SL520/530/631 PLUS Chartplotter Display

Owner's Handbook

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INTENDED USE

The display units detailed in this handbook may form part of navigational radar systems intended for light marine use. These displays and radar systems are only an aid to navigation.

SAFETY NOTICES

This equipment must be installed and operated in accordance with the instructions contained in this manual. Failure to do so can result in personal injury and/or navigational inaccuracies. In particular:

1. HIGH VOLTAGE. The LCD display unit unit contains 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.

2. NAVIGATION AID. This unit is only an aid to navigation. Its accuracy can be affected by many factors, including equipment failure or defects, environmental conditions, and improper handling or use. It is the user's responsibility to exercise common prudence and navigational judgements. This unit should not be relied upon as a substitute for such prudence and judgement.

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The technical and graphical information contained in this handbook, to the best of our knowledge, was correct as it went to press. However, our policy of continuous improvement and updating may change product specifications without prior notice. As a result, unavoidable differences between the product and handbook may occur from time to time, for which liability cannot be accepted by Raymarine.

Preface

This handbook describes the following PLUS displays from Raymarine:

System		Display	Scanner	Chartplotter
Chartplotter -	Mono 7″ Display	SL520 PLUS	No	Yes
	Color 7″ Display	SL530 PLUS	No	Yes
	Color 10.4″ Display	SL631 PLUS	No	Yes

Note: *The display units include a cartridge holder assembly which contains two slots for C-MAP NT chart cards.*

This handbook contains very important information on the installation and operation of your new equipment. In order to obtain the best results in operation and performance, please read this handbook thoroughly.

Raymarine's Technical Services representatives or your local dealer will be available to answer any questions you may have.

TFT Color LCD Displays

The colors of the display may seem to vary when viewed against a colored background or in colored light. This is a perfectly normal effect that will be seen with all color LCD displays.

In common with all Thin Film Transistor (TFT) LCD displays, the screen may exhibit a few (less than 20) wrongly illuminated pixels. These may appear as black pixels in a light portion of the screen, or as colored pixels in black areas.

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

Warranty

To register your display unit ownership, please take a few minutes to fill out the warranty registration card found at the end of this handbook. It is very important that you complete the owner information and return the card to the factory in order to receive full warranty benefits.

EMC Conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment.

The design and manufacture of Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised.

Contents

Chapter 1: Overview

How to Use This Handbook

This handbook describes the following displays:

SL520 PLUS Chartplotter, 7" Mono Display
SL530 PLUS Chartplotter, 7" Color Display
SL631 PLUS Chartplotter, 10.4" Color Display

If you are installing the display system yourself, you should read *Chapter 6* before you start the installation. This chapter also provides information that will be useful if you are connecting your system to other equipment.

For an overview of the display unit controls and the chartplotter system, read *Chapter 1*. *Chapter 2* will help you start using your system.

For chartplotter operating details, refer to *Chapter 3* and *Chapter 4*.

To change the system set up defaults, read *Chapter 5*.

Note: *Many illustrations in this handbook show example screens. The screen you see on your display depends on your system configuration and set up options, so it may differ from the illustration.*

This handbook is organized as follows:

Chapter 1 provides an overview of the features and functions of the Display. This chapter also provides an overview of the controls. You should read this chapter to familiarize yourself with the system.

Chapter 2 explains how to start using the display and describes how to use some of the basic chart functions. Chapter 2 also provides operating guidelines for typical chartplotter scenarios; these guidelines introduce you to many of the chartplotter functions.

Chapter 3 provides detailed operating information for the standard chartplotter functions - using chart cards, plotting waypoints and routes, following routes and showing tracks.

Chapter 4 provides detailed operating information for further chart functions, including measuring distances, man overboard and cursor echo. It includes instructions for setting up a differential GPS.

Chapter 5 provides instructions for setting up your system to suit your preferences. You should read this chapter to determine how to set up the system defaults.

Chapter 6 provides planning considerations and detailed instructions for installing the display unit. It should be referred to when you are ready to install

the system. Details to connect the display to other equipment are also provided.

Chapter 7 provides information on user maintenance, and what to do if you experience problems.

The Appendices provide additional information that you may find useful:
Appendix A lists the technical specifications for the chartplotter.
Appendix B defines the chart features shown on the chart display.
Appendix C defines the SeaTalk and NMEA data that is transferred on integrated systems.
Appendix D provides a list of abbreviations.
An Index and warranty information are included at the end of the handbook.

A summary of the chartplotter controls are provided on the Quick Reference Card supplied with your system.

Terminology

The following terminology is used to describechartplotter systems:

Master	A unit capable of sourcing specific data such as chart data.
Radar Display	Unit providing Radar Master functionality.
Chart Display	Unit providing Chart Master functionality.
Integrated System	Additional instruments are connected via the Seatalk or NMEA interfaces.

1.1 General

The display unit is waterproof to CFR46 and can be installed either above or below deck.

The unit includes:

- 7" or 10.4" PLUS display
- Trackpad
- Eleven dedicated (labeled) control keys
- Four soft keys (unlabeled) whose functionality changes
- Two slots for the C-MAP NT® chart cards

The display and keys can be illuminated for night-time use.

PLUS Display Units

Features

- Displays chart information from the C-MAP NT® chart cards (C-Cards)
- Uses position data from GPS, DGPS, WAAS or Loran-C technology
- Displays and transfers SeaTalk and NMEA data
- Half-screen windows to display additional data: Course Deviation Indicator (CDI), Bearing and Distance Indicator (BDI), navigation data.
- Cursor echo across SeaTalk
- Choice of orientation: Head Up, Course Up and North Up
- The system can be connected to an ST80 Navigator keypad for entry of alpha-numeric data.

Set Up Options

Set up options allow you to choose what is displayed, how it is displayed (including language and units), bearing mode and how the display operates with other equipment. You can view the cursor position and a variety of data from other equipment, e.g. speed, heading, depth, wind and tide information in a set of user-selectable data boxes. For systems with an autopilot, when the status and locked heading information change the new data can be displayed.

Display options are provided in System Set Up, described in *Chapter 5*. Screen Presentation Options, described in *Chapter 2* allow you to switch the cursor and data boxes On/Off. The cursor box and user-selected data boxes can be moved around the screen.

Operating Modes

You can view a full screen chart.You can also set *Windows On* to split the display into two half-screen windows to show supplementary data. The main operating mode (chart) is displayed in the upper window; you choose what is displayed in the lower window.
The following are available:

Table 1-1: Operating Modes and Window Options

Display	Full-screen mode	Half-screen Window Options
SL520/530/631	Chart	CDI, BDI or Nav Data
	Data Log Mode	Windows not available

Half-Screen Window Options

- **Chart display:** can be displayed full screen or in a half-screen window.
- **CDI:** This gives the Course Deviation Indicator graphical display, with data relating to the target waypoint.
- **BDI:** This gives the Bearing and Distance Indicator graphical display, with data relating to the target waypoint.
- **Nav Data:** This shows nine (mono display) or sixteen (color display) data boxes, providing navigational data in the units specified in your set up. Note that up to 6 of these data boxes are also available as a *user-selectable group* (see *Section 5.3*).

You select the operating mode and windows using the **DISPLAY** key as described in *Chapter 2*.

Heading and Position Data

Full functionality of the chartplotter is achieved when it is part of an integrated system with other equipment connected via SeaTalk or NMEA 0183. Data from this equipment including position and heading is shown on the display and is used in calculations.

Details on connecting other equipment are given in *Chapter 6*.

1.2 The Chartplotter Display

The SL520/530/631 PLUS display includes a Chartplotter. The chartplotter includes a small-scale world map and detailed navigation information is displayed when a cartographic chart card is installed. The details displayed depend on the chart zoom level selected. A plotter mode is provided to enable route plotting and tracking at large scales even when a chart card is not installed, or when the chart is zoomed beyond the available cartographic detail. A typical chartplotter screen is shown in *Figure 1-1*.

The chartplotter uses position information from a GPS, DGPS, WAAS or Loran-C instrument. Once the position fix has been established, your vessel's position, if on screen, is shown as a boat shape pointing in the direction of the current heading (or COG if heading data is not available). If no heading or COG data is available, the vessel is shown as a circle.

The chartplotter screen includes a status bar that displays chart scale, with either cursor position, range and bearing or, when the cursor is homed to the vessel (by pressing FIND SHIP), vessel position, Speed Over Ground (SOG), Course Over Ground (COG) and fix type (VES POS, DIF FIX or SD FIX).

Any waypoints you have placed are displayed (unless you turned them off in Chart Set Up as described in *Chapter 5*) and the current route is shown. Information can be viewed on-screen by positioning the cursor over a waypoint, current route or chart object. The chartplotter screen can also show additional information, depending on your currently selected options, set up selections and data available from other equipment.

An example chart display, in its default configuration, with a chart card installed, is shown in the following illustration.

Several functions are available to control the display as follows:

- Zoom in/out and Pan the Display
- Offset the Chart or Center the Chart around the Vessel

Operation of these functions is described in *Chapter 2*.

Chartplotter Display Options

In addition to the display set up options previously described, chart set up options, described in *Chapter 5*, allow you to customize the chart by selecting:

- What cartographic features and level of detail are displayed.
- The chart color palette (sunlight or shade) - color displays only.
- Chart orientation (north up, head up or course up), datums and position offset.
- How waypoints are displayed (symbols and numbers) and the availability of chart object identification data.
- Vectors for heading, COG and tide.

The Screen Presentation Options, described in *Chapter 2* allow you to switch the Chart Grid On/Off and Custom Chart Details On/Off.

Note: *When you turn the display off and on again, the Screen Presentation settings are retained in memory.*

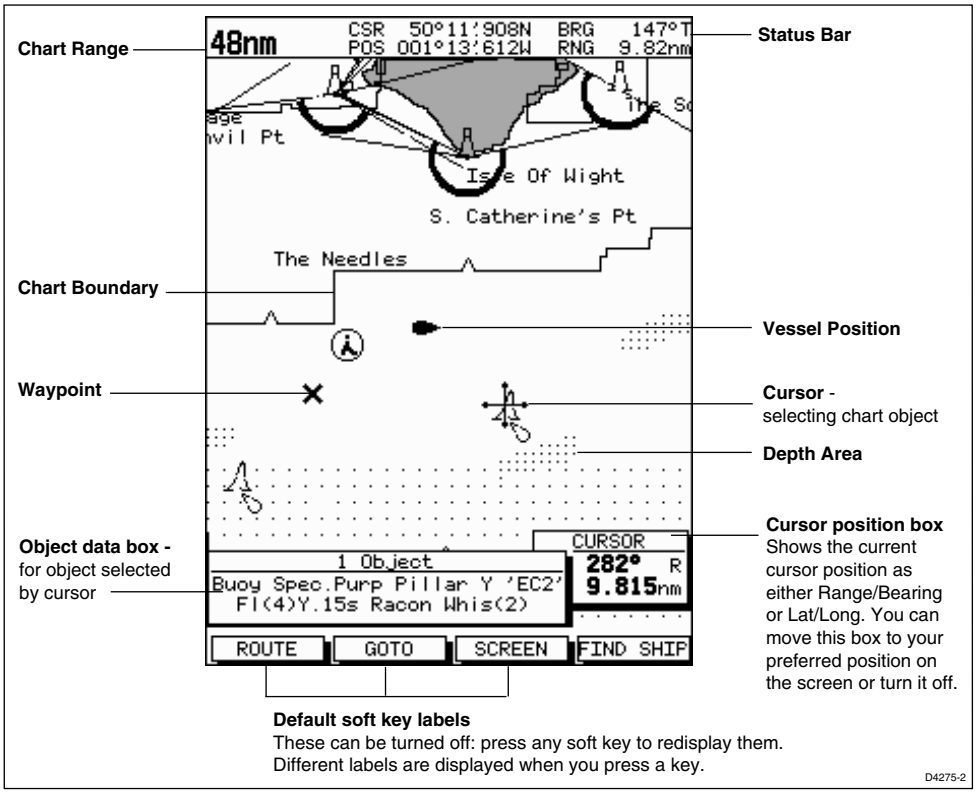


Figure 1-1: Typical Chartplotter Display

Custom Chart Details

The chartplotter set up options include a sub-menu to customize the cartographic features. This menu allows you to switch features On, Off, or control them using the CUSTOM soft key. The factory default settings for the Custom chart options are as follows:

ON: Chart text, chart boundaries, depth contours, navigation marks and land features.

OFF: Caution and routing data.

CUSTOM: Spot sounding, light sectors, marine features.

Note: *The factory default for the* CUSTOM *settings is* ON.

Icons are displayed in detail, depth shading limit is 10 m and depth contour display is 0-100 m.

A complete list of chart features is given in *Appendix B*.

Chartplotter Functions

The Chartplotter includes the following functions:

- Display C-MAP NT C-Card chart information including Ports and Tides (if available)
- View chart information (if available) for the Nearest Port
- Place, Move, Erase and Edit a Waypoint
- Goto Waypoint or Cursor
- Create, Save, Name, Edit and Follow a Route
- Review Route and Waypoint Lists
- Display vessel's track; Save and Name the Track for re-call to screen
- SmartRoute to make a track into a route
- Measure Chart Distances and Bearings on-screen
- Set Up Alarms and Timers
- Man OverBoard (MOB) to navigate back to a missing person or object
- Differential GPS set up page

Operation of these functions is described in *Chapter 3* and *Chapter 4*.

1.3 Operating Controls

You operate the chart using a variety of controls:

- A trackpad providing up, down, left, right and diagonal control of an on-screen cursor.
- Eleven dedicated (labeled) control keys.
- Four soft keys with labels displayed on the screen.
- Pop-up menus, displayed on-screen, from which you select options.
- Database lists, displayed on-screen, which enable you to edit items.

Note: *The cursor is the cross-hair symbol (+) visible on the display. You move the cursor using the trackpad and use it to select a position or item on the chart.*

The control keys are shown in *Figure 1-2*. They are back-lit for night-time use. When you use a control, a help message is displayed at the top of the screen (unless you switch help off as described in *Chapter 5*). The following paragraphs describe the controls and on-screen facilities.

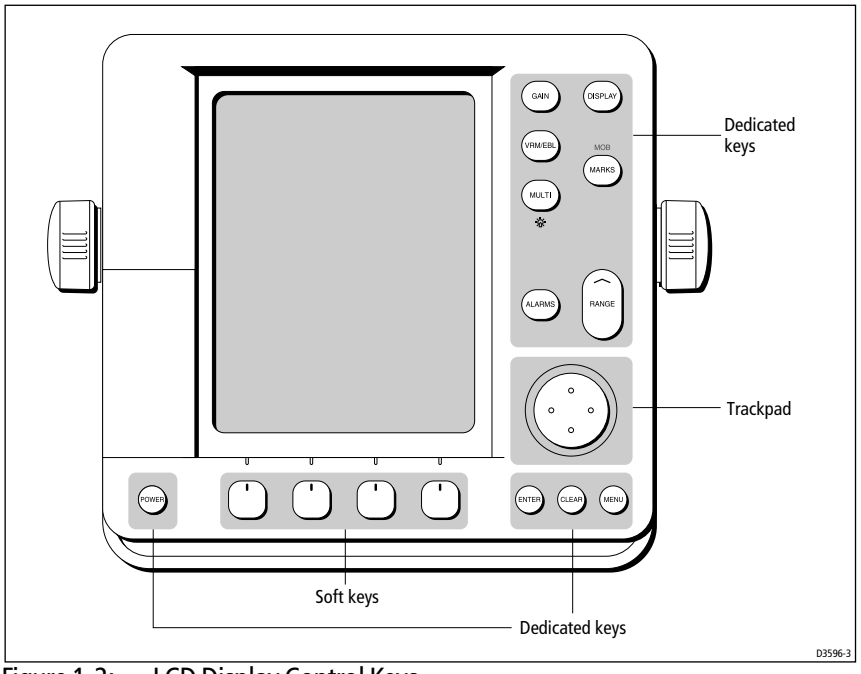


Figure 1-2: LCD Display Control Keys

Trackpad and Cursor

The trackpad has several functions:

- To move the cursor around the screen
- To select an item from a pop-up menu
- To adjust a variable soft key control

The cursor is used to:

- Select a position on the screen.
- Select an item, e.g. chart object.
- Pan the chart display.

Moving the Cursor

You can press on any of the four sections of the trackpad to move the cursor in that direction (up, down, left or right), or press two sections at the same time to move diagonally. The cursor moves faster as you continue to press the trackpad. The current cursor position is shown in the cursor data box (if selected).

Note: *During many operations you cannot move the cursor around the screen; if you cannot move the cursor using the* trackpad*, check the default soft keys are displayed (unless they have been switched OFF in system set up). If not, press* **ENTER** *until they are displayed.*

The cursor is normally displayed as a crosshair. However, if you have not moved the cursor for more than five seconds, when you next move it the cursor is outlined by a circle so it is easier to locate on the screen.

Context-Sensitive Cursor Control

The cursor is context-sensitive. When the cursor is positioned over special features on the display a text label appears to identify the feature as detailed in *Table 1-2* .

Moving and deleting items with the context-sensitive cursor

Some items on the chartplotter screen have information associated with them. Most information is displayed in a data box. The context-sensitive cursor allows you to move databoxes. It also allows you to move or delete other items. Further details of items that can be moved or deleted are given in the appropriate sections throughout this handbook.

➤ To move any data box or selectable item:

1. Use the trackpad to position the cursor over the item until the item's label is displayed.
2. Press **ENTER** to take control of the item, use the trackpad to move it to the required position.
3. Press **ENTER** again to fix the position, or press **CLEAR** to abandon the move.

➤ To delete an item:

1. Use the trackpad to position the cursor over the item until the item's label is displayed then press **CLEAR**.

Table 1-2: Context-Sensitive Cursor Text Labels

Text Label	Feature
BOX	Data box (any type)
MOB	Man Over Board marker
WPT	Chart Waypoint
A➡B	Ruler line
COG	Course Over Ground vector
HDG	Heading vector
POS	Vessel's position
RTE	Route leg
TIDE	Tide vector

Dedicated Keys

The dedicated keys: **DISPLAY, MARKS, VRM/EBL, MULTI ALARMS, RANGE, ENTER, CLEAR, MENU** and **POWER** have fixed functions; the functions are similar on all Pathfinder displays. For example, **ALARMS** is used to set up the system alarms on both a chartplotter and a radar.

Some keys can be used in two ways:

- **Press:** Press the key momentarily and then release it. This method is used for most key operations.
- **Press and hold:** Press the key and hold it down for the length of time stated (for example, 3 seconds), and then release it.

When you press a dedicated key, one of the following happens:

i. The associated operation is actioned, e.g. change chart scale (**RANGE**).

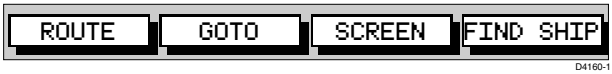
ii. A pop-up menu is displayed, providing further options.

iii. A set of soft keys is displayed, providing further functions.

As you press a key, a single audio beep confirms the key action. If the key-press is not valid for the current screen or mode, three rapid beeps sound to indicate that no response is available. If required, you can turn the key beeps off as part of your set up procedure (see *Chapter 5*).

Soft Keys

The four keys below the screen are called soft keys because their functions change according to the operation. The soft keys are grouped into related sets and subsets providing access to the various functions. The soft key labels are displayed on the screen just above the keys. The default soft keys are displayed until you press a key, or select an item on the screen; the soft keys associated with the action are then displayed.



The currently selected soft key option is shown by its gray or green background. If the key text is displayed in gray rather than in black, it is not currently available.

When you press a soft key one of the following happens:

i. The associated operation is actioned, e.g. NORTH UP.

ii. A sub-set of soft keys is displayed, providing further functions.

iii. A pop-up menu is displayed, providing further options.

As with dedicated keys, when you press a soft key a single audio beep confirms the key action. If the key-press is not valid for the current screen or mode, three rapid beeps sound to indicate that no response is available. If required, you can turn the key beeps off as part of your set up procedure (see *Chapter 5*).

Pop-Up Menus

Pop-up menus usually provide set up options. When a pop-up menu is on-screen, a set of associated soft keys is also displayed as shown in *Figure 1-3*.

You use the trackpad to select an option from the menu, then use the appropriate soft key to set the option. For example, you can toggle the OFF TRACK ALARM on/off.

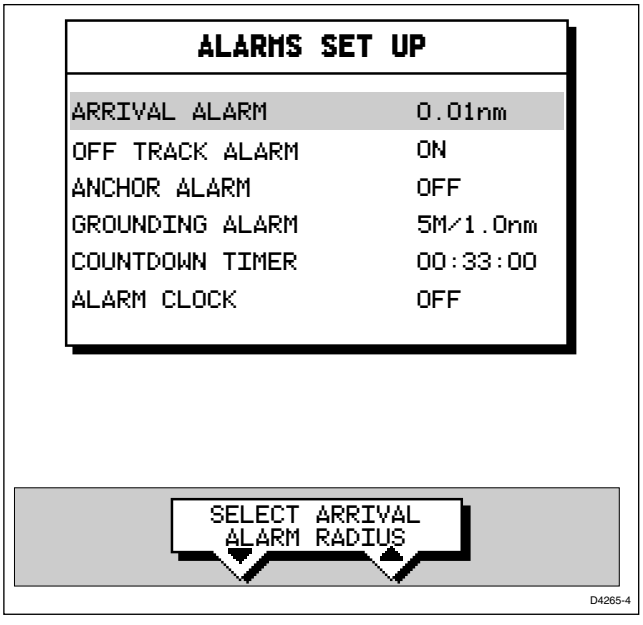


Figure 1-3: Typical Pop-up Menu

Database Lists

The waypoints, routes and tracks that you create on the chartplotter are stored in database lists. You can view these lists and select items for editing.

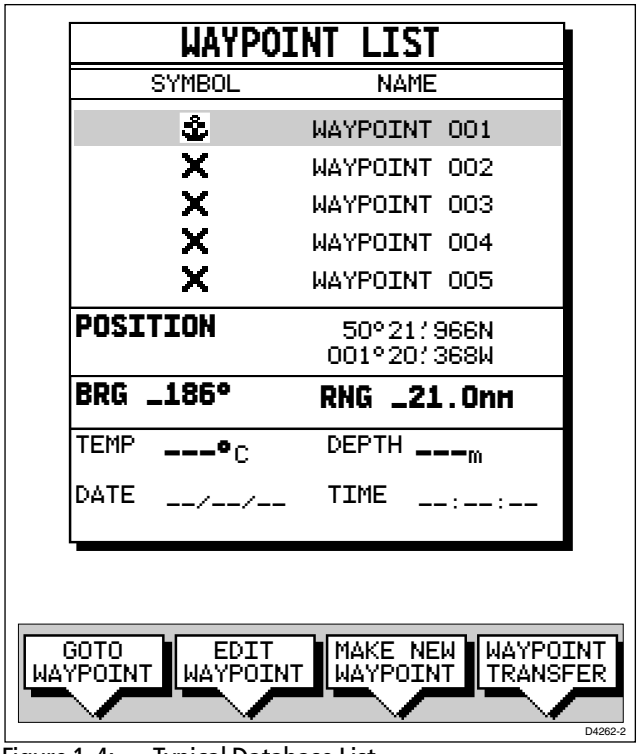


Figure 1-4: Typical Database List

As with pop-up menus, when a database list is on-screen, a set of associated soft keys is also displayed; you use the trackpad to select an item from the list, then use the appropriate soft key to edit the item. For example, you can erase a waypoint or a route.

Chapter 2: Getting Started & Adjusting the Display

2.1 Introduction

This chapter provides information and instructions to get you started using your display. It will help you to become familiar with the display and the functions of the controls before you start using the unit. Chartplotter operating details are given in *Chapter 3* and *Chapter 4*.

Conventions Used

Throughout this handbook, the dedicated (labelled) keys are shown in bold capitals; for example, **MENU**. The soft key functions, menu names and options are shown in normal capitals; for example, SCREEN.

Operating procedures, which may consist of a single key-press or a sequence of numbered steps, are indicated by a ➤ symbol in the margin.
When the procedure requires you to press a soft key, the soft key icon is shown in the margin.

Simulator

The display unit includes a simulator function, that allows you to practice operating your Chartplotter without data from the GPS system. You will need to use the set up options to switch the display to simulator mode, as described in *Section 2.2*. You can use it in either of two ways:

- Before the display unit has been installed on your vessel. In this case, you only need to connect the display to a 12V or 24V DC power supply, connecting the red core from the power lead to positive (+) and the black core to negative (-). See *Chapter 6* for full details.
- After the display has been installed on your vessel, but while in the marina or at anchor.

The following section, *Section 2.2*, includes instructions to view simulated chart images.

2.2 Switching the Display On and Off

➤ To switch the display on, press and hold the **POWER** key until the unit beeps. If the display was last used in chartplotter mode, the keys light up and the Raychart graphic is displayed, followed by the caution:

CAUTION:
Raychart chart displays are based on cartographic data that C-MAP believes to be accurate. However, you should not rely on these displays as your primary source of navigation. Rather, your Raychart should be used only as a backup to official government charts and traditional methods of navigation.

When you have read and understood the caution, press the CONTINUE soft key. The chart is displayed.
If this is the first time the chartplotter has been turned on, and no chart card is installed, the display shows the small-scale world map and the default soft keys. Otherwise, the display shows the selected chart area and any data that were displayed when the display was last used.

