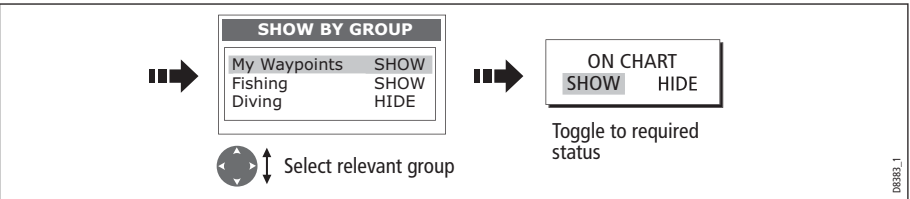
Show/hide by group/symbol

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:

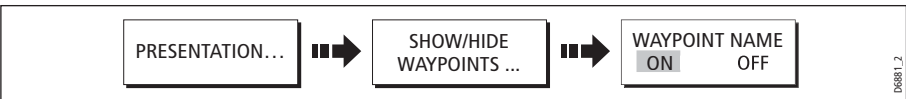


- 2. Change status to show or hide as required.



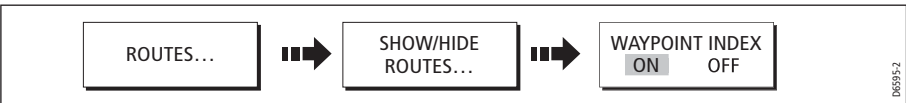
Show/hide waypoint name

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:



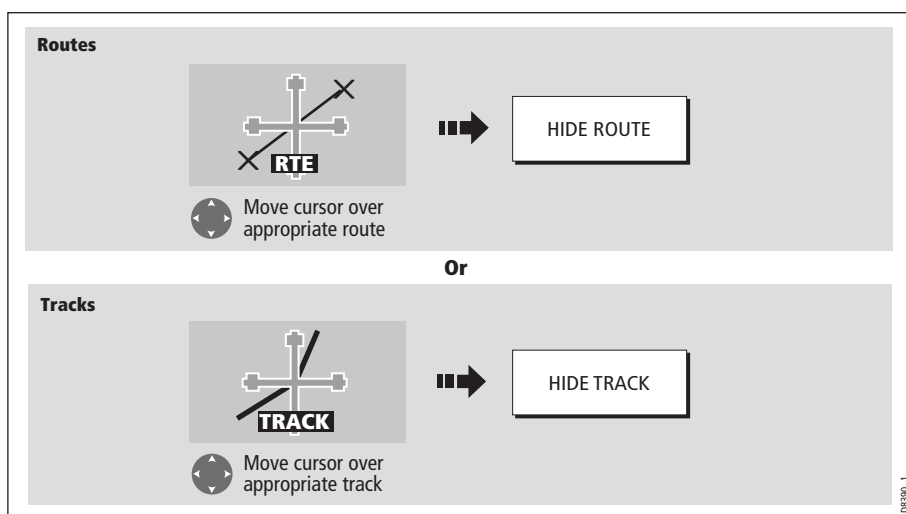
Showing or hiding a route or a track

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 87*). 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.

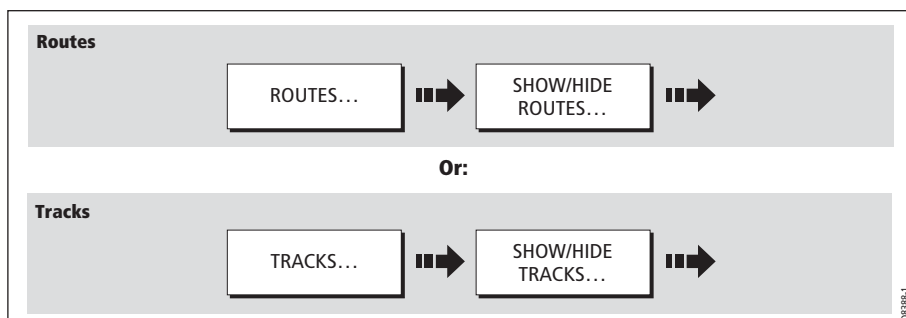


Note: *Use the route/track list to return the display status to SHOW.*

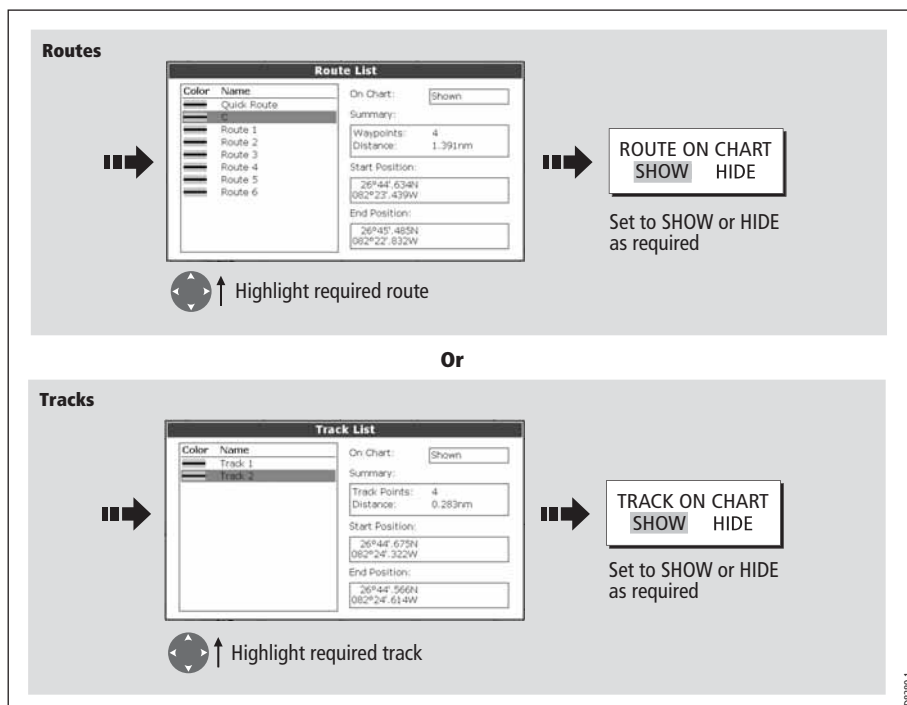
... via the route/track list

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:

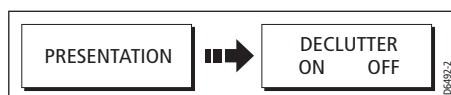


Showing or hiding cartographic features

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:



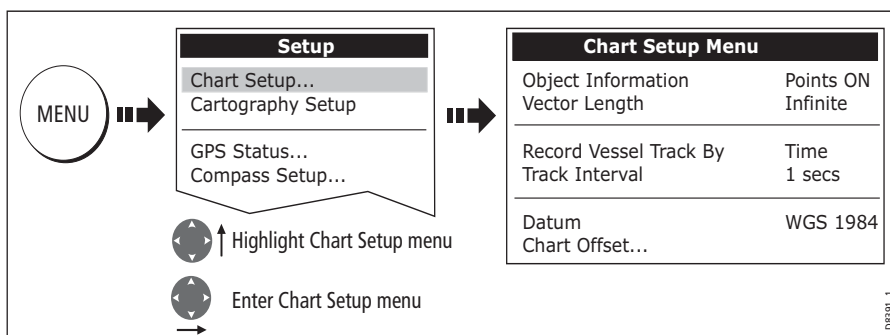
If the declutter option is applied to a chart window that is set to SYSTEM view, the declutter will be applied to all other system view chart windows. If decluttering does not hide/show the particular features of your choice, they can be turned on/off individually via the Cartography Setup menu (see *page 93*).

4.19 Setting up your chart and its cartography

The set up for your chart and its cartography 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 even when you power off.

Chart Setup

To select the Chart Setup Menu:



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

FUNCTION Description	OPTIONS (Default in bold)
Object Information OFF - No info pop-up is displayed but detailed data can still be displayed by pressing OK. ALL ON - the info pop-up for all cartographic areas (including objects) is displayed. Points ON - the info pop-up only displayed for objects selected with the cursor.	OFF All ON Points ON
Vector Length The time period specified for drawing COG and Heading vectors.	3 Mins 6 Mins Infinite
Record Vessel Track By AUTO - system automatically creates track points. TIME - for track point creation by time. DISTANCE - for track point creation by distance.	Auto Time Distance

FUNCTION Description	OPTIONS (Default in bold)
Track Interval 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	TIME selected: 1 sec 5 secs 10 secs 30 secs 1 min 3 min 5 min 10 min 30 min DISTANCE selected: 0.1 nm 0.5 nm 1.0 nm
Datum 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.	WGS 84 List of datum provided
Chart Offset Moves the position of the chart in order to correct for position errors in the cartography. See below for further information.	ON OFF

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 C-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.

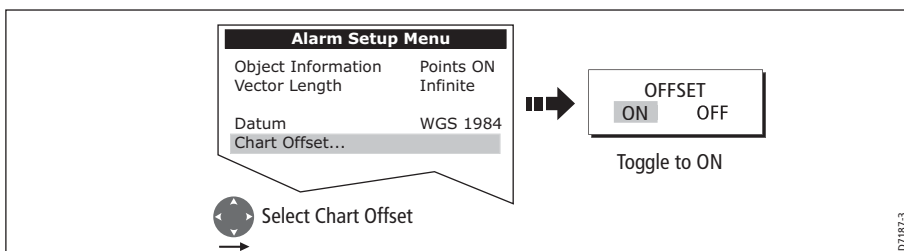
When adding waypoints numerically to the waypoint list, or via SeaTalk or NMEA, it is important that they are referenced to the same datum to which the display is currently set.

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 202*).

To switch on chart offset:

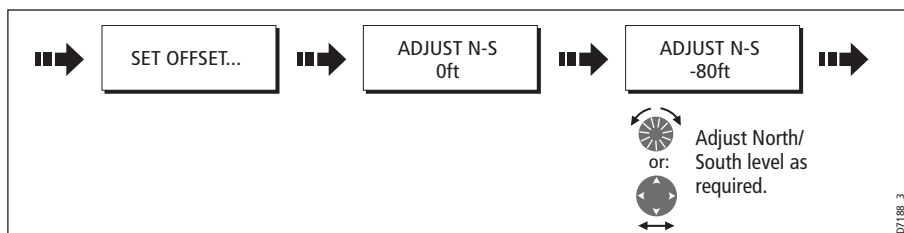


Note: If your vessel position is not available, the current chart centre is used as the reference point.

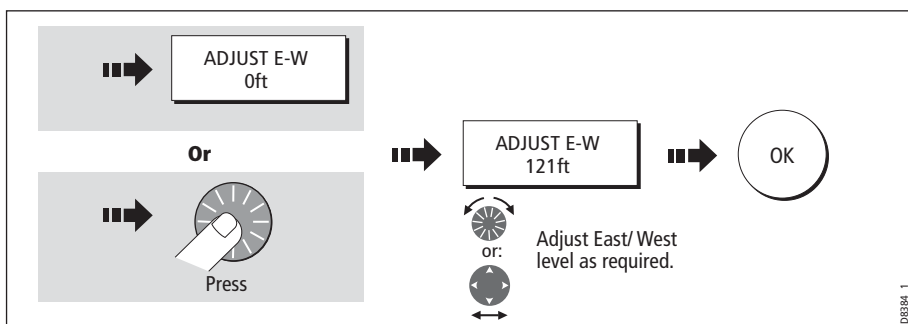
Changing the offset value

To change the offset value:

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



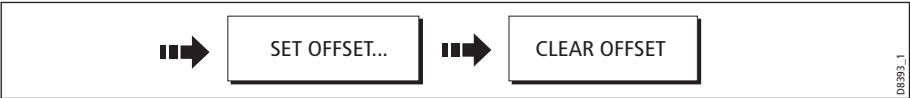
3. Set the east/west offset value:



Resetting the offset value

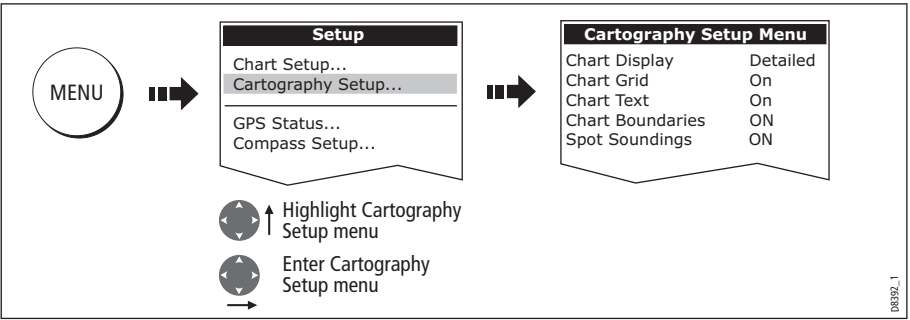
To reset the chart offset to zero:

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 bold)
Chart Display The level of detail shown on the chart.	Simple Detailed Extra detailed
Chart Grid Grid lines of latitude and longitude.	ON OFF
Chart Text Text appearing on the chart e.g. place names etc.	ON OFF
Chart Boundaries The line indicating the boundary of the chart.	ON OFF
Spot Soundings Number on the chart indicating depth.	ON OFF
Safety Contour 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 65ft (Contour always drawn at or deeper than the selected depth).

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

Chapter 5: Using the Fishfinder

5.1 Introduction

This chapter describes how the Fishfinder uses sonar to see fish, bottom structure and texture, and underwater obstructions such as wrecks.

The standard fishfinder image is a historical, scrolling bottom graph at an automatically selected range and frequency. Various functions are provided to improve the underwater view, select what is displayed and sound an alarm including:

- Changing the view displayed (Zoom, A-Scope or Bottom Lock).
- Adjusting the range and zoom.
- Shifting the image.
- Simplifying the bottom image and isolating bottom fish.
- Pausing the scrolling image.
- Switching the depth digit on/off.
- Using waypoints to mark a position.
- Determining depths and distances of targets.
- Fishfinder alarms (fish, depth or water temperature).
- Setting up the fishfinder application including manually adjusting the frequency and adjusting the gain values.

Note: *Please refer to the Installation Guide for fishfinder calibration information.*

5.2 How does the Fishfinder work?

The fishfinder application uses a Digital Sounder Module (DSM) to process sonar signals from a suitable transducer and provide a detailed underwater view.

The transducer located 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 sound echoes are affected by bottom structure and by any other objects in their path, e.g. fish, wrecks, reefs.

The Digital Sounder Module (DSM) processes these echoes and sends data to the fishfinder which displays a visual interpretation of the underwater view. The strength of echoes is indicated on the display by different colors. You can use this information to determine the bottom structure, the size of fish and other objects in the water e.g. debris, air bubbles.

Notes: (1) *The DSM will operate at a frequency of 50 kHz or 200 kHz.*

(2) *Some transducers will also enable the fishfinder to display water temperature and/or speed.*

5.3 What can the fishfinder show me?

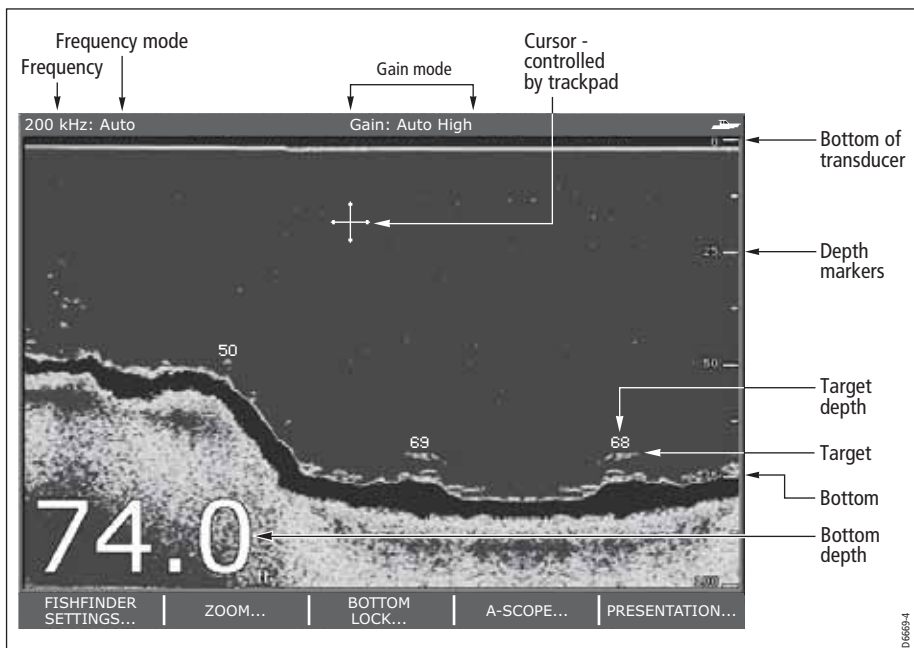
When you first view the fishfinder application, an image representing the echoes seen by the DSM is displayed. As time passes this image scrolls from right to left and becomes a record of the echoes seen. The images at the right hand side of the display are therefore the most recent.

The fishfinder window will display:

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

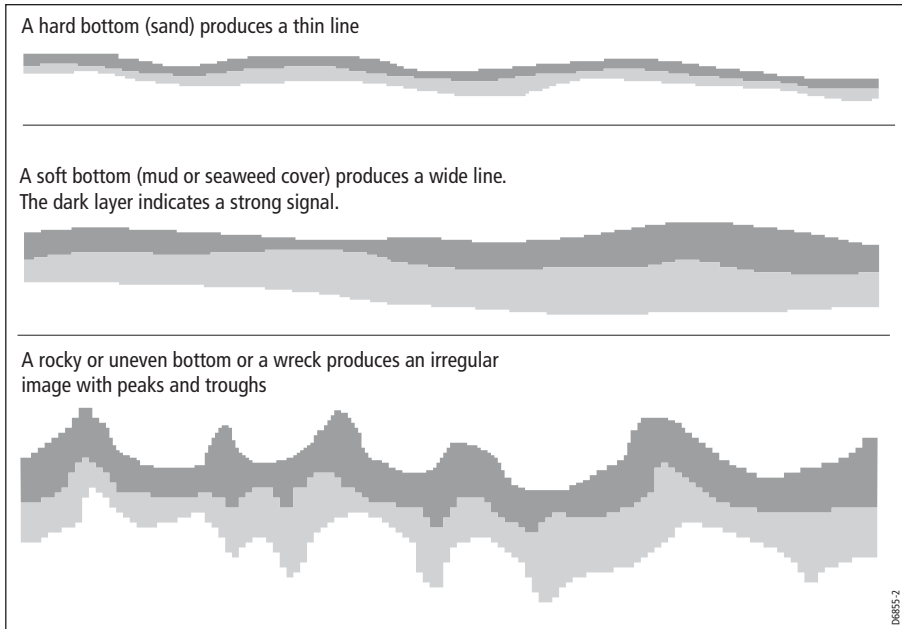
You can customize the fishfinder to:

- Hide the depth of the targets - see *page 106*.
- Show the depth lines - see *page 113*.
- Change the color palette and the depth displayed - see *page 113*.
- Pause or change the scroll speed - see *page 105*.
- Enable a fish, shallow or deep water alarm - see *page 110* and *page 188*
- Adjust the DSM and Transducer to suit local conditions - see *page 110*.



Interpreting the bottom structure

The bottom usually produces a strong echo. These images indicate the bottom conditions as follows:



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 high.

The Fishfinder provides various features to help you interpret the fishfinder picture.

Factors influencing target display

The shape and size of this mark is influenced by a combination of factors:

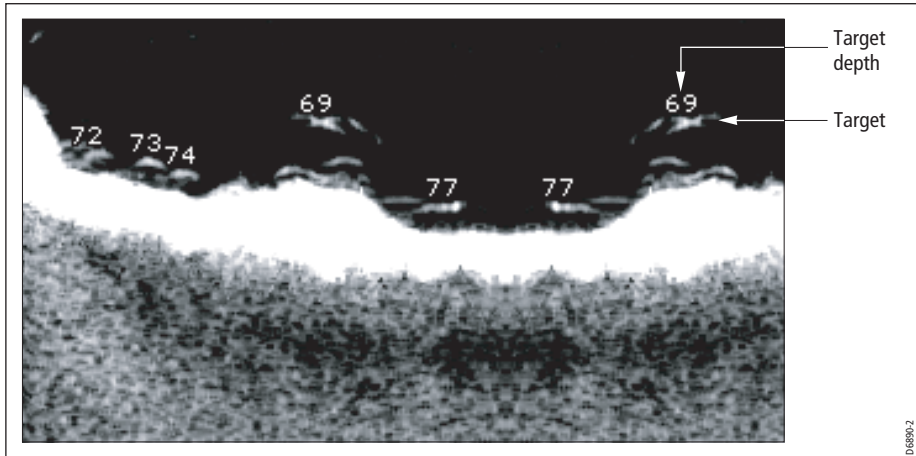
Boat speed

The shape of the target changes along with your speed. Slower speeds return flatter, more horizontal marks. As your boat's speed increases, the target will tend to thicken and arch slightly; until at fast speeds the mark resembles a double vertical line.

The depth of the target

The closer the target to the surface the larger the mark on screen.

Note: The depth of individual targets can be displayed by switching on the *Target Depth ID* in the *Fishfinder Setup Menu*. The number of target depths displayed is influenced by the fish alarm sensitivity level (see page 188).



The size of the target

The larger the target, the larger the return on the fishfinder display. The size of a fish target is however dependent upon the size of the fish's swim bladder rather than its overall size. This swim bladder will vary in size between different breeds of fish.

The frequency of the transducer

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

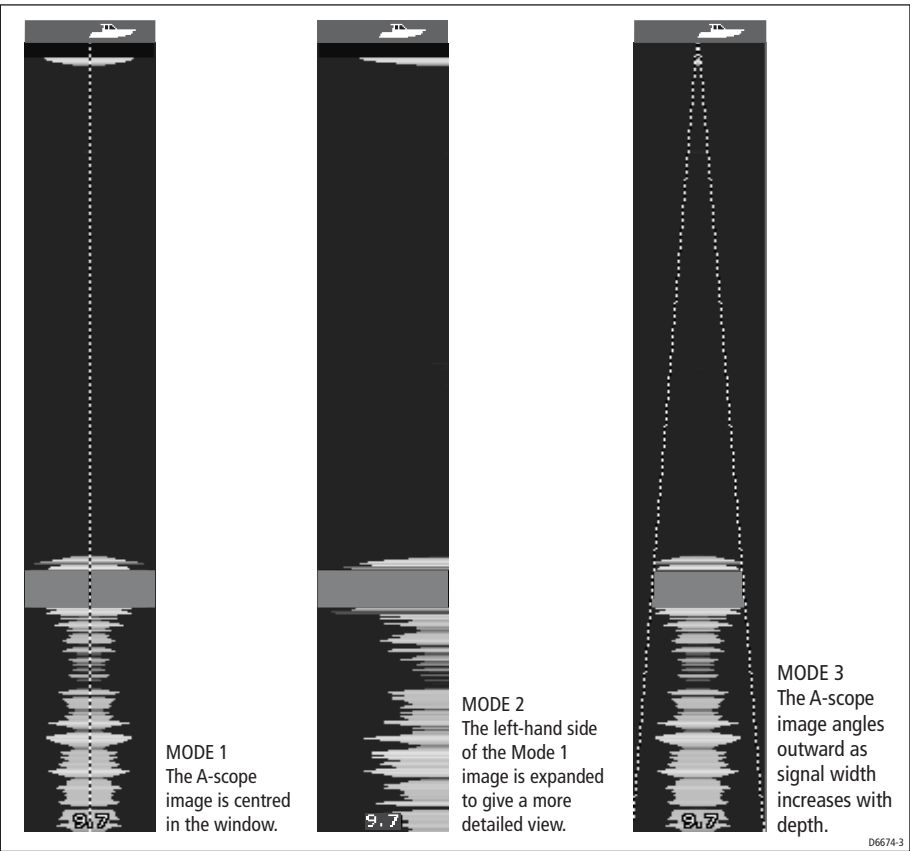
Factors impairing a fishfinder picture

Although weaker than the fish or bottom echoes, your fishfinder picture may be impaired by echoes received from floating or submerged debris, air bubbles or from your boat's movements. This is known as background noise or clutter and is controlled by the gain modes (gain, color gain and TVG). Raymarine recommends that you allow your system to automatically control the ideal sensitivity level based on depth and water conditions. You can however adjust these settings manually if you prefer. For more details, please refer to *page 116*.

Seeing a live image

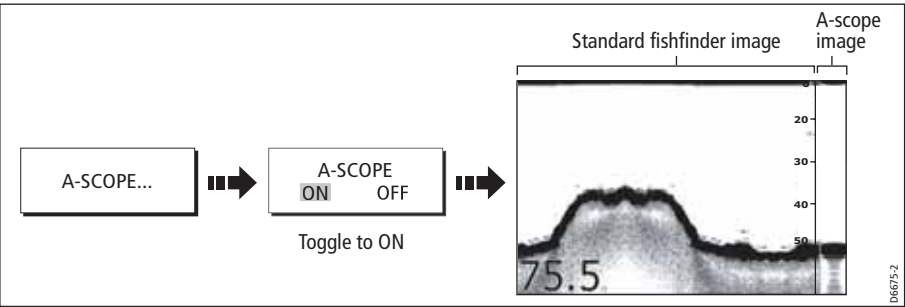
The standard fishfinder display shows a historical record of fishfinder echoes. If required, you can display a live image of the bottom structure and the fish directly below the transducer by using the A-Scope feature. The width of the bottom covered by the A-Scope is indicated at the bottom of the window. A-Scope provides a more precise and easier to interpret indication of the target strength.