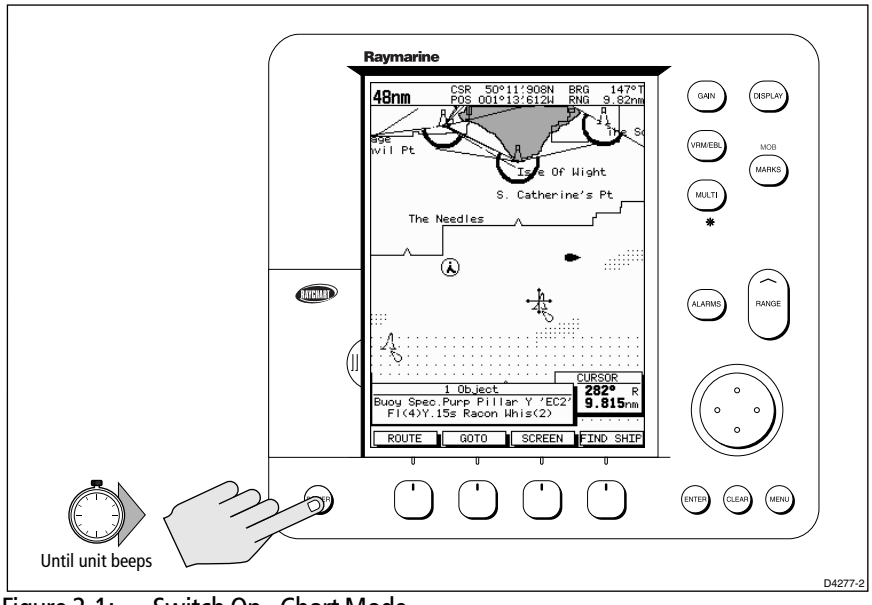


Figure 2-1: Switch On - Chart Mode

Switch Off

CAUTION:
To provide protection against the damaging effects of UV light, it is advisable to replace the sun cover provided when the color LCD display is not in use.
A reminder is displayed when you switch off the color LCD display.

➤ To switch the display unit off, press and hold the **POWER** key for three seconds. A countdown timer is displayed as shown below:

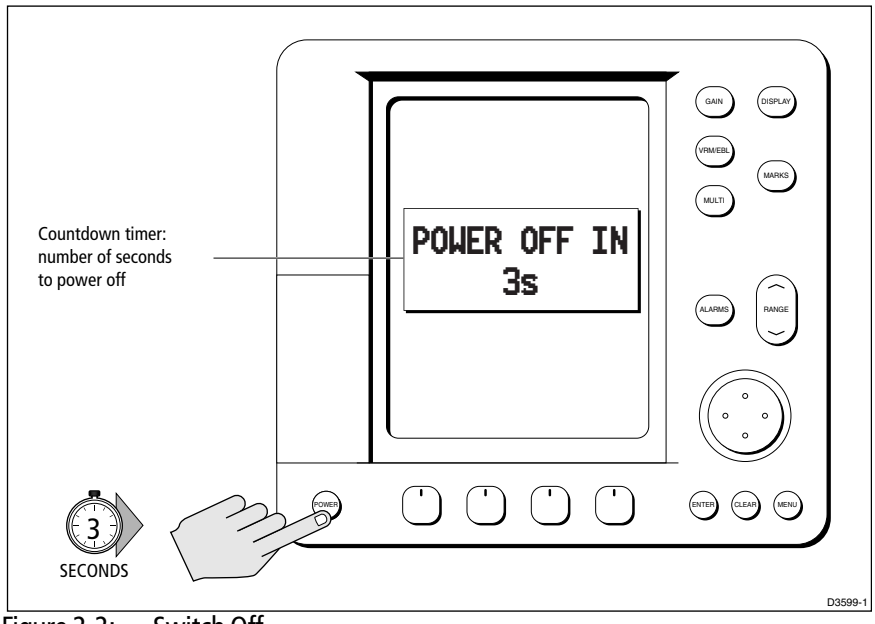


Figure 2-2: Switch Off

When the counter reaches zero a beep sounds, and the display unit switches off. Release the **POWER** key.

Note: *Switch the display unit off before you remove the power cord.*

Simulator Mode

When simulator mode is on a simulator data box is displayed.

When the display is switched off then on again, simulator mode is maintained. It is recommended that you select the System Set Up Menu and switch off simulator mode when you have finished.

➤ To view a simulated image:

1. Press **MENU** followed by the SYSTEM SET UP soft key.
   The set up menu pop-up is displayed.
2. Use the trackpad to move the selection bar over the option SIMULATOR. The simulator soft keys are displayed.
3. In the system set up menu, press DATA to view the chart display with simulated position.
4. Press **ENTER** twice to return to the default display.

Note: *Any waypoints placed on the chartplotter in simulator mode are retained in the database list and are available for use in routes.*

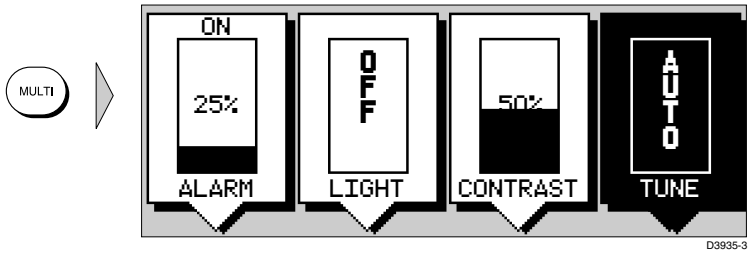
Changing the Lighting & Contrast - SL520 Mono Display

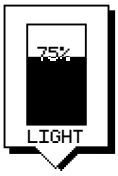
You can change the level of backlighting and contrast for the screen and keys. The key lighting is set the same as the screen lighting, except that it remains switched on at its lowest level even when the screen lighting is turned off, so that you can always find the keys.

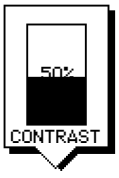
➤ To change the lighting and contrast:

1. Press the **MULTI** key to display the soft key controls:
   The last-used soft key is highlighted in inverse video (white text on a black background).

   If you press **MULTI** during the magnetron warm-up sequence countdown, only the LIGHT and CONTRAST sliders are displayed, and the lighting is automatically switched on at its last-used level.







2. To select a control (if it is not already highlighted) press the soft key. Alternatively, you can press the trackpad left and right edges to move sideways between the controls to select the soft key.
3. If necessary, press the soft key to toggle the control ON/OFF.
4. Use the trackpad (up or down) to increase or decrease the setting (between 0 and 100 in 1% steps). You can press and hold the trackpad to change the setting more rapidly. The lighting/contrast level is adjusted as you change the setting.
5. Press **ENTER** to remove the soft key sliders and return to the default screen, with the new lighting and contrast levels retained, or press **CLEAR** to discard the changes and return to the default screen.

If lights are left ON when you switch off the display, the next time the display is switched on, the lights will be ON, but at the default setting of 40%. The new contrast level is retained until you reset it, unless you set the control very low or very high; in this case, the contrast will be restored as follows:

Contrast set < 30% restored to 30%
Contrast set > 70 % restored to 70%

Changing the Brightness - SL530/631 Color Display

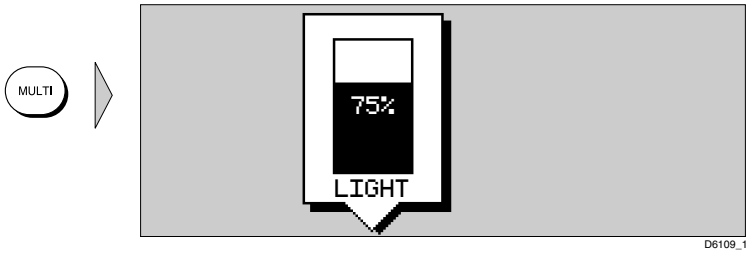
The **MULTI** key on the color LCD display is used to adjust brightness. The brightness of the screen can be adjusted over a wide range, suitable for viewing in daylight (high brightness level) or at night (low brightness level).

The key lighting is automatically adjusted as you alter the screen lighting, so that you can always find the keys. If you set the backlight to a high level, the key lighting is dimmed; if you set the backlight to a low level, the key lighting level is increased.

Adjusting the Brightness

➤ To change the screen brightness:

1. Press the **MULTI** key to display the soft key controls :



2. The LIGHT soft key indicates the brightness level, use the trackpad (up or down) to increase or decrease the setting. You can press and hold the trackpad to change the setting more rapidly. The brightness level is adjusted as you change the setting.
3. Press **ENTER** to return to the default screen, with the new brightness level.

➤ To set the screen brightness to 100%:
Press and hold the **MULTI** key for one second. The brightness is increased to 100%.

The brightness level is retained when you switch off the display.

Note: *During night-time use, the brightness may be set very low, when subsequently operated during the day it may not be apparent that the display is on; press* **MULTI***, followed by the second soft key from the left, then use the trackpad to increase brightness. Alternatively, press and hold* **MULTI** *for one second to set the brightness to 100%.*

2.3 Controlling the Display

You control the display using the cursor and control keys. You start all operations from the default screen, that is the default soft keys are displayed:

When you have completed an action using the soft keys, press **ENTER** or **CLEAR** to return to the default screen; you may need to press **ENTER** or **CLEAR** several times to back-track through the soft key hierarchy.

Note: *If you have set up your system so that the default soft keys are not displayed all the time, press any soft key to display the labels.*

The remainder of this section describes how to select the mode of operation and switch half-screen windows on/off. The following sections describe how to set up the display.

The controls are summarized in the fold-out illustration on page 2.8.

Selecting the Mode of Operation

You use the **DISPLAY** key to select the full-screen mode.

The following modes can be selected:

- Chart
- Data log

The **DISPLAY** key also accesses the soft keys for the half-screen window options.

➤ To change the mode, press the **DISPLAY** key to show the DISPLAY pop-up, then press again to toggle between chart and data log modes.

The selected mode is shown by an icon with a red border and the mode is displayed on the screen. The associated half-screen window soft keys are also displayed.

When the required mode is shown, press **ENTER** or **CLEAR**. The default soft keys are displayed. The selected mode is shown full-screen; in Chart mode you can switch on half-screen windows for additional display, as described in the following section.

If you press **DISPLAY** again, the pop-up and soft keys for the current mode are shown.

Selecting a Half-Screen Window for Display

Note: *Windows can only be used with the Chart screen, they are not available on the data log screen.*

➤ To select a window for display:

1. Press the **DISPLAY** key. The following soft are displayed with an image of each available window:

2. To select a different window, press either SELECT WINDOWS soft key until the required window is highlighted. If necessary, this will toggle windows on. Press **ENTER**.
3. To toggle windows off, press the WINDOWS OFF ON soft key.

Figure 2-3 shows the half-screen horizontal windows.

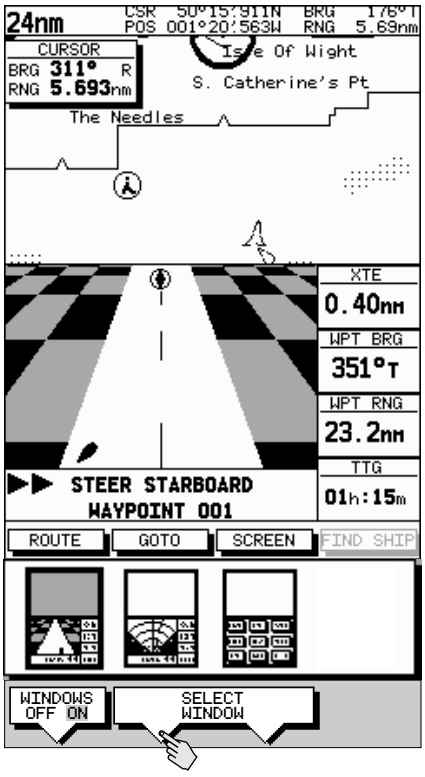
Returning to the Full-Screen Display

To return to the full-screen display you can turn windows off, as previously described. Alternatively, to return to full-screen display:

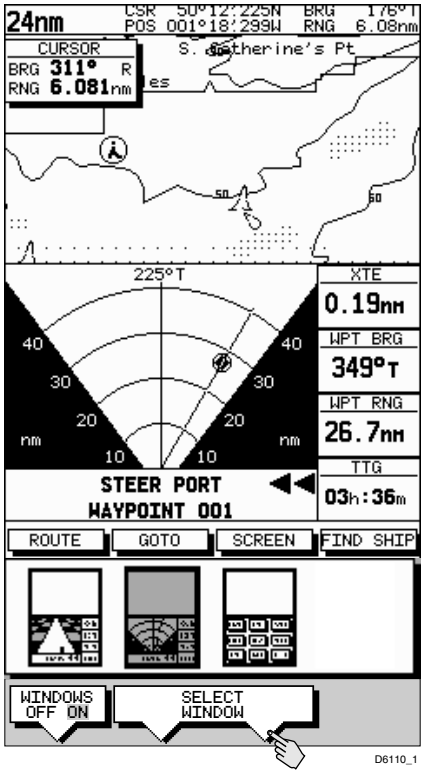
➤ Press and hold the **DISPLAY** key for 2 seconds to return to the currently selected full-screen (upper window) display.

Fold out sheet Radaronly /chartonly Display

CDI Window



BDI Window



Navdata Window

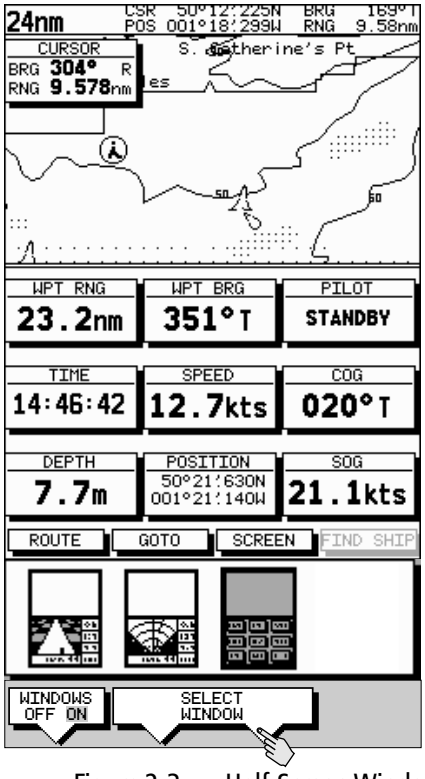
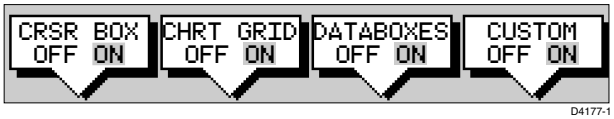


Figure 2-3: Half-Screen Window Options

Customizing the Screen Presentation Options

The SCREEN soft key lets you switch the following screen presentation options on or off:



Switching the Cursor Data Box On and Off

The cursor data box provides the cursor's position in latitude/longitude and/or bearing/range. If you wish to see a full image, you can switch the data box off.

➤ To control the cursor data box:

1. Press the SCREEN soft key.

2. Press the CRSR BOX soft key to toggle the setting from OFF to ON or from ON to OFF.
3. To return to the default soft key display, press **ENTER**.

➤ You can use the context sensitive cursor to select and move the cursor data box (the label BOX is displayed). See *Moving and deleting items with the context-sensitive cursor* on *page 1-9*

Switching Chart Grid On and Off

The Chartplotter display includes grid lines of latitude and longitude which you can use to help determine position on the chart. The grid lines can be switched on if required.

➤ To turn the chart grid on or off:

1. Press the SCREEN default soft key.
2. Press the CHRT GRID soft key to toggle the setting from OFF to ON or from ON to OFF.

To return to the default soft key display, press **ENTER**.

Data Boxes

A group of up to six data boxes can be displayed, if the information is available on your system. **You select which data is displayed in the boxes during system set up as described in *Chapter 5:Setting Up the System Defaults*.**

The default data box positions are along the bottom of the display. Each box can be moved to the required position on the screen using the context-sensitive cursor.

Note: *If you select BDI, CDI or Nav Data for display in a half-screen window, the data boxes are temporarily hidden.*

At any time, you can switch the *group* of data boxes on or off using the SCREEN soft key. When first installed, the boxes are all OFF. When the display unit is switched off and on again, the data boxes return to their last-used states (ON or OFF) and positions.

Note: *The* SCREEN *soft key does not control the nine or sixteendata boxes that can be displayed in the half-screen window.*

➤ To switch the group of data boxes on or off:

1. Press the SCREEN default soft key.

2. Press the DATABOXES soft key to toggle the setting from ON to OFF or from OFF to ON.

To return to the default soft key display, press **ENTER**.

If you turn the data boxes on and none are displayed, you need to select the ones you require using the system set up menu, as described in *Section 5.3, System Set Up Parameters*.

➤ You can use the context sensitive cursor to select and move any data box (the label BOX is displayed). See *Moving and deleting items with the context-sensitive cursor* on *page 1-9*

Custom Options

When chart details have been customized in the Chart Set Up menu (as described in *Section 5.4*) the SCREEN soft key can be used to switch the custom chart options off or on:
When set to ON, all chart options set to CUSTOM in the Customize Chart menu are displayed; when set to OFF, options set to CUSTOM are not shown.

The factory default for custom chart options is ON.

➤ To switch the customized options on or off:

1. Press the SCREEN default soft key.

2. Press the CUSTOM soft key to toggle the setting from OFF to ON or from ON to OFF.

To return to the default soft key display, press **ENTER**.

2.4 Chart Display Control Functions

Moving Around the Chart

You will normally operate the chartplotter with the chart showing your vessel's current location. The default orientation is North-Up, and the vessel moves across the screen. You will need to move the chart if your vessel moves out of the area currently displayed, or if you wish to examine or place waypoints in another area. Alternatively, you can *home* the cursor onto the vessel using FIND SHIP.

There are four ways in which you can move the chart:

- Use the trackpad to move the cursor to the edge of the chart. The chart will pan across. This method is useful if the area you wish to see is only just off the screen.
- Use the context-sensitive cursor to change the chart center.
- Automatically re-center the vessel using the FIND SHIP soft key.
- Change the chart scale to zoom out and in to a new area centered on the cursor position. This method is useful if the area you wish to see is a long distance away.

Changing the Chart Center

You can move the area of the chart displayed on the screen using the context-sensitive cursor. This allows you to center your vessel in the middle of the screen, or to move the chart so that your vessel is displayed off-center anywhere on the screen.

➤ To center the chart:

1. Use the trackpad to move the cursor to the vessel's position. The cursor text POS is displayed.
2. Press **CLEAR**. The chart is moved so that your vessel's position is in the center of the screen.

➤ You use the context sensitive cursor to select and move your vessel's position off-center (the label POS is displayed). See *Moving and deleting items with the context-sensitive cursor* on *page 1-9*.

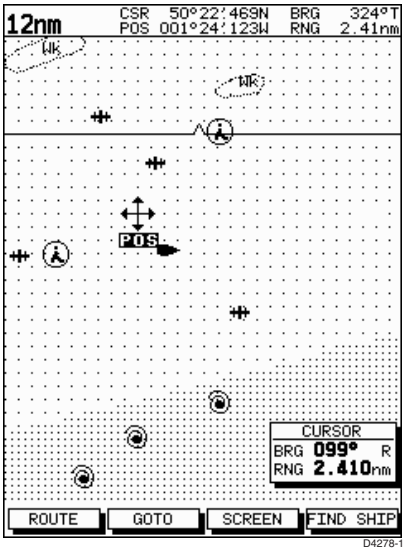
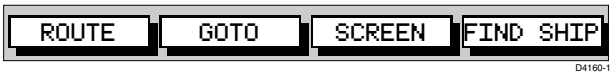


Figure 2-4: Changing the Chart Center

Using FIND SHIP

FIND SHIP is used in chart mode to re-draw the chart with the vessel at the center and the cursor homed onto the vessel.



When you press FIND SHIP the following occur:

- The chart is re-drawn with the vessel's position in the center.
- The cursor is homed onto the vessel position and moves with it.
- When the vessel moves near the edge of the chart window, the chart is redrawn to place the vessel and cursor at the center again.
- The status bar indicates vessel position, speed and course over ground.

➤ To release the cursor from homed mode press the trackpad to move the cursor away from the vessel's current position. The status bar shows the cursor position, range and bearing.

Changing the Chart Scale

The **RANGE** key allows you to change the chart scale so that you can see a smaller or larger area on the screen.

Plotter mode is available to allow you to zoom into a smaller area, even when no chart data is available for that scale. *Section 5.4* describes how to set plotter mode on/off.

You can change the chart scale for two purposes:

- To see either more detail (of a smaller area) or a larger area (in less detail) on the screen.
- To move the display to another area of the chart, by zooming out to a small scale chart, then zooming in on another position centered on the cursor.

The cartographic detail available on charts varies according to the chart scale and some areas include detail at smaller scales than others. This can cause blank areas on the display when adjacent areas with different levels of detail are displayed. To reduce this affect you can use the Chart Set Up options (see *Section 5.4*) to set chart display detail to simple. Then, as you zoom in, charted areas are displayed but with less detail shown.

Each time you press the **RANGE** key, the chart scale changes to the next available setting. The status bar indicates the distance from top to bottom of the screen, in nautical miles.

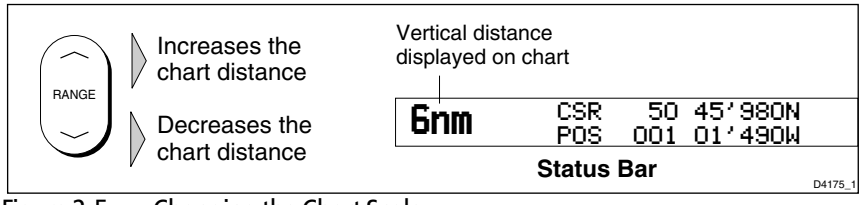


Figure 2-5: Changing the Chart Scale

➤ To change the scale quickly, press and hold the required arrow on the **RANGE** key.

The distance indicator at the left-hand end of the status bar is updated whenever you change the chart scale.

➤ To zoom in to a larger-scale (more detailed) chart:

1. Use the trackpad to position the cursor in the area you wish to see in more detail.
2. Press the lower part of the **RANGE** key to zoom into the area.

   The section of the chart around the cursor is enlarged to fill the screen with a larger-scale chart showing more detail. The cursor is now positioned in the center of the screen.

   The distance indicated at the top left of the screen is updated.
3. If further chart enlargement is available using the current chart card you can press the bottom of the **RANGE** key to zoom in again, re-positioning the cursor first if required.

   An area of further chart detail is indicated by a box around the area as shown in *Figure 2-6*.

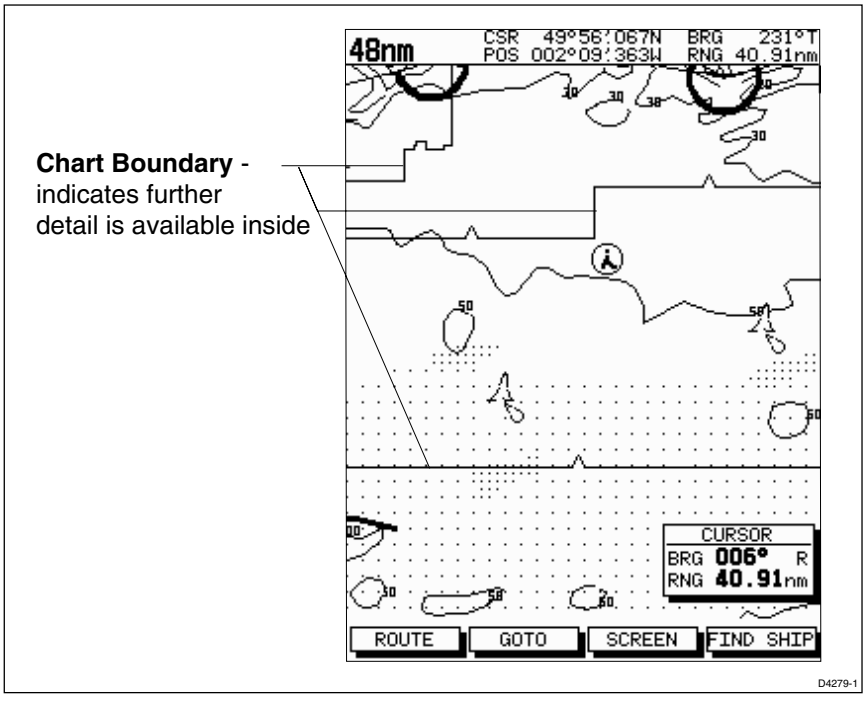


Figure 2-6: Chart Boundaries

4. When no further chart detail is available, as you press the bottom of the **RANGE** key, the effect depends on whether **Plotter Mode** is on or off as follows:

   - If Plotter Mode is Off, the chart scale remains unchanged, indicating the smallest chart scale is displayed.

     Note: *If Plotter Mode is Off and the cursor is homed to the vessel (see Using FIND SHIP* on *page 2-13), if the vessel moves outside an area of available cartography, the chart will automatically re-scale to the next range with cartography.*

   - If Plotter Mode is On, the scale is decreased and the message NO CHART DATA is displayed. The vessel, waypoints, routes and tracklines are displayed without cartography.

The chart information is restored when you return to a chart scale for which the information is available.

➤ To zoom out to a smaller-scale (less detailed) chart, simply press the upper part of the **RANGE** key as many times as required.

2.5 Typical Chart Scenarios

The following illustrations provide operating guidelines for typical navigation scenarios. These scenarios can be used as a training guide; they show you how to perform a particular operation and they introduce many of the chartplotter functions.

Each scenario indicates the key presses required to perform particular tasks. A typical chartplotter screen image is shown for each task.

The scenarios assume you have read the previous sections of this chapter and that you are familiar with the Operating Controls. Full operating details for each function are provided in *Chapter 3* and *Chapter 4*.

Operating guidelines are provided for the following scenarios:

- **Working with Waypoints**
  Place a Waypoint
  Goto a Waypoint
- **Make and Follow a Route**
  Create a Route
  Follow a Route
- **Review the Passage Plan**
  View Route Information
  Change the SOG, Hours and ETA.

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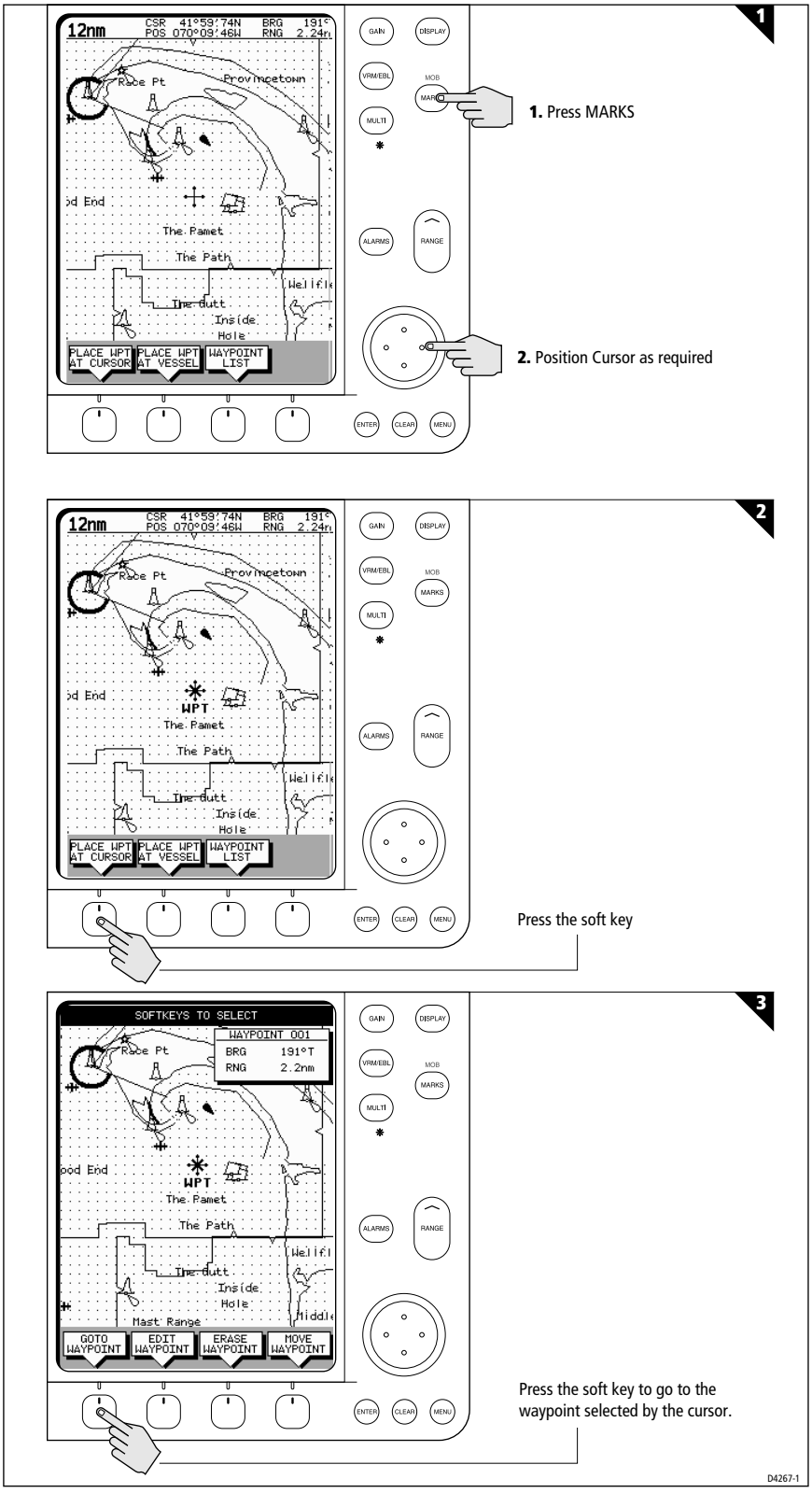
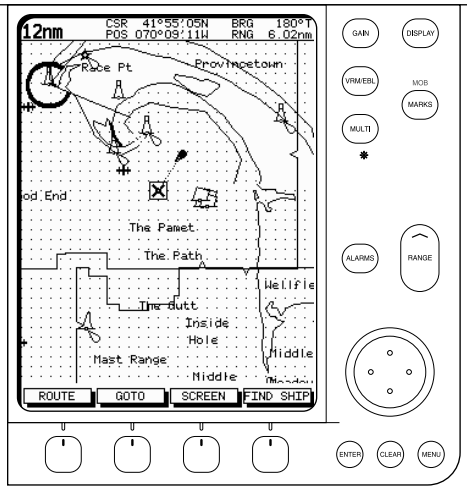
Place and Goto a Waypoint





4

The vessel navigates towards the target waypoint

See:
5.3 Working wth Waypoints
Go to an individual Target Point, page 5-26.

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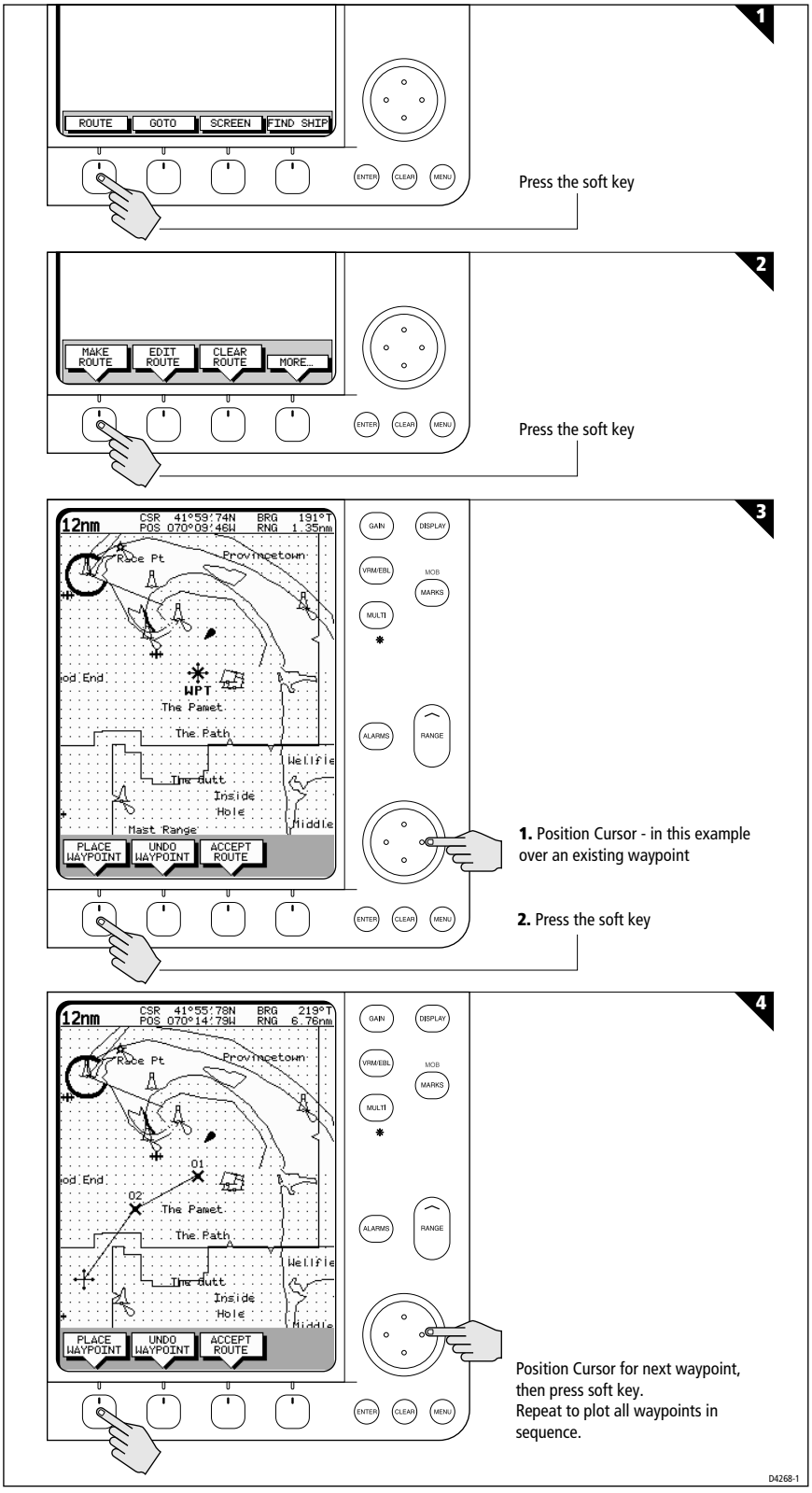
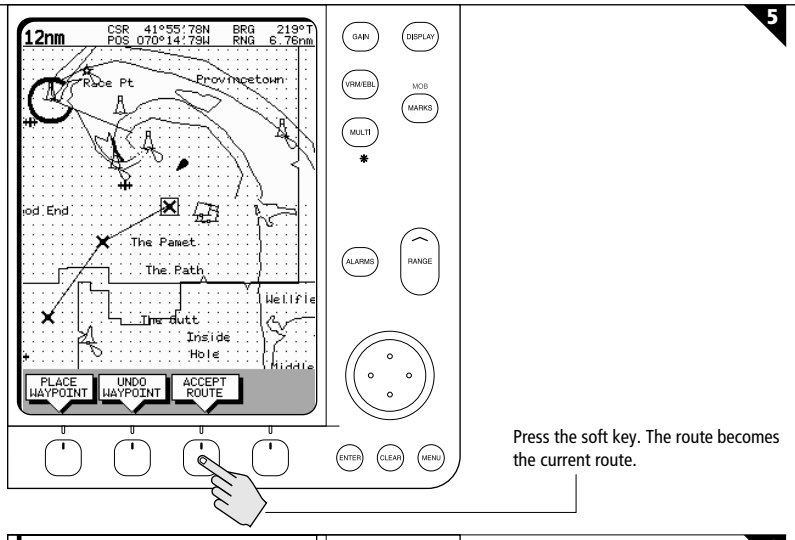
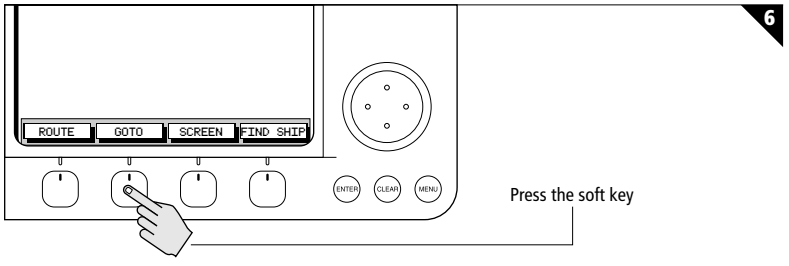
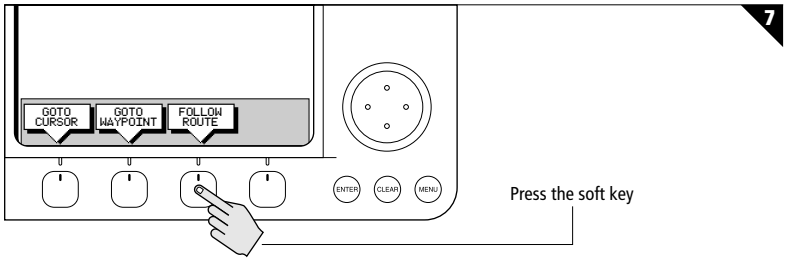
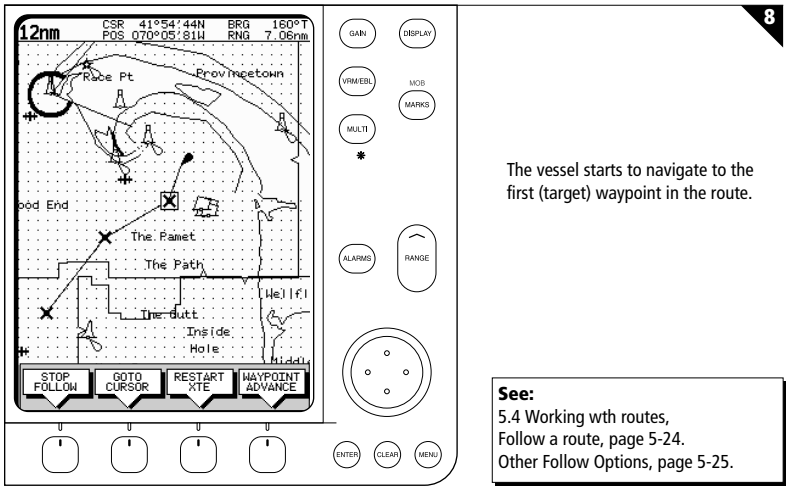
Make and Follow a Route











See:
5.4 Working wth routes,
Follow a route, page 5-24.
Other Follow Options, page 5-25.

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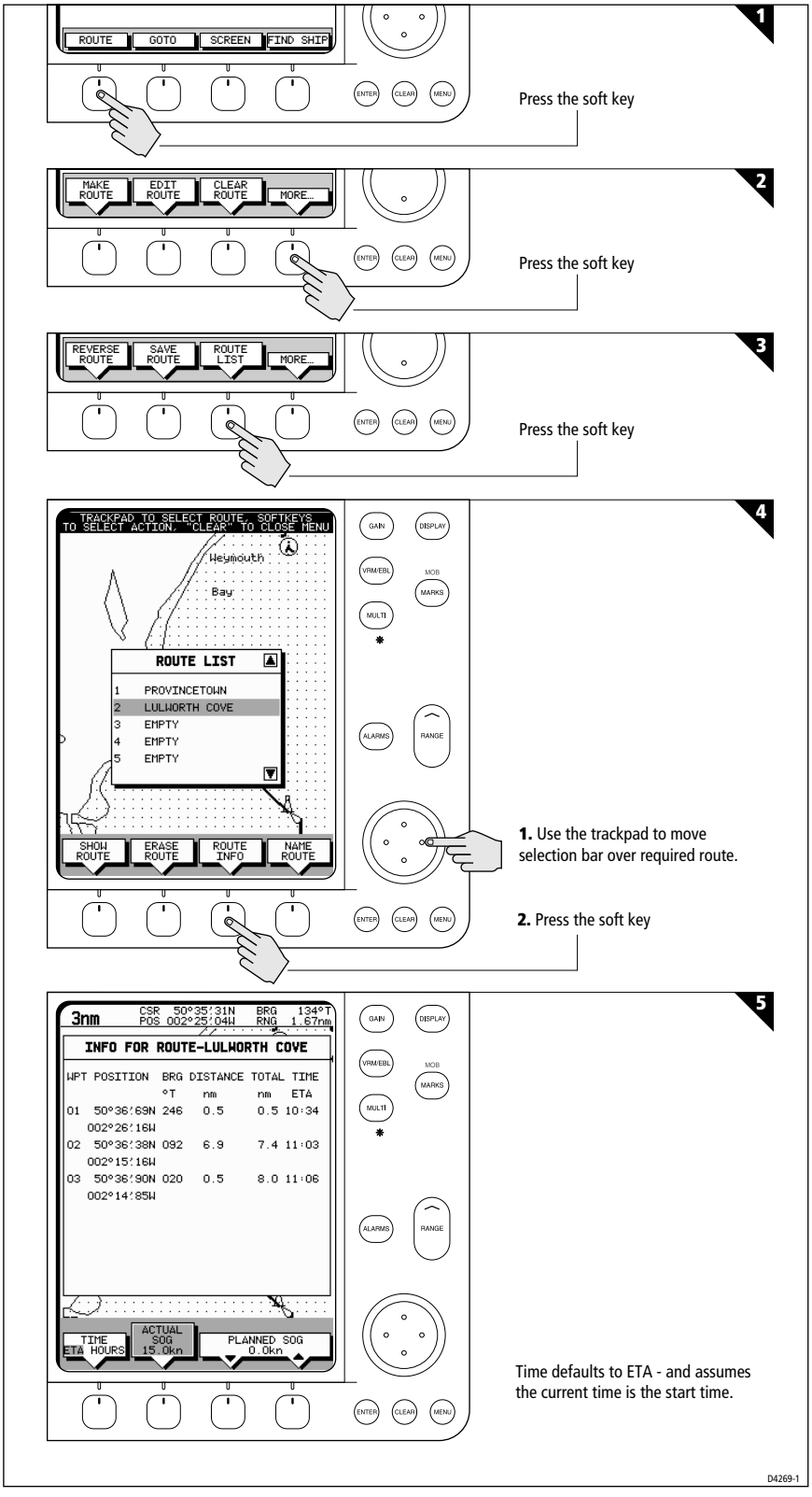
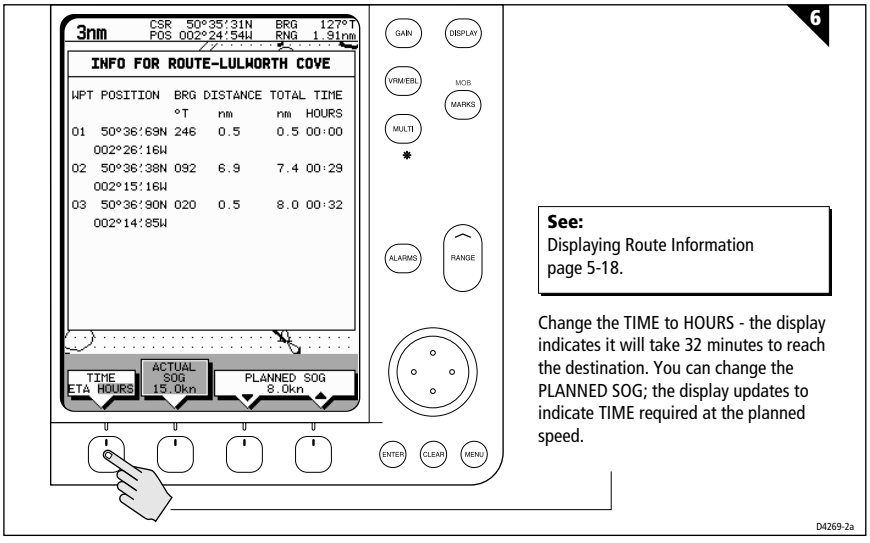
Review Your Passage Plan





See:
Displaying Route Information
page 5-18.

Change the TIME to HOURS - the display indicates it will take 32 minutes to reach the destination. You can change the PLANNED SOG; the display updates to indicate TIME required at the planned speed.

Chapter 3: Standard Chart Operations

3.1 Introduction

This chapter explains how to use the chart functions to navigate with your display. It covers the following topics:

- Using chart cards.
- Controlling waypoints, including placing, moving, editing and deleting waypoints.
- Working with routes, including creating a new route, managing routes using the route database and editing routes.
- Following routes and going to waypoints.
- Transferring Waypoints and Routes
- Using tracks, including showing tracks, setting up tracks, saving tracks and creating a route from a track (SmartRoute).

All these chart functions are available in plotter mode, so you can plot and track routes at large scales even when a chart card is not installed.

Further functions, including measuring distances and setting alarms are described in *Chapter 4*.

Safety

The chartplotter makes it very easy to place a waypoint and travel towards it. However, you should always check first that the route is safe. If you are using the chartplotter in combination with a SeaTalk autopilot, the autopilot will prompt for confirmation before it steers the vessel towards the waypoint.

If you have entered your route using a small-scale chart, zoom in to a larger scale to check for hazards, such as small shoals, that may not be shown on the smaller scale charts.

Note: *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.*

CAUTION:
The equipment should not be used as a substitute for good navigational practice nor for official government paper charts.

3.2 Using Chart Cards

The chartplotter has a built-in world map; most areas are displayed on a scale of 4000 nm from the top to the bottom of the screen, and can be zoomed in to 150 nm.
To use the chartplotter as a navigation aid, charts with detailed information for the area you wish to navigate are required. The charts are available on C-MAP NT electronic chart cards (C-Cards), each of which can store as many as 20 charts in an electronic format. A single C-MAP chart normally provides as much information as is available in paper charts for that geographic area, and can be displayed down to a range of 1/64 nm on the screen if the data is available.

Two card slots are provided on the display unit. Chart data from both slots can be downloaded.

The chart scale in use is indicated in the status bar - the number represents the distance (in nautical miles) displayed from the top of the chart window to the bottom of the chart window.

Note: *You can remove and insert cards while a chart is displayed. 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** *key to change the chart scale.*

Inserting a Chart Card

➤ To insert a chart card:

1. Check that the card is a C-MAP NT C-Card with the required chart stored on it.
2. Open the card cover, at the lower left of the display front panel.
3. Hold the card with the title label towards the left, as shown in the illustration.
4. Gently push the card into one of the two slots. It will only go in if it is correctly oriented. Push the card in as far as it will go, then move it to the right so that the top is under the retaining pegs. The card will be held in place by the pegs.
5. Close the card cover until it clicks shut, to prevent water entering the display unit.

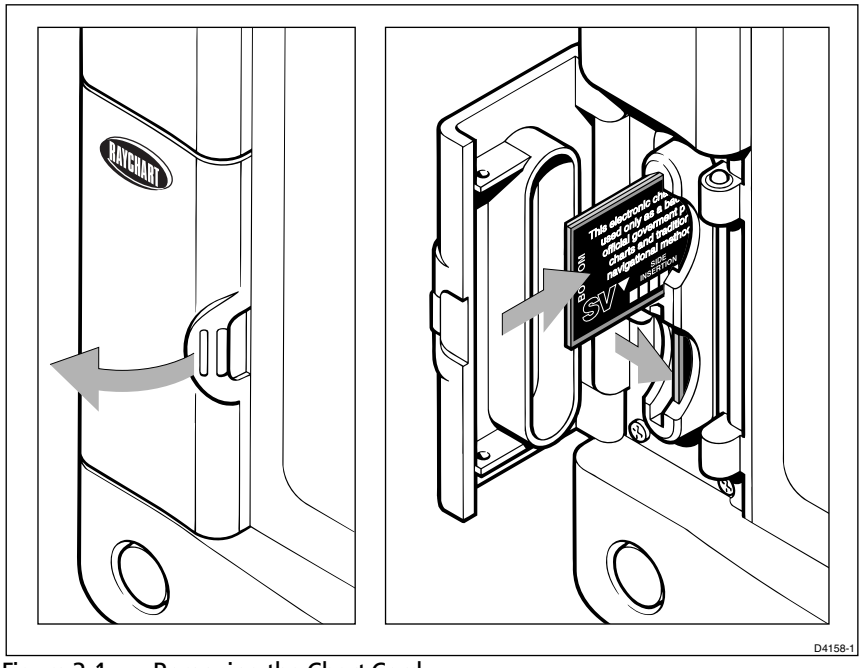


Figure 3-1: Removing the Chart Card

Removing a Chart Card

We recommend that before you remove a chart cartridge, you ensure the chart is not being used on any other display unit. Removing a chart cartridge whilst a display unit is accessing the chart may cause an operational error.

➤ To remove a chart card:

1. Open the card cover, at the lower left of the display front panel.
2. Press on the card you wish to remove, and move the top of the card to the left to clear the retaining pegs.
   The card will spring half-way out, enabling you to grip the card and remove it from the slot.
3. Remember to close the card cover so that it clicks shut, to prevent water from entering the card reader assembly.

Displaying the Chart Data

The new chart information will be displayed when you move the cursor into an area covered by the new chart or, if it is already in the area, change the range scale.

The boundary of each chart digitized in the current card is defined by a box or rectangle. (You can switch off the chart boundaries display if you wish, as part of the chartplotter set up described in *Section 5.4*.)

➤ To zoom in:

1. Use the trackpad to move the cursor inside one of the chart boxes, and press the lower part of the **RANGE** key.

   That area is expanded, with the cursor at the centre, so that you can see more detail. Note that the smaller the chart box is on the screen, the further you can zoom in and the greater the amount of detail that is available.

   If you have switched on **Plotter Mode** (see *Section 5.4*), you can zoom in further than the most detailed chart; all chart functions remain available.

Displaying Chart Object and Source Information

Chart cards include a number of displayed objects for which information is available, such as lights and buoys. They also contain additional source data for structures, lines, open sea areas etc. You can use the context-sensitive cursor to identify (in a pop-up box) an object or chart position and you can obtain detailed information for the selected item.

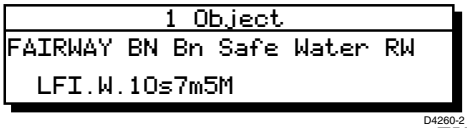
Set up options let you specify when an identification pop-up is displayed; three options are available:

- Display a pop-up for *all* objects and source data automatically when the cursor is over the object symbol or source area.
- Display a pop-up for displayed objects when the cursor is over the symbol.
- Do not display the identification pop-ups.

The chartplotter also provides information for the nearest waypoint, port service, port, tide station, wreck or obstruction for a selected position. If your chart includes port and tide data, this can be displayed.

➤ To identify an item and obtain detailed information:

1. Move the cursor over the symbol or chart position for which you require the information. If specified in Chart Set Up, a pop-up box such as the following is displayed at the lower left or upper right corner of the screen:



2. To view detailed information, press **ENTER**. The details available are listed on-screen in an object information pop-up.
   The pop-up is spit into two windows; objects are listed in the upper window and details for the selected object are provided in the lower window.Use the trackpad to select an object in the upper window and use the soft keys to scroll up or down the detailed information in the lower window.
3. Press **CLEAR** to remove the pop-up from the screen and return to the default display.

Port Area

At large chart scales **port area** information is indicated by the symbol . An object information pop-up provides the name of the marina or port and a list of the facilities available.

Where available, details for each facility can be displayed. This information includes items such as accommodation, slip sizes, fueling, sanitation, electrical or other maintenance services provided, VHF channels monitored, and other safety and navigation information.

In some areas the chart shows symbols for individual facilities. The facilities and their associated symbols are illustrated in *Figure 3-2*.