There are three A-Scope modes which are selected for individual fishfinder windows:

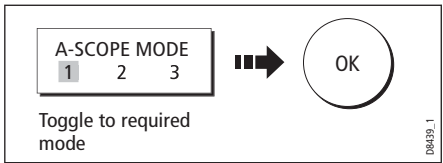


To display the A-Scope image:

1. Select the A-Scope option:



2. Select the required A-Scope mode:



Note: Selecting A-Scope automatically switches OFF Bottom Lock and Zoom.

5.4 Enhancing what you see

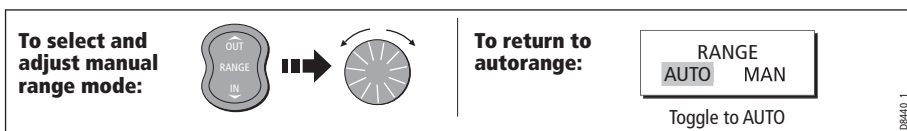
You can enhance the image by applying the following options:

- Change the range (Range).
- Shift the selected viewing range (Range Shift).
- View a zoomed area (Zoom).
- Flatten the bottom image to help separate fish from the bottom (Bottom Lock)
- Isolate bottom fish (White Line/Bottom Fill)
- Pause the scrolling image or adjust the rate at which the image scrolls (Scroll Pause/Scroll Speed)
- Change the size of or remove the depth digit.

Changing the range

The DSM automatically adjusts the display to show the shallowest required range. Alternatively, you can select to range in/out on the image (up to the maximum depth displayed on the scrolling bottom and A-Scope images). Changes to the range are reflected in all Fishfinder windows.

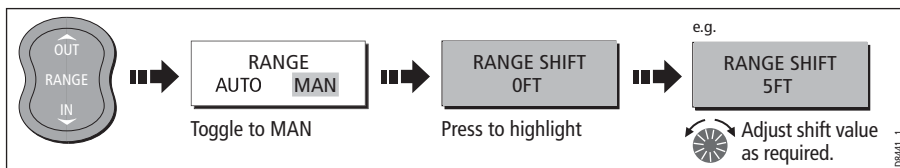
To select manual/auto range mode:



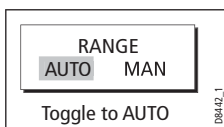
Shifting the image

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 image:



To return to the standard fishfinder image:



Zooming in on the bottom

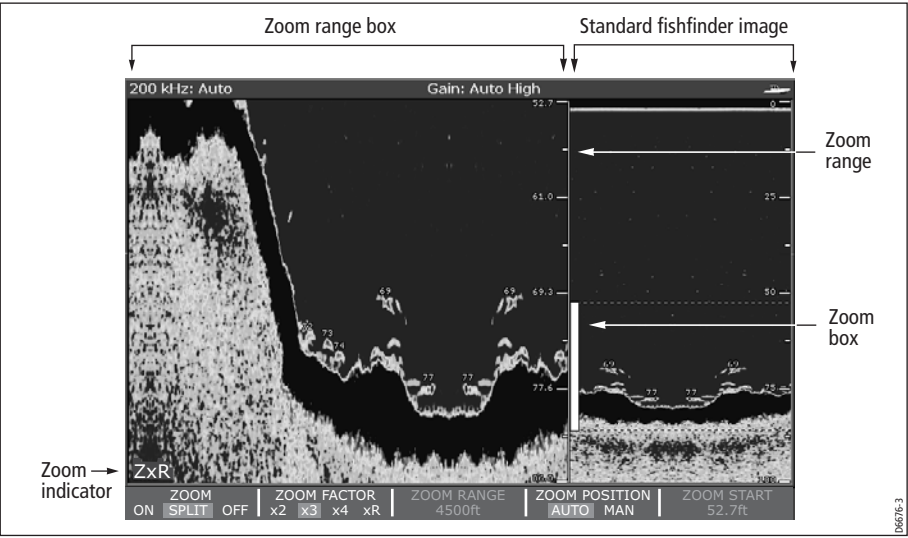
If necessary you can zoom in on the bottom to display more detail. This zoom option enables you to:

- Replace the standard fishfinder image with the zoomed image or display the zoomed image alongside the standard fishfinder image.
- Set to zoom level to one of the pre-defined zoom factor levels or adjusted manually.
- Reposition the portion of the image to be zoomed, if required.

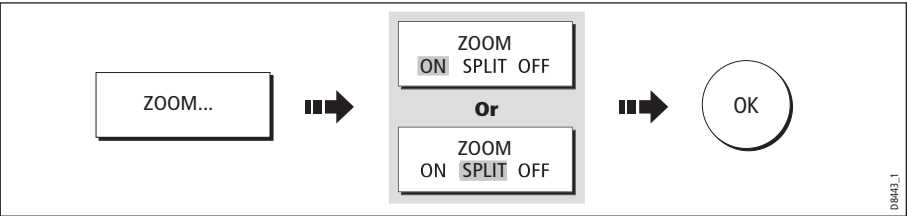
Note: When the range increases, the area shown in the zoom window also increases.

Selecting a split or full screen zoomed image

You can either replace the standard fishfinder image with the zoomed image (ZOOM ON) 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 a split or full screen:

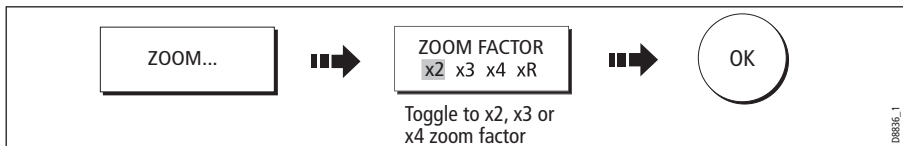
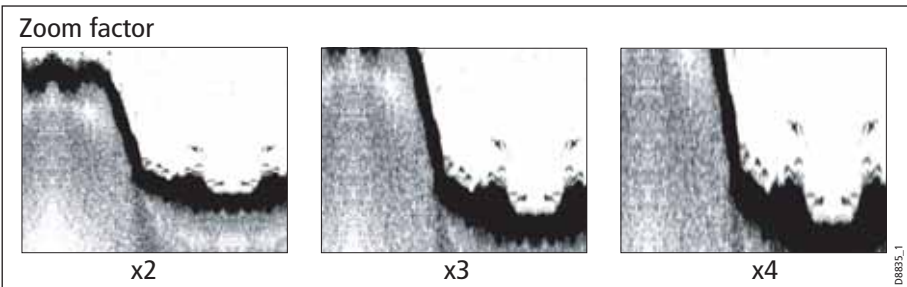


Selecting the zoom factor

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

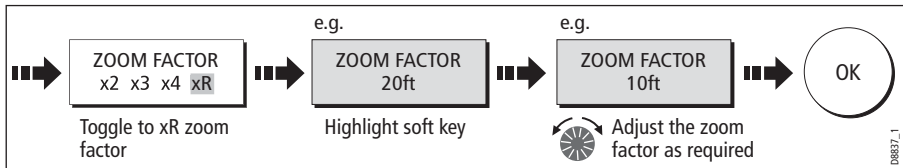
Pre-defined zoom factor

Select **x2**, **x3** or **x4** for a predefined zoom level. The greater the factor, the smaller the area you are viewing and therefore the smaller the zoom box. These factors are proportioned to the range e.g.



Manual zoom adjustment

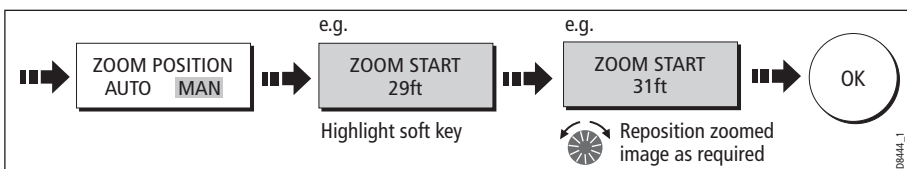
To manually adjust the range shown in the zoom window:



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.

With the zoom function set to ON or SPLIT:



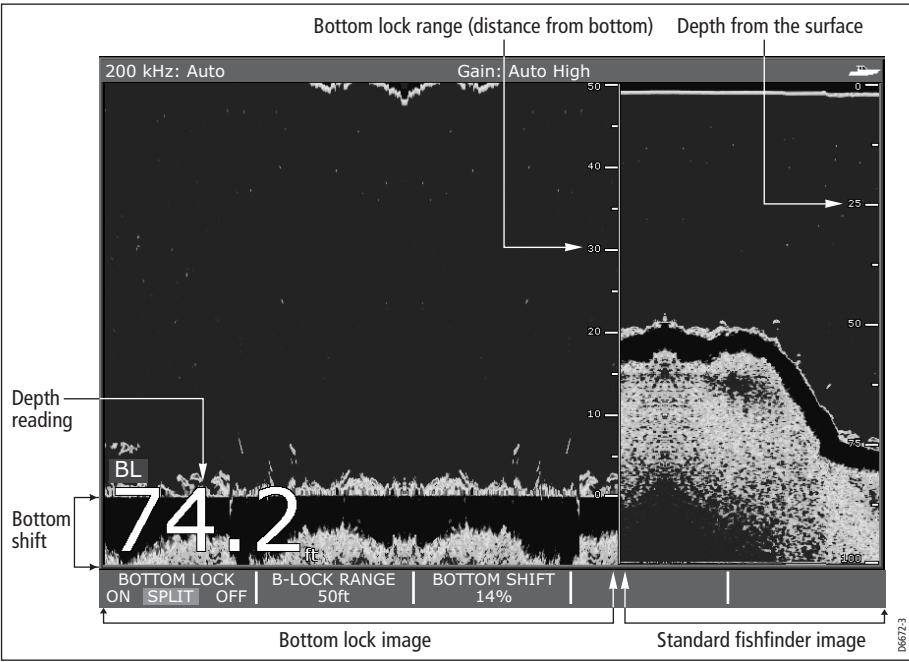
Note: Selecting Zoom automatically switches off Bottom Lock and A-Scope images.

Simplifying the bottom image

When you are looking for fish that feed close to the bottom, you can use the Bottom Lock function to filter out and flatten the bottom structure and display the fish (or any other objects directly above the bottom) more clearly.

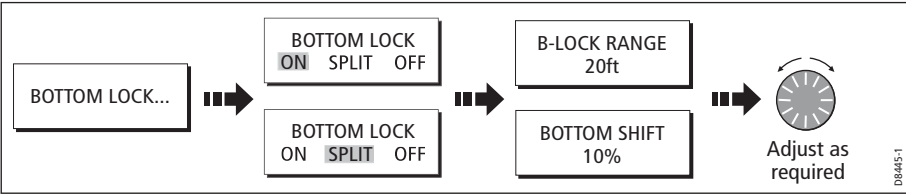
Bottom Lock is selected for individual fishfinder windows and can either replace (ON) or appear alongside (SPLIT) the standard fishfinder image.

Note: *If the A-Scope or Zoom image was displayed, selecting Bottom Lock automatically switches OFF A-Scope and Zoom.*



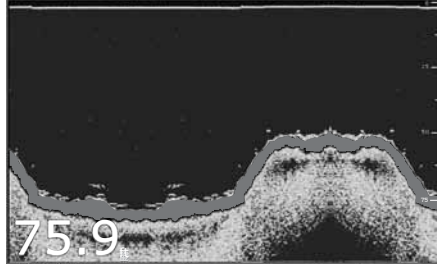
Adjusting bottom lock range/position

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%):



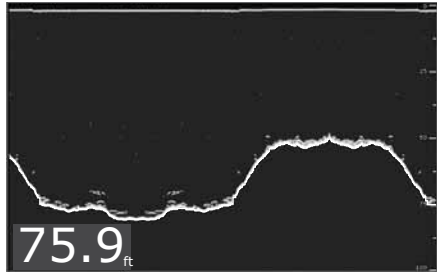
Isolating bottom fish

You can separate the echoes from fish near the bottom and from the bottom itself by using the White Line and/or the Bottom Fill features.



Standard fishfinder image

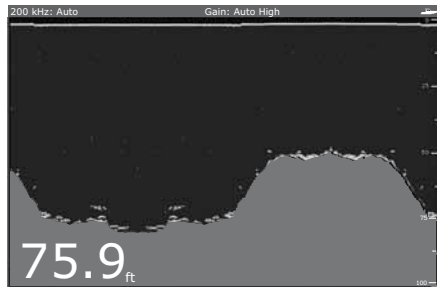
The standard fishfinder image displays the bottom as a combination of features (mud, sand, fish targets etc) with various sonar signal strengths.



White line

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.

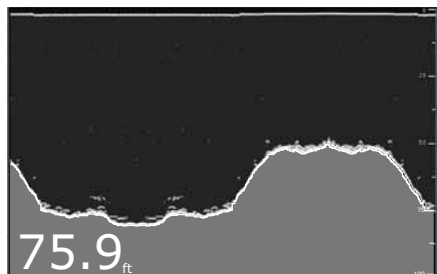
Fish near the bottom can now be seen more easily.



Bottom fill

When this feature is applied, the detail below the bottom is removed and replaced by a single contrasting color.

The bottom is now clearly defined and the fish near the bottom can be seen more easily.



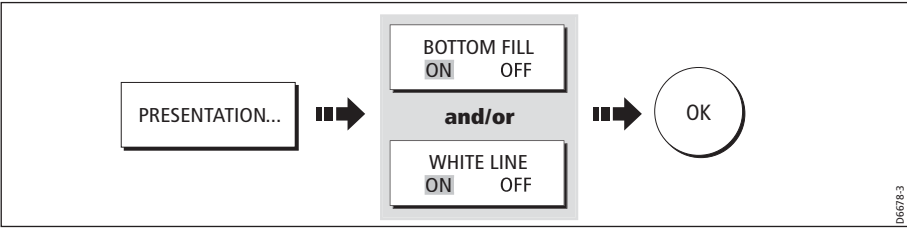
White line and bottom fill

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.

Both the bottom and fish near the bottom are now clearly defined.

D6833-3

Note: *White Line and Bottom Fill are selected for individual fishfinder windows.*



Changing how the image scrolls

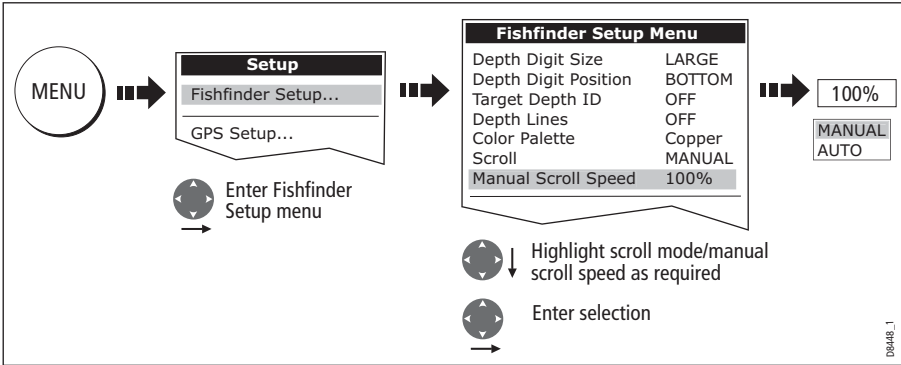
Adjusting the scroll mode and speed

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%).
- **Automatic** - The system automatically adjusts the scroll speed, based on boat speed:
 - Less than, or equal to 0.5 kts, scroll speed is constant at 10%.
 - Between 0.5–15 kts, scroll speed varies linearly with boat speed.
 - Greater than 15 kts, scroll speed is constant at 100%.

To select the scroll mode and speed:



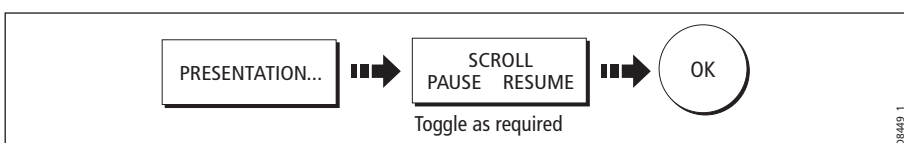
Note: If you have configured a transducer with no paddle wheel, selecting AUTO will result in full speed scrolling (100%).

Pausing the scrolling image

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 currently selected fishfinder frequency (200kHz, 50kHz or BOTH).

If you are in dual frequency mode (see *page 114*), you can pause one frequency while the other continues to scroll. This allows you to inspect a paused image, place waypoints or VRMs, while the other frequency continues to scroll and detect fish etc. When in automatic frequency mode and the depth changes, the new frequency will NOT be paused.

To pause or resume scrolling:

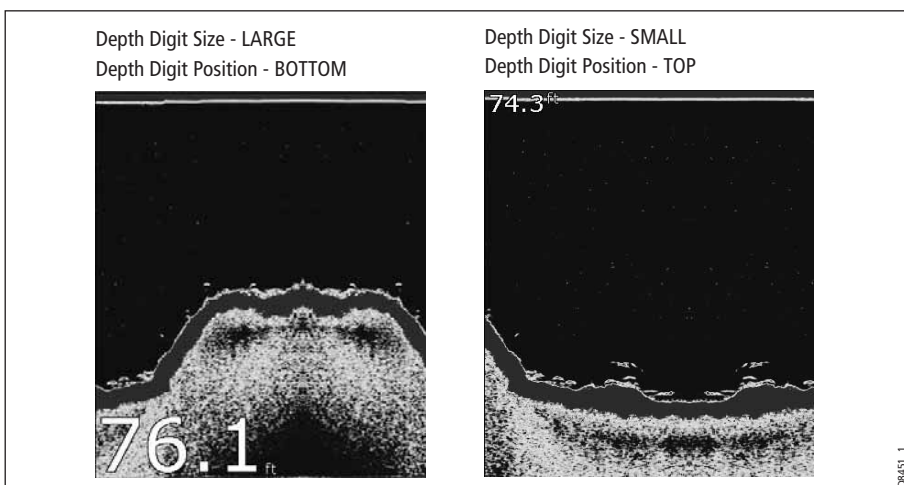


Changing how the depth digit is displayed

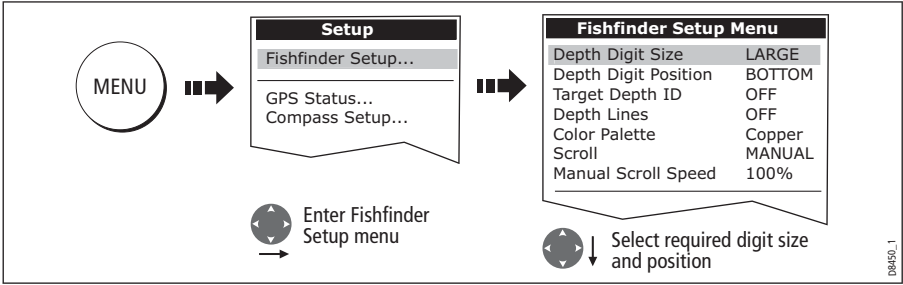
The depth under the boat is displayed in the upper or lower left hand corner of the fishfinder window. The size of this depth digit can be adjusted or it can be switched on/off for individual fishfinder windows.

Changing the size/position of the depth digit

You can decrease the size of the depth digit (to small or medium) and you can change its position to the top of the screen e.g.



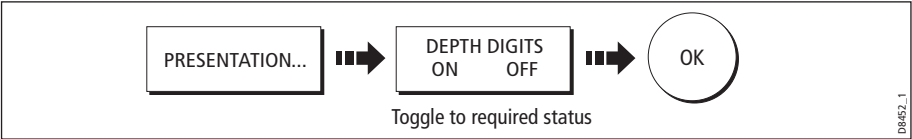
To change the depth digit size/position:



Note: No matter what size is selected, the Depth Digits will auto-shrink (when necessary) to fit in the available space.

Removing/redisplaying the depth digit

To remove or redisplay the depth digit:

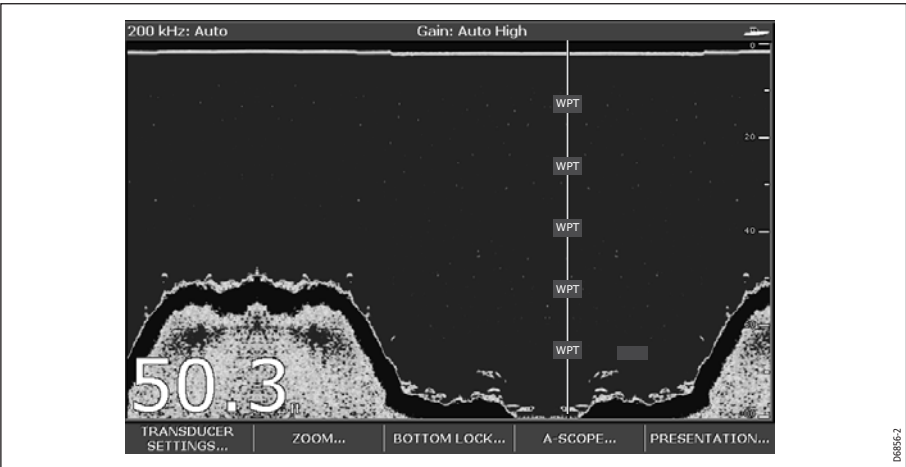


Note: When multiple fishfinder windows are displayed, we recommend that the depth digit is always displayed in at least one window.

5.5 Marking a position

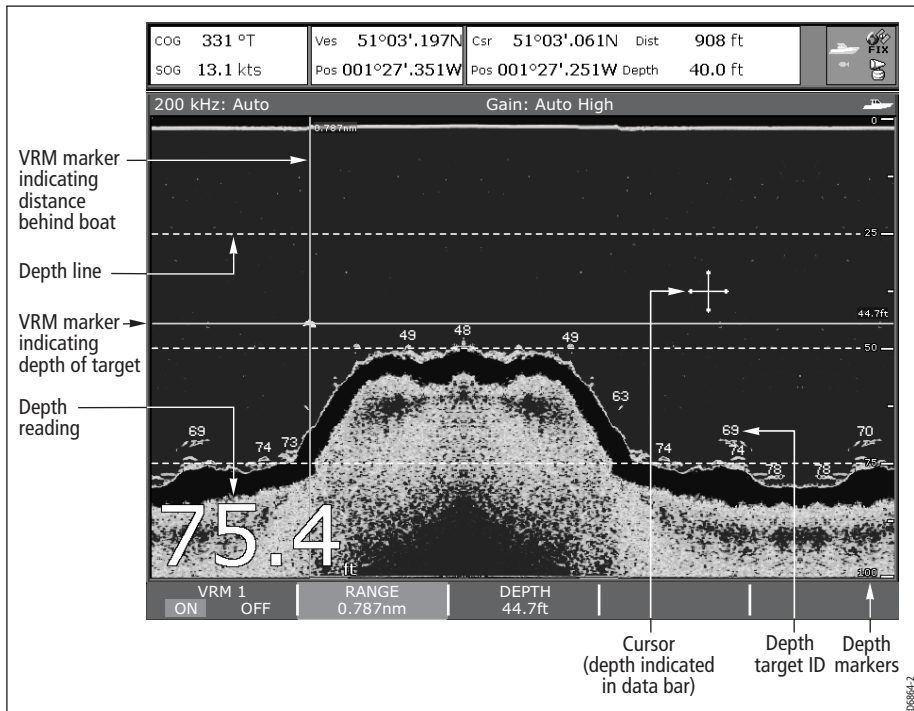
You can pause the scrolling image to place a waypoint at a position or target that you want to return to at a later date. When a waypoint is placed, its details are added to the Waypoint List and a vertical line labelled WPT (see illustration below) is displayed on screen. You can edit waypoints and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

- Notes:** (1) For full details of working with waypoints, please refer to Chapter 3.
- (2) For details of how to pause the scrolling Fishfinder image, see page 106.



5.6 Determining depths and distances of targets

The fishfinder provides various features to determine depths and distances:



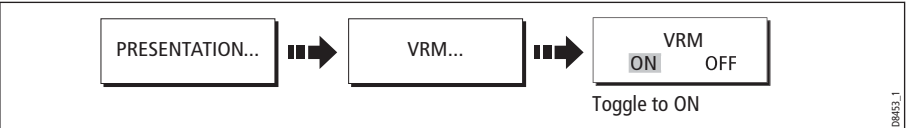
- **Depth reading** - your current depth displayed. The size and position of this digit can be changed via the Fishfinder display Setup menu (see *page 110*).
- **Depth lines** - horizontal dashed lines drawn at regular intervals to indicate the depth from the surface. These are switched on/off via the Fishfinder Display Setup menu (see *page 113*).
- **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 via the Fishfinder Display Setup menu (see *page 113*).
- **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. For further information see *page 109*.

Measuring using VRMs

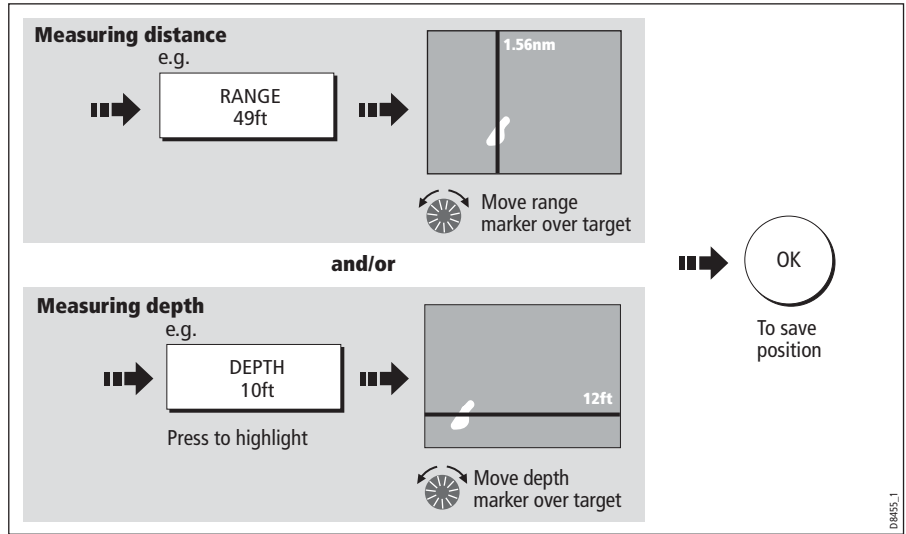
You can use a Variable Range Marker (VRM) to determine the depth and distance-behind-boat of an object. These markers consist of a horizontal (depth) line and a vertical (distance-behind-boat) line; each of which are marked with the appropriate measurement and are controlled individually.