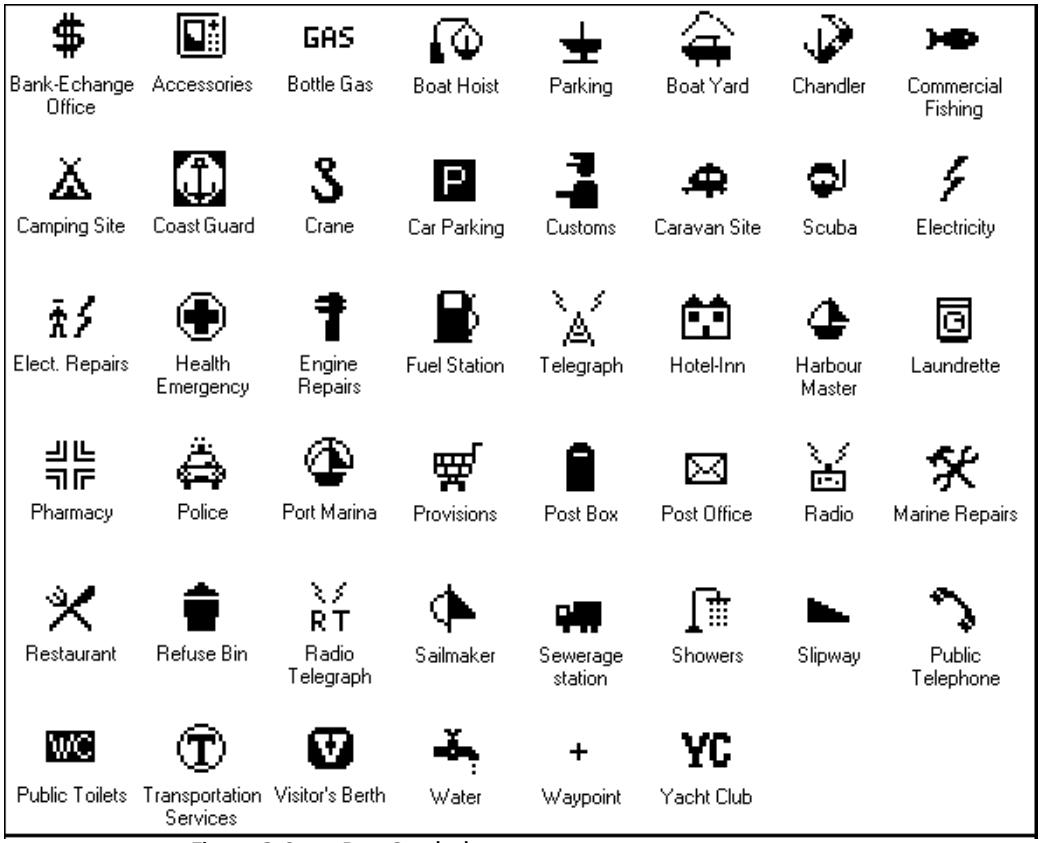


Figure 3-2: Port Symbols

Tide Data

The symbol indicates **tide height** data is available for that position on the chart. When you select the tide height option, a graph of predictions for maximum and minimum tide heights is displayed, data for sunrise and sunset is also provided as illustrated *Figure 3-3*.

Note: *The predictions available are sufficiently accurate under moderate weather conditions, for the coastal areas served by the reference station, to be used for navigation planning. However, certain weather fronts and storms can alter tidal patterns and influence predicted times and heights.*

The cursor, represented by a dotted vertical line on the graph, is used to select a time for which the tide height is displayed.
You can use the soft keys and trackpad to change the date for which tide information is shown.

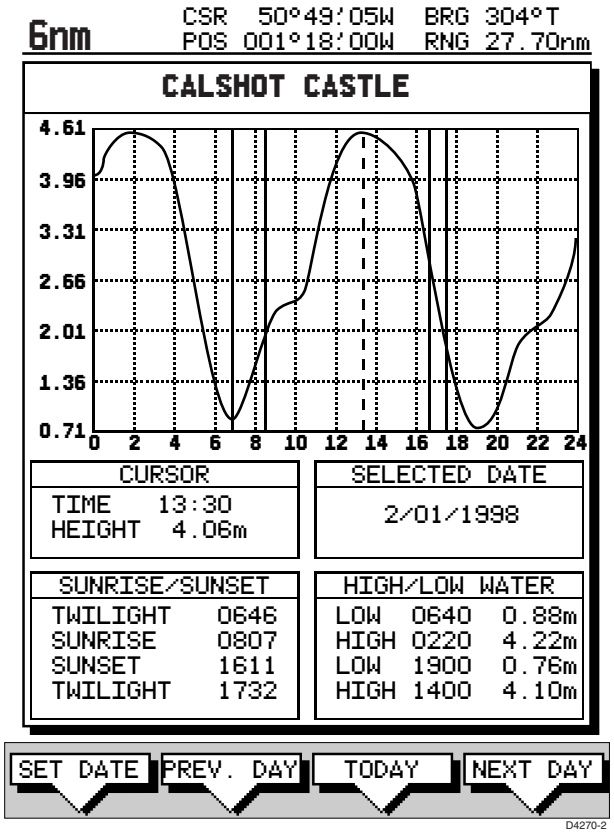


Figure 3-3: Tide Data

➤ To select a time, use the trackpad to move the cursor to the required time.

➤ To change the day press PREV. DAY, DAY or TODAY, as required. Alternatively, press SET DATE; to change date, use the trackpad to move the cursor left/right to select the character and up/down to increase/decrease the value.
The graph and tide data will be updated accordingly.

Nearest

You can obtain information for the eight nearest waypoints, port services, ports, tide stations, wrecks or obstructions for a selected position. The chartplotter also provides options to redraw the chart with a selected item at the centre, Goto a waypoint and display a list of all the port on the chart card.

➤ To obtain the information for the nearest objects:

1. Move the cursor to the required position then press **ENTER** to display the object information pop-up.
2. Press the NEAREST soft key. The Find Nearest pop-up list is displayed. Use the trackpad to highlight the required object, then press **ENTER**.
   i. For port services the port service symbols are displayed, use the trackpad to highlight the required service, then press **ENTER.**
   If you select a port then press **ENTER**, detailed information for the service at that port is displayed. Typical port data is shown in *Figure 3-4*.

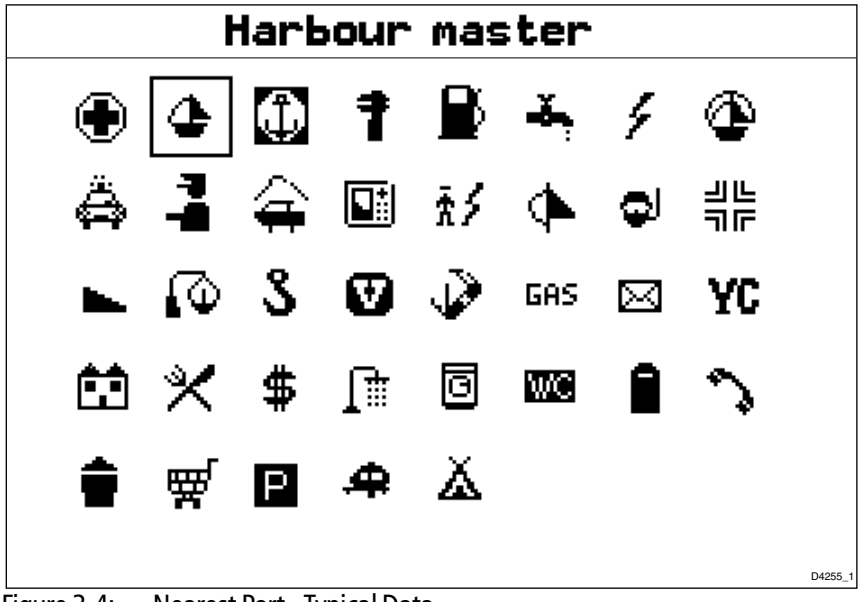


Figure 3-4: Nearest Port - Typical Data

   ii. For all other items, the eight nearest objects are listed with distance and bearing.
   Soft keys provide you with options to EXPAND port, wreck and obstructions data; view a FULL LIST of ports detailed on the chart card; SHOW TIDE data; GOTO a waypoint and FIND the object (redraw the chart with the object at the centre). Use the trackpad to highlight an object, then press the required soft key.
3. To return to the default display, press **CLEAR** to back-track through the pop-up lists.

3.3 Working with Waypoints

Introduction

The Chartplotter enables you to place up to 998 waypoints (in addition, waypoint number 999 is used for MOB operation): a waypoint is a position entered on a chart as a reference, or as a place to go to. All waypoints *placed on the chartplotter* are stored in a waypoint database list which includes symbol, position, bearing, range and additional data. All waypoints in the database are displayed on the screen, unless you set waypoint display off in the Chart Set Up menu, as described in *Chapter 5*. You can select a waypoint, either on-screen or from the list, for editing.

A waypoint can be placed at the cursor position, or at the vessel's current position (this is sometimes known as an event mark); a waypoint at the vessel position includes additional information (if available) on the depth and temperature when it was placed. Alternatively, you can manually enter Waypoints as either Lat/Long coordinates or Loran TDs which are automatically converted into Lat/Long coordinates. All waypoints can be included in a route. You can place waypoints, using simulator mode, before you install the chartplotter on your vessel.

When you place a new waypoint, it is displayed using the default symbol of a cross (unless you have changed the symbol in Chart Set Up). The waypoint is added to the waypoint list and tagged with the next available number. You can use the edit functions to change the symbol and name. When the cursor is positioned over a waypoint, the waypoint bearing and range are displayed.

Waypoints in the current route are available on other SeaTalk instruments that support current route transfer, for example, anotherRaymarine Chartplotter or ST80 Masterview. You can transfer waypoints between the chartplotter and other NMEA or SeaTalk instruments using the Waypoint Transfer functions. You can also save waypoints to, or load them from, a user cartridge. These functions are described in *Section 3.6*.

This section explains how to perform the following tasks using the on-screen cursor and the waypoint list:

- Placing a Waypoint
- Selecting a Waypoint
- Displaying Waypoint data
- Editing a Waypoint (symbol, name & position)
- Erasing a Waypoint
- Moving a Waypoint

At the end is a section about using the ST60/80 Navigator Keypad to select, edit, and name your waypoints.

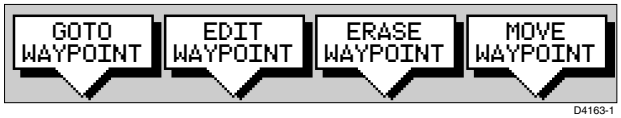
Placing a Waypoint

The scenario *Place and Goto a Waypoint* on *page 2-18* provides a simple example of how to place a waypoint.

➤ To access the place waypoint soft keys, press **MARKS**:

➤ To place a waypoint at the cursor position or at the vessel position:

1. Press either the PLACE WPT AT CURSOR or the PLACE WPT AT VESSEL soft key. The waypoint is added to the waypoint list and tagged using the next available number.
   The waypoint soft keys are displayed until you move the cursor away from the waypoint or press **CLEAR**.

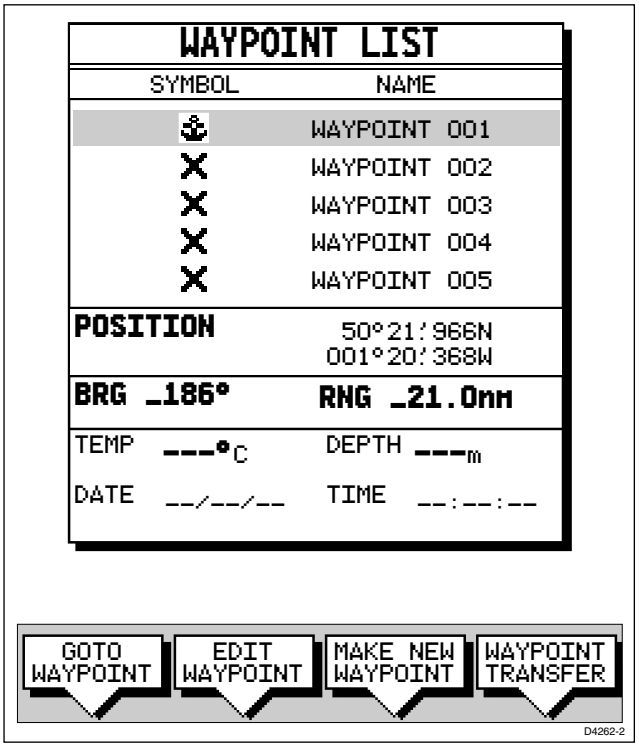


   You can use the EDIT WAYPOINT soft key to name the waypoint as described in Editing Waypoints below.

2. Press **CLEAR** or **ENTER** to remove the place waypoint soft keys.

➤ To place a waypoint as latitude/longitude using the Waypoint List:

1. Press**MA RKS**, followed by the WAYPOINT LIST soft key. The Waypoint List and associated soft keys are displayed.
2. Press the MAKE NEW WAYPOINT soft key followed by the LAT/LONG soft key; the WPT POSITION (LAT/LONG) screen is displayed, with it's associated soft keys. The waypoint is placed at the current vessel position, or if not available, the cursor position.



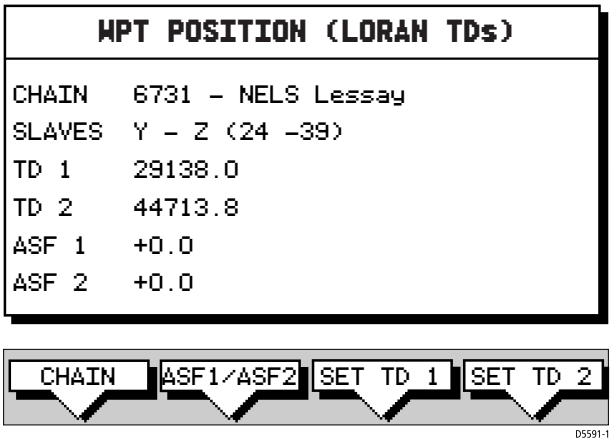
3. You can use the soft keys to edit the waypoint position as described in *Editing the Waypoint Details* on *page 3-13*.
   It is added to the Waypoint List and named with the next available number.

To return to the default soft key display, press **ENTER** or **CLEAR** twice.

➤ To place a waypoint as Loran TDs using the Waypoint List:

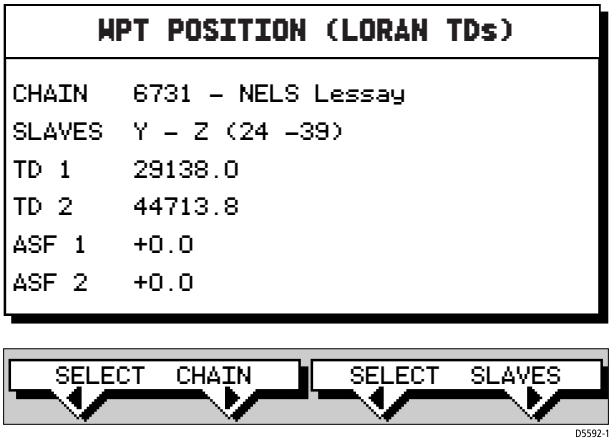
1. Press **MARK**, followed by the WAYPOINT LIST soft key; the Waypoint List and associated soft keys are displayed.
2. Press the MAKE NEW WAYPOINT, the waypoint is placed at the current vessel position, or if not available, the cursor position. To change the position press the LORAN TDs soft key; the WPT POSITION (LORAN TDs) screen is displayed, with it's associated soft key.

Note: *You can enter waypoints as Loran TDs which are converted to Lat/Long coordinates. However, although the waypoint is shown in both Lat/Long and Loran TDs in the Waypoint List, you can subsequently only edit the position as Lat/Long coordinates. TD entries in the Waypoint List are shown only for those waypoints which were entered as TDs.*



3. Edit the Loran parameters as required, using:

   i. The CHAIN soft key, which enables selection of both the Chain and it's Slave:



   ii. The ASF1/ASF2 soft key, which presents two soft keys for editing ASF 1 and ASF 2 parameters independently:

   iii. The SET TD 1 and SET TD 2 soft keys, which enable editing of each TD's parameters independently.

Note: *Except for the* CHAIN *setting, parameters are edited using the* trackpad *as described in Editing the Waypoint Details on page 3-13.*

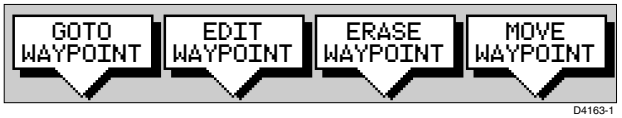
4. When editing is complete, press the **ENTER** key to save the waypoint or **CLEAR** to cancel the operation; the display returns to the New Waypoint screen.
   Press the **ENTER** or **CLEAR** to return to the Waypoint List.

Selecting a Waypoint

Positioning the cursor over a waypoint selects that waypoint and accesses the waypoint soft keys. These keys enable you to GOTO (described in *Section 3.5*), EDIT (symbol, name, position), ERASE or MOVE the waypoint.
Selecting a waypoint from the List allows you to GOTO and EDIT (symbol, name, position, erase) the waypoint. The Waypoint List also provides options to make a new waypoint and transfer waypoints.

➤ To select a waypoint using the cursor:

1. Move the cursor over the waypoint, until the letters WPT are displayed.
   The Waypoint Data box (see *Waypoint Data Display* on *page 3-12*) and the following soft keys are displayed:



The selected waypoint can be edited via these soft keys.

➤ To select a waypoint using the Waypoint List:

1. Press **MARKS**, followed by the WAYPOINT LIST soft key.
   The Waypoint List and associated soft keys are displayed.
   The list details all waypoints in alpha-numeric order. The selected waypoint is indicated by the selection bar; its position, bearing and range are provided.
2. Use the trackpad to move the selection bar up and down the list to highlight the required waypoint.

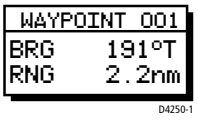
The selected waypoint can be edited via the soft keys displayed.

Waypoint Data Display

Waypoint data can be viewed in two ways: you can use the context-sensitive cursor to select the waypoint and thus display the waypoint data box, or you can view waypoint details on the waypoint list.

Note: *To permanently display the target waypoint data box, select it in the System Set Up menu (see Section 5.3) and use the* SCREEN *soft key to switch data boxes on.*

➤ To display the waypoint data box, move the cursor over the waypoint.
The waypoint data box is displayed, this indicates waypoint number/name, bearing and range (or latitude and longitude if selected in system set up).



While the cursor is over the waypoint, the waypoint soft keys are displayed.

➤ To remove the waypoint data box and soft keys either:

Move the cursor away from the waypoint, or press **CLEAR**.

➤ To display the waypoint details from the waypoint list:

MARKS

WAYPOINT LIST

Select the waypoint in the list as described above.
The details for the selected waypoint are displayed in the lower half of the window. Temperature, depth, date and time are included (if available) for waypoints placed at the vessel position.

To remove the Waypoint List and return to the default soft key display, press **CLEAR** twice.

Editing the Waypoint Details

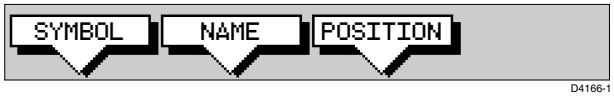
You can change the name, symbol and position of any waypoint.

➤ To edit a waypoint:

1. Select the waypoint, using the cursor or the waypoint list, as previously described. The waypoint soft keys are displayed.

EDIT WAYPOINT

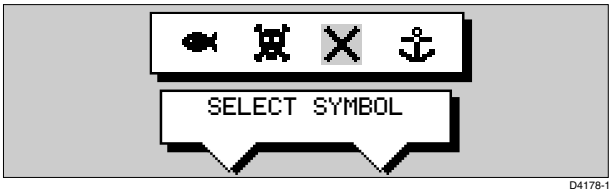
2. Press the EDIT WAYPOINT soft key. The Edit Waypoint soft keys are displayed:



3. To edit the symbol, press the SYMBOL soft key.

   Use the soft keys, shown in the following illustration, to highlight the required symbol, then press **ENTER** to confirm the selection.

   Press **ENTER** or **CLEAR** to return to the default soft keys.



4. To edit the waypoint name, press the NAME soft key.

   The NAME WAYPOINT window is displayed.
   Use the trackpad to enter or edit the name:
   Use the left or right side of the trackpad to move the cursor to the character you wish to change.
   Use the top or bottom of the trackpad to scroll through the characters.

   When you have finished editing the name, to remove the window, press **ENTER** to save the name or **CLEAR** to cancel the operation. The waypoint name replaces the waypoint number.

   Press **ENTER** or **CLEAR** to return to the default soft keys.

5. To edit the waypoint position, press the EDIT WAYPOINT soft key, followed by POSITION. The Waypoint Position pop-up is displayed.

   Use the soft keys to select LAT, LON, BRG or RNG.
   Use the trackpad to edit the value:
   Use the left or right side of the trackpad to move the cursor to the character you wish to change.
   Use the top or bottom of the trackpad to scroll through the characters.
   Adjust each parameter until the waypoint position is correct.

When you have finished editing the position, press **ENTER** to save the position or **CLEAR** to cancel the operation. Press **ENTER** or **CLEAR** again, the Waypoint Position window is removed from the screen and the default soft keys are displayed.

Erasing a Waypoint

You cannot erase the target waypoint or waypoints that are used in routes. However, you can remove a waypoint from the current route - see *Editing a Route* on *page 3-27*.
If you try to erase a waypoint that is used in a saved route you are warned "WAYPOINT IS USED IN A ROUTE & CANNOT BE DELETED"

➤ To delete a waypoint using the cursor:

1. Move the cursor over the waypoint, until the letters WPT are displayed. The waypoint soft keys are displayed.

2. Press the ERASE WAYPOINT soft key. The waypoint is removed from the screen and the Waypoint List is updated.

Note: *If you have stopped a GOTO (see Stop Follow or Stop Goto on page 3-33), the target waypoint remains displayed as a target; you need to use the* CLEAR GOTO *soft key before you can erase the waypoint using the cursor.*

➤ To delete a waypoint using the waypoint list:

1. Select the waypoint from the waypoint list as previously described. The waypoint list soft keys are displayed.

2. Press the EDIT WAYPOINT soft key, followed by ERASE WAYPOINT. The waypoint is removed from the screen and the waypoint list is updated.

Moving a Waypoint

You can move any waypoint except the target waypoint (the waypoint you are following). You can use the Waypoint soft keys and cursor to move the selected waypoint, or you can edit the waypoint position.

CAUTION:
Take care when editing waypoints as it is possible to move waypoints that are used in routes stored in the Route Database. In such instances, the stored route will include the waypoint in its new position.

➤ To move a waypoint using the cursor:

1. Move the cursor over the waypoint, until the letters WPT are displayed. The waypoint soft keys are displayed.

2. Press MOVE WAYPOINT, the cursor changes to a four-headed arrow.
3. Move the cursor to the required waypoint position.
   Press **ENTER** to set the position and return to normal cursor control.
   Press **CLEAR** to cancel the operation.

➤ To move a waypoint using the Waypoint Edit functions:

1. Select the waypoint using either the cursor or the waypoint list as described above. The waypoint soft keys are displayed.
2. To edit the waypoint position proceed as previously described in *Editing the Waypoint Details* on *page 3-13*.

Using the ST60 or ST80 Navigator Keypad

If you have an ST60 or ST80 Navigator Keypad connected on SeaTalk it can be used to name or edit your waypoints, tracks, or routes on any display in the system. The keypad can also be used to select entries in the Waypoint List. The Navigator provides 10 dedicated alphanumeric keys, a multidirectional cursor control pad, plus Insert and Delete keys. The snall red LED glows when the keypad is operational.

Note: *When using the Navigator Keypad, you should be aware that it can control several displays simultaneously; any display in edit mode (i.e. ready for alpha-numeric data entry) will be affected by the Navigator Keypad.*

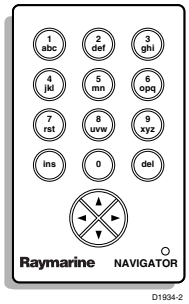


Figure 3-5: ST80 Navigator Keypad

Most of the alphanumeric keys are used to input multiple characters. Each time you press one of these keys in succession, the next character on that key is input. For example, each press of the **1** key alternately inputs A, B, C, then 1. A short beep is emitted each time a key is pressed.

The Navigator's arrow keys function much like the chart display's trackpad, enabling you to move the cursor position or input alpha, numeric, or special characters (. , - / ' &).

The **ins** key functions the same as the **ENTER** key on chart display and **del** inserts a space during edit mode.

Selecting an Entry in the Waypoint List

The Navigator can be used to select an existing item in the Waypoint List. This can be accomplished using the arrow or alphanumeric keys.

➤ To select an existing item in the Waypoint List:

1. Use the up and down arrow keys to move the selection bar up and down the list to highlight the desired entry.

   or

   Press the alphanumeric key that contains the first letter or number of the desired waypoint name. The selection bar moves to the entry starting with that letter or number.

   If more than one entry begins with that character, the selection bar moves to the first one in the list. Each time the same key is pressed, the selection bar moves to the entry starting with the next character on the key. If no entry exists for that character, the entry starting with the nearest previous character is selected. If the numeric value of the key is input when no numeric entry exists, the selection bar moves to the first alpha entry.

   For example, let's say we have four waypoints named ORION, POLARIS, QUANTUM, and 6-GUN. Pressing the **opq/6** key four successive times would select the waypoints ORION (O), POLARIS (P), QUANTUM (Q), then 6-GUN (6). However, pressing the **rst/7** key four successive times would select QUANTUM for the first three key presses because entries beginning with the associated letters do not exist and Q is the next previous beginning letter. The fourth press of the **rst/7** key would select 6-GUN because no entries begin with a 7 and 6 is the next previous beginning number.

2. Use the **ins** key like the display's **ENTER** key, to close the Waypoint List.

   The **del** key and left and right arrow keys do not function in select mode.

Editing Entries in the Waypoint, Route, or Track Lists

You can also use the Navigator Keypad to edit an existing item or to name a new item in the Waypoint List, Route List, or Track List. You first must enter the edit mode for the list you want to modify. Methods for editing each list are described in the respective sections of this chapter.

➤ To edit an item in a list using the Navigator Keypad:

1. If necessary, use the right and left arrow keys to move the cursor to the desired character position.
2. Press an alphanumeric key until the desired character is displayed. Each time you press one of these keys in succession, the next character on that key is input.

   or

1. Use the up and down arrow keys to scroll through the list of alpha, numeric, and special characters until the desired character is displayed (just as you would with the trackpad). Note that you must use this method to input special characters; they are not available using the alphanumeric keys.

   Use the **del** key to insert a space, if required.
2. Use the arrow keys and alphanumeric keys to input the remainder of the characters required to complete the editing.
3. When done, press the **ins** key to enter your changes.