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

- 1. Select the VRM option:



- 2. Pause the display to make it easier to position the VRM over an object (see page *page 106*)
- 3. Measure the depth and/or distance:



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

5.7 Fishfinder alarms

In addition to the system alarms (see [page 187](#)), 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.

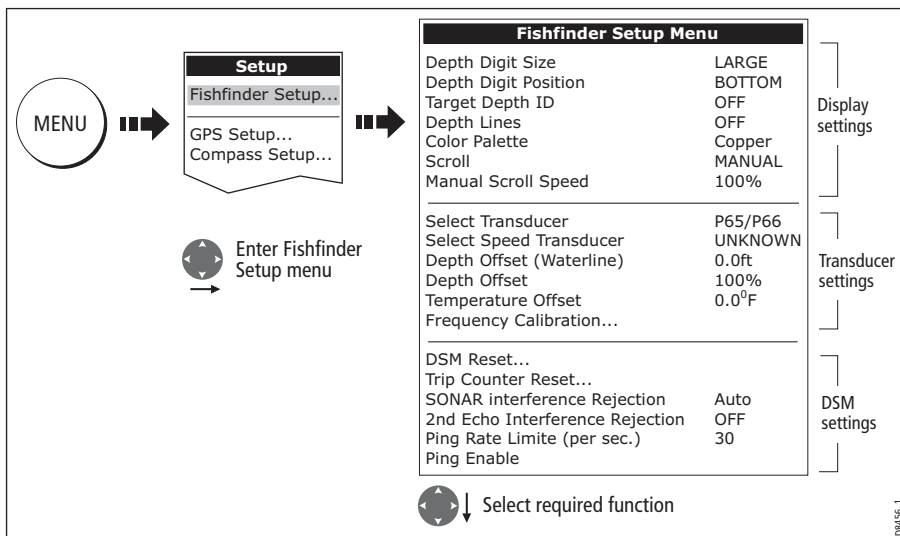
You can switch the alarms on, set the limits and specify the fish alarm sensitivity as described on [page 188](#).

5.8 Setting up your fishfinder

The set up for your fishfinder can be changed from the standard configuration to suit your particular needs. The Fishfinder Setup Menu is divided into three sections:

- Display settings.
- Transducer settings.
- DSM settings.

To select the Fishfinder Setup Menus:



Note: For general information on the Setup Menus, see [page 183](#).

Display settings

The display settings provide controls to change the fishfinder image. These settings are applied locally and will therefore only affect the individual display on which you are working:

MENU ITEM	OPTIONS (Default in bold)
Depth Digit Size The size of the digit indicating the depth	SMALL MEDIUM LARGE
Depth Digit Position The position of the digit indicating the depth	BOTTOM TOP
Target Depth ID Controls whether the depth of identified targets are displayed. N.B. The level of targets displayed is directly linked to the level of Fish Alarm sensitivity (see <i>page 188</i>).	ON OFF
Depth Lines Controls whether horizontal lines indicating depth are displayed	ON OFF
Color Palette Choose the color palette to suit different conditions/your personal preference.	Classic Blue Classic Black Classic White Sunburst Greyscale Inverted Greyscale Copper Night Vision
Scroll Select AUTO to vary the scroll speed in relation to your boat's speed or MANUAL to specify the <i>Scroll Speed</i> .	MANUAL AUTO
Manual Scroll Speed If Scroll is set to MANUAL, specify the percentage of the normal speed that screen should scroll at (see <i>page 105</i> for more details).	10-100% 100%

Transducer Calibration

The C-Series display receives the image from a DSM which processes sonar signals from a transducer mounted in the water. If the transducer is equipped with a speed paddle wheel and temperature-sensing thermistor, the DSM calculates speed and temperature. To ensure accurate readings it may be necessary to calibrate the transducer(s) by applying offsets to depth, speed and temperature. As these settings are held in the DSM and relate to the transducer, they are applied system-wide.

The Fishfinder Setup Menu provides the following set up options for your transducer:

MENU ITEM	OPTIONS (Default in bold)
Select Transducer When selecting a transducer, the DSM reports to the C-Series whether it sees a 600W or 1kW transducer. The C-Series then allows you to select an appropriate transducer from the 600W or 1kW list.	600W detected: P65/66 P79 P319/B117/SS555 B66V/B66VL B744V/b744VL/SS544V B45 1kW detected: B256 B260 R99
Select Speed Transducer Select the equipped speed transducer. Note: This option is only available if the selected transducer is one that does not include an integrated speed transducer.	NONE UNKNOWN B120/P120 ST 600 ST69
Depth Offset (Waterline) or (Keel) When the offset is '0' or positive (Waterline), the offset represents how far below the water's surface the transducer is. When the offset is negative (Keel), the offset represents how far below the transducer the keel is.	0 feet +/- 9.9 feet
Speed Offset Specify the offset to calibrate the speed transducer (if fitted).	100% 1 - 200%
Temperature Offset Specify the offset to calibrate the thermistor (if fitted).	0°F +/- 9.9°F
Frequency Calibration... Hides the setup menu and brings up a set of soft keys to tune the transducer frequencies. For details, see <i>page 114</i> .	50 kHz 200 kHz

DSM Setup

Certain conditions, such as a hard bottom or other vessels equipped with a fishfinder, may affect the DSM. The following DSM Setup controls enable you to change settings to allow for this. As they are held in the DSM, they are applied system-wide.

MENU ITEM	OPTIONS (Default in bold)
DSM Reset... Restore all settings on the DSM to factory default. When performing a DSM Reset, it is normal to briefly lose connection with the DSM.	YES NO
Trip Counter Reset... Resets the Trip Counter of the DSM.	YES NO
SONAR Interference Rejection Removes spikes caused by other fishfinder-equipped vessels	AUTO LOW MEDIUM HIGH
2nd Echo Interference Rejection Minutely adjusts the ping rate according to the 2nd echo level. Results in better sensitivity of the image.	OFF LOW HIGH
Ping Rate Limit (per sec.) Provides a speed limiter; it is useful to adjust the ping rate to suit local conditions. For example, the ping rate may be too fast when there is a hard bottom in shallow water.	26 pings per second 5 to 30 pings per second
Ping enable The sonar ping is normally enabled. It can be disabled. This is useful when other equipment is being tested, or if someone is diving beneath the boat.	Disabled Enabled

Any changes that you make to the set up are saved when you power off the digital sounder module (DSM) except for the following:

Type	Function	Reverts to
Soft keys	Gain	AUTO (automatic)
	Auto Gain Mode	MED (medium)
	TVG	AUTO (automatic)
	Range	AUTO (automatic)
	Range Shift	0
	Power	AUTO (automatic)
Setup Menu	Ping Speed Limit	26
	Ping Enable	Enabled

5.9 Other settings affecting the fishfinder image

The system automatically adjusts the following settings in order to optimize the fishfinder image:

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

They should not ordinarily require adjustment. You can however make adjustments manually if required.

Operating frequency modes

The operating frequency is indicated in the status bar. You can choose to either set the frequency to automatic (default) or manual.

Automatic frequency

When operating in automatic frequency, your DSM automatically changes the frequency from 200 kHz to 50 kHz as your depth increases and from 50kHz to 200 kHz as your depth decreases. This mode is useful for automatically searching for the bottom and is the normal mode of operation.

Manual frequency

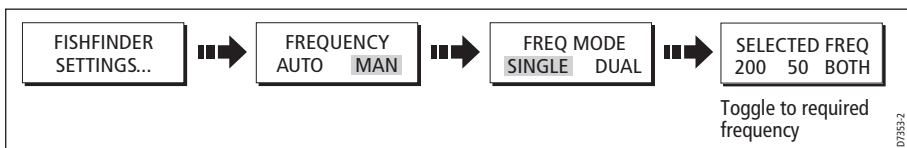
Manual frequency allows you to manually set the system to either a single or dual frequency mode:

Single frequency mode

This mode sets the transducer to ping at a single frequency:

- **50 kHz** - scans a wide area and penetrates water well. Use this setting when you are in deep water and the DSM is locked onto a shallow target e.g. very large shoal of fish or you are in very shallow water (<30 feet) and you need to see better fish targets (wider cone angle), or:
- **200 kHz** - scans a narrow area but produces more detail. Use this setting when you are in deep water and the 200 kHz signal is so strong that you want to retain this higher resolution picture. It is good for finding fish that are near the bottom or close together.

To select a single frequency:



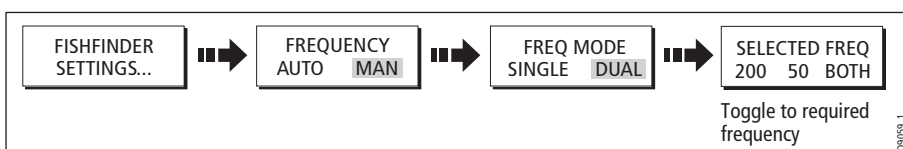
Note: Changing the frequency in a single fishfinder window will automatically change all other fishfinder windows to that frequency.

Dual frequency mode

In dual frequency mode the DSM pings at the same rate but alternates between 200 kHz and 50 kHz. This allows you to select the required frequency(s) - 50kHz, 200 kHz or BOTH for each individual fishfinder window. Combine this mode with the zoom, bottom lock and A-scope functions to customize each fishfinder window to meet your particular requirements or fishing conditions. For example, when you are in deeper water you can set one fishfinder application to 200 kHz and another to 50kHz. Display the 50 kHz in normal mode to show full bottom detail and a long history. This will give you an overview of the current fishing conditions. Display the 200 kHz window in full-pan zoom to view the top of the water column in very high detail and see fish swimming near the surface. In a third fishfinder application, select BOTH to split the window and display a high resolution image (200 kHz) and a wider cone (50kHz) simultaneously. Using these settings covers all possibilities and ensures that nothing is missed.

Note: *When BOTH (default) is selected, any changes that you make to the zoom, bottom lock, A-scope etc. will be applied to both images within that window.*

To select the dual frequency(s) for the active fishfinder window:



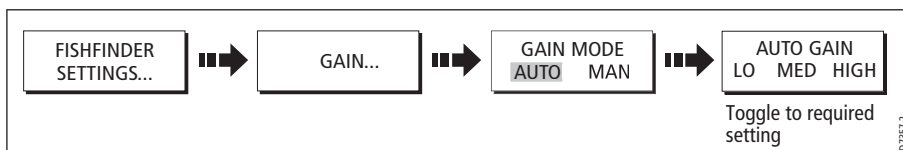
Gain modes

You can make various adjustments to the gain modes if required:

- Gain mode.
- Auto gain.
- Color gain.
- TVG.

Note: *In addition to the controls described in this section, the Fishfinder Setup options allow you to adjust the Interference Rejection, 2nd Echo Interference Rejection and Ping Rate Limit. These options are described on page 110.*

Auto gain modes



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:

- **Low** is ideal for viewing fishfinder images with a minimum of background noise as you are cruising to your fishing spot. Only the strongest echoes are displayed.
- **Medium** is a slightly higher gain setting that displays more detailed echoes as you are trolling. This is the default mode.
- **High** gives the best details of the targets you have located but also displays the most background noise and surface clutter. This is suitable when you are fishing.

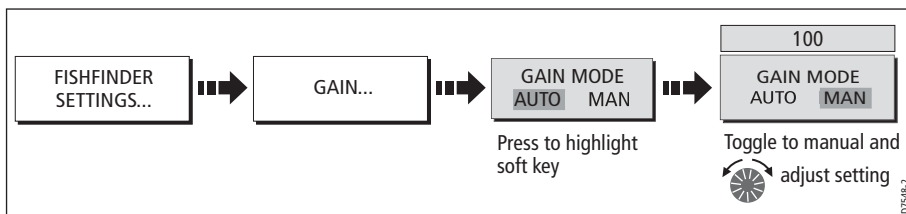
With all of these modes, the DSM will automatically adjust the Gain setting for current conditions and adjust separately for each frequency. Any adjustments made apply to all windows using that frequency.

Manually adjusting the gain modes

If necessary you can set the gain controls manually. The new values remain set even when you switch off the display and are applied to both the active window and any other fishfinder windows displaying that frequency.

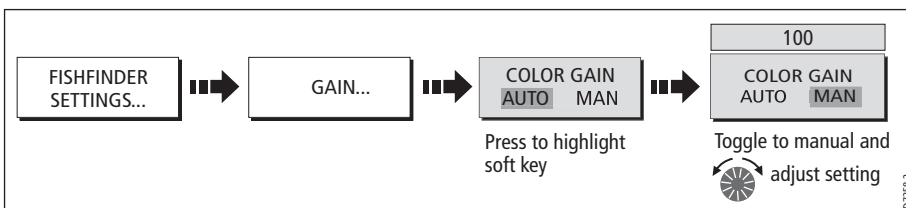
Manual Gain Mode

This should be set high enough to see fish and bottom detail but without too much background noise. Generally, a high gain is used in deep and/or clear water; a low gain in shallow and/or murky water.



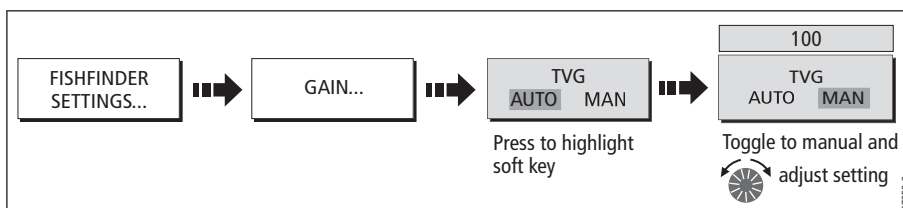
Color Gain

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 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)

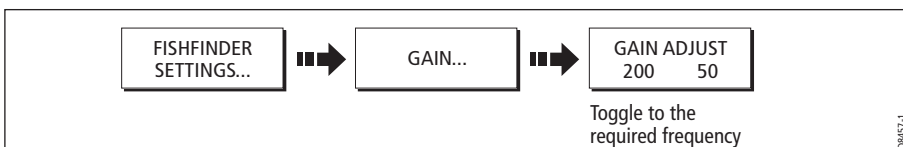
The TVG (Time Variable Gain) reduces the clutter by varying the gain throughout the water column. This function is useful for reducing the appearance of 'noise'. Increasing the TVG value increases the maximum depth to which TVG is applied. Decreasing it reduces the maximum depth. A low TVG value has little effect on gain in shallow water; a high value decreases the gain in shallow water so that only the strongest echoes are displayed. TVG has no effect in Fishfinder Simulator Mode.



Gain adjust (200/50)

When the SELECTED FREQ is set to BOTH (see *page 115*), the GAIN ADJUST soft key is enabled to allow you to select the frequency that the gain controls affect.

To adjust this gain setting:



Note: Gain adjustment for individual frequencies is only available when the selected frequency is set to BOTH.

Adjusting the power setting

The Power control provides adjustment of the transducer signal.

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.

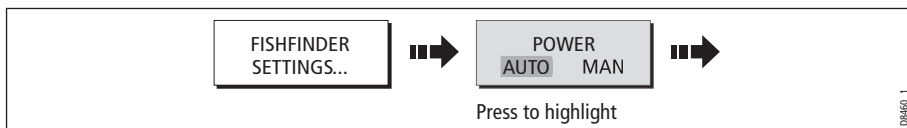
Manual

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).

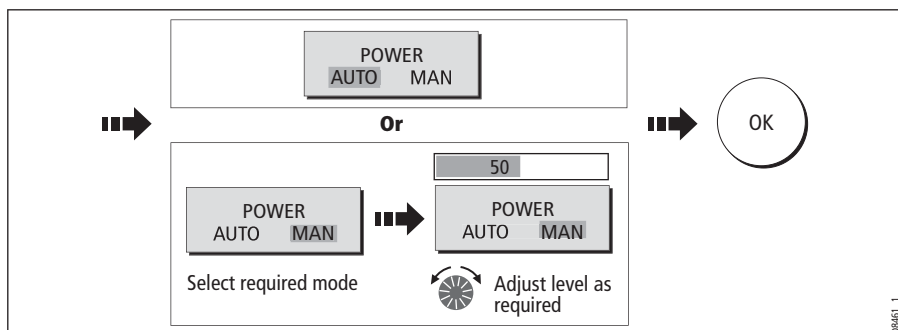
Note: When the power level setting is changed there is a short delay while the new setting takes effect.

To adjust the Power Setting:

1. Select the power setting function:



2. Select the power setting mode and adjust as necessary:



Chapter 6:Using the Radar

6.1 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.

6.2 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.

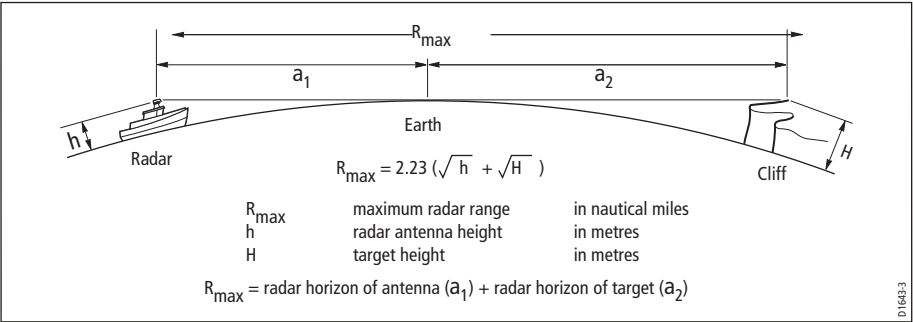
Until you are familiar with interpreting the radar display, every opportunity should be taken to compare the radar screen patterns with visual targets, such as other boats, buoys and coastal structures. You should practise harbor and coastal navigation during daylight hours and in clear weather conditions.

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:

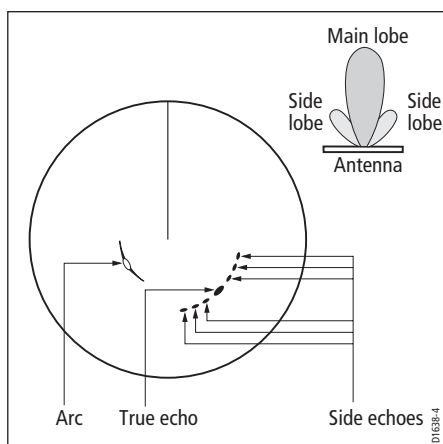
- Side lobes.
- Indirect echoes.
- Multiple echoes.
- Blind sectors.
- Sea, rain or snow clutter.
- Interference.

Through observation, practice, and experience, you can generally detect these conditions very quickly and use the radar controls to minimize them.

Side lobes

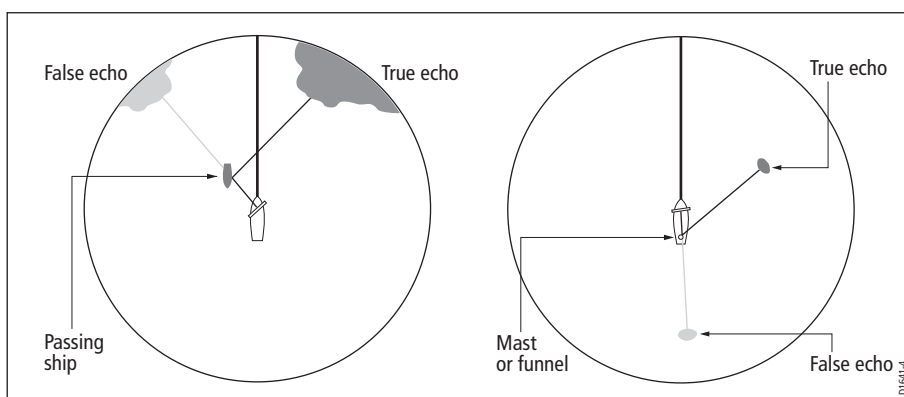
Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside the narrow main beam.

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.



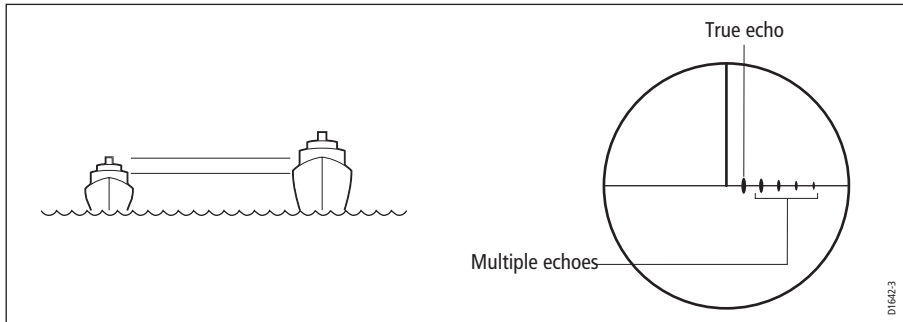
Indirect echoes

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.

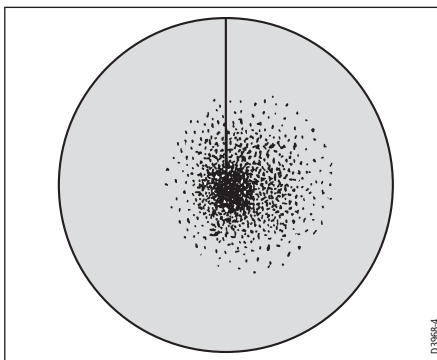


Blind sectors

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.

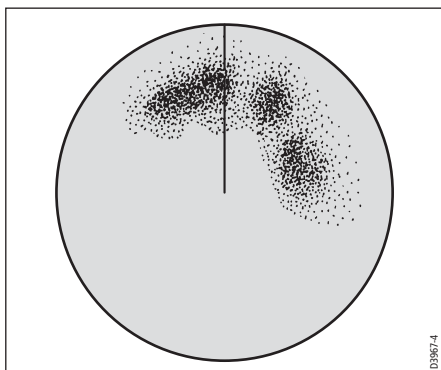
Sea clutter

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.



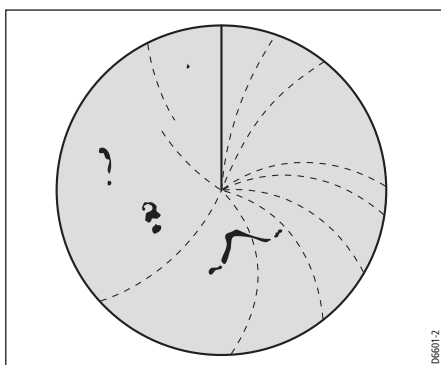
Rain or snow clutter

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.



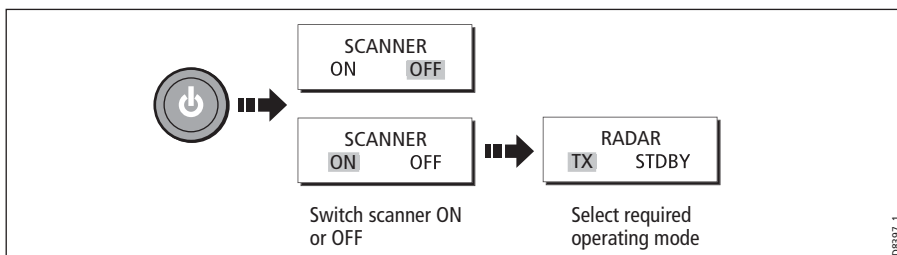
Interference

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.







6.3 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:

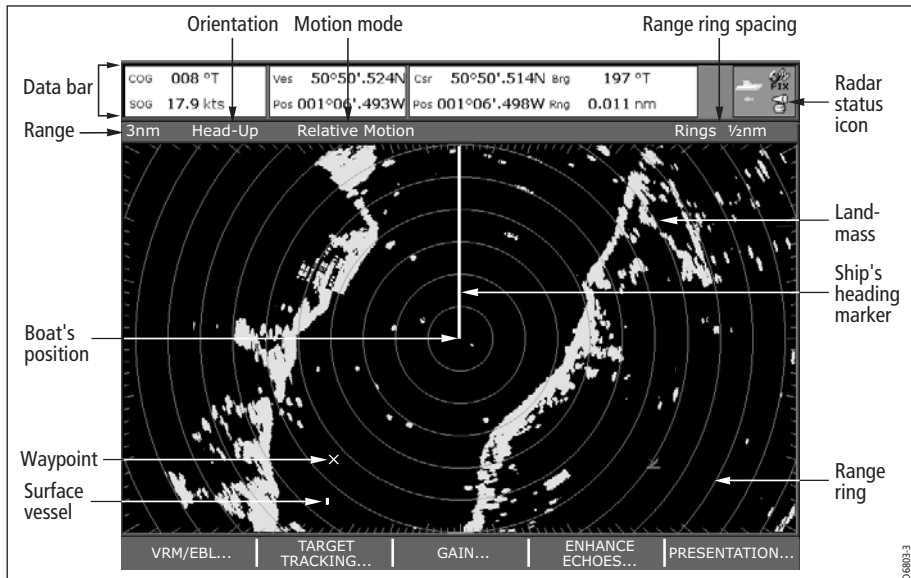
Radar Mode	Radar status icon	Status description/use
Transmit (TX)	 (Rotating icon) D7440-1	Scanner on and transmitting. When SCANNER set to ON, select this mode to activate scanner. This is the usual mode of operation.
Standby (STDBY)	 (static icon) D6894-2	Scanner on but not transmitting and antenna not rotating. 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) D7441-1	Scanner powered off 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) D7442-1	Scanner switches between on/transmitting & standby mode Power save mode when constant use of radar not required. To set up this option, see <i>page 148</i>

Note: When an open array antenna is fitted, the system stops the antenna in the forward facing position when Standby mode is selected.