3.4 Working with Routes

A route is made up of a series of waypoints (maximum 50). To make a route you place a series of waypoints on the chart, or you can select waypoints from the Waypoint List. You can also save your vessel's track as you navigate, then convert the track to a route - this function is described in *Section 3.7*.

When a route is created it becomes the current route and is displayed on-screen. The current route is maintained when you power-off. Only one route can be current and is displayed (if it is in the field-of-view) as solid lines connecting waypoints. If you are following the route, the current leg is shown as a dotted line and previous legs are removed from the screen (although the waypoints remain displayed). The current route (and its waypoints) is transferred via SeaTalk to a repeater chart display and other instruments. You can also use the Waypoint Transfer functions to transfer the route database to a repeater display.

Once you have created a route you can use the GOTO soft keys to follow the route. In addition, the GOTO default soft key provides various options as described in *Section 3.5*.

Up to 20 routes can be saved in the route database. You can then select a route from the database list as the current route.

The current route can be edited by adding and moving waypoints. The current route is always placed in the database list as route number 0, so you can edit the current route without affecting the original route in the database. Once a route has been saved, options are also provided to name a route, erase a route and to display route details.

You can use the route information to review your passage plan by adjusting the planned Speed Over Ground (SOG).

Note:
It is possible for the current route to be overwritten by a route from another unit on an integrated system, so it is advisable to save all routes.

This section explains how to perform the following tasks:

- Creating a new route.
- Saving the current route in the database list.
- Clearing the current route.
- Retrieving a route from the database list as the current route.
- Displaying route information, including the route leg data and waypoint details. Use the waypoint details to review your passage plans for different speeds.
- Using the database list to erase and name existing routes.
- Editing a route by adding, removing and moving waypoints.

➤ To access the route soft keys, press the default soft key ROUTE:

Creating a New Route

Note: *If there is a current route, it is cleared when you select* MAKE ROUTE. *If you are following the current route you are prompted to* STOP FOLLOW. *Press the* YES *soft key to continue, or* NO *to abandon route creation. If the route has not been saved you are prompted to save it.*

The chart scenario *Make and Follow a Route* on *page 2-20* provides a simple example of how to create a route.

There are two methods to create routes, whilst creating a route you can switch between these methods:

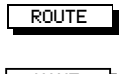
- Placing new waypoints on the chart.
- Selecting existing waypoints from the Waypoint List.

You can edit a route after you have finished making it, as described in *Editing a Route* on *page 3-27*.

➤ To make a new route by placing waypoints:

Note: *You can pan the chart and change the scale while placing waypoints.*

1. If necessary, move the cursor to the area in which you wish to make the route, and select a suitable chart scale.
2. Press the ROUTE soft key, then press the MAKE ROUTE soft key. The make route soft keys are displayed:



3. Move the cursor to the position on the chart where you want your first waypoint to be. Press the PLACE WAYPOINT soft key.

Note: *You can position the cursor on an existing waypoint – the cursor text* WPT *indicates you are re-using the waypoint rather than placing a new one. This waypoint is included in the route when you press* PLACE WAYPOINT.

The waypoint appears on the screen at the cursor position. The number displayed alongside the waypoint identifies its position in the route. The new waypoint is temporarily added to the waypoint list with the first available waypoint number. The waypoints in the current route are re-numbered to identify the new positions.

Note: *If you Clear the route before it is Saved, the waypoint is removed.*

4. Move the cursor to the next waypoint position. A dotted line connects the cursor to the last placed waypoint.

5. Press PLACE WAYPOINT again. The waypoint is placed and the dotted line changes to a solid line.

   If you placed the waypoint incorrectly, you can delete the last-placed waypoint by pressing the UNDO WAYPOINT soft key.

6. Repeat steps 4 and 5 until you have placed all your waypoints. You can have up to 50 waypoints in a route.
7. When you have entered all your waypoints, either:

   Press the ACCEPT ROUTE soft key (or **ENTER**) to complete the route. Your route is displayed on the screen, and is the current route, but it is not active.

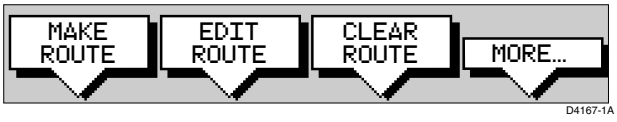
   The first waypoint of a new route is outlined with a square, indicating that it will be the target waypoint when the route is activated. If selected, the waypoint data box is displayed for the target waypoint.

You can save the route as described below.

Note: *The completed route is stored in the display unit, and will be re-displayed if you turn the unit off and on again. However, on an integrated system it is possible for a current route from another unit to overwrite this route; it is therefore recommended that you Save the route as described below.*

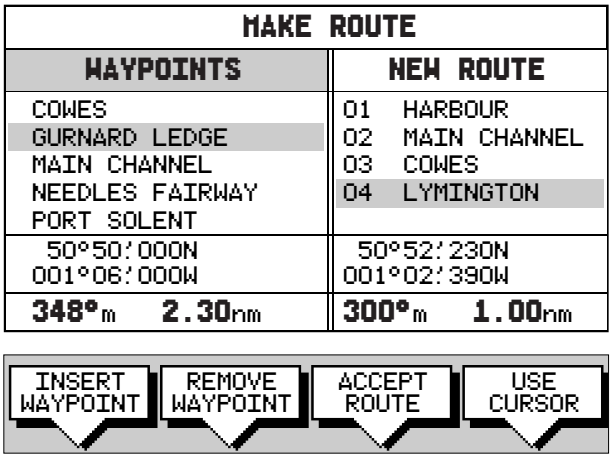
➤ To make a new route using the Waypoint List:

1. Press the ROUTE soft key; the route soft keys are displayed.



2. Press the MAKE ROUTE soft key; the make route soft keys are displayed.

3. Press the USE WPT LIST soft key; the MAKE ROUTE screen is displayed with its associated soft keys.



The available Waypoints are listed in the left hand column (alphanumeric); the right hand column lists the waypoints in the New Route, the number indicates its order in the route. The lower part of the table shows position, bearing and range of the highlighted waypoint.

You use the trackpad left/right to move control between the two columns (the highlighted title indicates the selected column) and the trackpad up/down to scroll through the lists.

4. Select a waypoint from the Waypoint List then go to the New Route column and select a position in the list.
5. Press the INSERT WAYPOINT soft key to place the waypoint *below* the selected position in the Route. You can have up to 50 waypoints in a route.
6. To remove a waypoint from the New Route column, highlight the waypoint and press the REMOVE WAYPOINT soft key.

Notes: (1)*A waypoint cannot be used more than once in a route; those already used are displayed in a lighter shade of gray.*

Notes: (2)*The* INSERT WAYPOINT *or* REMOVE WAYPOINT *action adds/removes the highlighted waypoint to/from the Route column, regardless of which column is selected.*

7. When all waypoints have been entered, press the ACCEPT ROUTE soft key (or **ENTER**) to complete the route.

Note: *The completed route is stored in the display unit and will be re-displayed if you turn the unit off then on again. However, on an integrated system it is possible for a current route from another unit to overwrite this route; it is therefore recommended that you save the route, as described in Saving the Current Route on page 3-22.*

Saving the Current Route

You can save up to 20 named routes in the route database list. These routes can then be re-displayed and followed at a later date. When you save the route, all new waypoints are saved in the Waypoint List.

Note: *If the current route has not been saved, when you attempt an operation that affects this route, e.g.* CLEAR ROUTE*, you are prompted to save it.*

➤ To save and name the current route:

1. To access the SAVE ROUTE soft key, press the ROUTE soft key, followed by MORE.

2. Press the SAVE ROUTE soft key. The save route pop-up and the NAME ROUTE soft keys are displayed as illustrated in *Figure 3-6*.
3. The next available entry on the route list is highlighted.
   (If required, you can use the trackpad to select another position in the list; this can be a blank slot, or an existing route that you no longer require).

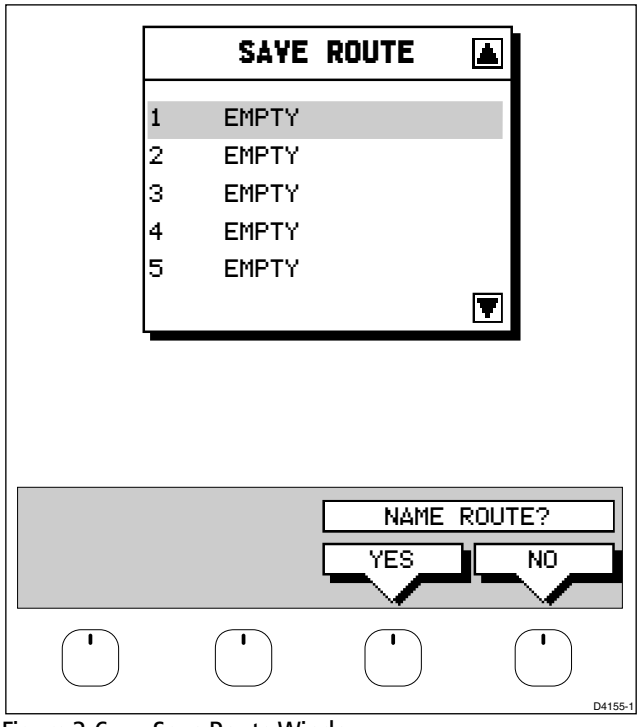


Figure 3-6: Save Route Window

4. If you do not wish to name or re-name the route, press the NO soft key to clear the list. The route is saved and is listed as Route Not Named.

   If you wish to name the route press the YES soft key. Use the trackpad to move the cursor right or left to the character you wish to edit. Then use the top or bottom of the trackpad to increase or decrease the letter or number.

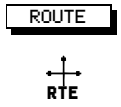
You can use a Navigator Keypad (see *Using the ST60 or ST80 Navigator Keypad* on *page 3-15*) to name the route.

5. Press **ENTER** to finish and clear the Name List, or press **CLEAR** to cancel the operation. To return to the default soft key display, press **ENTER** again.

Clearing the Current Route

You can clear the current route from the screen. When you select CLEAR ROUTE if the current route has not been saved, you have the option of saving it and, if you are following the current route, you have the option to stop.

➤ To clear the current route:



1. Press the ROUTE default soft key or place the cursor over a route leg until the text RTE is displayed.
   Press the CLEAR ROUTE soft key.

2. If you are following the current route the STOP FOLLOW soft keys are displayed.
   To cancel the CLEAR operation press NO.
   To stop following and clear the route press YES.

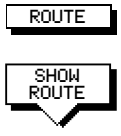
3. If the route has not been saved the SAVE ROUTE soft keys are displayed.
   To clear the route, without saving it in the route database, press NO.
   To save the route in the database, press YES. The Name route soft keys are displayed and you should continue as described in the previous section, *Saving the Current Route* on *page 3-22*.

The current route is cleared from the screen and the default soft keys are displayed. You can now use the ROUTE soft keys to make a route, or to show another route from the database.

Retrieve a Route From the Database

You can select a route as the current route from the database list. The list is accessed from the second set of ROUTE soft keys.

➤ To select a route as the current route:



1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The route list is displayed as illustrated in *Figure 3-7*. The selection bar indicates the selected route.
2. Use the trackpad to select the required route then press the SHOW ROUTE soft key. The chart is re-drawn at a scale suitable to display the whole route.

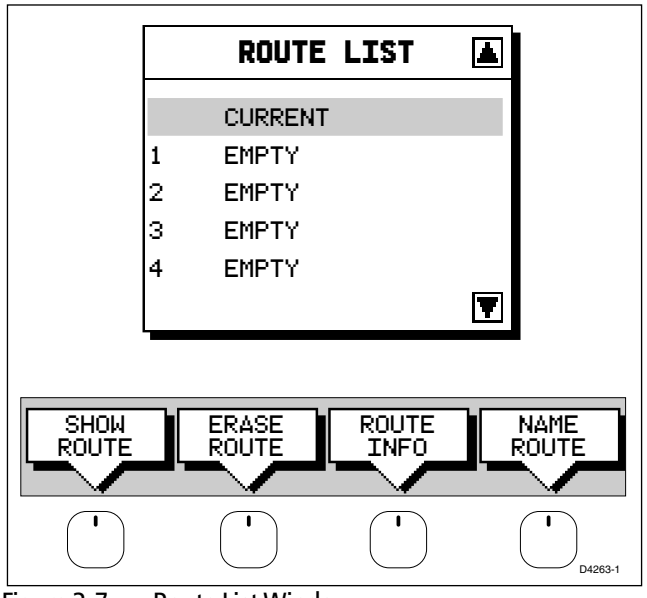


Figure 3-7: Route List Window

Displaying Route Information

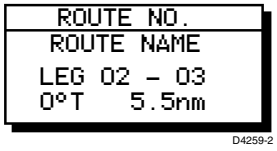
You can display the following information that relates to your route:

- Route leg or waypoint information, using the context-sensitive cursor.
- Details of waypoints in the route, using the soft keys. You can use this information to review your passage plan.

Route Leg and Waypoint Information

➤ To display information about a route leg, move the cursor over the leg until the letters RTE are displayed. A Route Leg data box such as the following is displayed.

RTE



To remove the data box, move the cursor away from the route or press **CLEAR**.

➤ To display information about a route waypoint, move the cursor over the waypoint until the letters WPT are displayed. The waypoint data box is displayed, this box includes the route and waypoint number.
To remove the data box, move the cursor away from the route or press **CLEAR**.

WPT

Using Route Information to Review Your Passage Plan

You can view data for all the waypoints in the current route, or any saved route.

You select the route from the database list and the information is displayed in a Route Information pop-up; the following details are provided for each waypoint:

Position
Bearing (from previous waypoint)
Length of leg (from previous waypoint)
Total Length
Time (ETA or Elapsed)

Soft keys are provided to toggle the time between ETA or elapsed and to change the Speed Over Ground (SOG) value; the ETA for each waypoint is calculated using the selected SOG, so you can change the SOG to determine its effect on your ETA.

The chart scenario *Review Your Passage Plan* on *page 2-22* provides a simple example of how to use the route information.

➤ To display information about any route in the database:

1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The route list is displayed. The selection bar indicates the selected route.
2. Use the trackpad to select the required route, then press the ROUTE INFO soft key.

The Route Information pop-up is displayed. As illustrated in *Figure 3-8*, this lists the waypoints in the route and details bearing, length of each leg, total distance, and either the estimated time of arrival (ETA) or the elapsed time.

The soft keys allow you to toggle between ETA or total (elapsed) time, and to change the Speed Over Ground (SOG) value used in the time calculations. The current selections are highlighted.

➤ To change the SOG used for ETA calculations:

1. Press one of the PLANNED SOG keys to switch from actual to planned SOG.
2. Press the up or down PLANNED SOG keys to change the planned SOG value. The Time values in the Route Information list are updated.
3. Press the ACTUAL SOG key to use the actual SOG value rather than a planned one.

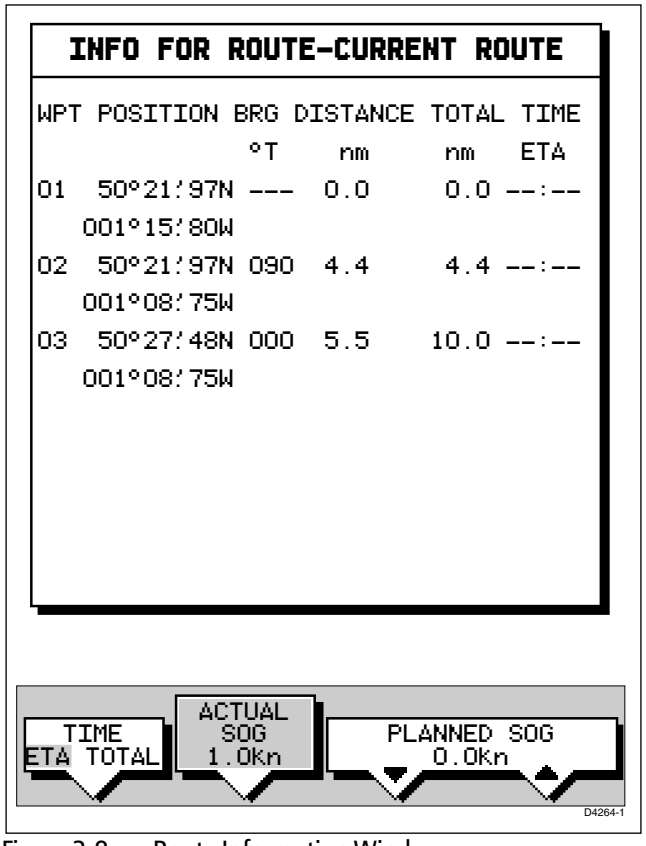


Figure 3-8: Route Information Window

4. Press **ENTER** to remove the Route Information window, then **ENTER** or **CLEAR** to return to the route soft keys.
5. To return to the default soft key display, press **ENTER**.

Using the Route List to Erase and Name a Route

You can delete a route and you can re-name a route by selecting the route on the route list.

➤ To select a route to delete or re-name:

ROUTE

1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The route list is displayed. The selection bar indicates the selected route. Press the appropriate soft key – ERASE ROUTE or NAME ROUTE.

ERASE ROUTE

2. If you ERASE a route you are prompted to confirm.
   Press NO to cancel the operation, then **ENTER** or **CLEAR** if you wish to remove the route list.
   Press YES to erase the route from the list, then **ENTER** or **CLEAR** to remove the route list.

3. If you NAME a route, use the trackpad to move the cursor right or left to the character you wish to edit. Then use the top or bottom of the trackpad to increase or decrease the letter or number.
4. Press **ENTER** to clear the Name List, or **CLEAR** to cancel the name then to return to the default soft key display, press **ENTER** again.

Editing a Route

Once you have created a route, you can edit it using the Waypoint List as described in *Creating a New Route* on *page 3-19*, or using the context-sensitive cursor to:

- Insert a Waypoint into the route
- Add waypoints at the end of the route
- Remove a Waypoint
- Reverse a Route
- Move a Waypoint as described in *Moving a Waypoint* on *page 3-14*.

Any changes you make to the route, except move a waypoint, affect only the current route. The current route is always held in position 0 in the database, so you need to Save the route if you want to keep the changes.

Inserting a Waypoint into a Route

You can use the context-sensitive cursor to insert one or more waypoints in the current route. However, if the route is being followed you cannot insert a waypoint into the current leg.

➤ To insert a new waypoint in the current route:

1. Move the cursor over the route leg into which you wish to insert a waypoint. The letters RTE and the route leg data box are displayed. The Route soft keys are displayed.
2. Press **ENTER**. The cursor changes to a four-way arrow, controlling a new waypoint. The waypoint is connected to the existing waypoints on either side with a dashed line.
3. Move the new waypoint to the required position, and press **ENTER** to drop it and return to normal cursor operation, or **CLEAR** to abandon the operation.

The new waypoint is temporarily added to the waypoint list and named with the first available waypoint number. The waypoints in the current route are renumbered to identify the new positions.

Note: *If you Clear the route before it is Saved, the new waypoint is removed.*

Adding Waypoints at the End of the Route

➤ To add waypoints at the end of the route:

1. Press the ROUTE soft key, followed by the EDIT ROUTE soft key.
   The Make Route soft keys are displayed and the cursor is connected to the last-placed waypoint with a dotted line. You can add further waypoints to the route in the same way as for a new route.
2. Either:

   i. Move the cursor to the required location, and press PLACE WAYPOINT soft key.
   If you place the waypoint in the wrong position, press the UNDO WAYPOINT soft key.
   Or

   ii. Press USE WPT LIST, the MAKE ROUTE pop-up is displayed.
   Select a waypoint from the Waypoint List then press the INSERT WAYPOINT soft key to place the waypoint at the end of the Route.
3. Place as many waypoints as required, and press the ACCEPT ROUTE soft key, the default soft keys are displayed.

Note: *You can* UNDO *waypoints in the original route, not just the new ones.*

Removing a Waypoint from the Route

➤ To remove a waypoint from the current route:

1. Move the cursor over the required waypoint until the letters WPT are displayed. The waypoint soft keys are displayed.
2. Press the REMOVE WAYPOINT soft key. The waypoint is removed from the route and the route is re-numbered.

Alternatively, you can remove the last waypoint from a route by pressing the UNDO WAYPOINT soft key, as described above in *Adding Waypoints at the End of the Route* on *page 3-28*.

If the route has *not* been saved and the waypoint was placed as part of the route, the waypoint is erased.
If the route has been saved, or the waypoint existed before you created the route, the waypoint remains on the screen.

Reversing the Route

➤ To reverse the route, so you can Follow the route back:

1. Either press the ROUTE soft key followed by MORE,
   or move the cursor over the required waypoint until the letters RTE are displayed.
   The route soft keys are displayed.

2. Press the REVERSE ROUTE soft key. The current route is reversed on the screen.

3.5 Following Routes and Going to Points

The default soft key GOTO accesses the functions to FOLLOW a route and GOTO a waypoint or cursor. When you select the target destination, the chartplotter calculates bearing, distance and cross track error; this information is passed to a helmsman or autopilot. You can also restart the cross track error (XTE) from the actual vessel position to set XTE to zero at that point.

When the chartplotter is following a route, the target destination is indicated by a square around the waypoint (or cursor marker) and a dotted line shows the intended track, from your start point or previous waypoint, to the target waypoint.

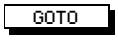
This section describes the following:

- Follow a route either forwards, or in reverse order.
- Target Point Arrival
- Other follow route options, including joining at a selected waypoint, advancing waypoints, and restarting XTE.
- Go to an individual point, either an existing waypoint or the cursor.
- Stop and Restart Follow/Goto.

An alarm is triggered when you approach a waypoint, this section describes what happens when you arrive at waypoints. *Chapter 4* describes how to set the alarm.

The chartplotter can also display the vessel's actual track and the track can be recorded for later display. The Track function is described in the *Section 3.7*.

➤ To access the Goto/Follow soft keys, press the default soft key GOTO (the soft keys differ if a follow or goto is already in progress):



Follow a Route

Note: *The current route may have been created on this display, or created on another unit and received on this display via SeaTalk.*
If a route has been reversed or if a route on screen was being followed but stopped before completion, the target waypoint – outlined by a square box – may be different to when the route was created.

You should always check the target waypoint before initiating a follow route.

➤ To follow the current route:

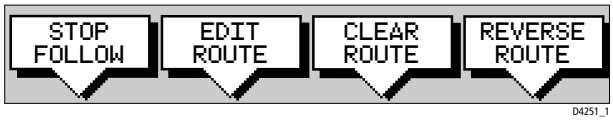
1. Press the GOTO default soft key. The Goto/Follow soft keys are displayed.

2. Press the FOLLOW ROUTE soft key.

Alternatively, to follow a route:

1. Place the cursor over a route leg until the letters RTE and the route soft keys are displayed then press FOLLOW ROUTE.

Your vessel's current position becomes the origin, and the target waypoint in the current route becomes the active target.
The soft keys change as follows:



These options are described in the following sections.

➤ To follow the current route in reverse:

1. Press the ROUTE default soft key, followed by MORE. The route soft keys are displayed.

2. Press the REVERSE ROUTE soft key. The current route is reversed on the screen. Press **ENTER** or **CLEAR**.

3. Press the GOTO default soft key. The Goto/Follow soft keys are displayed.
4. Press the FOLLOW ROUTE soft key.

The soft keys change as follows:

These options are described in the following sections.

Alternatively:

1. Place the cursor over the route leg until the letters RTE and the route soft keys are displayed. Press REVERSE ROUTE then FOLLOW ROUTE.

Your vessel's current position becomes the origin, and the target waypoint in the current route becomes the active target.

Target Point Arrival

The arrival alarm is used to alert you when the vessel is approaching the target point. The arrival alarm is defined as a circle (not visible on the screen) around the target. You can specify radius of the arrival alarm (see *Section 4.3*).

The alarm is triggered when either of the following conditions is met:

- The distance to the target point is less than that specified for the arrival alarm.
- Your vessel reaches the closest point of approach to the target (defined by a line passing through the waypoint and perpendicular to the route leg).

➤ To cancel the arrival alarm and go towards the next waypoint in the route,
either press any key
or wait for 10 seconds.

The target becomes the origin, the next waypoint becomes the target point, and the two are connected by a dotted line indicating the current leg. Any previous route leg is removed from the screen, but waypoints remain.

Note: *When following a route using a SeaTalk autopilot, the autopilot will not turn to the new waypoint until it is accepted at the autopilot control unit.*

Other Follow Route Options

You can use the soft keys to follow a route from a selected waypoint (join a route), or if already following, you can advance to the next waypoint. You can also restart the cross track error, setting the current vessel position as the new origin.

In addition, you can move a selected waypoint as described in *Section 3.3*, or remove a waypoint from the route as described in *Section 3.4*.

Joining a Route

➤ To start tracking the current route at a selected waypoint:

1. Move the cursor over the required waypoint until the letters WPT and the waypoint soft keys are displayed.

2. Press the FOLLOW FROM HERE soft key.
Your vessel follows the route, using the selected waypoint as the target point.
3. To return to the default display, move the cursor away from the waypoint or press **CLEAR** or **ENTER**.

Advancing to a Waypoint

➤ Once you are following a route, you can advance to the next waypoint, even if you have not reached the current target waypoint:

1. If necessary, press the GOTO default soft key to display the Goto/Follow soft keys.

2. Press the WAYPOINT ADVANCE soft key. The current leg of the route is abandoned and the next waypoint becomes the target. The display is updated to show the new route leg.

Restart Cross Track Error (XTE)

While you are following a route, or going to a target point, you can restart the XTE. This sets the XTE to zero and moves the origin to the actual vessel position.

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.

➤ To restart XTE:

1. Press the GOTO default soft key, the Follow/Goto soft keys are displayed.

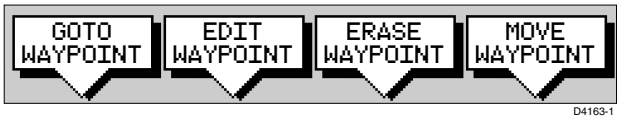
2. Press the RESTART XTE soft key. The route origin moves to the current vessel position, thus the XTE becomes zero.