6.4 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.

6.5 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*.

6.6 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 126*).
- Change where your boat is positioned (motion mode) in relation to the radar (see *page 128*).
- Show or hide waypoints (see *page 42*).
- Show or hide range rings (see *page 130*).
- Change the bearing mode for EBLs (see *page 130*).
- Show AIS targets.

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:

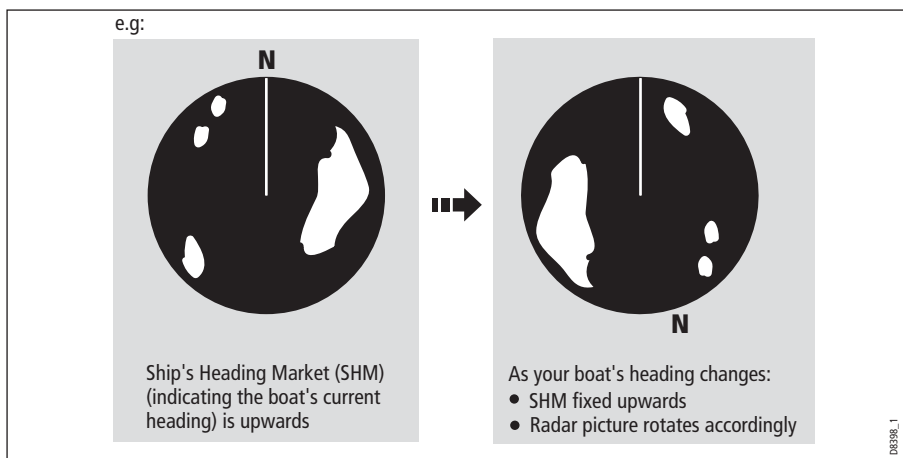
- Head up.
- North up.
- Course up.

These orientation modes are used in conjunction with motion mode (see *page 128*) to control how your boat and radar relate to one another and how they are displayed on

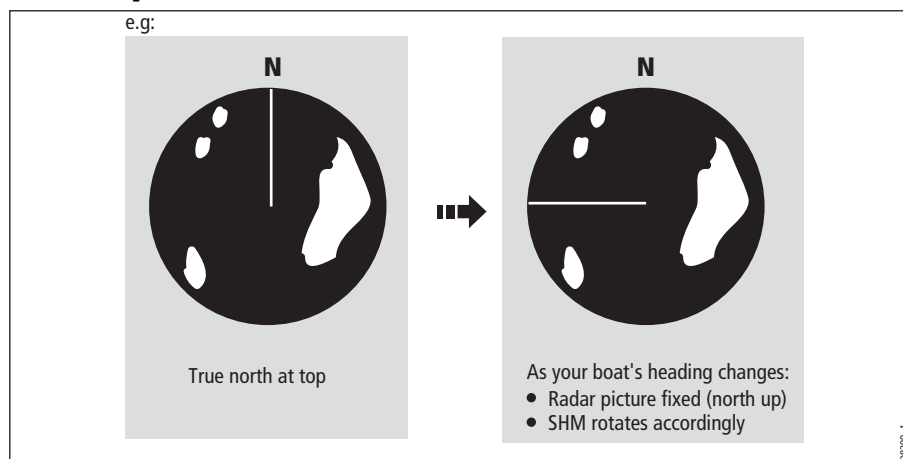
screen. Any changes that you make to the orientation of the radar are retained when you switch off.

Head Up (H-UP)

This is the default mode for the radar application.

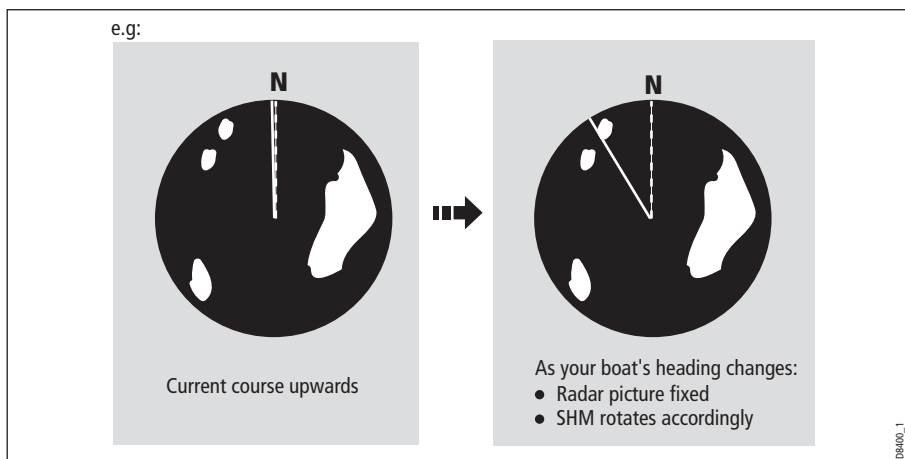


North Up (N-UP)



- 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)



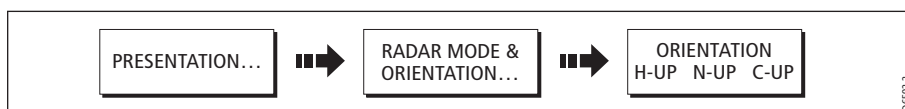
If you select a new course, the picture will reset to display the new course upwards.

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:

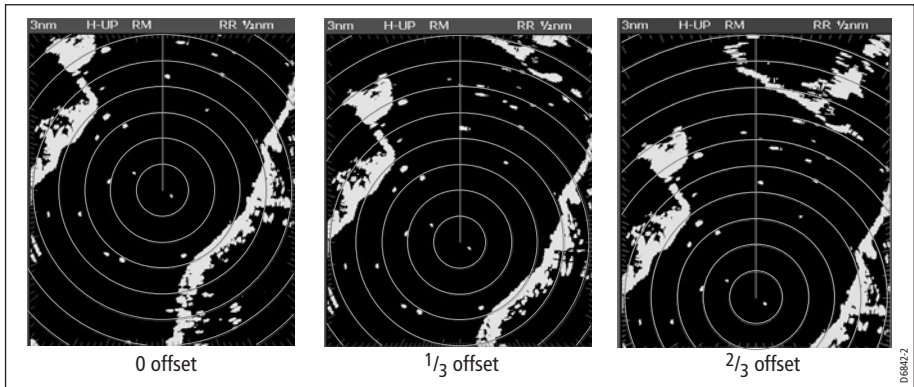
- Relative motion.
- True motion.

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

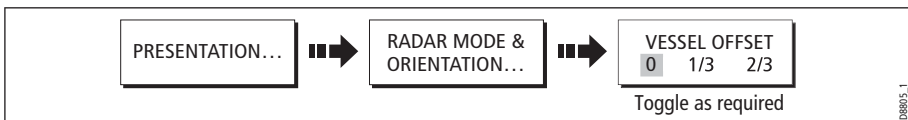
When the motion mode is set to Relative, the position of your boat is fixed on the screen and all the targets move relative to the boat.

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:



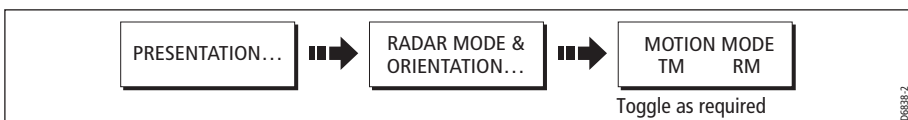
Note: If no position data is available, the status bar shows the motion mode in brackets.

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.

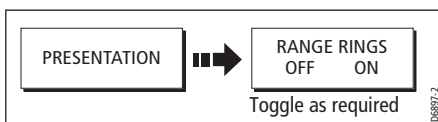
- Notes:** (1) If heading and position data become unavailable when True motion is selected, a warning message will be shown, the mode will revert to relative motion and be noted in the status bar in brackets e.g. (TM)
- (2) It is not possible to select True Motion when the orientation is set to Head Up.

To change the motion mode:



Showing or hiding the range rings

To turn the range rings on/off:

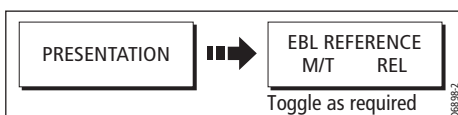


Changing the bearing mode for EBLs

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:



6.7 Getting the best picture

You can improve the quality of the radar picture by using:

- The gain controls - sea, gain, tune, FTC and rain.
- The target display controls - interference rejection, expansion, wakes.

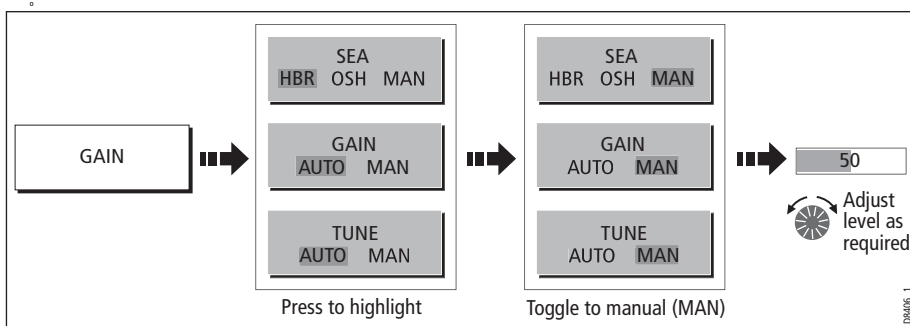
Using the GAIN functions

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 sea, gain and tune 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.

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 122*).

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 149*). Manual sea clutter mode should be used in conjunction with the GAIN function (described below).

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.

Tune

The tune function is used to fine tune the receiver in the scanner for maximum target returns on the display.

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.

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 123*) 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.

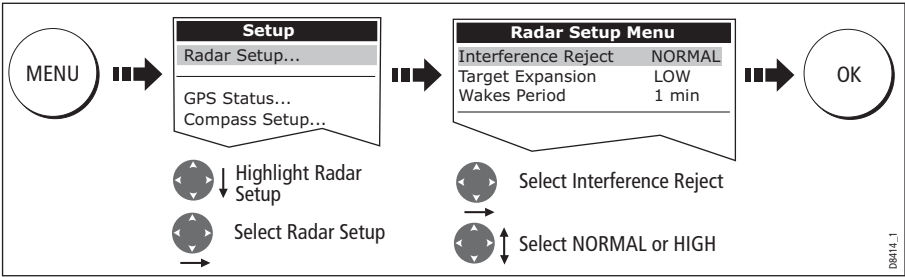
Using the enhance echoes functions

You can improve visibility with the enhance echoes function.

Interference Rejection**ON**

The interference rejection function, which is normally left switched on, automatically reduces any mutual radar interference when two radar equipped vessels are operating within range of each other (see *page 123*).

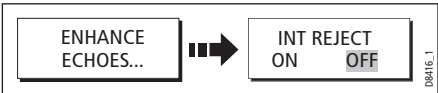
To change the interference rejection setting:



Note: This menu can also be selected by pressing and holding INT. REJECT.

OFF

If you wish to detect the presence of other radars in the vicinity:



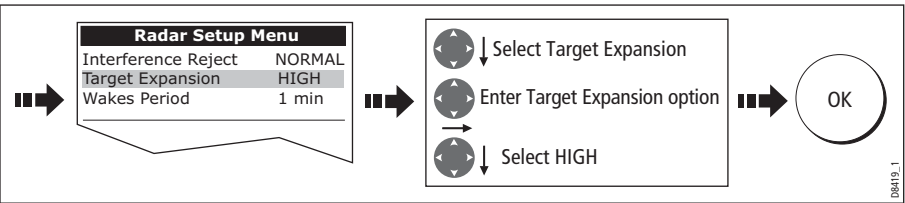
Expansion

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:

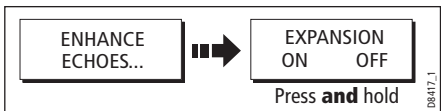
1. Select the Radar Setup Menu:



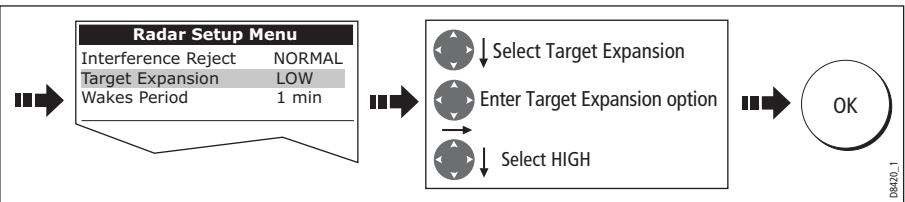
Larger returns

To alter the processing to give larger returns:

1. Select the Radar Setup Menu:



2. Set the magnification level for target expansion to LOW:



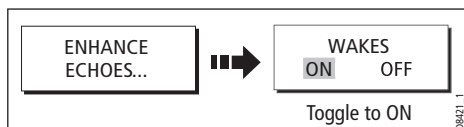
Note: Selecting this option may compromise target resolution.

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.

Displaying wakes

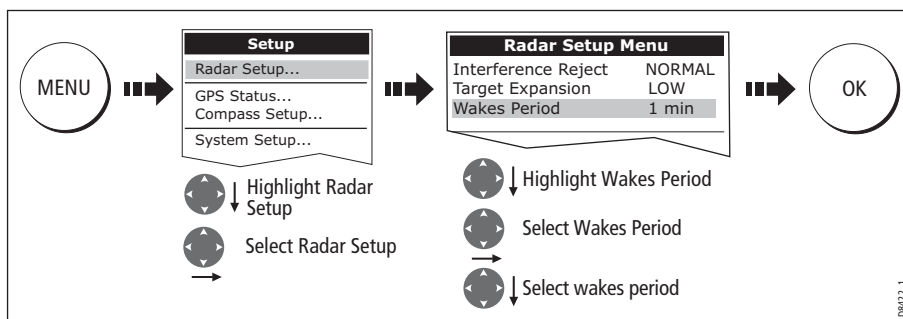
To switch on the wakes function:



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.

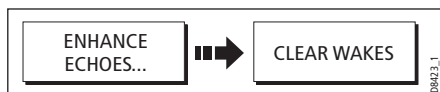
To specify the wake period:



Note: You can also enter the Radar Setup Menu by pressing and holding the **WAKES** soft key.

Removing wakes

When the currently displayed wakes are no longer required they can be remove from your screen:



6.8 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.

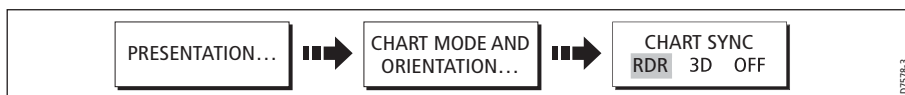
Radar range and chart scale synchronization

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.

6.9 Measuring distances, ranges and bearings

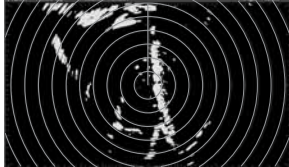
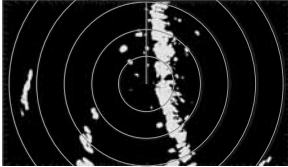
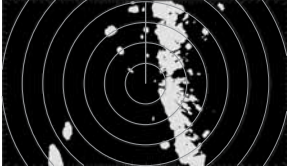
When you are using the radar application, you can measure distances, ranges and bearings in a variety of ways. These options are detailed in the table below:

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.

e.g.



Range - $\frac{1}{4}$ nm
Range rings - $\frac{1}{8}$ nm apart

Range - $\frac{3}{4}$ nm
Range rings - $\frac{1}{4}$ nm apart

Range - $1\frac{1}{2}$ nm
Range rings - $\frac{1}{4}$ nm apart

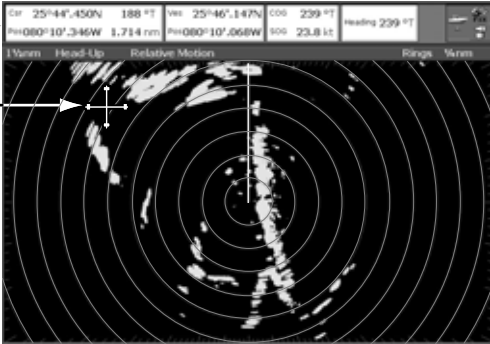
D8407_1

... 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.

Bearing and range from your vessel to cursor

Cursor



D8402_1

Note: If cursor data is not shown, refer to page 180.

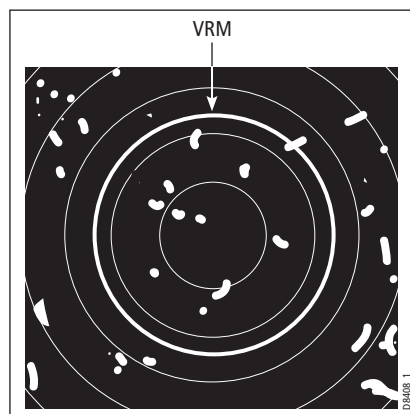
... Using VRMs and EBLs

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.

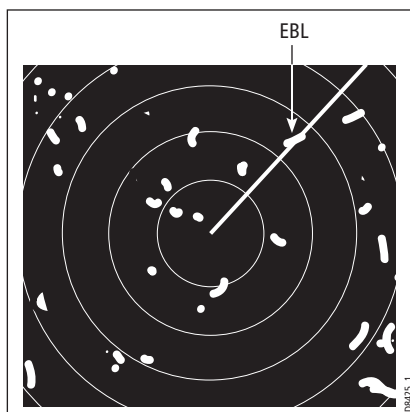


What is an EBL?

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.

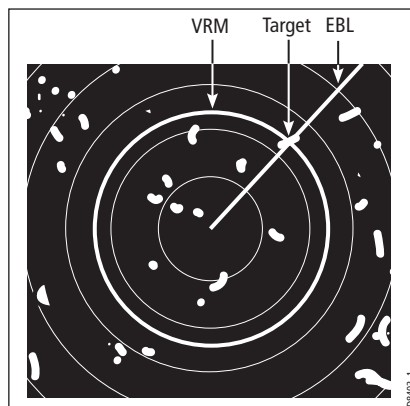
The data is also displayed if you select the EBL with the cursor.



Note: To change the EBL reference from relative to magnetic or true, see page 130.

Combined VRM and EBL

A VRM and an EBL can be combined to measure both the **range and the bearing** of the specified target.



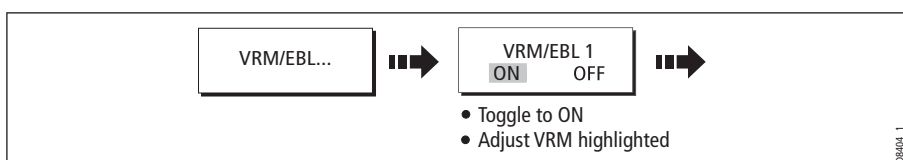
Tracking a target with a VRM/EBL

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

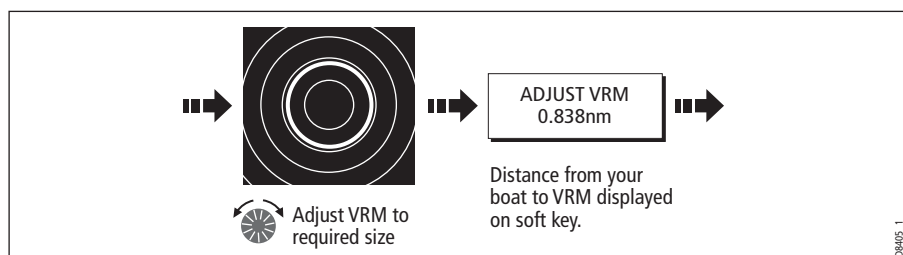
To use VRMs and EBLs to tell you the range and bearing of a target:

1. Select the VRM/EBL 1 option:

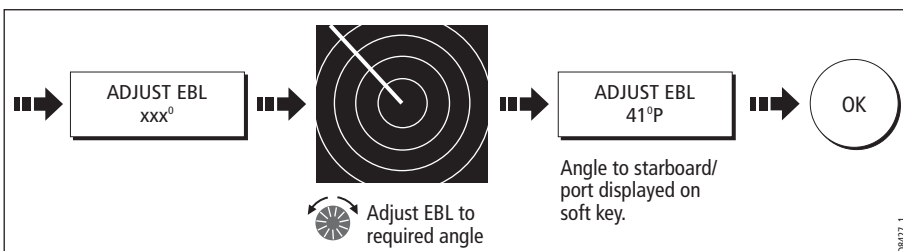


Note: The first VRM/EBL will be placed at a location of 1/3 of the current range and 030° relative to your boat's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next turned on.

2. Adjust the VRM to the required size:

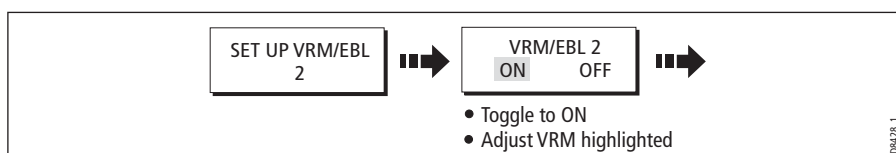


3. Adjust the EBL to the required angle:



4. Save the adjustment and remove control from the VRM/EBL:

5. To place a second VRM/EBL if required:

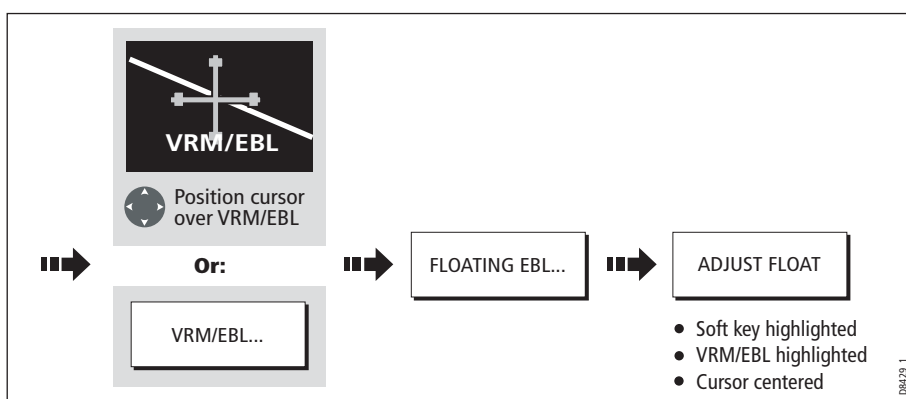


... Using floating VRMs/EBLs

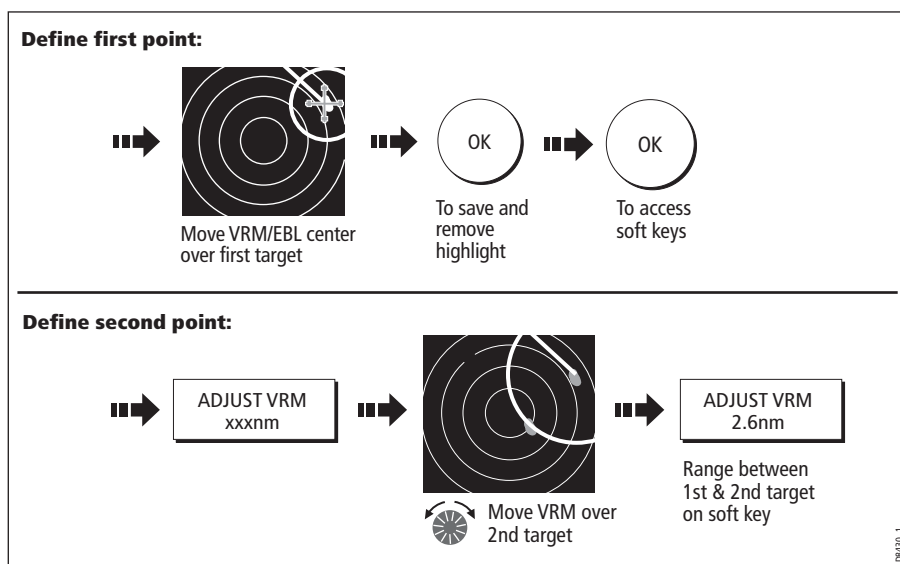
You can use the VRM/EBL float function to measure the range and bearing between any two points on the radar screen. This function allows you to move the VRM/EBL centre away from your boat's position and onto a target. You can then change the radius of the VRM to determine the distance between two points and change the angle of the EBL, relative to its new origin, to obtain the bearing.

Floating a VRM/EBL

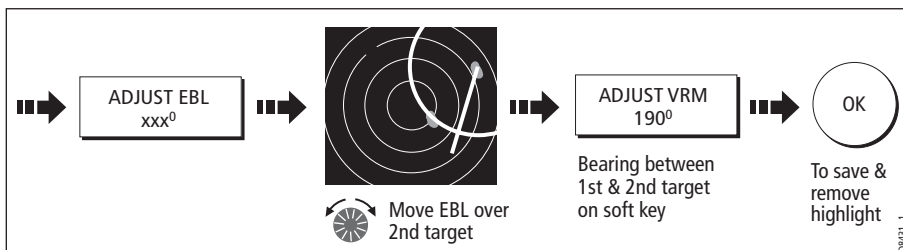
1. Create the VRM/EBL as described previously.
2. Select the floating option:



3. Measure the **range** between two points:



4. Measure the **bearing** between two points:



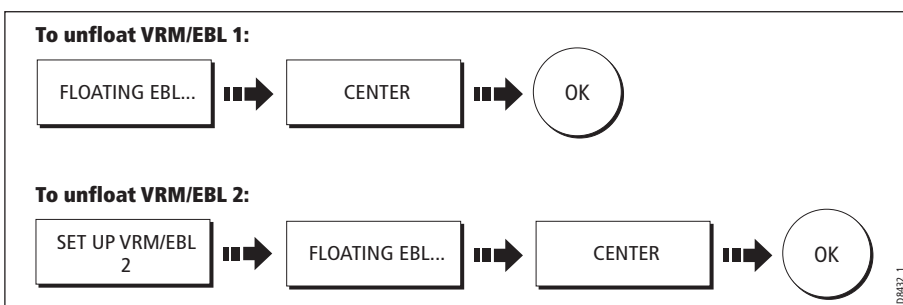
5. If required, you can float a second VRM/EBL:

- 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:



6.10 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.

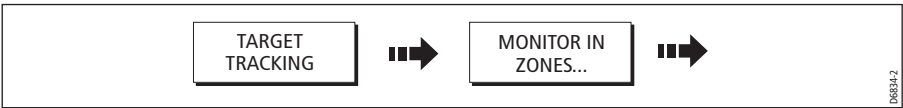
Guard zones are inactive for 10 seconds after being placed or re-sized, to avoid inappropriate alarms whilst they are being positioned.

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.

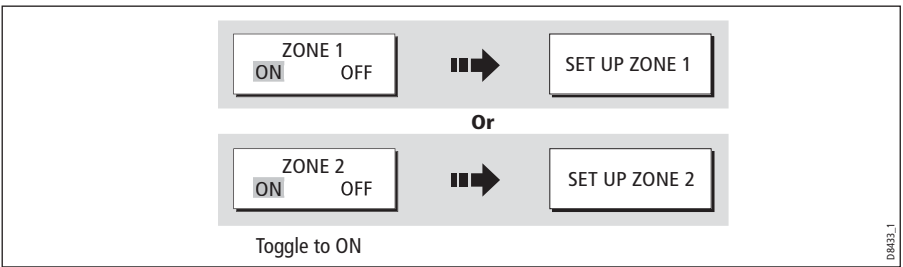
You can adjust the sensitivity of the guard zone via the Alarms Setup Menu described on *page 188*.

To set up a guard zone:

- 1. Select the guard zone option:

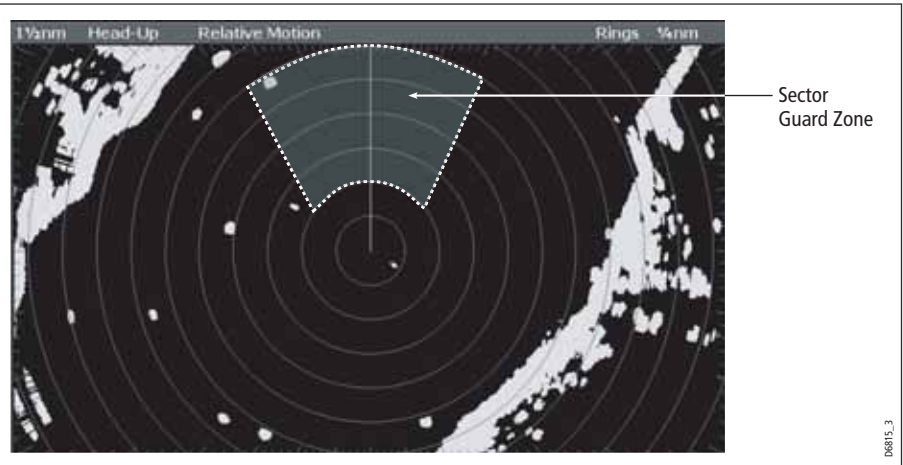


- 2. Select Zone 1 or 2:

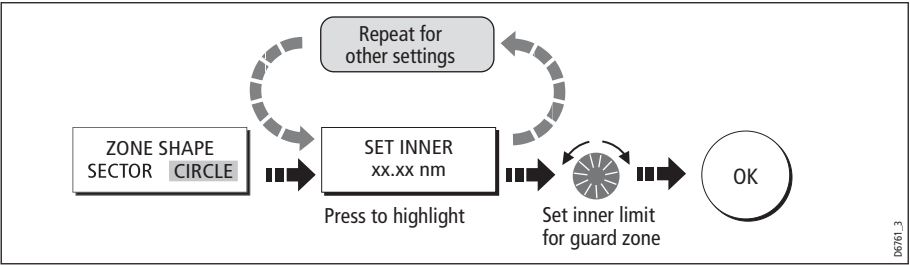


You can now select the guard zone to be either a sector or a circular zone.

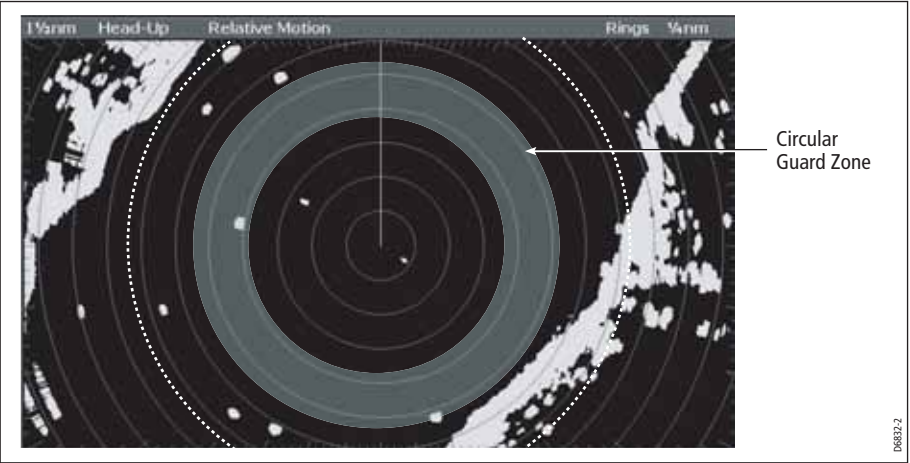
Sector guard zones



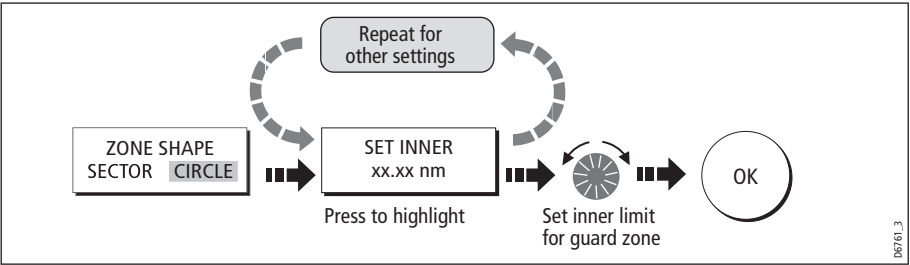
To set up a sector guard zone:



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.

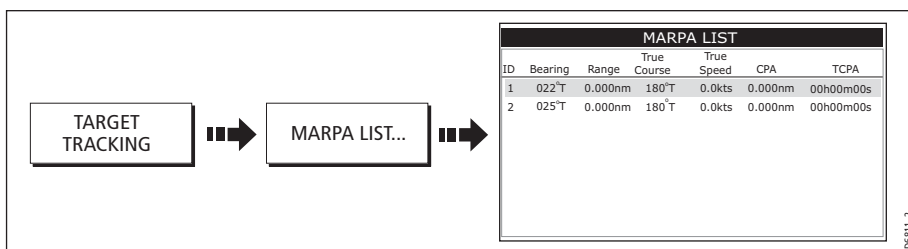
How far from my boat does MARPA work?

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.

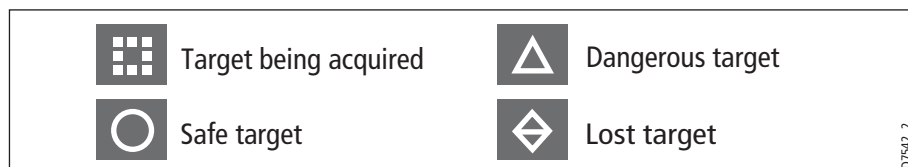
What happens to target data?

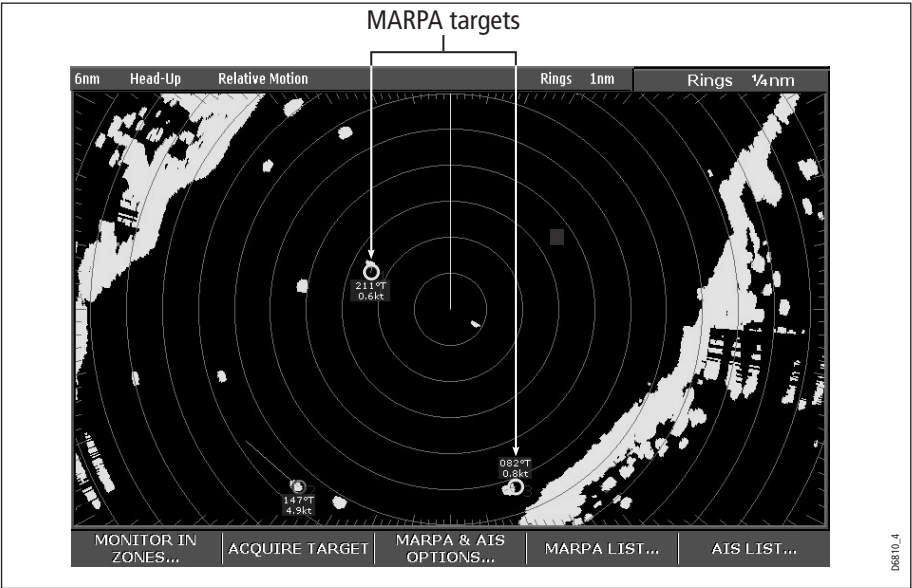
All MARPA targets are stored in a MARPA database list which shows the following information:



Target display

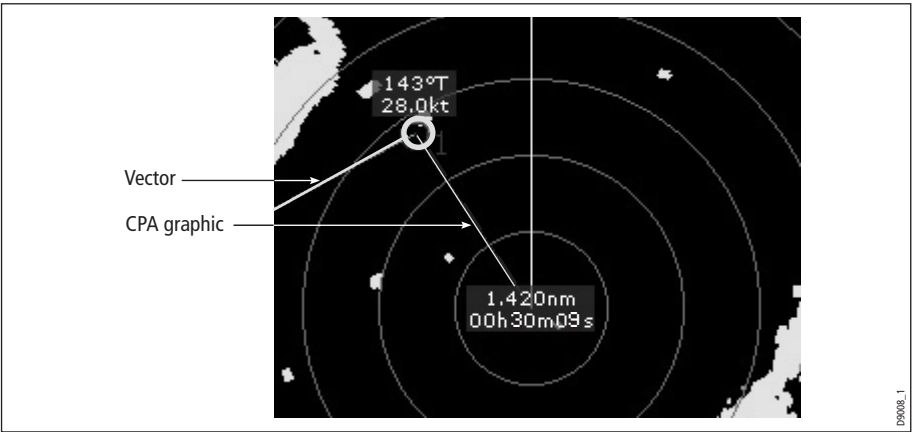
Each target is displayed as a symbol which indicates its status:





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:

Move cursor over target

CPA GRAPHIC
ON OFF AUTO

CPA GRAPHIC
ON OFF AUTO

CPA GRAPHIC
ON OFF AUTO

ON - The CPA graphic will be displayed for as long as the target is being tracked.

OFF - No CPA graphic is shown.

AUTO - When you place the cursor over any part of a MARPA symbol, the CPA graphic is displayed. This is the default setting.

D9809_1

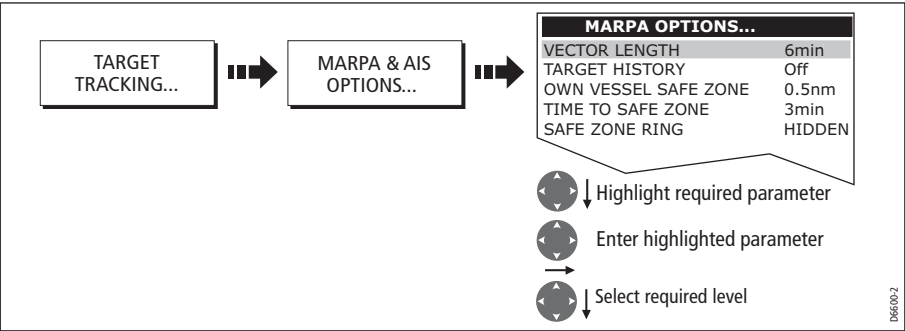
True mode

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

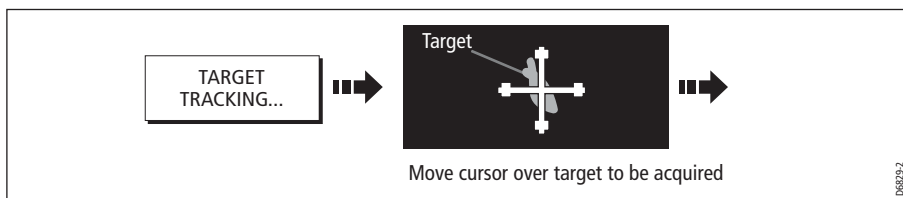


You can set up the following MARPA parameters:

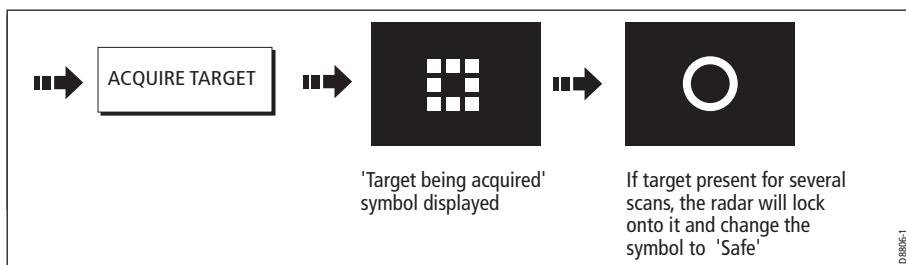
Parameter	Options (Default in bold)
Vector Length The time period specified for drawing length of vectors.	0.5min, 1 min, 3 min, 6min , 12min, 30 min, 60 min
Target History Plots a target's previous position at specified intervals. The four most recent position points are displayed. If True target vectors are selected, the four most recent vessel position points are also displayed.	OFF , 0.5 min, 1 min, 3 min, 6 min
Own vessel safe zone 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, 0.5nm , 1.0 nm, 2.0nm
Time to safe zone If a target enters your safe zone within this time period, it is considered dangerous.	3 mins , 6 mins, 12 mins, 24 mins
Safe zone ring Controls whether the safe zone ring is displayed or hidden on screen	Visible Hidden

Acquiring a target to track

1. Select target to be acquired:



2. Acquire target:

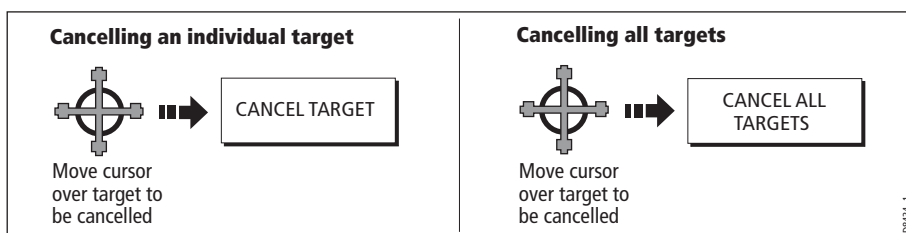


Note: If set to ON, the CPA graphic is displayed.

Cancelling targets

... from the screen

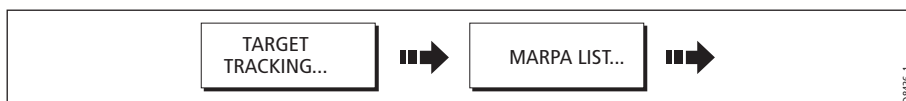
To cancel a target from the screen:



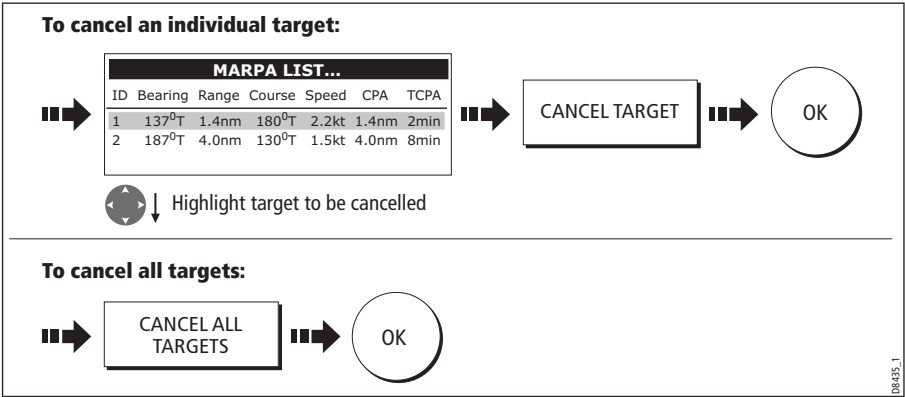
...from the MARPA list

To cancel a target from the MARPA list:

1. Display the MARPA List:



2. Cancel target/s:

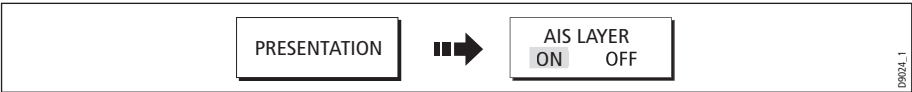


Displaying vessel identity (AIS)

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:

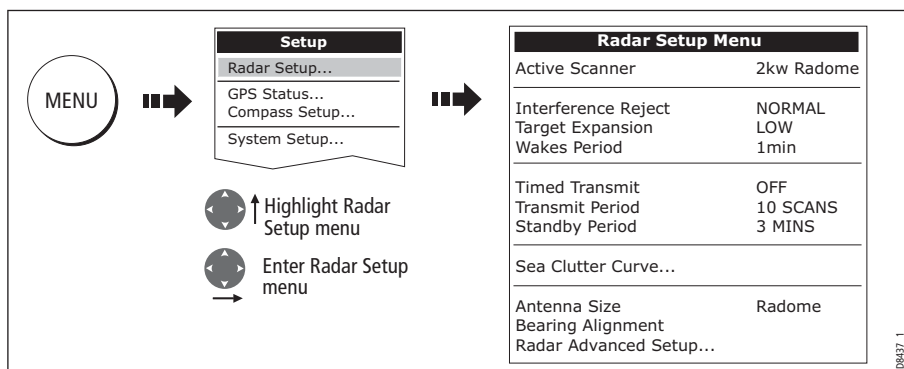


For more information on AIS, see *Chapter 11:Automatic Identification System (AIS)*.

6.11 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 Radar Setup menus when a radar window is active:



Function Description	Options (Default in bold)
Interference Rejection When ON, any mutual radar interference between two radar equipped vessels operating within range of each other, is automatically reduced.	NORMAL HIGH
Target Expansion When ON, targets are magnified to make them easier to see.	LOW HIGH
Wakes Period When ON, the target is displayed at the brightest level and its previous positions are retained at successively fainter levels on the screen.	10 seconds 30 seconds 1 minute 5 minutes 10 minutes
Timed Transmit Controls the radar's timed transmission power-save mode.	OFF ON
Transmit Period When ON, the scanner performs the number of scans specified and then shuts down for the number of minutes specified by the Standby Period.	10 scans 20 scans 30 scans
Standby Period Indicates the number of minutes that the system shuts down - the scanner does not rotate and the display is in standby mode.	3 minutes 5 minutes 10 minutes 15 minutes
Sea Clutter Curve... Adjusts the acuteness of the sea clutter curve when the sea clutter option is set to manual (see <i>page 122</i>).	1-8
Antenna Size If an open array scanner is fitted, this specifies the size of the scanner.	Open array 48" 72"
Bearing alignment Correct for display azimuth error. Please refer to the C-Series installation guide.	
Radar Advanced Setup Please refer to the C-Series installation guide.	

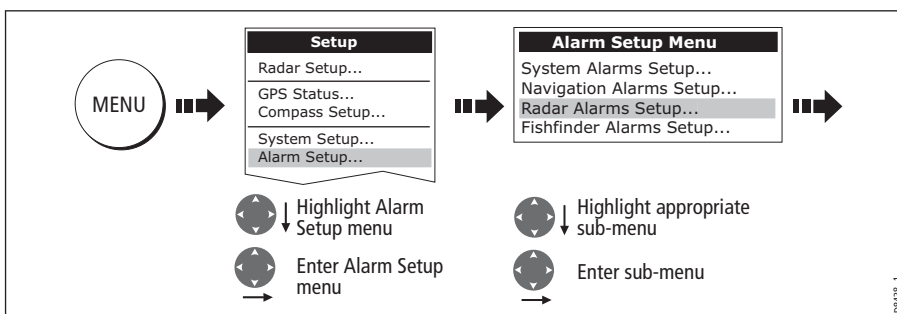
6.12 Warnings of potential dangers

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.
- 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 27 and page 187.

Chapter 7: Using the data application

7.1 Introduction

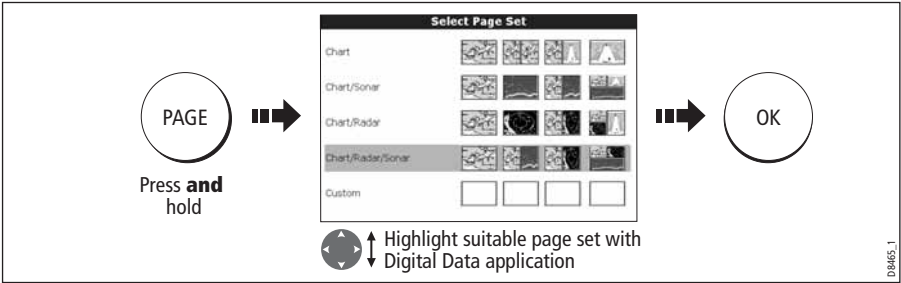
The data application enables you to view numeric data generated by the system or by instruments available on NMEA or SeaTalk.

Ves Pos 50°49'.595N 001°12'.306W	Cog Sog 071°T 10.5kt	Heading 074°T	Speed 10.9kt
		Waypoint TTG 00h13m18s	VMG Wpt 10.5kt
GOTO CURSOR 075°T 2.324nm 00h13m18s	Set Drift 304°T 0.9kt	Depth 48.9ft	XTE 0.000nm
		Trip 73.48nm	Local Time 04:16:41 AM

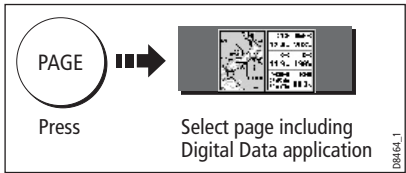
7.2 Selecting a data application

To select a data application:

1. Select a page set that includes a data application:



2. Select a page which includes a data window:



7.3 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.

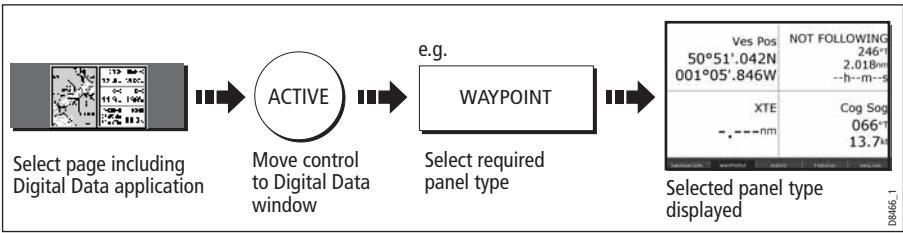
Note: *Panel selection is a local setting and will therefore only affect the individual display on which you are working.*

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
Data content	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					✓

To select a pre-configured data panel:



Customize the panels

You can customize each panel by changing:

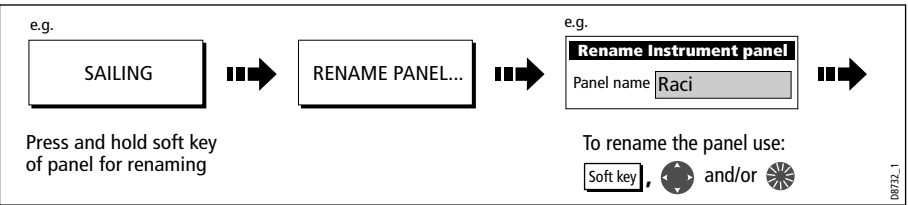
- The panel name.
- The size and number of data cells
- The data contained in each cell. This data can include any transducer or internally calculated navigation data that is available on NMEA or SeaTalk. Additional data includes a compass rose, a distance log and four resettable trip counters.
- How 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.