Going To an Individual Target Point

Rather than following a route, you can go directly to a selected target point, this can be an existing waypoint (not in the current route), or the cursor position.

➤ To navigate directly to an existing waypoint:

1. Use the trackpad to position the cursor over the required waypoint until the letters WPT and the waypoint soft keys are displayed.



Alternatively, you can select the waypoint from the waypoint list as described in *Section 3.3*.

2. Press the GOTO WAYPOINT soft key.
   Navigation to the selected waypoint begins. The soft key STOP GOTO is displayed.
3. To return to the default soft key display, move the cursor away from the waypoint or press **ENTER** or **CLEAR**.

➤ To navigate directly to the cursor position:

1. Use the trackpad to position the cursor as required.

2. Press the GOTO default soft key, followed by GOTO CURSOR.
   If navigation is currently in progress you are warned "Already following route. Cancel route and goto cursor?".

   To cancel the GOTO CURSOR operation, press NO.
   To continue with the GOTO CURSOR operation (and stop the current GOTO ROUTE), press YES.

   The chartplotter places a temporary waypoint as the target and starts to navigate towards it. The waypoint is shown as a square with a circle and dot in the centre, and is connected to the vessel's starting position with a dashed line.

   The soft key STOP GOTO is displayed.
3. To return to the default soft key display, move the cursor away from the waypoint or press **ENTER** or **CLEAR**.

Stop Follow or Stop Goto

➤ To stop following the route or target point either:

1. If necessary, press the GOTO soft key, then press the STOP GOTO/FOLLOW soft key.

Or:

1. Move the cursor over any waypoint or leg in the current route, then press the STOP GOTO/FOLLOW soft key.

The dotted line from your vessel to the target waypoint disappears.
If you stopped a GOTO WAYPOINT or CURSOR, to remove the target point from the screen, move the cursor over the target point then press the CLEAR GOTO soft key.

If you subsequently use the FOLLOW ROUTE soft key to restart navigation, the route is followed from the point at which it was stopped. This is indicated by a square around the target waypoint. If you want to follow from another waypoint you can initiate the follow then use the WAYPOINT ADVANCE or FOLLOW FROM HERE soft key to step through the route.

3.6 Transferring Waypoints and Routes

Displayed SeaTalk Waypoints

In an integrated system, when a route is made current on any SeaTalk equipment it is sent to all SeaTalk instruments, including this chartplotter; this route will override any other current route. When GOTO waypoint or GOTO cursor is in operation it is considered a route.

The current route can be edited on any instrument with route edit capability.

Note: *Transferred waypoints are not automatically saved by the chartplotter, however you can save the route locally, thus adding the waypoints to the local waypoint list.*

Managing Database Lists

There are several methods of maintaining database lists. The method you choose will depend on the links available (SeaTalk or NMEA), and whether you want to transfer individual waypoints or the complete waypoint and route list:

- You can save the complete Waypoint and Route Lists to a user cartridge in the chart card slot.
- You can load new Waypoint and Route Lists from a user cartridge in the chart card slot.
- If waypoints are transmitted by other equipment on SeaTalk or NMEA, you can receive them on the chartplotter.
  When RECEIVE WPTS FROM ST/NMEA is selected, any waypoints sent on SeaTalk or NMEA are transferred and appended, one-by-one, to the waypoint list; routes sent on NMEA are appended to the route list.
  You can use this function to add waypoints from a PC connected via NMEA.
- You can send the waypoint **and** route lists from the chartplotter to other instruments via NMEA using the SEND WPT LIST function.
  Sending the waypoint list does not affect **current** routes.
  The NMEA link could be to a PC.

CAUTION:
The function LOAD USER CARD **replaces the existing waypoint and route lists with the transferred lists.**

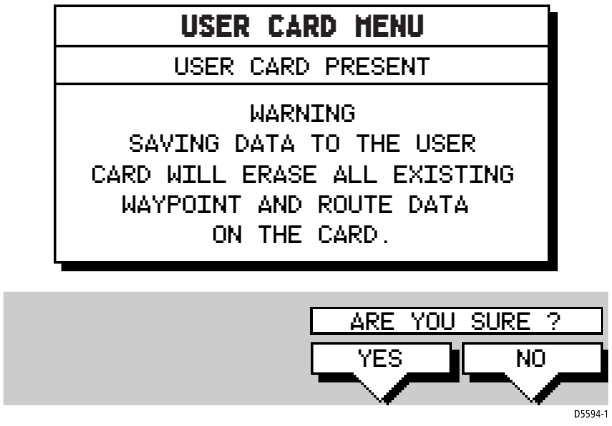
➤ To save waypoints to, or load waypoints from a user cartridge:

CAUTION:
Loading waypoints from a user cartridge overwrites any existing waypoint and route lists.

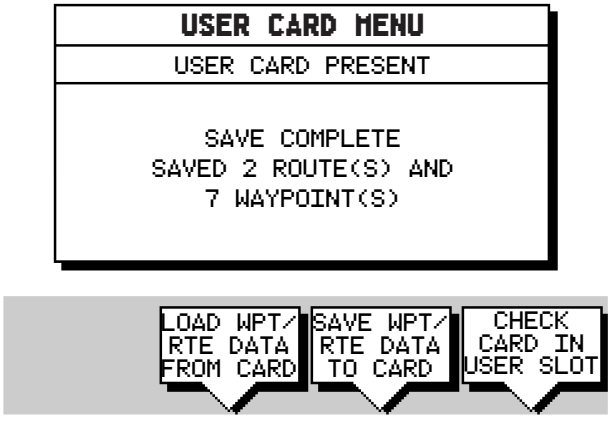
1. Insert a C-MAP User Card into the lower of the two cartridge slots.

MARKS

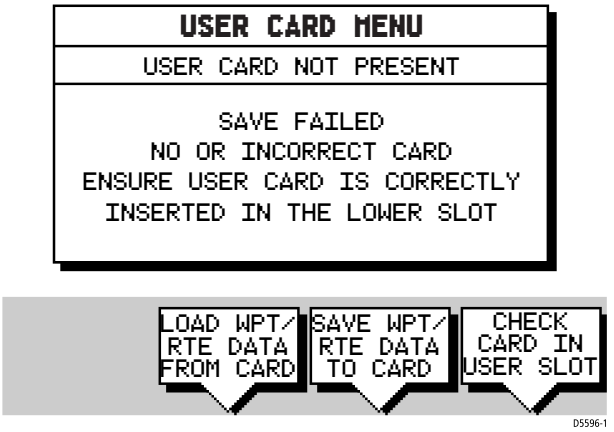
1. Press **MARK S** followed by the LOAD/SAVE USER CARD soft key.
2. The User Card Menu and associated soft keys are displayed.
3. Press the SAVE WPT/RTE DATA TO CARD or LOAD WPT/RTE DATA FROM CARD soft key; an appropriate warning and Yes/No soft keys are displayed.



4. Press Yes to continue or No to abandon the operation and return to the previous screen.
5. If the operation is successful, confirmation of the number of Routes and Waypoints saved/loaded is displayed.



If the operation fails, the Save Failed message is displayed.



➤ To receive incoming waypoints on SeaTalk or NMEA:

1. To display the waypoint list press **MARKS** followed by the WAYPOINT LIST soft key.
   Press the WAYPOINT TRANSFER soft key.

2. Press the soft key RECEIVE WPTS FROM ST/NMEA.
   The soft key changes to STOP RECEIVING WAYPOINTS.
   When waypoints are transmitted by other equipment they are added to the waypoint list on the chartplotter. Routes transmitted on NMEA are appended to the route list.

3. To disable waypoint transfer, press the soft key STOP RECEIVING WAYPOINTS.
   Alternatively, press **ENTER**, or **CLEAR**, twice to close the Waypoint List.

➤ To send the waypoint list on NMEA:

1. Display the waypoint list as previously described, then press the WAYPOINT TRANSFER soft key.
2. Press the soft key SEND WPT LIST ON NMEA.
   The soft key changes to STOP SENDING WAYPOINTS.
   The waypoint and route lists are transmitted from the chartplotter to other instruments on NMEA.

3.7 Using Tracks

The Track function is used to mark on-screen the trail that your vessel has followed, as if it had left a visible fixed wake.

While the track is switched on it is recorded in the display unit's memory. You specify the interval at which track points are made and a line is drawn on-screen between each point. Up to 4500 track points can be saved in total: in the current track and in up to 5 track files (each a maximum of 750 points). The current track remains on-screen, even following a power off/on, until you clear the track.

Breaks in the track will be caused when any of the following occur for longer than the specified track interval: the track is switched off then on; the position fix is lost; the display unit is switched off.

To enable you to follow this track on your return voyage, the *SmartRoute* function converts the track (or the last segment of a track with breaks) into a route which is automatically reversed, see *SmartRoute* on *page 3-41*.

A track can be saved and retrieved for display at a later date. You can only display one track at a time; you must clear a current track from the screen if you want to display a saved track.

This section describes:

- Setting up a track, including how to specify the interval.
- Clearing the current track.
- Managing tracks, using the track list, including Saving, Naming, Erasing and Showing a track.
- Making a Track into a Route

➤ To access the track controls:

1. From the chart display, press the **MENU** key to display the chart set up soft keys.

2. Press the TRACK SETUP soft key to display the Track soft keys:

The following instructions assume you have the track soft keys displayed.

Setting Up a Track

You use the track soft keys to switch the track on and to specify the interval, as time or distance, at which track points are saved. The time interval between track points can be set to 1s, 5s, 10s, 30s, 1min, 3min, 5min, 10min or 30minutes. The distance spacing between track points can be set to 0.1nm, 0.5nm or 1.0nm. The interval default is a distance of 0.1nm. The maximum track length is 750 points. When the track has reached this length, the first points are overwritten. The track is saved until you switch it off. When the unit is powered off, the current track (thus far) is retained in memory.

Setting a short time interval between track points is best suited to navigation within a close or complex environment, e.g. an estuary or marina whereas, in contrast, a greater distance interval is best suited to a long haul voyage.

Refer to the setting guide shown in *Figure 3-9* to determine the best setting for your planned voyage; this is particularly important if you wish to use *SmartRoute* to convert your track to a route.

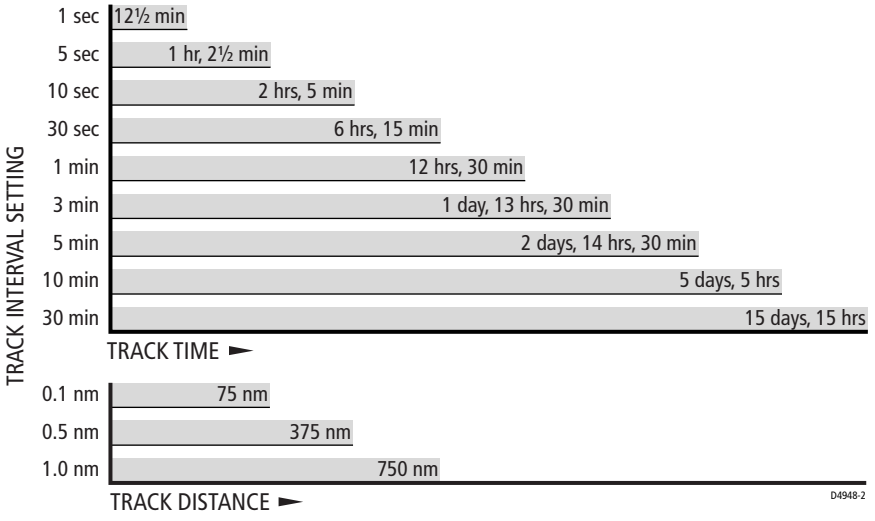


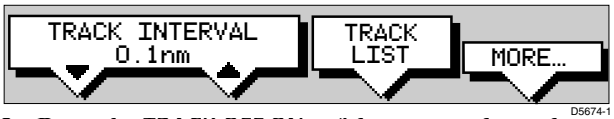
Figure 3-9: Track Interval Setting Guide

You can change the setting at any time. The setting applies only to the current track and is not saved as a stored track.

➤ To set up a track:

1. Press the MORE soft key to access the TRACK INTERVAL soft keys.
   Press the appropriate soft key to set either a time interval or a distance interval; press the UP arrow to increase the interval, the DOWN arrow to decrease the interval.

   Press **ENTER** to return to the track soft keys.



TRACK OFF ON

2. Press the TRACK OFF ON soft key to toggle tracks on.

   Your vessels trail will be displayed on-screen, with a line joining the points at the selected interval.

Clearing the Current Track

You can clear the current track from the screen. When you select CLEAR TRACK, if the current track has not been saved, you have the option of saving it.

➤ To clear the current track:

CLEAR TRACK

1. Press the CLEAR TRACK soft key.
2. If the track has not been saved the SAVE TRACK soft keys are displayed.
   To clear the track without saving it in the Track List, press NO.
   To save the track in the list, press YES. The Name track soft keys are displayed and you should continue as described in the following section, Saving and Naming a Track.

   Press **CLEAR** to abort the Clear Track operation.

SAVE TRACK

The current track is cleared from the screen and the default soft keys are displayed.

Managing Tracks

Although it is easy to set up a track, and this track is retained even if you switch off your display, you can store a number of different tracks so that you can review them at a later date. This section explains how to perform the following tasks:

- Save and Name a track.
- Name, Erase and Show an existing track.

Saving and Naming a Track

You can save up to 5 named tracks in the Track List. These tracks can be re-displayed at a later date.

➤ To save and name the current track:

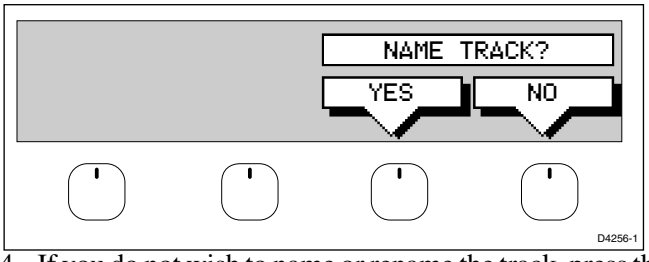
TRACK LIST

1. Press the MORE soft key followed by the TRACK LIST soft key. The track list pop-up and associated soft keys are displayed.

2. The next available entry on the track list is highlighted.
   (If required, you can use the trackpad to select another position in the list; this can be a blank slot, or an existing track that you no longer require).

SAVE TRACK

3. Press SAVE TRACK. The name track soft keys are displayed.



4. If you do not wish to name or rename the track, press the NO soft key (or **CLEAR**) to clear the list. The track is saved and is listed as Track Not Named.
   If you wish to name the track press the YES soft key. Use the trackpad to move the cursor right or left to the character you wish to edit. Then use the top or bottom of the trackpad to increase or decrease the letter or number.
   You can use a Navigator Keypad (see *Using the ST60 or ST80 Navigator Keypad* on *page 3-15*) to name the track.
5. Press **ENTER** to finish and clear the Track List, then to return to the default soft key display, press **ENTER** again or **CLEAR**.

Naming, Erasing and Showing a Track

➤ To name an existing track, erase a track or show a track, you select the track from the track list, then press the appropriate soft key as follows:

TRACK LIST

1. Press the TRACK LIST soft key. The Track List is displayed. The selection bar indicates the selected track.
   Select the required track then press the appropriate soft key.

NAME TRACK

2. If you NAME a track, use the trackpad to move the cursor right or left to the character you wish to edit. Then use the top or bottom of the trackpad to edit the letter or number. Press **ENTER** finish the operation or **CLEAR** to cancel the name, then **ENTER** to remove the track list.

ERASE TRACK

3. If you ERASE a track you are prompted to confirm.
   Press NO to cancel the operation, then **ENTER** to remove the track list.
   Press YES to erase the track from the list, then **ENTER** to remove the track list.

SHOW TRACK

4. If you SHOW a track, and you have a current track on screen, you are prompted to save the track. Proceed as previously described in Clearing the Current Track.
   Alternatively, press the NO soft key to cancel the SHOW TRACK operation. The track list is removed and the selected track is displayed.
5. Press **ENTER** or **CLEAR** to return to the default display.

SmartRoute

SmartRoute enables the current track, or the last segment of a track with breaks, to be converted to a route (the track could have been retrieved from the track list). SmartRoute places a waypoint at the last track point, then considers each point in turn and determines the closest route through the recorded track. The number of waypoints created is minimized, whilst maintaining optimum correlation to the recorded track. On completion, the maximum deviation of the route from the recorded track is displayed.

➤ To convert the current track into a route:

1. Select MAKE INTO ROUTE and press **ENTER**.
   The current track is converted to a new route and becomes the current route, with the most recently placed track point as the start of the route, i.e. the track is reversed.
   If there is an unsaved current route on screen, the option to save the route is given, see *Section 3.4, Working with Routes*.
2. Check the calculated route and, in particular, that the route deviation from the original, given in the warning box, is within navigable limits.

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

Chapter 4: Further Chart Operations

4.1 Introduction

This chapter explains how to use the additional functions that are provided on the chartplotter display.

It covers the following topics:

- Measuring distances and bearings on the chart, using the **VRM/EBL** key
- Setting alarms and timers
- Man Overboard (MOB)
- Cursor Echo
- GPS Setup
- Data Log Mode

In order to use some of these functions, you may need the following additional data from equipment connected to your system via a SeaTalk or NMEA link:

Table 4-1: Function of External Data

Data	Example source	Integrated functions available
Heading COG	Compass* GPS	- Head Up or Course Up heading modes - MOB (if speed data also available)
Position	GPS system	- Waypoints - Position, COG, SOG and time data in Data Box and Nav Window - MOB - Data Log
Other data	Transducers	- Data Box and Nav Window data displays, including speed, depth, wind, temperature

*If heading data is available via both NMEA and SeaTalk, NMEA data takes priority. For all other data, SeaTalk data takes priority (see *Section 4.3*).

4.2 Measuring Distances Using the VRM/EBL Key

You can obtain an accurate measurement of the distance and bearing between two points by using the **VRM/EBL** key.

➤ To place a ruler line and Ruler data box:

1. Position the cursor on the starting point from which you wish to measure.
2. Press **VRM/EBL**.
   A Ruler data box is displayed showing the bearing and distance from the starting point to the cursor position. The character A appears at the cursor location.
3. Use the trackpad to move the cursor to the measurement end point. A line connects the cursor to the starting point, and the Ruler data box is updated to show the bearing and length of the line as shown in *Figure 4-1*.
4. Press **ENTER** to fix the end point of the ruler line, and return to normal cursor control. The letter B marks the location of the end point on the chart.

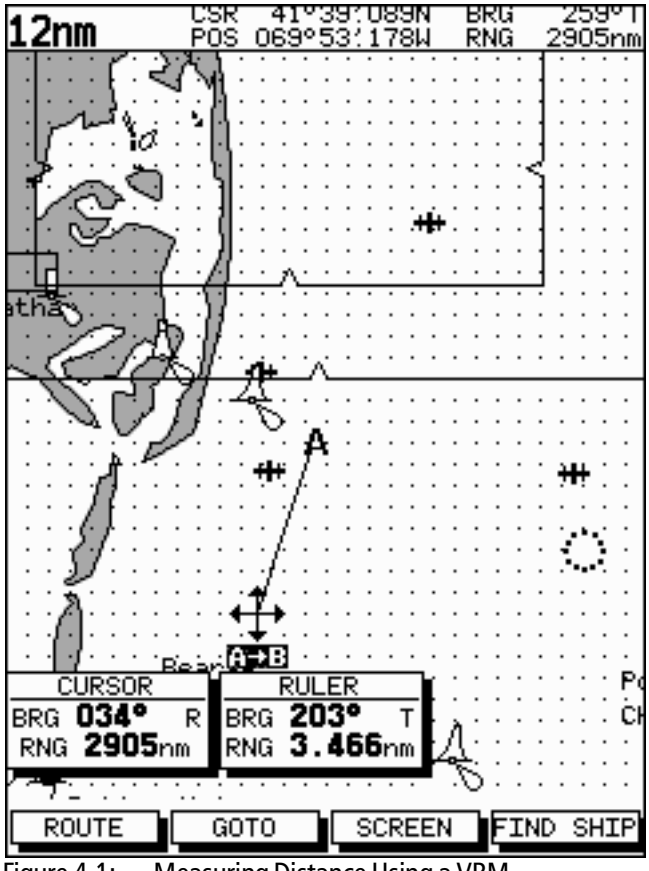


Figure 4-1: Measuring Distance Using a VRM

➤ To re-position one end of the ruler line:

1. Move the cursor over the ruler line towards the end that you want to re-position, until the letters A→ B are displayed.
2. Press **ENTER** to take cursor control of the ruler. The ruler end moves to the cursor which changes to a four-headed arrow.
3. Move the cursor to the required position. The ruler data box is updated.
4. Press **ENTER** again to set the position and return to normal cursor control. Alternatively, press **CLEAR** to reset the ruler to the previous position.

➤ To clear the ruler line and ruler data box
either:
Move the cursor over the ruler line, until the letters A→ B are displayed, then press **CLEAR**.

or:
Press **VRM/EBL**, the ruler soft keys are displayed. Press RULER OFF ON to toggle the ruler line and data box off.

➤ To clear the ruler data box:
Press **VRM/EBL**, the ruler soft keys are displayed. Press RULER DATABOX OFF ON to toggle the ruler data box off.

➤ To move the Ruler data box, using the context-sensitive cursor:

1. Move the cursor over the box until the letters BOX are displayed, and press **ENTER** to take cursor control of the box.
2. Use the trackpad to move the box to its new location, and press **ENTER** to drop it and return to normal cursor operation.

4.3 Alarms and Timers

Alarm Reporting

The chartplotter reports the following alarms, that are set using the **ALARMS** key:

Alarm	Indicates:
Arrival	Your vessel has arrived at the active waypoint: it has either reached the arrival circle (the radius of which is specified) or, has reached its closest point of approach (defined by a line passing through the waypoint and perpendicular to the route leg).
Off Track	Your vessel has exceeded the specified distance (maximum cross track error) from the active route leg.
Anchor	Your vessel has drifted from its anchor position (set when the alarm was turned on) by more than the specified distance.
Grounding	The chartplotter checks a sector ahead of your vessel for a dangerous object (land, depth area, intertidal area, rock, obstruction or shore obstruction). You specify the depth and range of the sector from your vessel. You can view a report of the objects that triggered the alarm.
Countdown	The countdown timer has reached zero.
Alarm Clock	The time matches the specified alarm time.

The alarms are switched on or off, and the limits set, using the Alarms Set Up menu, accessed from the **ALARMS** key.

When an alarm is triggered, the alarm buzzer sounds and a pop-up window describing the alarm is displayed.

➤ To silence the alarm and clear the message, press any key.
If the alarm was generated by the chartplotter, the appropriate action is taken. For example, following an arrival alarm, the next route leg is activated.
If an anchor alarm is silenced, but the alarm condition perstists, the alarm is repeated every 30 seconds.

External Alarms

All SeaTalk system alarms (except autopilot alarms) are received and displayed on the chartplotter. You can silence these alarms by pressing any key. No other action is taken by the chartplotter except to silence the alarm.

Setting Alarms and Timers

➤ To set up an alarm or timer:

1. Press the **ALARMS** key. The Alarms Set Up menu is displayed, showing the current settings (see *Figure 4-2*).
2. Use the trackpad to move the selection bar up or down the options. As each line is highlighted, the soft key labels are updated to show the current settings and controls.

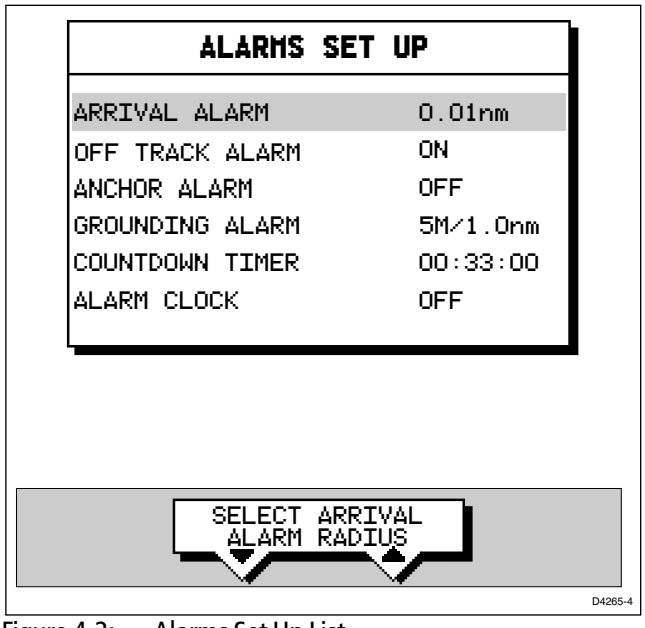


Figure 4-2: Alarms Set Up List

3. Use the up or down soft keys to change the alarm setting. For example, for the arrival alarm you can adjust the radius from the waypoint at which the arrival alarm will be triggered.
   The arrival, off track and anchor alarm distances can be set in the range 0.01 to 9.99 nm, in steps of 0.01nm.
   The grounding alarm depth can be set from 1 to 20m in 1m steps and can be specified to cover a sector at a range from 0 to 1nm, in 0.1nm steps.
   The timer is set in hours, minutes and seconds, and the alarm clock in hours and minutes.

4. If required, press the ALARM OFF ON soft key to toggle the alarm on or off. If you turn an alarm off, its value is retained and will be used when you turn the alarm on again.

Note: *You can turn all the alarms and timers on and off, except for the Arrival Alarm which is always on.*

5. Press **ENTER** to save the changes and clear the list.

4.4 Man Overboard (MOB)

If you lose a person or object overboard, and need to return to the location, you should use the Man Overboard (MOB) function.

You can select the type of data used for the MOB position using the set up menus (see *Section 5.3*).