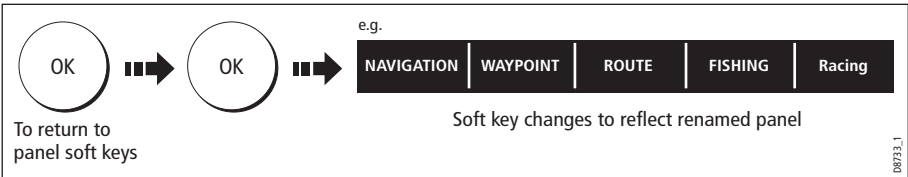
Renaming a panel

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:



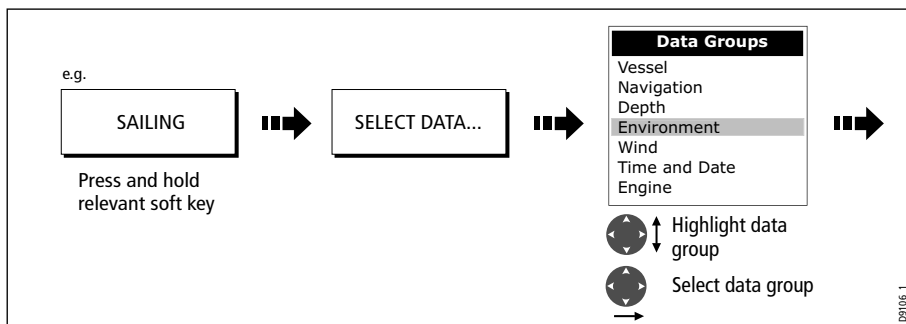
2. Save the changes:



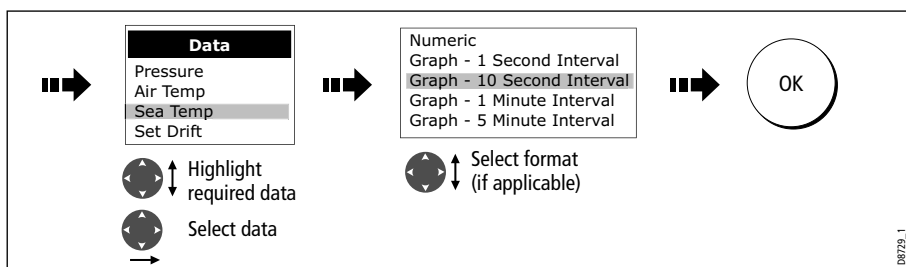
Selecting cell data

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:



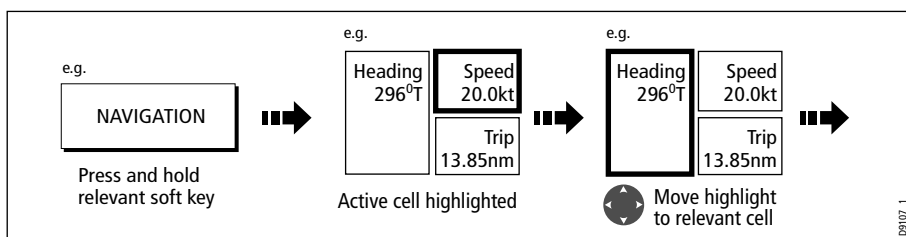
Changing the size of the cells

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

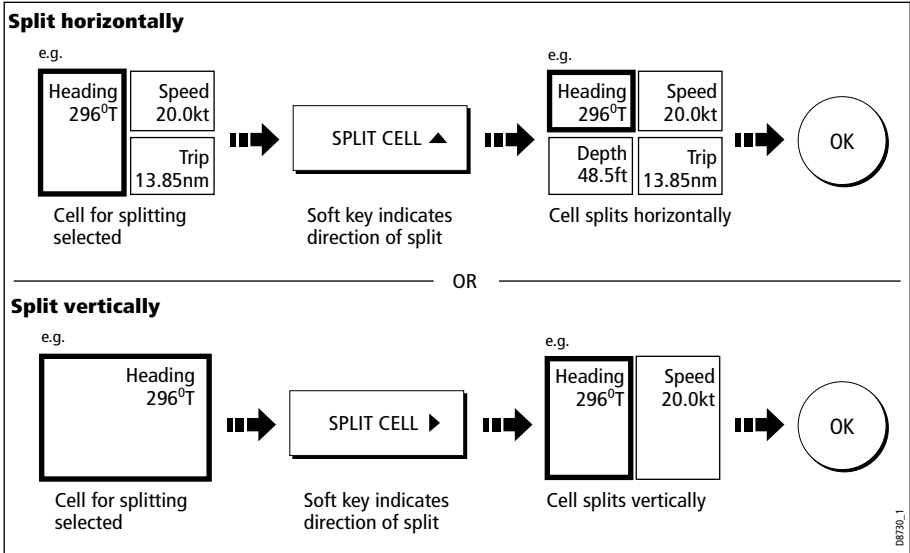
Use the SPLIT CELL function to create two smaller data cells:

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.

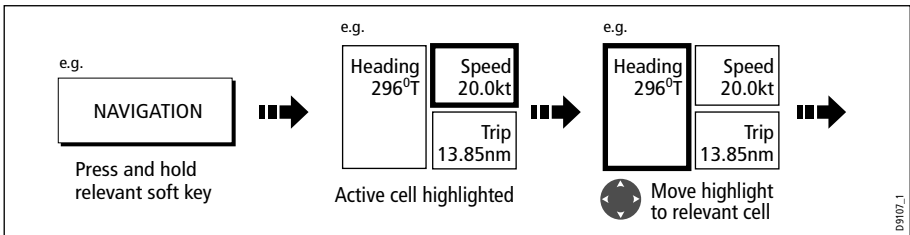
2. Split the highlighted cell:



Merging a cell

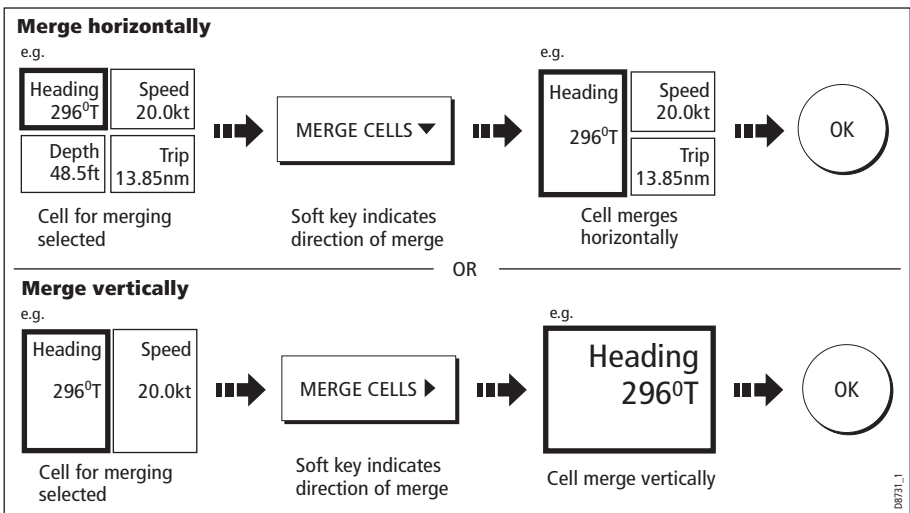
Use the MERGE CELLS function to make a cell larger and therefore easier to see:

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:



Chapter 8: Using the Course Deviation Indicator Indicator

8.1 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.

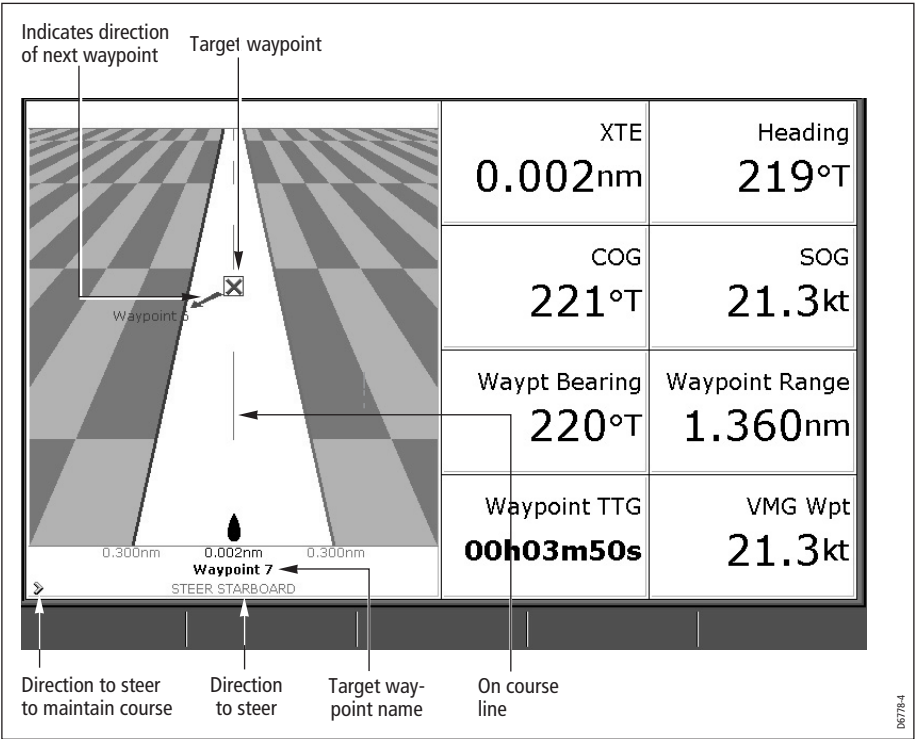
The CDI application is pre-configured to display the CDI graphic. You can customize the panel to display any available data.

8.2 The CDI screen

The CDI gives a graphical representation of yours 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.

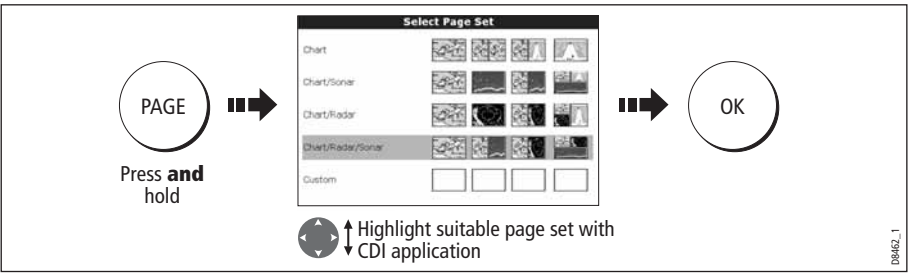
Instruction	Cause
STEER STARBOARD	XTE error to port is more than a 1/4 of the maximum XTE error limit in the Setup menu
STEER PORT	XTE error to starboard is more than a 1/4 of the maximum XTE error limit in the Setup menu

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.

8.3 Selecting the CDI application

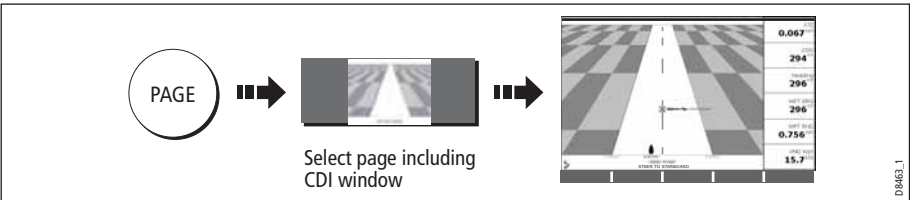
To select the CDI application:

- 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.

8.4 Modifying the CDI application

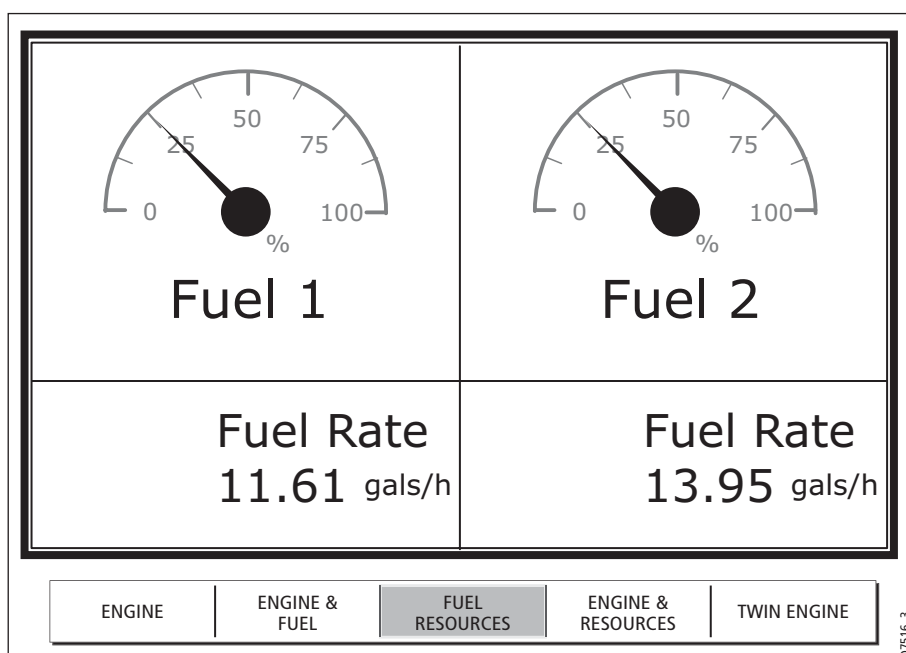
If required, you can modify the information displayed in the CDI application window to meet your own particular requirements. For details, please refer to *page 180*.

Chapter 9: Using the Engine Monitor

9.1 Introduction

The engine monitor 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 C-Series display via NMEA2000/SeaTalk².

Note: For details of compatible engines and related software updates, please refer to the Raymarine website on www.raymarine.com.



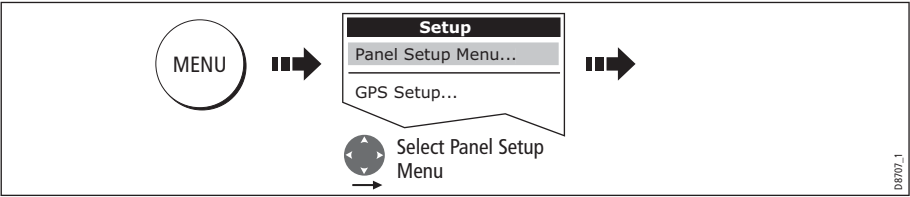
If the pre-configured content of these panels and/or the layout of the individual data boxes is not suitable, you can configure the system to display the data and layout of your choice - see [page 153](#).

9.2 Displaying and setting up the engine monitor

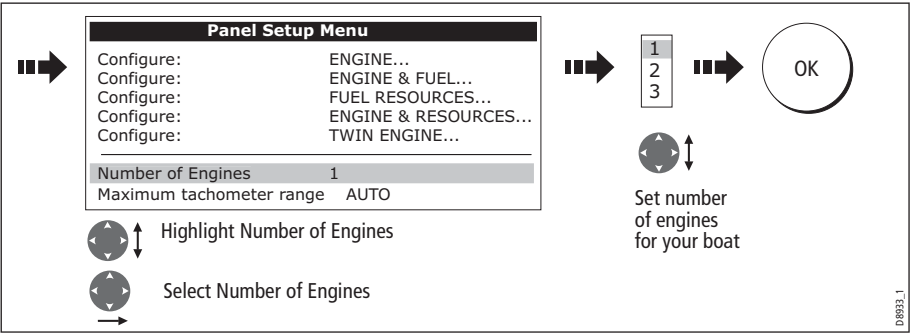
Before using the engine monitor application you should set up your system as follows:

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 177](#).
2. Set the number of engines and the maximum tachometer range to reflect your particular vessel:

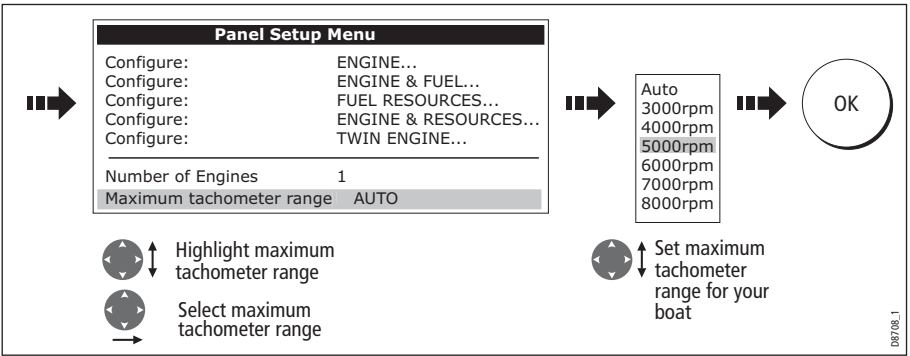
i. With an engine monitor window active, select the Panel Setup Menu:



ii. Set the number of engines:



iii. Set the maximum tachometer range:



Note: The engine temperature unit ($^{\circ}\text{F}$ or $^{\circ}\text{C}$) and the fuel unit (litres, imperial gallons or US gallons) is defined in the System Setup Menu (Units Setup) and is detailed on page 185.

9.3 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	Twin engines
Data content	Tacho & engine hours	✓	✓		✓	✓
	Oil pressure	✓	✓		✓	✓
	Engine coolant temperature	✓	✓		✓	✓
	Boost pressure	✓	✓		✓	✓
	Alternator	✓	✓		✓	✓
	Fuel level (tanks 1 & 2)		✓	✓	✓	
	Fuel rate			✓	✓	
	Total fuel			✓	✓	

9.4 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. For further detail, please refer to *page 153*.

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

9.5 What should I do when an alarm is triggered?

Your engine monitor application will trigger an alarm (via NMEA/SeaTalk²) 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.*

Chapter 10: Navtex

10.1 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.

10.2 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 186*).
2. Enable the category of Navtex messages that you wish to receive alerts for (see *page 164*).

10.3 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:

The screenshot shows a 'Navtex Alert' window with the following fields:

ID:	Date:	Time:
KA53	02/02/2006	02:37:36PM

Message:

AVURNAV CHERBOURG 021

PORTLAND

WRECK CHIMICAL VESSEL "ECE" SUNK IN POSITION: 4943.7 N 003 15.4 W

AT 010230Z FEB. LENGHT: 126 METERS. NO FISHING AND ALL NAUTICAL

ACTIVITIES PROHIBITED ONE NAUTICAL AROUND POSITION OF WRECK

At the bottom of the window are two buttons: 'ERASE MESSAGE' and 'SAVE MESSAGE'.

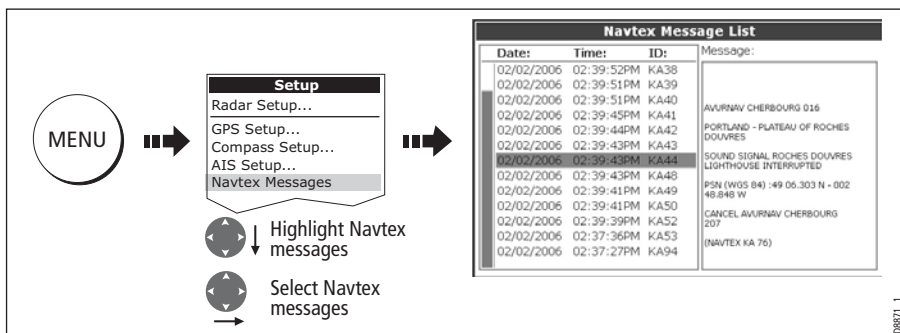
Proceed as follows:

- 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.

10.4 Viewing messages

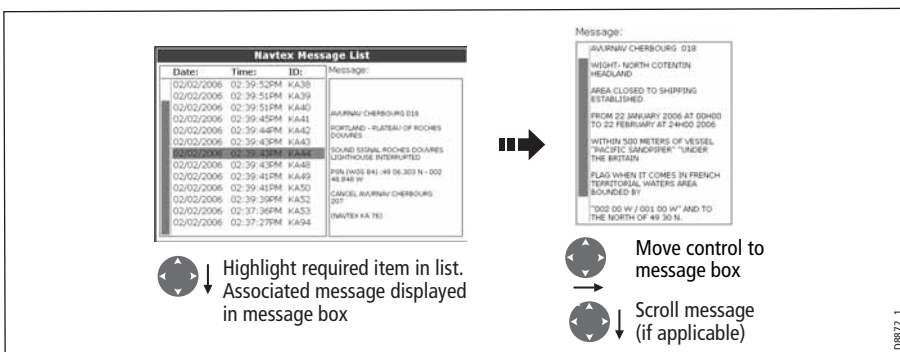
Displaying the Navtex Message List

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



10.5 Managing Navtex messages

You can manage your messages by:

- Selecting the message categories for which the C-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:

Navtex Message List

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	NAVNAV CHENBOURG 038
02/02/2006	02:39:45PM	KA41	PORTLAND - PLATON OF RICHES
02/02/2006	02:39:44PM	KA42	COAST
02/02/2006	02:39:43PM	KA43	COAST
02/02/2006	02:39:43PM	KA44	COAST
02/02/2006	02:39:43PM	KA45	COAST
02/02/2006	02:39:43PM	KA46	COAST
02/02/2006	02:39:43PM	KA47	COAST
02/02/2006	02:39:43PM	KA48	COAST
02/02/2006	02:39:43PM	KA49	COAST
02/02/2006	02:39:43PM	KA50	COAST
02/02/2006	02:39:36PM	KA51	CANCEL NAVNAV CHENBOURG
02/02/2006	02:37:36PM	KA53	037
02/02/2006	02:37:27PM	KA54	NAVTEX KA 761

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 - Loran 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).

Navtex Message List

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	NAVNAV CHENBOURG 038
02/02/2006	02:39:45PM	KA41	PORTLAND - PLATON OF RICHES
02/02/2006	02:39:44PM	KA42	COAST
02/02/2006	02:39:43PM	KA43	COAST
02/02/2006	02:39:43PM	KA44	COAST
02/02/2006	02:39:43PM	KA45	COAST
02/02/2006	02:39:43PM	KA46	COAST
02/02/2006	02:39:43PM	KA47	COAST
02/02/2006	02:39:43PM	KA48	COAST
02/02/2006	02:39:43PM	KA49	COAST
02/02/2006	02:39:43PM	KA50	COAST
02/02/2006	02:39:36PM	KA51	CANCEL NAVNAV CHENBOURG
02/02/2006	02:37:36PM	KA53	037
02/02/2006	02:37:27PM	KA54	NAVTEX KA 761

SORT LIST
DATE STN CAT

Toggle to required sort option e.g. station

Navtex Message List

Date:	Time:	ID:	Message:
02/02/2006	02:32:48PM	EL59	
02/02/2006	02:32:37PM	EA92	TS 08
02/02/2006	02:32:03PM	EL59	
02/02/2006	02:31:56PM	EL59	
02/02/2006	02:31:52PM	KA29	
02/02/2006	02:31:48PM	KA34	NAV NAV CHENBOURG 038
02/02/2006	02:31:43PM	KA35	PORTLAND - PLATON OF RICHES
02/02/2006	02:31:39PM	KA39	COAST
02/02/2006	02:31:42PM	KA54	PORTLAND - PLATON OF RICHES
02/02/2006	02:31:09PM	CA27	037
02/02/2006	02:32:58PM	TA37	
02/02/2006	02:32:38PM	TA36	
02/02/2006	02:32:11PM	TA35	

List sorted by DATE (default)

List sorts accordingly

Chapter 11: Automatic Identification System (AIS)

11.1 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.

11.2 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.*

Data details	Class A (Sends and receives)	Class B (receives only)
Static Data <ul style="list-style-type: none"> • Ship's name • Type • Call sign • IMO number • Length and beam • Antenna location 	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
Voyage Related Data <ul style="list-style-type: none"> • Draft • Cargo information • Destination • ETA • Other relevant information 	✓ ✓ ✓ ✓ ✓	 ✓ ✓
Dynamic Data <ul style="list-style-type: none"> • Time • Ship's position • COG • SOG • Gyro heading • Rate of turn • Navigational status 	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓
Dynamic Reports <ul style="list-style-type: none"> • Ship's speed • Ship's status 	✓ ✓	✓ ✓
Messages <ul style="list-style-type: none"> • Alarm • Safety 	✓ ✓	✓ ✓

D9656_1

Note: To change the specified AIS targets and range see page 173.

11.3 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.

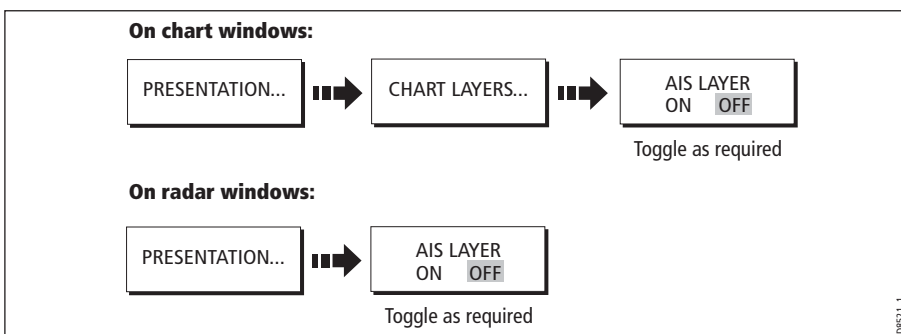
- A VHF antenna - this is usually supplied with the AIS system.
- A GPS - to provide position data.
- A Compass - although not essential, will improve speed calculations.

When the AIS unit is connected to the C-Series display, the status of the unit is indicated by an AIS icon in the transducer data box.

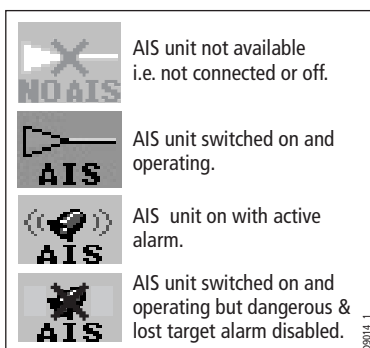
You will now need to specify the 38,400 baud for the NMEA port that communicates with the AIS transceiver or receiver (see *page 186*).

11.4 Selecting the AIS function

AIS is a selectable layer of the chart or radar application. To switch on AIS:



AIS status

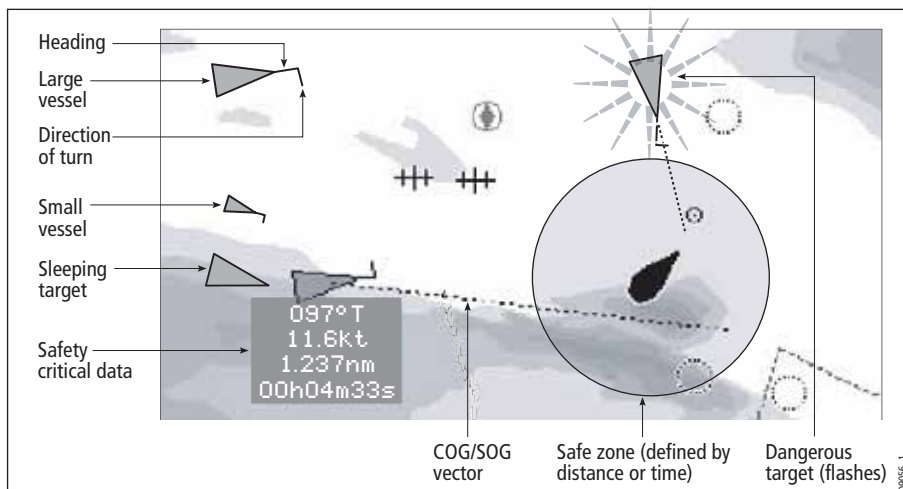


The status of the AIS is displayed in the data bar on your display.

If your own boat's position is lost the display will disable the AIS functionality and will display the AIS indicator in parenthesis.

Once your own boat's position returns and the AIS display is switched on, the display will re-enable the AIS function.

11.5 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 176*).

AIS Target symbols

Sleeping target <ul style="list-style-type: none"> Target not activated, dangerous or lost. 	
Activated target <ul style="list-style-type: none"> Target activated i.e. AIS vector displayed. Vector line (optional) shows predicted distance travelled within given time. 	
Selected target <ul style="list-style-type: none"> Target selected with cursor. Can activate the target and view detailed data. 	
Dangerous target <ul style="list-style-type: none"> Targets within specified distance (CPA) or time (TCPA). Dangerous target alarm sounds if en-abled. Target flashes. 	
Uncertain target <ul style="list-style-type: none"> Calculated CPA/TCPA value uncertain. 	
Lost target <ul style="list-style-type: none"> When signal of dangerous target not received for 20 seconds. Target in latest predicted position. Alarms sounds if enabled. Target flashes. 	

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:

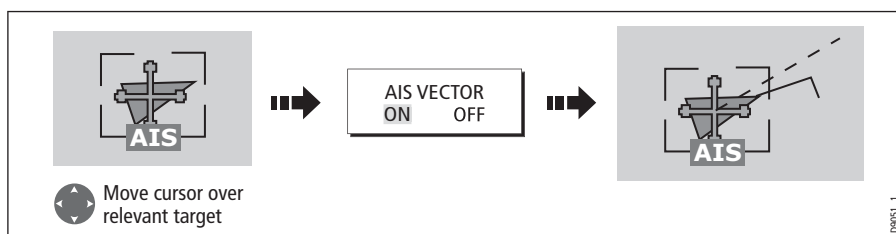
- AIS vectors.
- AIS safety critical data.
- AIS List.
- Full AIS data.

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:



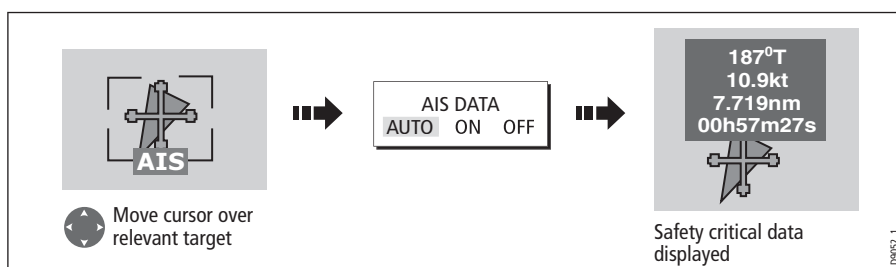
When a target is activated, its symbol is scaled according to the size of the vessel.

Note: The same target vector and 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

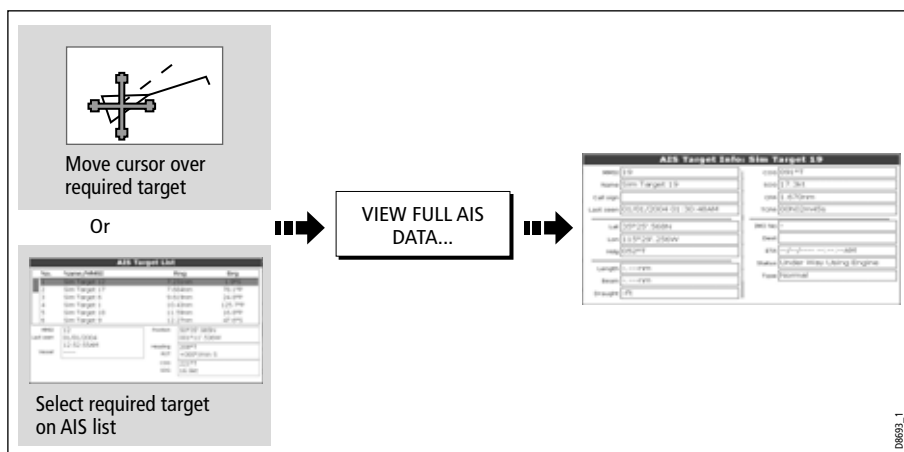
MMSI	12	Position	50°35'.985N
Last seen	01/01/2004		001°11'.536W
	12:52:55AM	Heading	208°T
Vessel	-----	ROT	+000°/min S
		COG	221°T
		SOG	16.9kt

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:



11.6 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?

A safe zone is a ring centred on your boat within which a target is considered dangerous. 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.

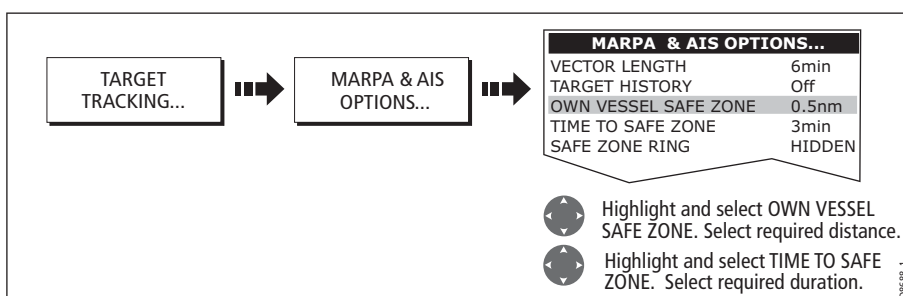
Disabling the dangerous target alarm



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.

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 176*) or the VISIBLE/HIDDEN status of the safe zone ring

MARPA and AIS options

Parameter	Options (Default in bold)
Vector Length The time period specified for drawing length of vectors.	0.5min, 1 min, 3 min, 6min , 12min, 30 min, 60 min
Target History 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.	OFF , 0.5 min, 1 min, 3 min, 6 min
Own vessel safe zone 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, 0.5nm , 1.0 nm, 2.0nm
Time to safe zone If a target enters your safe zone within this time period, it is considered dangerous.	3 mins , 6 mins, 12 mins, 24 mins
Safe zone ring Controls whether the safe zone ring is displayed or hidden on screen	Visible Hidden

Safety messages

When the status of the AIS Safety Messages function is set to ON in the AIS Layer Setup Menu (see *page 176*), 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.*

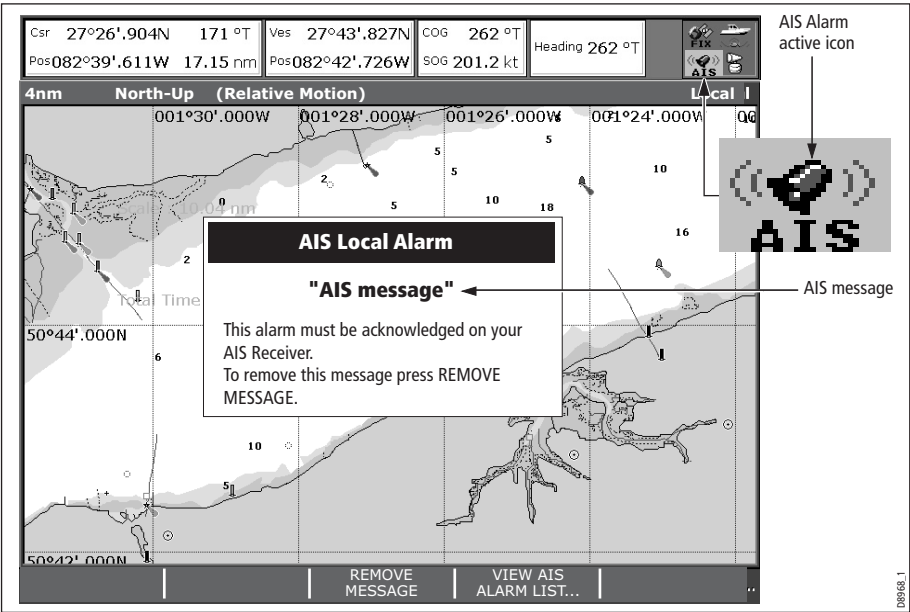
11.7 AIS Alarms

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 C-Series display whenever an alarm condition exists on the unit.

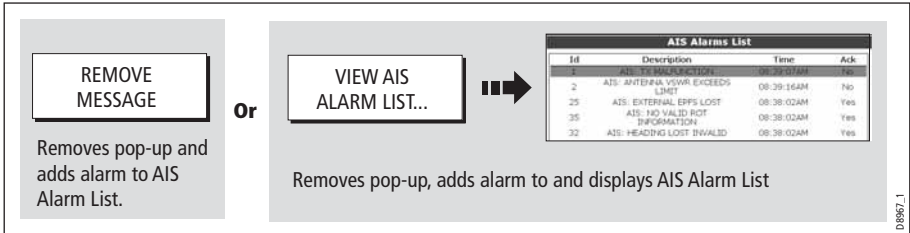
Local AIS alarms

When the connected AIS unit generates an alarm, your C-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 176*) or from the Alarms Setup Menu (see *page 187*).

Note: The local AIS alarms must be acknowledged at the AIS receiver. Removing the message or adding it to the Alarm list on your C-Series display does not cancel the alarm.

11.8 Simulator

We recommend that you use the simulator to familiarize yourself with the AIS function.

When the system simulator is switched on (see *page 184*), it displays 20 AIS targets within a 25nm range. These targets are displayed using the appropriate AIS targets status symbol (see *page 170*) and move around the screen as if they were real targets.

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

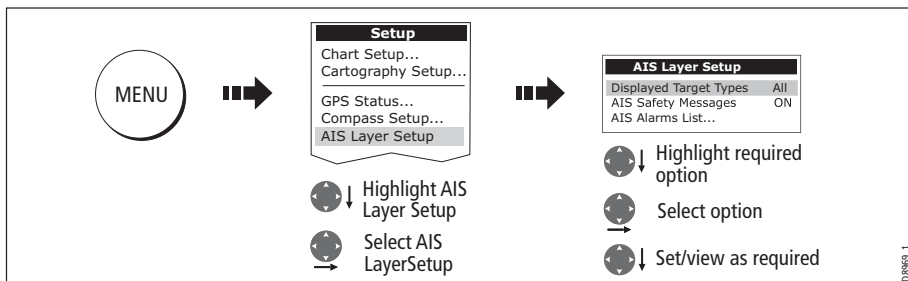
11.9 AIS Layer Setup Menu

The AIS Layer Setup Menu allows you to:

- Select the target types displayed (ALL or DANGEROUS).
- Switch the dangerous and lost target alarm warning ON/OFF.
- 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 169*).
2. Select the AIS Layer Setup:



Chapter 12: System setup and customizing

This chapter describes how to setup and customize your C-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.

12.1 Customizing the page sets

Each page set provides access to 5 different pages. Each page can display up to four application windows. 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.

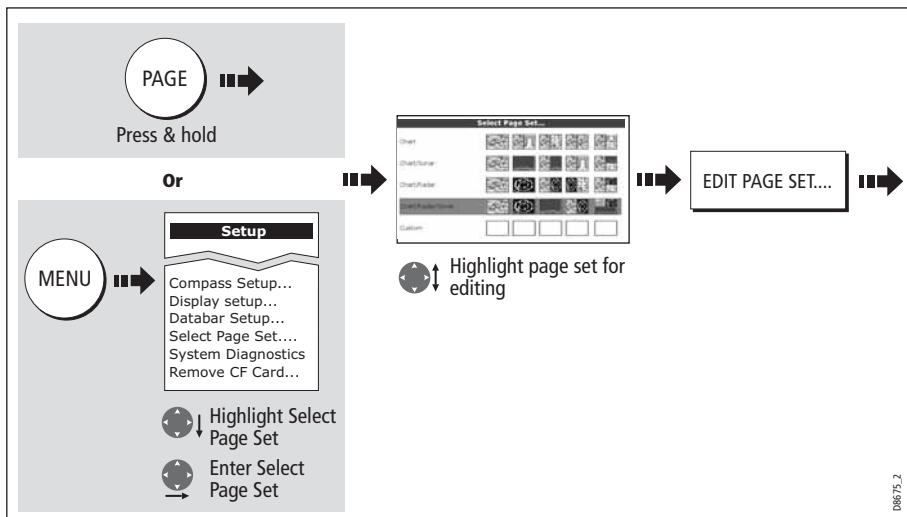
If none of these meet your particular requirements you can edit the page sets to display the application and page layout that suits your particular needs. This process should also be used if you wish to run an engine monitor application.

In addition, you can rename 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.

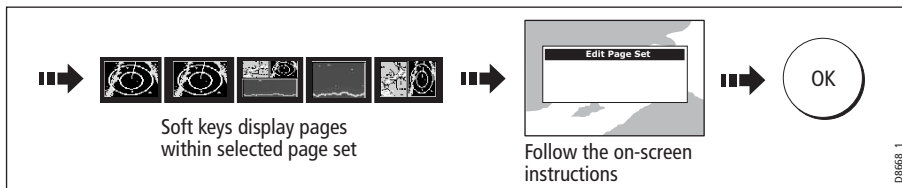
Reconfiguring the application and page layout

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:



The page, window and application layout that you have defined will now be available each time you open the Select Page Set screen.

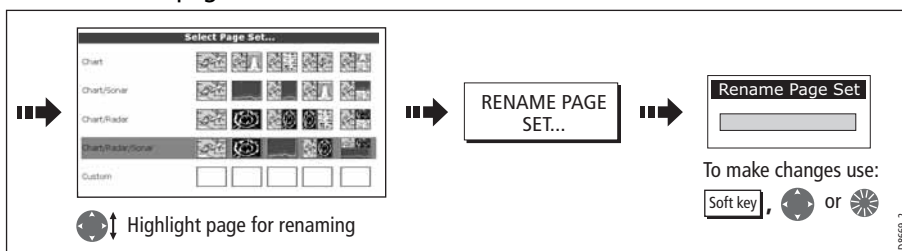
If you do not want to use all 5 pages in a page set, you can switch off individual pages. When you use PAGE to cycle through the pages, the system will now skip any pages that are set to OFF.

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:

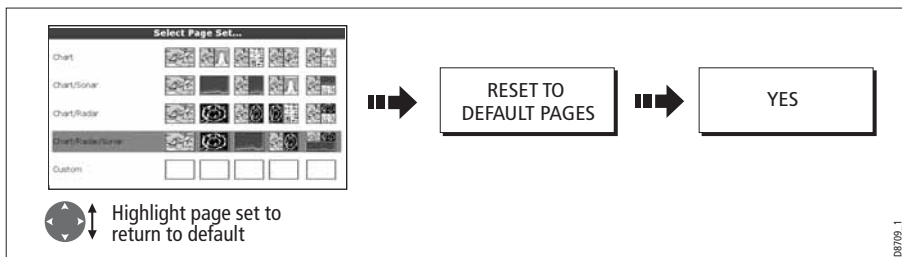
1. Display the Select Page Set Menu, as described on *page 177*
2. Rename the page set:



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 177*.
2. Reset the page set to the default:



12.2 Changing the databar

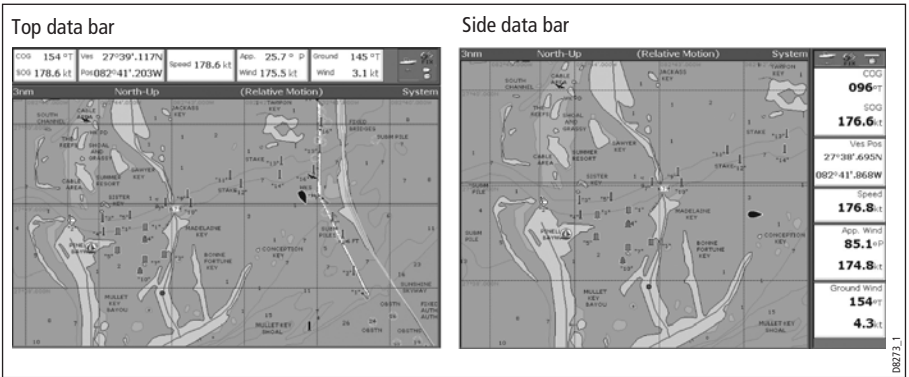
You can change the data bar to meet your own particular needs. This includes:

- Position - top or side.
- Size (top position only).
- Data displayed.

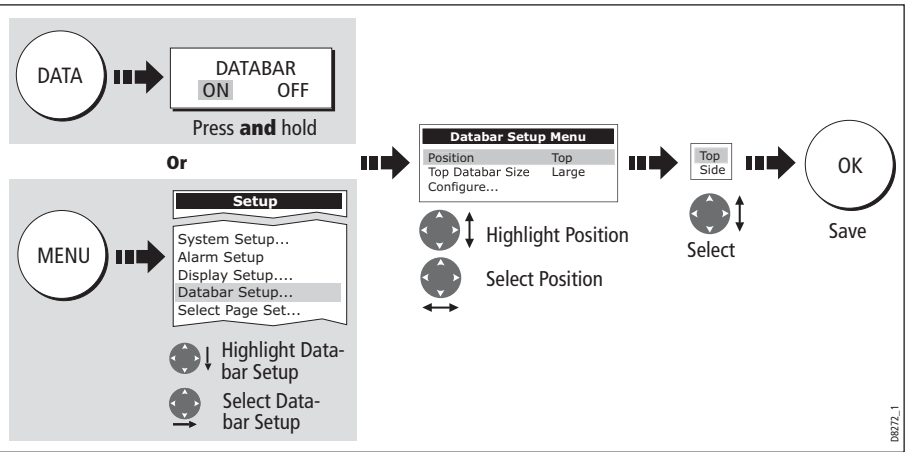
Note: *The databar configuration is a local setting and will therefore only affect the individual display on which you are working.*

Databar position

The data bar can either be displayed vertically at the right-hand side of your screen or horizontally across the top:

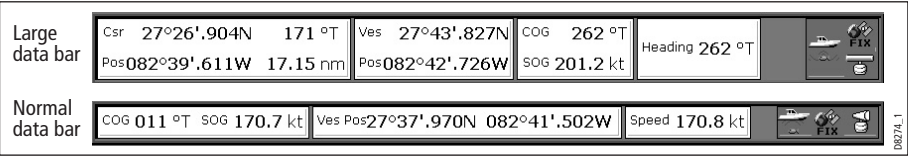


To change the data bar position:

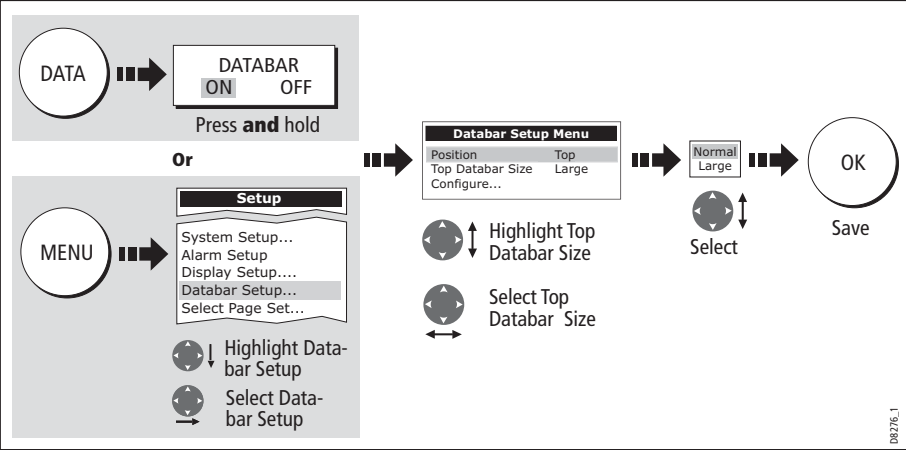


Data bar size

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:



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

Data groups	Data (abbreviations in brackets)
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

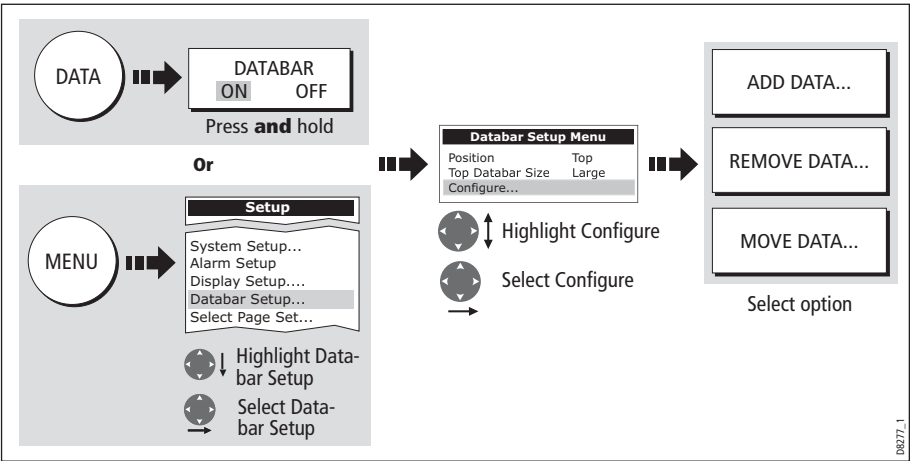
You can view the total distance travelled (Log) and the distance since you last applied a reset (Trip) based on your speed through water (STW).

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 land trip counters resume.

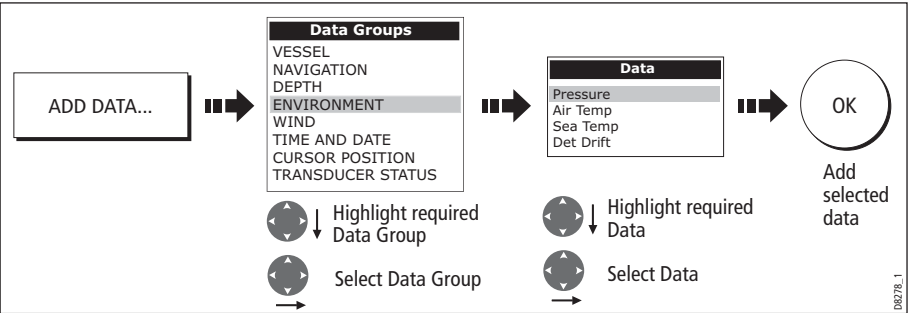
Selecting the configure options

To select the configure options for the data bar:



Adding data

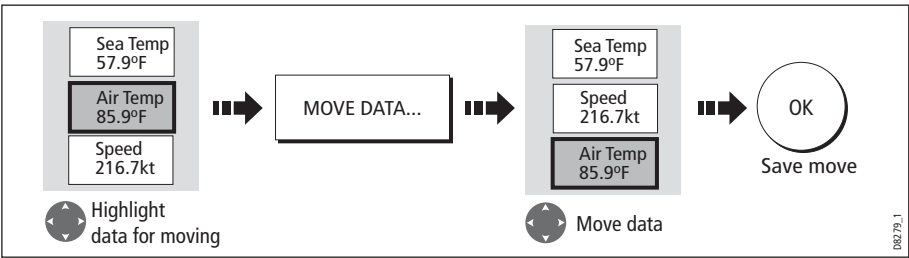
Once you have selected the configure option (see above), you can add new data:



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.

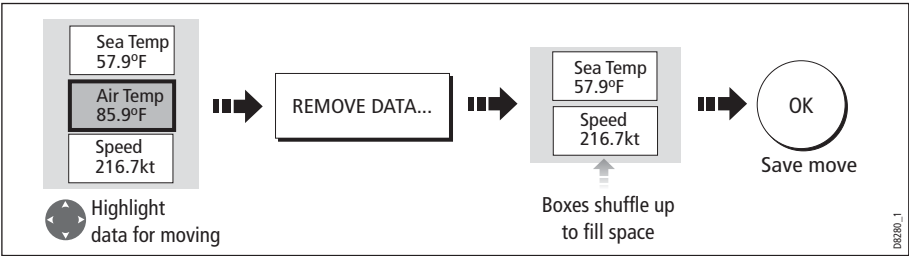
Moving data

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.



MENU ITEM	OPTIONS (Default in bold)
Simulator 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.	OFF ON Demo
Bearing Mode Mode of all bearing and heading data displayed. This does not affect how the chart or radar are drawn.	True Magnetic
MOB Data Type 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.	Dead Reckoning Position
Variation Source This allows you to compensate for the naturally occurring off-set 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.	Auto Manual
Manual variation 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.	0°E Range 0 - 30° east/west
Language Selected language used for screen text, labels, menus, options and display format for lat/lon position information.	Selection available will vary according to your location.
Extended Character Set Controls whether additional accented characters are made available when you are entering text.	OFF ON
Ground Trip Reset... Resets the chosen ground trip distance counter to zero.	Ground Trip 1 - 4 Reset
Settings Reset Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are NOT removed.	
Settings and Data Reset Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are deleted.	
Date /Time Setup	See sub-menu below
Units Setup	See sub-menu below

MENU ITEM	OPTIONS (Default in bold)
System Integration	See sub-menu below
Waypoint Password Set-up... Allows you to set up a password to protect access to your waypoint and route databases.	See <i>page 23</i> .