Note: *To obtain MOB position, you need either of the following:*

- Position data from a GPS or equivalent device
- Heading and speed data, so that the position can be calculated by dead reckoning

➤ To initiate the MOB procedure, press and hold the **MARKS** key for two seconds. The system then performs the following tasks automatically:

- Redraws the chart at 1/2 nm (even if cartography is not available but plotter mode is on).
- Marks the current position with a MOB symbol which replaces any current active waypoint and route.
- Displays the MOB data box, showing the bearing and distance from your vessel to the MOB waypoint position, and the elapsed time since the MOB was initiated (*Figure 4-3*).
- Displays the position data box, showing your vessel's position.
- As your vessel moves from the MOB position, a dotted line is displayed connecting the MOB symbol and the vessel's current position.
- Sounds a 4-second alarm pattern every 30 seconds.
- Sends an MOB message (including bearing and distance) to other units in the system, via the SeaTalk connection.

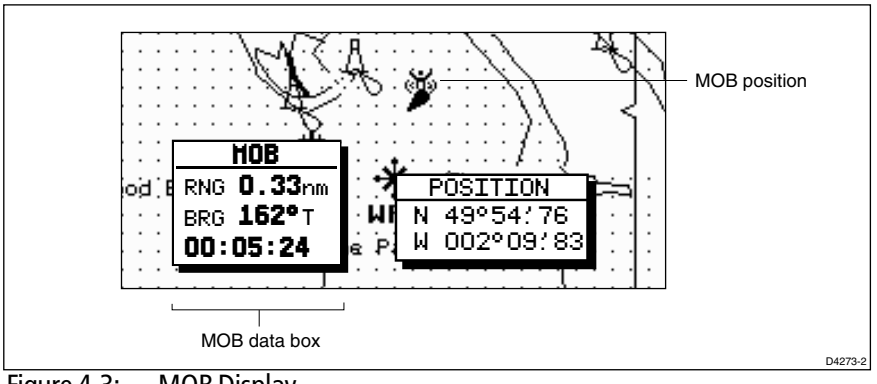


Figure 4-3: MOB Display

➤ To cancel the MOB, press and hold the **MARKS** key for 2 seconds.
The chart is re-drawn at its previous scale, and the MOB symbol and data box are removed.

Note: *The MOB procedure can also be initiated or cancelled if the appropriate SeaTalk message is received by the display unit.*

4.5 Cursor Echo

In a system with a radar display connected via SeaTalk, you can set the display to enable cursor echo. Cursor echo (accessed from System Set Up, described in *Section 5.3*) enables you to display a radar cursor on the chart picture, or a chart cursor on the radar picture(you cannot display a remote chart cursor in a chart window nor a remote radar cursor in a radar window).

The following options can be toggled ON or OFF:

- **Radar Cursor In :** displays the cursor from a radar on the chart window (default - OFF).
- **Chart Cursor In:** - not valid for the SL520/530/631PLUS display.
- **SeaTalk Cursor Out:** enables the output, onto SeaTalk, of the display's own cursor (default - OFF).
- **Cursor Echo Local:** - not valid for the SL520/530/631 PLUS display.

If you set the options to OFF, no cursor echo information is displayed.

When the appropriate option is switched on, the display shows its own cursor, plus the cursor of the other display with appropriate cursor text (RDR) to indicate its origin. This means that you could move the cursor over a target on a radar display, and check the identity of the target by looking at the radar cursor position on the chartplotter.

4.6 GPS Setup

GPS set up page provides you with information and the status of the tracked navigation satellites for a SeaTalk GPS. It also enables you to SET UP a SeaTalk Differential GPS, by manually retuning it to a different differential beacon.

The GPS Navigation Status pop-up window (shown in *Figure 4-4*) provides, for each tracked satellite, the satellite number, a graphical signal strength bar and its current usage status. HDOP and satellite Fix Status are also displayed. Data for up to 12 satellites are shown.

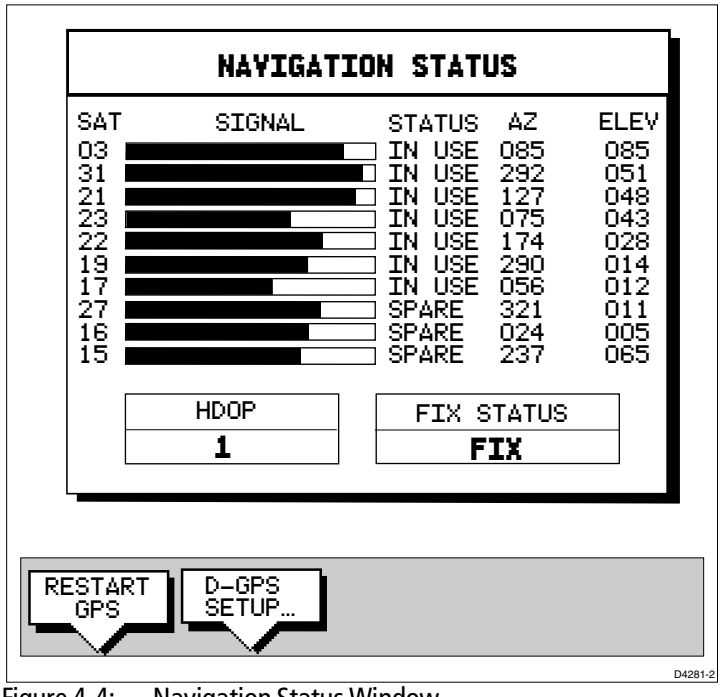


Figure 4-4: Navigation Status Window

Positional accuracy is dependent upon certain parameters; in particular for GPS, the azimuth and elevation angles are used in a triangulation process to calculate position. HDOP (Horizontal Dilution Of Position) is a measure of this accuracy; a higher figure signifies greater error. In ideal circumstances, the figure should be in the region of 1.0. The Fix Status can indicate:

- FIX, where a satellite fix has been acquired.
- D-FIX, where a differential beacon fix has been acquired.
- SD-FIX, where a satellite differential fix has been acquired.
- NO FIX, where no fix can be acquired.

➤ To select GPS Set Up:

Press **MENU**, then press the GPS SETUP... soft key.
The Navigation Status pop-up window shown in *Figure 4-4* is displayed.

Restart GPS

This soft key enables re-acquisition of a GPS position fix.

Note: *Under normal circumstances* RESTART GPS *is not required.*

D-GPS Set Up

The D-GPS SET UP function provides the ability to set up an external Differential GPS, either automatically (default) or by manually retuning it to a different differential beacon.

In AUTO mode, the D-GPS is set to automatic and beacon selection is made automatically by the beacon receiver. The beacon frequency and bit rate received from the beacon receiver are displayed. The soft keys are disabled and grayed out.

In MANual mode, you can select the beacon frequency and bit rate that are sent to the beacon receiver.

When you select D-GPS SETUP a pop-up window, providing the following parameters, is displayed with associated soft keys:

- Beacon ID - This shows the Beacon ID of the beacon transmitter. If no beacon has been found this item states NOT LOCKED.
- Beacon Frequency - Both the menu item and associated soft keys show the currently used differential beacon's frequency in kHz. The frequency range available is 283.5kHz to 325.0kHz.
- Bit Rate - Both the menu item and associated soft keys show the currently used differential beacon's bit rate in bps. The rates available are 50bps, 100bps and 200bps.
- Signal Strength and Signal to Noise Ratio - These items indicate the received signal strength and Signal to Noise Ratio (SNR) in dB, received from the beacon receiver. If the display unit is using RTCM data received via NMEA, this information is not available and the item shows dashes, one per character. The received Signal Strength and SNR are interrelated. SNR provides a measure of the quality of the received signal and is dependent upon signal strength.
- Differential Age - This indicates the time elapsed since the last differential beacon correction update.

➤ To tune a differential SeaTalk GPS to another beacon:

1. Press D-GPS SETUP, the Differential GPS Setup pop-up is displayed.

2. Press MODE AUTO MAN to toggle between AUTO and MAN modes; the selected mode is highlighted is indicated in the pop-up window.

Note: *If the display unit is receiving RTCM data via NMEA, repeating a differential fix from another unit, the* MODE *soft key is set to* AUTO *and is grayed out. If receiving* RTCM *data, the setting must be performed manually on the external DGPS receiver.*

3. To set a new beacon manually, press BEACON SELECT, use the soft keys to set the required beacon frequency and bit rate.

   Press **ENTER** to return to the Differential GPS Setup pop-up window. The status of the selected beacon is displayed in the pop-up.

   Press **ENTER** to return to the Navigation Status window, then **ENTER** to return to the **MENU** soft keys.

4.7 Data Log Mode

You can set the chartplotter to log course data every thirty minutes. Up to 48 log entries are held, when 48 entries have been made, the chartplotter will start overwriting the first entries.

You start the log using soft keys provided in Data Log Mode. When you select Data Log Mode the log is displayed full-screen. If the screen is full, you use the trackpad to scroll the list and view further log entries. Each line in the log shows:

- Time of log entry
- Position at time of log entry
- Course Made Good (CMG) since last log entry
- Distance Made Good (DMG) since last log entry

Once you have enabled the data log, data is continually logged, but you must set the display to Data Log Mode to view it. You use the **DISPLAY** key to change the full-screen mode.

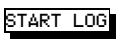
You can stop the log at any time and you can clear the log from memory.

If the chartplotter is switched off while the log is running, a dashed line will be displayed before the first new entry since switching the chartplotter on again.

➤ To activate Data Log Mode:

1. Press **DISPLAY**, the DISPLAY pop-up is shown.
2. Press **DISPLAY** again, until LOG is selected, then press **ENTER**.

➤ To start recording log entries, press the START LOG soft key.
As shown in *Figure 4-5*, the chartplotter records the time and vessels position. Every thirty minutes the time, new position, distance made good and course made good are recorded.



The START LOG soft key changes to STOP LOG.

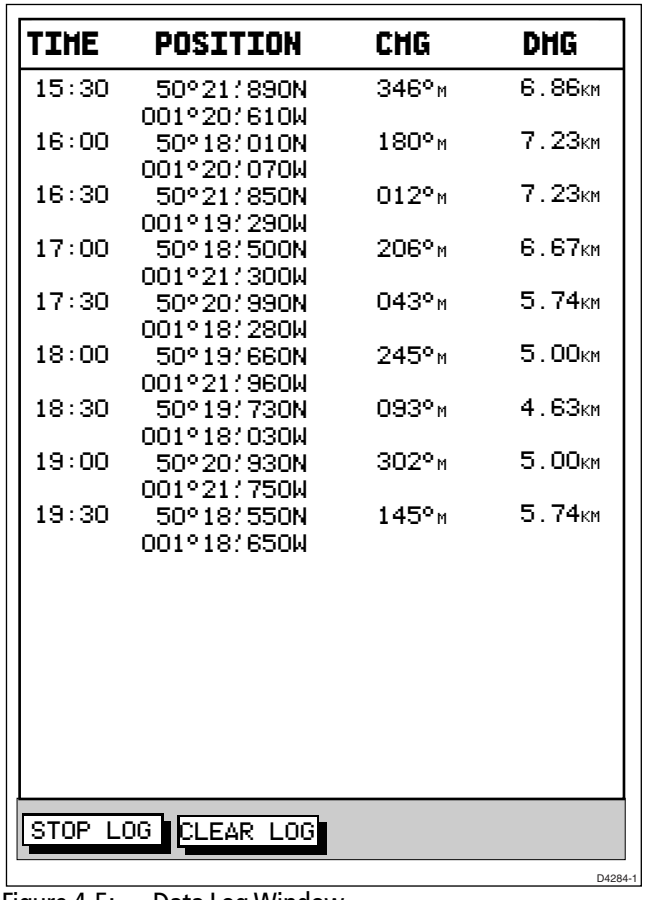


Figure 4-5: Data Log Window

➤ To stop recording log entries:

STOP LOG

Press the STOP LOG soft key.

➤ To clear the log entries:

CLEAR LOG

Press the CLEAR LOG soft key, you are prompted "Are You Sure". To cancel the CLEAR LOG operation press the NO soft key.
To continue press the YES soft key, all log entries are deleted, but the data log remains active.

➤ To return to the chart display:

DISPLAY

Press **DISPLAY** to select the chart mode, then press **ENTER**.

STOP LOG

The log continues until you return to the data log mode and press STOP LOG.

Chapter 5: Setting Up the System Defaults

5.1 Introduction

Once you have installed your display unit and are familiar with its basic operation (described in *Chapter 1* and *Chapter 2*), you need to set it up so that it obtains the correct information from the equipment you have connected it to, operates according to your requirements, and displays information according to your preferences.

This is achieved using the soft key controls that are displayed when you press the **MENU** key.

In most cases, you will only need to use the **MENU** key options when you first set up your system. However, you may decide to change the way you have customized some aspects, such as the screen and help setting, as you become more familiar with your system.

Once you have set the values, they remain as the default settings until you reset them; they are retained even if you power off your display.

This chapter covers the following topics:

- Changing the default set up parameters
- System parameter functions and default settings
- Chart specific parameter functions and default settings

You should check the functions of the parameters, and decide on the new settings, before making the changes.

5.2 Changing the Set Up Parameters

The set up parameters are divided into two sections:

- **System**, to control the aspects of the system that are not specific to the chart.
- **Chart**, to control the chartplotter display , including waypoint information and vectors.

Note: *The GPS and Track Set Up menus are described in Chapter 4.*

This section provides instructions for displaying and changing the default values. The following sections list the parameters and their possible settings, and describe the function of each parameter in turn.

➤ To set the default parameters:

1. Press the **MENU** key to display the set up soft keys - the options available depend on the selected operating mode.

2. Press the soft key for the set up you require.

   The requested set up menu is displayed, listing the parameters and their current settings.

3. Use the trackpad to move the selection bar up and down the list. An arrow is displayed at the top or bottom right-hand corner if you can scroll the list to display further parameters.

   As each line is highlighted, the soft keys are updated to show the settings available.

   - For parameters that have a numeric value, or more than four possible settings, a scroll list is displayed above two of the soft keys.
   - Some parameters are controlled by a slider that is displayed above two of the soft keys.
   - For some parameters, a soft key provides access to a sub-menu of further options.

4. Press the soft key corresponding to the desired setting or, for scroll lists, use the soft keys to scroll forwards or backwards through the list until the required setting is displayed. This setting is retained when you move the selection bar on to the next parameter in the menu list.

   For sliders, press the appropriate soft key repeatedly to increase or decrease the slider value in individual steps, or press and hold the key to change the setting quickly.

5. Once you have set all the required values, press **ENTER** to clear the menu and return to the set up soft keys.
6. Press **ENTER, MENU** or **CLEAR** to clear the soft keys and return to the default display.

You can return all the settings to their original factory settings, if required, by performing a factory reset as described in *Chapter 7*.

5.3 System Set Up Parameters

The following table lists the System menus and their options, shows the factory default setting, and provides a space for you to make a note of your new default setting. Each parameter is described in the following subsections.

Table 5-1: System Set Up Parameters

Menu	Options	Factory Default	New Default
DATA BOXES			
POSITION	OFF, LAT/LONG, TDs	OFF	
SPEED	OFF or ON	OFF	
DEPTH	OFF or ON	OFF	
COG	OFF or ON	OFF	
SOG	OFF or ON	OFF	
TIME	OFF or ON	OFF	
DATE	OFF or ON	OFF	
WIND	OFF, APP, TRUE or BOTH	OFF	
WAYPOINT	OFF, LAT/LON, or RNG/BRG/TTG	OFF	
CROSS TRACK ERROR	OFF or ON	OFF	
HEADING	OFF or ON	OFF	
LOG/TRIP	OFF or ON	OFF	
PILOT	OFF or ON	OFF	
VMG	OFF, WIND, WPT or BOTH	OFF	
TEMPERATURE	OFF or ON	OFF	
TIDE SET/DRIFT	OFF or ON	OFF	
BEARING MODE	MAGNETIC, TRUE	TRUE	
CURSOR REFERENCE	MAG/TRUE, RELATIVE	RELATIVE	
CURSOR READOUT	OFF,LAT/LONG,RNG/BRG,BOTH	RNG/BRG	
DAY/NIGHT	DAY, NIGHT	DAY	
HELP	OFF/ON	ON	
SOFT KEYS	OFF/ON	ON	
KEY BEEP	OFF/ON	ON	
MOB DATA	DR, POSITION	DR	
PILOT POP-UP	OFF/ON	OFF	
MENU TIMEOUT PERIOD	NO TIMEOUT, 10, 20, 30 SECONDS	NO TIMEOUT	
DISTANCE UNITS	NAUTICAL MILES, STATUTE MILES, KILOMETERS, KILOYARDS	NAUTICAL MILES	
SPEED UNITS	KNOTS, MILES PER HOUR, KILOMETERS PER HOUR	KNOTS	
DEPTH UNITS	METERS, FEET, FATHOMS	FEET	
TEMPERATURE UNITS	CENTIGRADE, FAHRENHEIT	FAHRENHEIT	

Table 5-1: System Set Up Parameters

Menu	Options	Factory Default	New Default
VARIATION SOURCE	AUTO, MANUAL	AUTO	
BRIDGE NMEA HEADING	OFF or ON	ON	
NMEA OUT SET UP			
APB	OFF or ON	ON	
BWC	OFF or ON	ON	
BWR	OFF or ON	ON	
DBT,	OFF or ON	ON	
DPT	OFF or ON	ON	
MTW	OFF or ON	ON	
RMB	OFF or ON	ON	
RSD	OFF or ON	ON	
RTE	OFF or ON	ON	
TTM	OFF or ON	ON	
VHW	OFF or ON	ON	
VLW	OFF or ON	ON	
WPL	OFF or ON	ON	
GGA	OFF or ON	ON	
GLL	OFF or ON	ON	
RMA	OFF or ON	ON	
RMC	OFF or ON	ON	
VTG	OFF or ON	ON	
ZDA	OFF or ON	ON	
CURSOR ECHO			
RADAR CURSOR IN	OFF or ON	OFF	
CHART CURSOR IN	Not valid for SL520/530/631 PLUS display	OFF	
S/T CURSOR OUT	OFF or ON	OFF	
CURSOR ECHO LOCAL	Not valid for SL520/530/631 PLUS display	ON	
DATE FORMAT	DD/MM/YY, MM/DD/YY	MM/DD/YY	
TIME FORMAT	12 HOUR, 24 HOUR	12 HOUR	
TIME OFFSET	UTC, or local offset value: Plus or minus up to 13 hours, in whole hours	UTC	
GPS SOG/COG FILTER	HIGH, MEDIUM, LOW	MEDIUM	
COMPASS SET UP		-	
LINEARISE COMPASS	Press soft key to start the linearisation procedure and		
ALIGN HEADING	to align the heading		
LANGUAGE	ENGLISH (UK), ENGLISH (US), DANISH, FRENCH, GERMAN, DUTCH, ITALIAN, ICELANDIC, NORWEGIAN, PORTUGUESE, SPANISH, SWEDISH, FINNISH	ENGLISH (US)	
SIMULATOR	OFF, DATA, RADAR, BOTH	OFF	

Data Boxes

Press the SELECT BOXES soft key to display the data box sub-menu. This allows you to select up to 6 data boxes that you can display.

Note: ***1.*** *A fixed set of 9 (mono) or 16 (color)of these data items are available for display in the Nav Data half-screen window (see Chapter 2).*
2*. In addition to these grouped data boxes, boxes for the cursor readout, VRM/EBL data, waypoint data, MOB data and simulator status are displayed when selected or when the appropriate function is active..*

Data boxes provide regularly used data in a compact form so that most of the picture can still be seen. The ones you select here can be turned on and off as a group during normal operation, and you can also move them around the screen individually using the context-sensitive cursor (see *Context-Sensitive Cursor Control* on *page 1-9.)*.

Bearing Mode

The mode (magnetic or true) of all the bearing and heading data displayed. This is indicated in the status bar after the heading value.

Cursor Reference

The mode of the bearing data displayed for the cursor readout. The bearing information can be displayed in either of two forms:

- Relative: The bearing relative to your vessel's heading.

  Mag/True: The actual bearing in either degrees magnetic or degrees true. If you choose this mode, the selection you made for the previous parameter (Bearing Mode), °M or °T, is displayed in the cursor (Rng/Brg) data boxes. The current units are shown for the heading value in the status bar at the top of the screen.

Cursor Readout

This option controls whether the cursor data is shown in latitude and longitude or in range and bearing. Alternatively, you can show both types of readout, in separate boxes, or turn the cursor data box off.

You can also turn the cursor readout box(es) on and off during normal operation, via the SCREEN default soft key (see *Switching the Cursor Data Box On and Off* on *page 2-10.)*

Day/Night

This option allows you to change the display between day and night modes. If you select NIGHT mode, a different palette, more suited to night time viewing is used.

Help

When Help is set to ON, a prompt appears when selecting a soft key or menu choice, and when using the context-sensitive cursor. The help message is cleared when an action is selected.

Soft Keys

When the Soft Keys option is set to ON, the default soft keys are displayed if no other operation is in progress.
When the Soft Keys option is set to OFF, the default soft keys are only displayed when a soft key is pressed, and they disappear if no operation is performed for 10 seconds.

Key Beep

This option controls whether or not the keys make a noise when you press them.

MOB Data

This option controls whether MOB data is based on position data, or on dead reckoning (DR). Dead reckoning normally provides a better indication of the course to an object in the water, on the assumption that your vessel and the object are both subject to the same tide and wind effects.

Autopilot Pop Up

This option controls whether or not the autopilot pop up is displayed. When set to ON, if the status and locked heading of the autopilot changes, they are displayed in a pop up box. The box is removed from the display after two seconds.
When Autopilot Pop Up is set to OFF, the pop up box is disabled.

Menu Timeout Period

With no timeout set, menus and soft key labels remain displayed until you clear them by pressing **ENTER**, **CLEAR** or the appropriate dedicated key.

If you set a value here, the menus and soft key labels will be cleared if a key has not been pressed for the specified number of seconds.

This setting does not affect the *default* soft key labels, which are controlled by the Soft Keys option (see above).

Units

You can set the units for speed, depth and temperature. The units you set will be used to display all data, including information received from other instruments on the system.

Variation Source

The variation value is the difference between True and Magnetic direction data for heading or bearing values. The Variation Source option provides soft keys for selecting Auto or Manual variation mode, displays the current variation value for each and highlights the currently selected mode.

Auto Mode

If you select Auto mode, the display obtains the value of variation automatically, normally from received data. The variation value that is used depends on the data available, and is selected in the following order of priority:

1. Variation value from the same source as the heading data:
   - If heading data is being taken from NMEA, then variation is also taken from NMEA
   - If heading is taken from SeaTalk, then SeaTalk variation is used
2. Variation value from a different source:
   - If heading data is being taken from NMEA, but no NMEA variation is available, then variation is taken from SeaTalk
   - If heading is taken from SeaTalk, but no SeaTalk variation is available, then variation is taken from NMEA
3. A calculated variation value, using position data, if no SeaTalk or NMEA value is available
4. The current manual variation value, if no SeaTalk or NMEA value and no position data is available

Manual Mode

If you select Manual mode, by pressing either of the MANUAL keys, you can specify the local variation value according to the area in which you are operating. Press the appropriate MANUAL key to adjust the variation up or down, to a maximum of 30° East or West.
This value is then transmitted to any other SeaTalk instruments on your system. It is retained if you turn the display off and on again.

In Manual mode, incoming NMEA variation is ignored. However, if the variation is changed on another SeaTalk instrument, the new value is used and the manual value that is displayed is updated.

Note: *The Manual variation value defaults to 0°, so it is important to set up a value if variation is not available from an external source.*

Bridge NMEA Heading

The display bridges NMEA input data to the SeaTalk bus (see *Section 6.8*). The Bridge NMEA Heading option can be used to prevent NMEA heading data being bridged onto the SeaTalk bus.

For example, if you have a course computer connected on SeaTalk and NMEA, and an active compass connected on NMEA, SeaTalk data overrides NMEA data in the course computer. You should therefore switch OFF the Bridge NMEA Heading option to ensure the course computer receives the same NMEA heading input as the display system.

NMEA Out Set Up

This option lets you switch off individual NMEA out sentences.

Cursor Echo

You can set up an integrated system so that radar and chartplotter displays connected via SeaTalk can display each other's cursors.
Cursor echo functions so that you can display a chart cursor on the radar picture, or a radar cursor on the chart picture (you cannot display a remote radar cursor in a radar window nor a remote chart cursor in a chart window). When the appropriate options are switched on, each display shows its own cursor, plus the cursor of the other display with appropriate cursor text (RDR or CHT) to indicate its origin. This means that you could move the cursor over a target on the radar display, and check the identity of the target by looking at the radar cursor position on the chartplotter.

Press the CURSOR ECHO soft key to display the cursor transfer soft keys. The following options can be toggled ON or OFF:

- **Radar Cursor In:** displays the cursor from a radar on the chart display (default - OFF).
- **Chart Cursor In:** - not valid for the SL520/530/631 PLUS display.

Note: *The remote display must have SeaTalk Cursor Out enabled. Raymarine recommend that in multi-display systems, you do* ***not*** *enable Cursor Out on more than two displays. If multiple displays have cursor out enabled, the cursors will not be displayed simultaneously, but will flash on/off.*

- **SeaTalk Cursor Out:** enables the output, onto SeaTalk, of the display's own cursor (default - OFF).
- **Cursor Echo Local:** - not valid for the SL520/530/631 PLUS display.

If you set the options to OFF, no cursor echo information is displayed.

Date and Time Settings

Set your preferred date format (DD/MM/YY or MM/DD/YY) and time format (12 or 24 hour). If you wish to display local time, use the soft keys to change from UTC to the required time offset. This can be up to plus or minus 13 hours, in hourly steps.

GPS SOG/COG Filter

The SOG/COG filter averages the velocity vectors to compensate for the oscillating motion of the vessel, giving a clearer indication of the vessel's course and speed. The filter does not affect the calculation of the GPS position. The velocity vectors calculated from the GPS Signal give an instantaneous measure of speed and direction of the GPS antenna. The COG and SOG can therefore seem erratic under certain conditions. For example, when a vessel is moving slowly through rough seas, the antenna moves from side to side as well as in the direction of the vessel.