Date/Time Setup Menu

MENU ITEM	OPTIONS (Default in bold)
Date Format Displays date as day/month/year or month/day/year	mm/dd/yy dd/mm/yy
Time Format Displays either 12 or 24 hour clock	12hr 24hr
Local Time Offset Specify local time in increments of 0.5 hours (plus or minus 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 the nearest 0.5 hr.	+/- 13hrs from UTC

Units Setup Menu

MENU ITEM	OPTIONS (Default in bold)
Distance Unit Choose the units that you require distances to be displayed in.	NM Miles km
Speed Units Choose the units that you require speed to be measured in.	Knots MPH KPH
Depth Units Choose the units that you require depths to be measured in.	Meters Feet Fathoms
Temperature Units Select required temperate unit.	Fahrenheit Celsius

MENU ITEM	OPTIONS (Default in bold)
Pressure Units Select required pressure unit.	Bar Psi Kpa
Volume Units Select required volume unit.	US Gallons Imp Gallons Litres

System Integration Setup Menu

MENU ITEM	OPTIONS (Default in bold)
DSC Message When set to ON, details of distress DSC messages are displayed on screen	ON OFF
SeaTalk Alarms When set to enabled, all SeaTalk system alarms are received and displayed on the chartplotter.	Enabled Disabled
Bridge NMEA Heading 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 OFF
NMEA Output Setup 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
NMEA Port Setting 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.	NMEA 4,800 Navtex 4,800 Navtex 9,600 AIS 38,400
ST290 System Select ON if your C-Series is connected to a SeaTalk ² system.	OFF ON
SeaTalk² Keyboard Used to set up the SeaTalk2 keyboard with your Display. When you are connecting a keyboard to your system select ALL or ONE. When ONE selected press button on required keyboard - display beeps to indicate keyboard selected.	OFF ALL ONE

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 bold)
Anchor Alarm Switches the anchor alarm on or off.	OFF ON
Anchor Alarm Radius 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 0.10nm (or equivalent in the selected <i>Distance Unit</i>)
Timer Switches the countdown timer alarm on or off	OFF ON
Timer Period 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 00h00m
Alarm Clock Switches the alarm clock on or off.	OFF ON
Alarm Clock Time 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 00:00
Temperature Alarm 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> .	OFF ON
Lower Temperature Limit Specifies the lower limit of the temperature range that is to trigger the <i>Temperature Alarm</i> .	60°F 0°-99.8°F
Upper Temperature Limit Specifies the upper limit of the temperature range that is to trigger the <i>Temperature Alarm</i> .	75°F 0.2°-99.9°F

Navigation Alarms Setup

Navigation alarms will sound in any application when you are navigating.

MENU ITEM	OPTIONS (Default in bold)
Arrival Alarm Radius The distance from the target waypoint or the closest point of approach to the target waypoint that triggers the arrival alarm to sound.	0.1nm 0.01 - 9.99nm
Offtrack Alarm Switches the off-track alarm on or off	OFF ON
Offtrack Alarm XTE 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.	0.3nm 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 bold)
Guard Zone Sensitivity Ensure that this is not set too low or targets will be missed.	50% 0 - 100%

Note: If a radar is not detected, the alarm setup windows are greyed out.

Fishfinder Alarms Setup

MENU ITEM	OPTION (Default in bold)
Fish Alarm Switches the fish alarm on or off.	OFF ON
Fish Alarm Sensitivity 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.	5% 10% - 100%
Fish Alarm Depth Limits 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.	OFF ON
Shallow Fish Limit Specifies the lower value for the <i>Fish Alarm Depth Limit</i> .	2ft (0002ft - 1000ft)

MENU ITEM	OPTION (Default in bold)
Deep Fish Limit Specifies the upper value for the <i>Fish Alarm Depth Limit</i>	1000ft (0002ft - 5000ft)
Shallow Depth Alarm Switches the shallow depth alarm on or off. If a DSM is not connected, this cannot be set.	OFF ON
Shallow Depth Alarm Value If the <i>Shallow Depth Alarm</i> is set to ON, an alarm is triggered if the depth drops below the value you specify.	5ft (0002ft - maximum range of transducer)
Deep Depth Alarm Switches the deep depth alarm on or off. If a DSM is not connected, this cannot be set.	OFF ON
Deep Depth Alarm Value If the <i>Deep Depth Alarm</i> is set to ON, an alarm is triggered if the depth exceeds the value that you specify.	3000 ft (DSM with 600W transducer attached) 5000 ft (DSM with 1kW transducer attached)

Note: If a fishfinder is not detected, the alarm setup windows are greyed out.

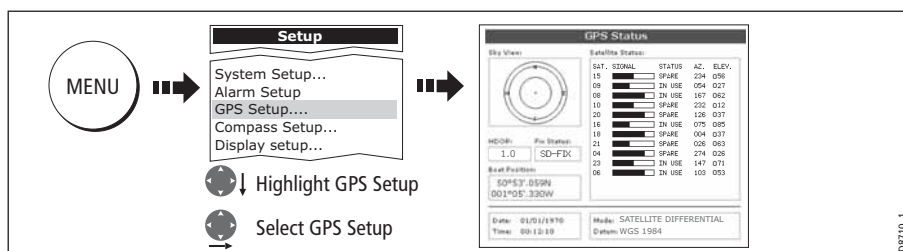
AIS Alarms Setup

Dangerous Targets Alarm Switches the alarm for dangerous targets to on or off. When OFF, the AIS alarm off icon is displayed in the status bar.	OFF ON
AIS Alarm List Details the identity, description, time and acknowledgment of alarm messages received from an AIS receiver.	See "AIS Alarms" on page 174.

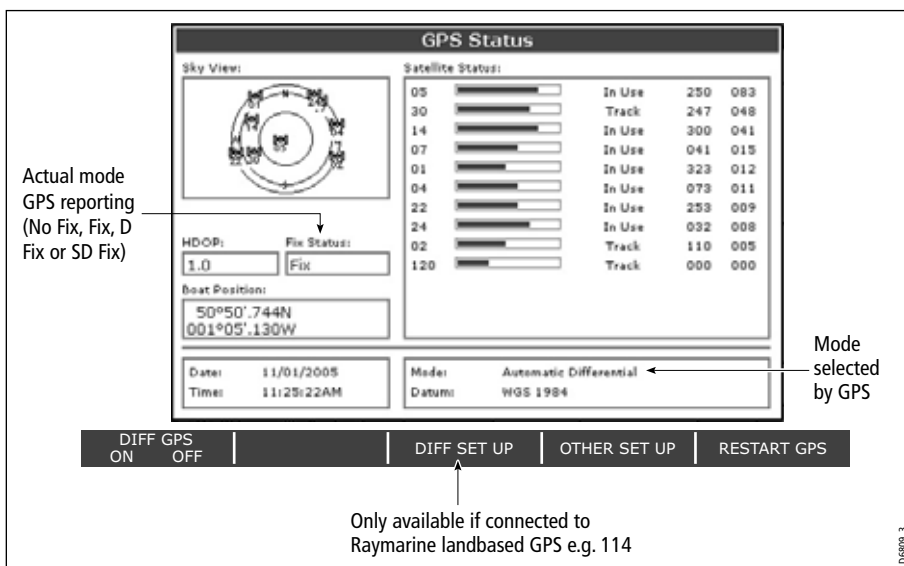
GPS Status

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.



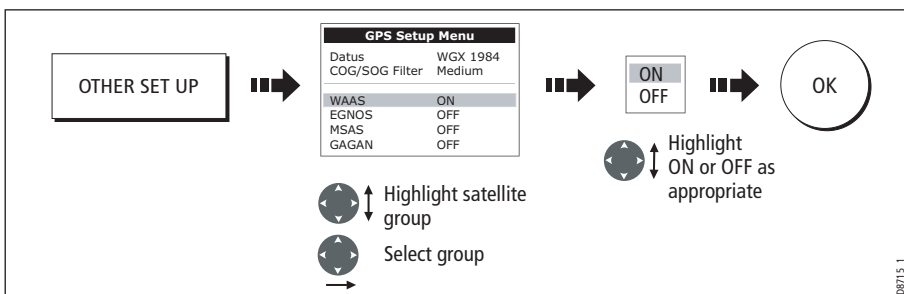
Positional accuracy is dependent upon these parameters; in particular, the azimuth and elevation angles are used in a triangulation process to calculate your position. Horizontal Dilution of Position (HDOP) is a measure of this accuracy; a higher figure signifies a greater positional error. In ideal 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.



Selecting the COG/SOG filter

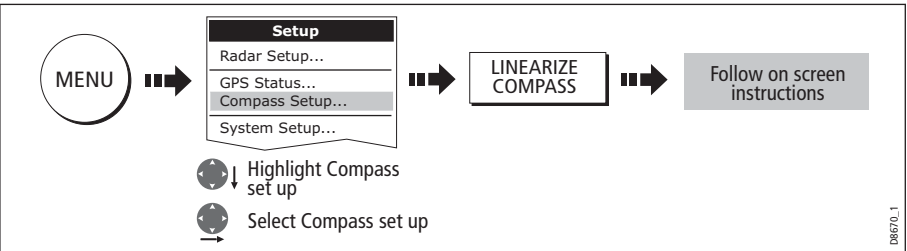
The COG/SOG filter should be set to the level appropriate to your boat's use and to the level of oscillation being experienced by the GPS:

- 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

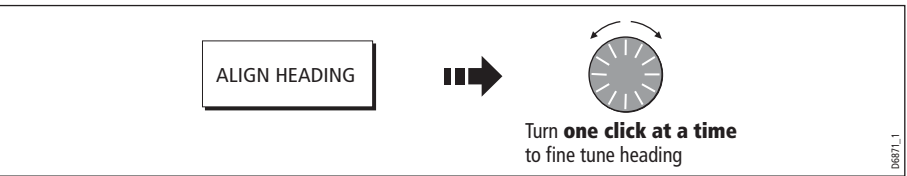
Compass Setup

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 bold)
Soft key Autohide 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.	OFF ON
Cursor Autohide Controls whether the cursor is automatically hidden if not used for 10 seconds. Pressing any key re-displays the cursor.	OFF ON

MENU OPTION	OPTIONS (Default in bold)
Key beep Controls whether a noise is made when you press a key.	OFF ON
Text size Controls the size of the text on the screen	Small Large

Databar Setup

This sub-menu accesses the Configure Data Bar Menu - refer to *page 179* 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 177*.

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 18* thoroughly before attempting to remove or insert a CF card.

Chapter 13: Maintenance & Troubleshooting

13.1 Introduction

This chapter provides information on maintaining and troubleshooting your C-Series Display, and also information on how to get assistance from Raymarine.

13.2 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

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.**

Regularly clean your Display as follows:

1. Switch off the power to the Display.
2. Wipe the Display with a clean soft cloth. To remove oily finger marks use a spray cleaning agent of the type used for cleaning eyeglasses.

A suitable micro-fibre cloth is supplied with your display and spray can be purchased from your local optician.

13.3 Resetting the Display

You can reset the C-Series Display in several ways:

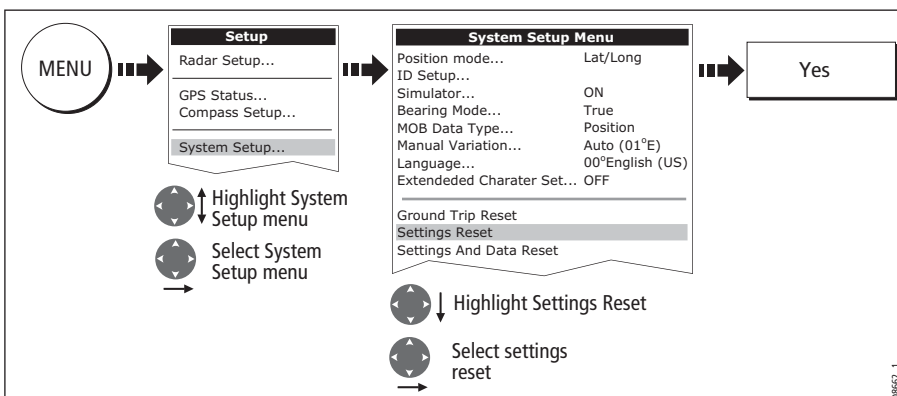
- Settings reset.
- Settings and data reset.

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.

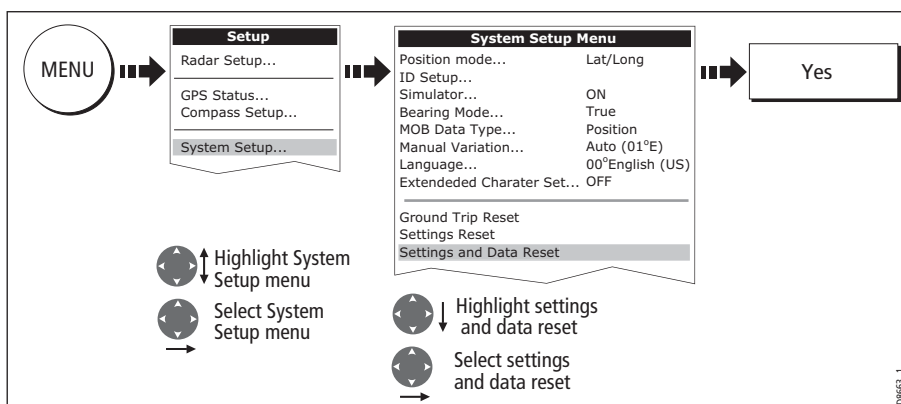
Settings and data reset

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.

13.4 Troubleshooting your Display

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if your C-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.
- Fishfinder application.
- Radar application.

Installation/Display

Problem Solution
Display does not power up <ul style="list-style-type: none"> • Check power supply cable is sound and that all connections are tight and free from corrosion. • Check relevant fuses. • Check power source is of the correct voltage and sufficient current.
My display switches off <ul style="list-style-type: none"> • Check power input connection is secure at the rear of the Display(s). • Check power cable for damage or corrosion. • Check your boat's power supply for faulty connections or insufficient cable diameter.
How do I upgrade my Display software? Visit www.raymarine.com and click on Support to download the latest software. Follow the instructions included with these downloads.
How do I reset my display? Via the system setup menu. For details see page <i>page 194</i> .
Display very dull/hard to view <ul style="list-style-type: none"> • Check PALETTE set to DAY (see <i>page 16</i>). • Check backlight level (see <i>page 16</i>).
No fix displayed against GPS status icon <ul style="list-style-type: none"> • Check GPS status (see <i>page 189</i>). • 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 <ul style="list-style-type: none"> • 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.

Chart

Problem

Solution

Display continually resets, reboots or initiates power cycles

- Check that buttons are not stuck down or held down by the fascia bezel.
- Save waypoint, route and track data if you can. A reset is necessary which will erase all stored data and settings.
- While the display continues to reboot, press and hold the first softkey (next to the power button).
- Keep the softkey held down while the system reboots. A "Factory Reset" countdown is displayed. Keep holding the softkey down until the countdown completes. The display restarts, and the factory reset is complete.
- Perform a software upgrade or reinstall software if the latest software is already installed.

Display occasionally reboots, crashes or performs erratically

- Check that buttons are not stuck down or held down by the fascia bezel.
- Save waypoint, route and track data if you can. A reset is necessary which will erase all stored data and settings.
- If the menus are available, perform a settings and data reset (see page 195). If the menus are **not** available, perform a **factory reset**:
 - *Press the power button to turn off the display.*
 - *Press and hold the first softkey (next to the power button).*
 - *Keep holding the softkey down, then press the power button. A "Factory Reset" countdown is displayed. Keep holding the first softkey down until the countdown completes. When it does, the display restarts and the factory reset is complete.*
- Perform a software upgrade or reinstall software if the latest software is already installed.

Vessel not shown in correct geographical position on Display

- Check GPS status (*page 189*).
- Check that the Display is not in Simulator mode (see *page 184*).
- Check the SDGPS setting is switched OFF.
- Perform the chart offset operation (see *page 91*).

Display does not show enough chart detail

- Check that the chart card for the appropriate area is installed.
- Set the Declutter option to OFF (see *page 89*).
- In the Cartography Setup Menu switch the appropriate feature(s) to ON.

Display will not read chart correctly

- Check the Chart Card has been inserted correctly with the display switched off.
- Check this is the correct compact flash cartography for the unit.

Fishfinder

Problem
Solution
<p>How do I upgrade my DSM software?</p> <p>Visit www.raymarine.com and click on Support to download the latest software. Follow the instructions included with these downloads.</p>
<p>'No data source' for my fishfinder</p> <ul style="list-style-type: none"> • Check the DSM power cable is free from damage and corrosion. • Check DSM is receiving the correct voltage and current. • Check status LED of the DSM unit - refer to Maintenance and problem solving section of the DSM owner's handbook. • Check the DSM's connections are sound and connected correctly - refer to the System Integration chapter of your C-Series Installation Guide.
<p>No depth readings available from the DSM</p> <ul style="list-style-type: none"> • Check status LED of DSM unit - refer to the Maintenance and Problem solving section of your DSM Owner's manual • Check Gain setup and Transducer frequency - refer to the Fishfinder chapter in your Reference Manual. • Check the DSM power cable is free from damage and corrosion

Radar

Problem
Solution
<p>'No data' message</p> <ul style="list-style-type: none"> • Check that cable connecting the scanner to the Display is securely connected and undamaged.
<p>'Scanner software incompatible' message</p> <ul style="list-style-type: none"> • Check software revisions by contacting your local Raymarine dealer.
<p>"Invalid scanner software: Version xx.x, Version xx.x required"</p> <p>Incorrect software version installed. Contact your local Raymarine dealer.</p>
<p>"Scanner not responding" message</p> <p>Check that the cable connecting the scanner to the radar display unit is securely connected and undamaged.</p>
<p>"Open array cannot be powered from the display"</p> <p>Scanner not compatible with C-Series Display - refer to <i>Important Information</i> Section of this manual.</p>
<p>"Scanner hardware fault"</p> <p>Scanner not functioning - refer to <i>Chapter 4 - Maintenance & Troubleshooting</i> of this manual.</p>
<p>The bearing displayed on the radar picture is not the same as the actual bearing</p> <p>Perform the bearing alignment procedures described in the Installation Guide.</p>

13.5 Getting Technical Support

This section details how you can obtain technical support for your C-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.

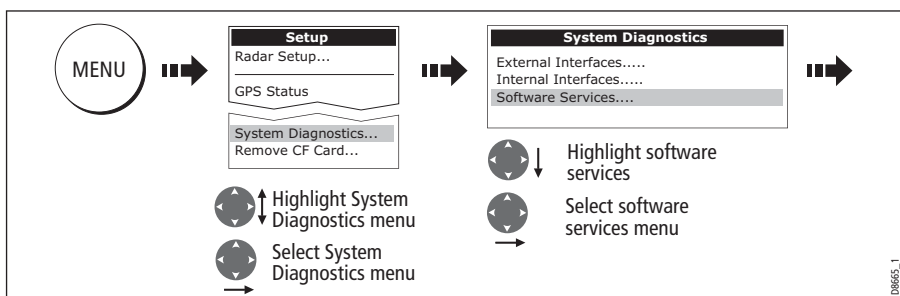
Help us to help you

When requesting service, please quote the following product information:

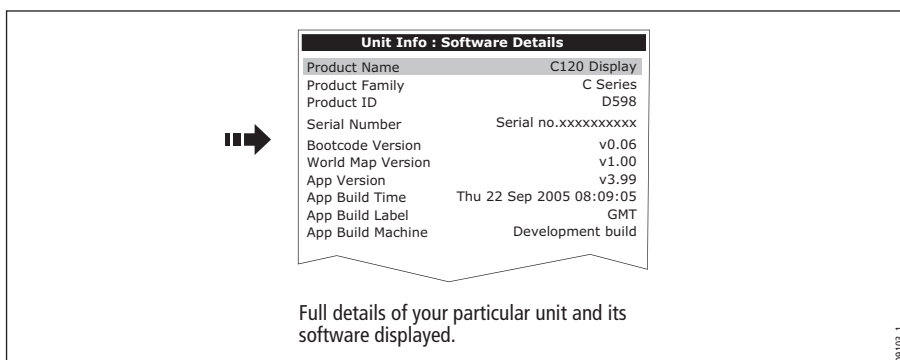
- Product name.
- Product identity.
- Serial number.
- Software application version.

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

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
1-800-539-5539

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 cartography, please contact Navionics directly through their web site:

www.navionics.com

or contact Navionics customer support:

Navionics customer support		
Navionics Italy	Via Fondacci, 269 Z.I. Montramito 55054 Massarosa Italy	Tel: +39-0584-329111 Fax: +39-0584-962696 sales@navionics.it
Navionics USA	6 Thatcher Lane Wareham MA 02571 USA	Toll Free: 800-848-5896 Tel: 508-291-6000 Fax: 508-291-6006 sales@navionics.com
Navionics Australia	134/85 Reynolds Street Balmain NSW 2041 Australia	Tel: +61-2-9555-2522 Fax: +61-2-9555-2900 sales@navionics.com.au
Navionics UK	PO Box 38 Plymouth, PL9 8YY England	Tel: +44-1752-204735 Fax: +44-1752-204736 sales@navionics.co.uk

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 the link below:

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

Appendix A: Specification

C70, C80 and C120 LCD Color Displays

General

Approvals: CE FCC	Conforms to essential requirements of 1995/5/EC, 1989/336/EC. Compliant with CFR47 Parts 2 & 80
Size: C70 C80 C120	253 x 175 x 110 mm (9.9 x 6.9 x 4.3 in.) excluding bracket 283 x 210 x 110 mm (11.1 x 8.2 x 4.3 in.) excluding bracket 356 x 264 x 114 mm (14.0 x 10.4 x 4.5 in.) excluding bracket
Weight: C70 C80 C120	1.2 kg. (2.6 lbs) 1.8 kg. (3.9 lbs) 3.0 kg. (6.6 lbs)
Mounting	Bracket with panel mount option
Supply voltage	12V or 24V DC nominal (10.7-32V DC maximum) Floating earth/ fully isolated
Power consumption: C70 C80 C120	9 W (full brightness) 10 W (full brightness) 12 W (full brightness)
Environmental: Op/Storage Temp. Range Humidity limit	Waterproof to CFR46; 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	Color TFT LCD
Resolution: C70 C80 C120	640 x 480 pixels (VGA) 640 x 480 pixels (VGA) 800 x 600 pixels (VGA)
Display size: C70 C80 C120	6.5 in 8.4 in 12.1 in
Display Windows	Chart, Radar, Fishfinder, CDI, Data and Engine Monitor
Illumination	Screen and keypad: 0 to 100% in 64 steps Day and Night color palettes available
Languages	The selection available will vary according to your location.
System Alarms	Alarm clock, Anchor, Arrival, Deep depth, MOB, Offtrack, Shallow depth, Temperature, Timer

General

Connectors	13 pin Radar scanner 4 pin DSM 3 pin SeaTalk 5 pin NMEA 5 pin SeaTalk ² / NMEA2000 3 pin Power
Interfaces	Pathfinder Radar scanner 1 x DSM receive 1 x SeaTalk, receive and transmit 1 x NMEA0183, receive and transmit 1 x SeaTalk ² / NMEA2000 CompactFlash card slot
Waypoints	1000 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

Radar Features

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	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
Off centre function	In Relative Motion, 66% of radius (except at max. range)
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. Specify range and display heading/ speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.

Chart Features

Cartography	Navionics Charts on CompactFlash cards Chart of the world built in
Chart scaling	1/64nm (if cartographic detail is available to 4000nm)
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic) Relative or True Motion
Waypoints	1000 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 100 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 optimisation reduces number of points used. Additional storage available on CompactFlash cards
Alarms	Programmable waypoint arrival, cross track error, anchor alarm, anchor drift, position fix/data loss warning, countdown timer and alarm clock.
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.
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual
AIS overlay	Switch AIS symbols on/off. Specify range and display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.
Radar/Chart overlay	Radar image can be overlaid on all screen charts

Fishfinder features

Transducer	Transom-mount, in-hull or thru-hull
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
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

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 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.

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, Temperature, MOB and cursor position
SeaTalk Output	Cursor data, guard zone and navigational data bridged from NMEA
SeaTalk ² Input	
SeaTalk ² Output	
AIS Receiver	To receive or receive and transmit AIS data.

Appendix B: List of Abbreviations

AIS	Automatic Identification System	km	Kilometer
ALR	Alarm	kpa	Kilo pascals
°C	Degrees Centigrade	KPH	Kilometers per hour
°F	Degrees Farenheit	kt	Knots
amp	Amperes	ky	Kiloyards
Auto	Automatic	l	litres
CAT	Category	Lat	Latitude
CCFL	Cold Cathode Fluorescent Lamp	Lon	Longitude
CDI	Course Deviation Indicator	m	Metres
COG	Course Over Ground	Man	Manual
C-Up	Course up orientation	MARPA	Mini Automatic Radar Plotting
CPA	Closest Point of Approach	MMSI	Maritime Mobile Service Identity
DC	Direct Current	MOB	Man Overboard
DSC	Digital Selective Calling	MPH	Miles per hour
DSM	Digital Sounder Module	nm	Nautical Mile
EBL	Electronic Bearing Line	NMEA	National Marine Electronics
EMC	Electromagnetic Compatibility	N-Up	North up orientation
ETA	Estimated time of arrival	OSH	Automatic offshore mode
fa	Fathoms	PSI	Pounds per square inch
ft	Feet	RM	Relative motion
FTC	Fast Time Constant	RTE	Route
gal	Gallons	ROT	Rate of turn
GPS	Global Positioning System	s	seconds
HBR	Automatic harbor mode	SHM	Ships Heading Marker
HDFI	High Definition Fish Imaging	sm	Statute Miles
HDG	Heading	SOG	Speed Over Ground
H-Up	Head up orientation	SRM	Safety Related Message
KHz	Kilohertz	STDBY	Standby

STN	Station
TCPA	Time to Closest Point of
TM	True motion
TTG	Time To Go
TVG	Time Variable Gain
TX	Transmit
UTC	Universal Time Constant
VMG	Velocity Made Good
VRM	Variable Range Marker
WPT/	Waypoint/Waypoints
XTE	Cross Track Error

Appendix C: List of cursor labels

Label	Feature	Application
A/B	Ruler line	Chart
AIS	AIS target	Chart
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

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