Slow moving vessels, or vessels sailing in rough seas will benefit from a high setting, whereas a power boat that can quickly change speed and direction will benefit from a low setting.

Select the SOG/COG filter setting as required. This can be set to HIGH, MEDIUM or LOW.

Compass Set Up

This option is used to calibrate a Raymarine heading sensor such as the Pathfinder Smart Heading System. Controls are provided for Linearise Compass which detects and corrects for heading errors caused by metal objects, and Align Heading which matches the displayed heading to a known heading or transit.

Refer to the Handbook supplied with your heading sensor for more details.

Language

Select the language in which you wish information to be displayed. The selected language will be used for screen text, labels, menus and options, but will not affect the letters displayed by the context-sensitive cursor. The language setting also affects the display format for lat/long position information.

Simulator

The simulator allows you to operate your display without data from the antenna and/or external data sources. The system set up simulator options have the following functions:

- **Data** provides simulated numerical data, and a waypoint display.

When the simulator is switched on, a SIMULATOR data box is displayed during operation, showing the simulation selected.

5.4 Chart Set Up Parameters

The CHART SET UP option allows you to set up the chartplotter according to your system configuration and your personal preferences.

The following table lists the Chart Set up parameters and their options, shows the factory default setting, and provides a space for you to make a note of your new default setting. Each parameter is described in the following subsections.

Table 5-2: Chart Set Up Parameters

Parameter	Options	Factory Default	New Default
CUSTOMIZE CHART	See below for details		
PLOTTER MODE	OFF, ON	OFF	
CHART ORIENTATION	NORTH UP, COURSE UP, HEAD UP	NORTH UP	
OBJECT INFORMATION	OFF, ON POINTS, ON ALL	ON ALL	
WAYPOINT SYMBOLS	OFF, ON	ON	
WAYPOINT NUMBERS	OFF, OFF	ON	
DEFAULT WAYPOINT SYMBOL			
HEADING VECTOR	OFF, 3 MINS, 10 MINS, INFINITE	OFF	
COG VECTOR	OFF, 3 MINS, 10 MINS, INFINITE	OFF	
TIDE VECTOR	OFF, 10 MINS, 1 HOUR, INFINITE	OFF	
RADAR/CHART SYNCH	Not valid for SL520/530/ 631 PLUS display	OFF	
DATUM SELECTION	WGS 84, LOCAL	WGS 84	
POSITION OFFSET	SET UP, OFF/ON	OFF	

Customize Chart

This provides a list of chart options, enabling you to specify how the chart features are displayed. Most options can be toggled between on, off and custom - custom passes on/off control to the SCREEN soft keys (see *Customizing the Screen Presentation Options* on *page 2-10*).

The following features can be set using Customize Chart, factory default settings are shown in **bold** type:

- chart text (**on**, off, custom)
- chart text size (small, **normal**, large)
- chart display (**detailed**, simple)

- chart boundaries (**on**, off, custom)
- spot soundings (on, off, **custom**)
- depth shading limit (set the limit)
- depth contours (**on**, off, custom)
- depth contour display (set the upper and lower limits)
- nav marks (**on**, off, custom)
- nav marks icon (**international**, US)
- light sectors (on, off, **custom**)
- caution and routing data (on, **off**, custom)
- marine features (on, off, **custom**)
- land features (**on**, off, custom)
- icon display (simple, **detailed**, custom)

The factory default for CUSTOM options is ON.

Plotter Mode

Plotter Mode enables you to zoom into a smaller area, even when no chart data is available for that scale. This allows you use the chartplotter functions at large scales even when a chart card is not installed.

Chart Orientation

The chart orientation is normally North Up, but can be changed to Course Up or Head Up if heading data is available. The orientation modes give the following displays:

- **North Up:** The chart is displayed with north upwards. As you change heading, the ship's heading marker moves. This is the default mode, and is the only mode available if there is no heading data.
- **Course Up:** The chart is stabilized and displayed with the currently selected course upwards. If you select a new course, the picture rotates to display the new course upwards.
  The reference used for the Course Up depends on the information available. The first available in the following is used:
  i. A locked heading over a SeaTalk connection
  ii. The heading at the time Course Up was selected
  To update the Course Up reference while Course Up is the current mode, re-select Course Up from the set up menu.
- **Head Up:** The chart is displayed with the vessel's current heading upwards. As the heading changes the chart will rotate.

Object Information

You can set Object Information ON ALL, ON POINTS or OFF to determine when an object identification pop-up is displayed. When set to ON ALL, the information pop up is displayed when the cursor is placed over any chart area for two seconds. ON POINTS enables the information pop up when the cursor is placed over a displayed chart object and OFF disables the information pop up.

Waypoint Options

Waypoint Symbols controls whether or not the waypoints are shown on the Chart display, with their appropriate symbols. The active waypoint, and waypoints in the current route are always shown.

Waypoint Numbers controls whether or not the waypoint numbers are shown for any waypoints in the current route.

Default Waypoint Symbol lets you select the symbol you want used for waypoint display.

Vectors

Heading, Tide and Course Over Ground vectors can be displayed as a line from your vessel. The length of the vector is determined by your choice of SOG and the time period. An infinite vector extends to the edge of the chart screen.

Heading Vector indicates your current heading.

COG Vector indicates your course over ground.

Tide Vector indicates the tide angle. Tide information is calculated from the speed through water, compass and position data.

Radar/Chart Synch

Not valid for SL520/530/631 PLUS display.

Datum Selection

You can select either WGS 84 or LOCAL datum. In LOCAL mode, you are presented with a list of datums; use the trackpad to scroll through the list, then press **ENTER** to select the option and close the menu.

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.

When you change datum selection, the system attempts to set any connected GPS to the new mode, using SeaTalk and NMEA set up commands. A message shows whether the set up was successful or not.

Position Offset

You can offset the vessel position to allow for differences between the GPS and paper chart data. This may be useful if you are using a datum that is not available on the Chartplotter, or if you are referring to a paper chart drawn to unknown datum.

You can change the offset by moving the cursor to the known vessel position. This offset is applied to all incoming position data. The default offset value is zero.

When position offset is switched on, all displayed vessel position data is annotated (C) to indicate it has been corrected.

➤ To switch the position offset on/off:

1. Select the POSITION OFFSET option, then press the OFFSET OFF ON soft key to toggle the option on/off. The last selected offset value is added to position data and the vessel is displayed at the corrected position.

➤ To set a new offset value:

1. Select the POSITION OFFSET option, then press the SET UP OFFSET soft key. If necessary, position offset is automatically toggled on.
2. Use the trackpad to move the cursor to the required vessel position; the cursor position is displayed in a position offset data box.
3. Press the ACCEPT OFFSET soft key, the vessel is displayed at the new position. Press **ENTER** to return to the default display.

Chapter 6: Installation

6.1 Introduction

This chapter provides installation instructions for your SL520/530/631 PLUS display. Details for mounting the SL520/530/631 PLUS display and connecting the equipment are included.

- To install display unit follow the instructions in *Section 6.2* to *Section 6.6*. ou should then test the display as described in *Section 6.7*.
- To connect your display to other equipment, follow the guidelines in *Section 6.8* and *Section 6.9*, taking particular care to ensure the correct polarity of the SeaTalk supply.

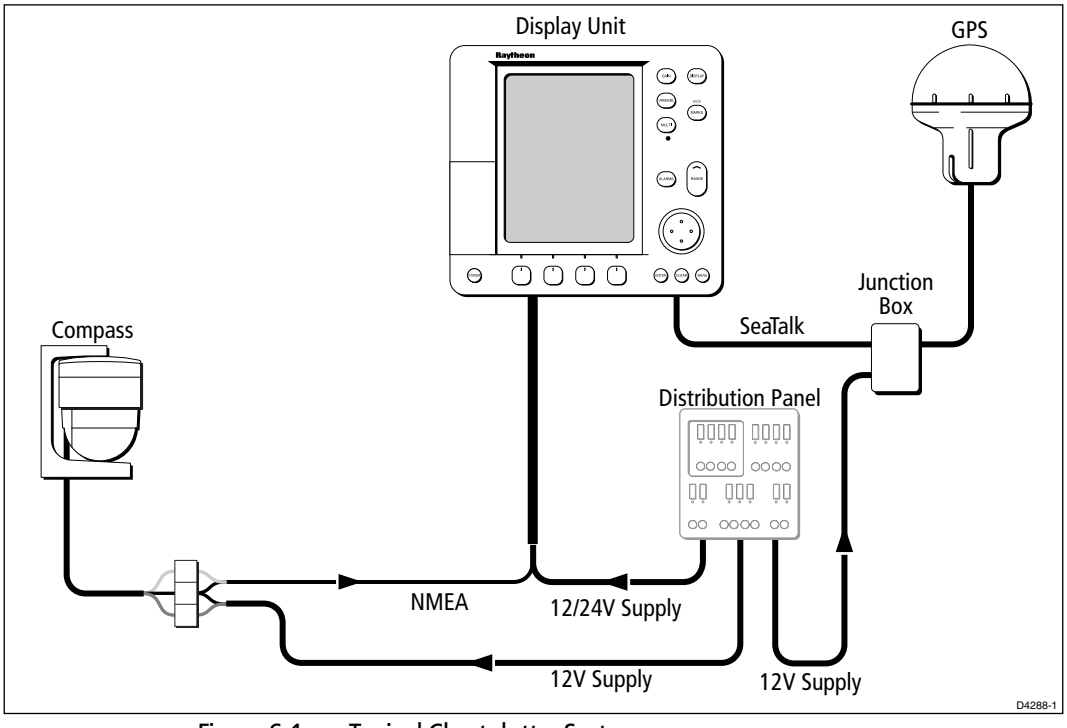


Figure 6-1: Typical Chartplotter System

Note: *If you wish to practice using the display before installation, connect a 12V or 24V DC power supply (connecting the red wire via a 6.3A quick blow fuse to positive and the black wire to negative) and using the simulator mode, as described in Chapter 2.*

For full functionality of the chartplotter you need to provide position and heading data.

- Orientation - heading data is required for chart to operate in Course Up and Head Up.
- MOB requires heading and speed data. Alternatively, SOG and COG (derived from the same source as position data) enable the MOB function.
- Position data is required for full functionality of the chart display.

Full details of heading, position and other data are given in *Section 6.8*.

Planning the Installation

Before you install your system, plan the installation, considering:

- Location of the display unit, as described in *Section 6.3*.
- Cable Runs, including cables for an integrated system (to provide heading and position data etc.), as described in *Section 6.4*.

EMC Installation Guidelines

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. Although every effort has been taken to ensure that they will perform under all conditions, it is important to understand what factors could affect the operation of the product.

The guidelines given here describe the conditions for optimum EMC performance, but it is recognized that it may not be possible to meet all of these conditions in all situations. To ensure the best possible conditions for EMC performance within the constraints imposed by any location, always ensure the maximum separation possible between different items of electrical equipment.

For **optimum** EMC performance, it is recommended that **wherever possible**:

- Raymarine equipment and cables connected to it are:
  - At least 3 ft (1 m) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).
  - More than 7 ft (2 m) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.

- The equipment is supplied from a separate battery from that used for engine start. Voltage drops below 10 V, and starter motor transients, can cause the equipment to reset. This will not damage the equipment, but may cause the loss of some information and may change the operating mode.
- Raymarine specified cables are used. Cutting and rejoining these cables can compromise EMC performance and must be avoided unless doing so is detailed in the installation manual.
- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite needs to be removed during installation it must be reassembled in the same position.

Suppression Ferrites

The following illustration shows typical cable suppression ferrites used with Raymarine equipment. Always use the ferrites supplied by Raymarine.

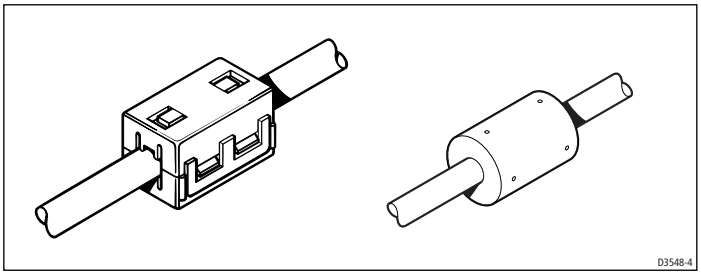


Figure 6-2: Typical Suppression Ferrites

Connections to Other Equipment

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

6.2 Unpacking and Inspecting the Components

Unpack your system carefully, to prevent damage to the equipment. Save the carton and packing, in case you need to return a unit for service.
Check that you have all the correct system components. These depend on your system package, as follows:

Table 6-1: Parts and Accessories

Item	Part No	Supplied with:	Option for:
7" Mono LCD Display	E32046	SL520 PLUS	-
7" Color LCD Display	E32047	SL530 PLUS	-
10.4" Color Display	E32048	SL631 PLUS	-
Display Accessories			
7" Sun cover	D331	SL520/530 PLUS	
10.4" Sun cover	E55031	SL631 PLUS	
Handbook	81209	SL520/530/631 PLUS	-
Quick Reference Card, Chart	86079	SL520/530/631 PLUS	-
7" Mounting bracket assy	W143	SL520/530 PLUS	-
Trunnion knobs (x2)	W145	All	-
7" Flush Mount Kit	M92708	-	SL520/530 PLUS
10.4" Mounting bracket assy	E55032	SL631 PLUS	-
10.4" Flush Mount Kit	E55033	-	SL631 PLUS
Power cable	W144	All	-
Seatalk cable assembly -			
Flat moulded plugs both ends:			
3 ft 3 in (1 m) long	W284	-	All
9 ft 9 in (3 m) long	W285	-	All
16 ft 3 in (5 m) long	W286	-	All
29 ft 3 in (9 m)) long	W287	-	All
Flat to male round connector:			
12 in (0.3 m) long	D187	-	All
Flat to female round connector:			
12 in (0.3 m) long	D188	-	All
Flat moulded plug one end only:			
3 ft. 3 in (1 m) long	D229	-	All
Ferrite for SeaTalk Cable	-	All	-
Seatalk junction 3-way block	D244	-	-
Seatalk auxiliary junction box	R55006	All	-
NMEA OUT cable assy			
4 ft 11 in (1.5m)	R55005	All	-

6.3 Selecting the Display Unit Location

The display unit can be mounted using the mounting bracket supplied, or console mounted using the optional flush-mounting kit.

The dimensions of the display unit, including the bracket, are shown in *Figure 6-3*, *Figure 6-5* and *Figure 6-4*.

When planning the display installation, the following should be considered to ensure reliable and trouble free operation:

- **Convenience:** The contrast and colors seen on all color LCD displays vary slightly with viewing angle; this is more noticeable on the left hand side. Power the unit and select a suitable mounting location prior to installing the display.
  The mounting location should be easily accessible to allow operation of the front panel controls.
- **Access:** There must be sufficient space behind the display to allow cable connections to the rear panel connectors, avoiding tight bends in the cable.
- **Interference:** The selected location should be far enough away from devices that may cause interference, such as motors, generators and radio transmitter/receivers (see the EMC guidelines earlier in this section).
- **Magnetic compass:** Mount the display unit at least 3 ft (1m) away from a magnetic compass.
- **Cable runs:** The display unit must be located near a DC power source. The power cable supplied is 4.9 ft. (1.5m), but a longer cable can be used if required: refer to *Section 6.4*.
- **Environment: Do not restrict airflow at the rear of the display unit;the color display incorporates Cold Cathode Florescent Lamps (CCFL), which have a reduced light output when the unit is very hot. Ensure there is adequate ventilation, particularly if the display unit is pod-mounted.**
  The display should be protected from physical damage and excessive vibration. Although the display unit is waterproof, it is good practice to mount it in a protected area away from prolonged and direct exposure to rain and salt spray.

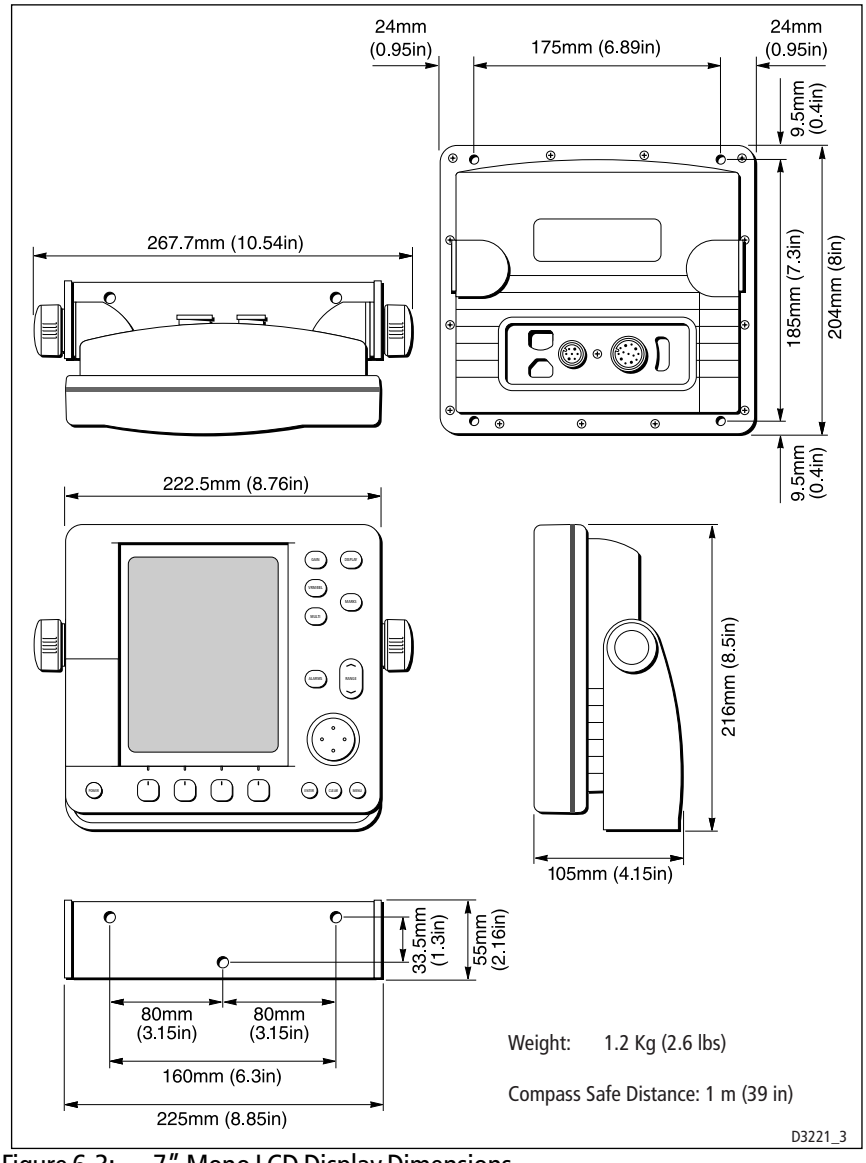


Figure 6-3: 7" Mono LCD Display Dimensions

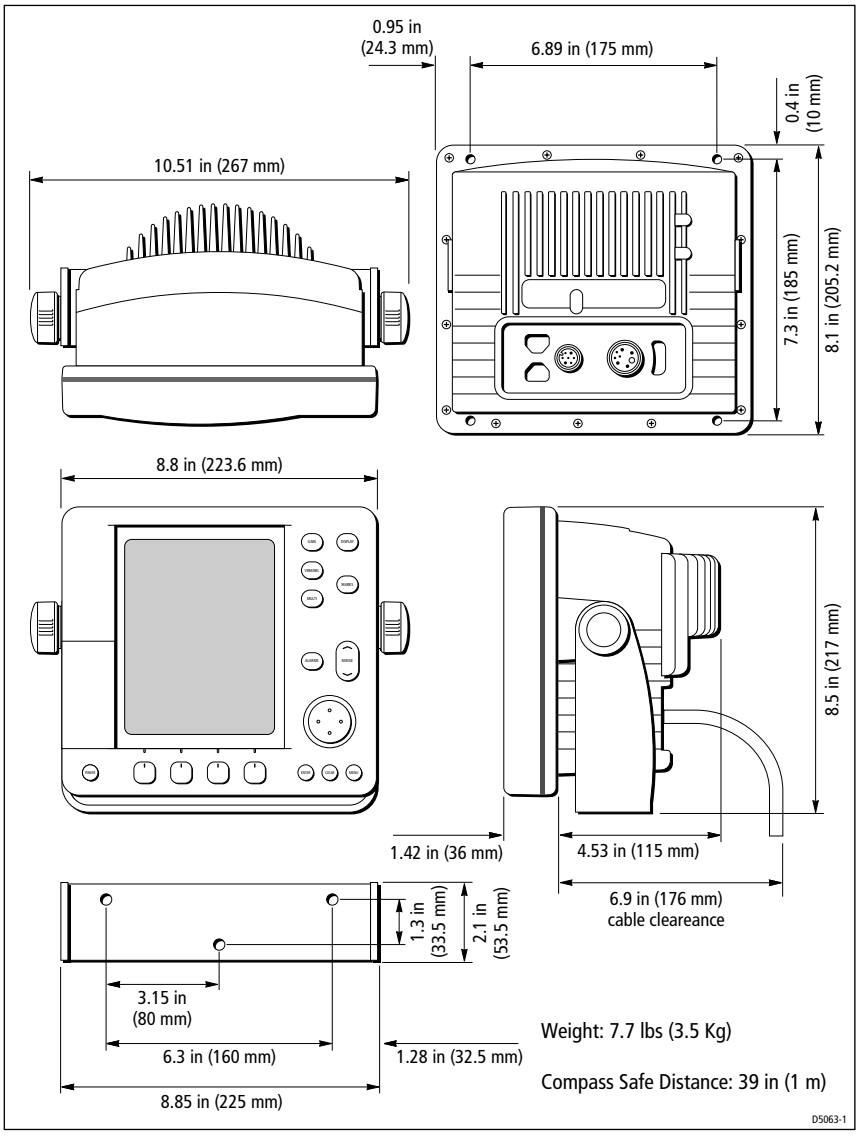


Figure 6-4: 7″ Color LCD Display Dimensions

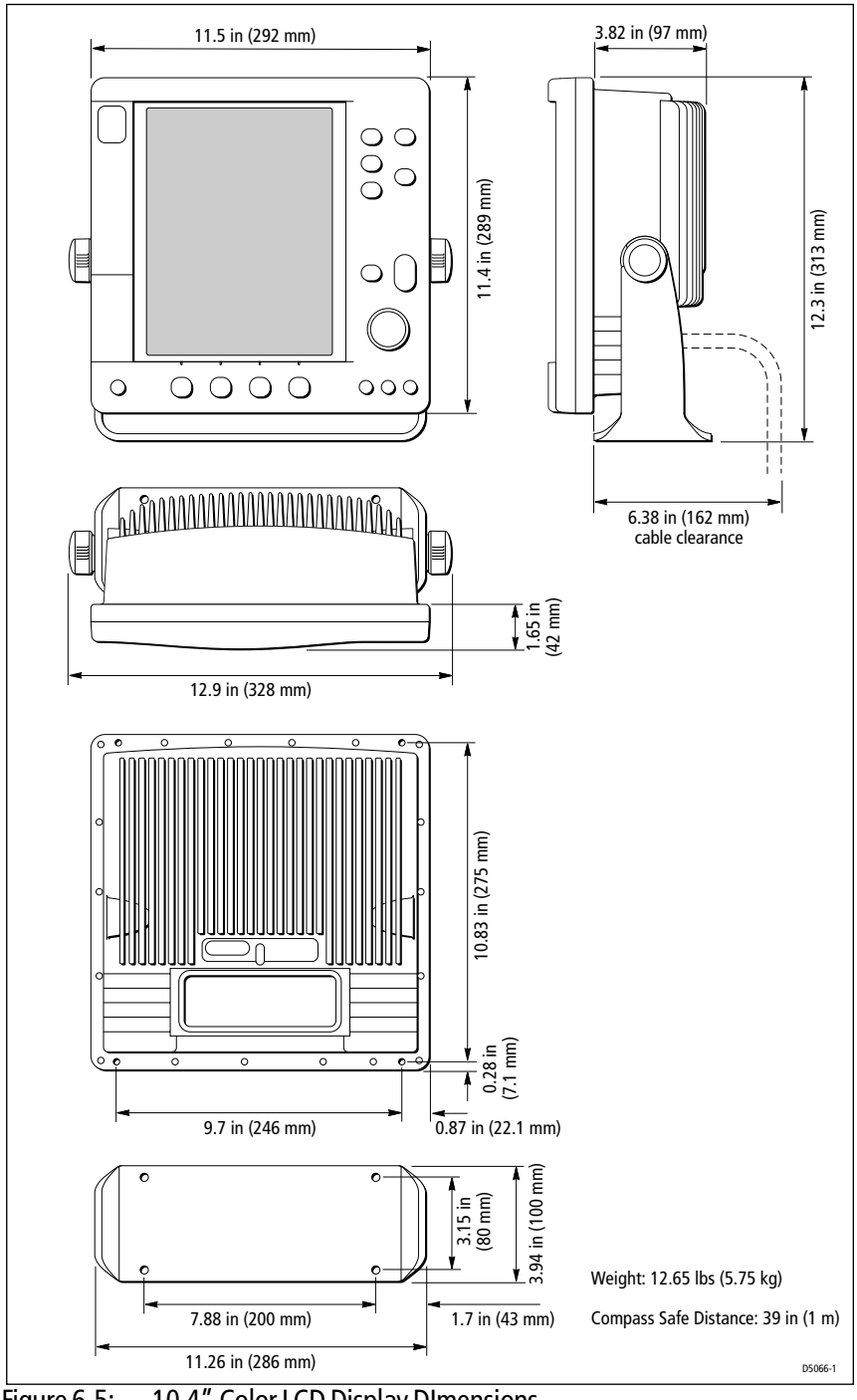


Figure 6-5: 10.4" Color LCD Display DImensions

6.4 Cable Runs

Consider the following before installing the system cables:

- You need to attach the power cable. Additional cables will be required if you are installing an integrated system.
- All cables should be adequately secured, protected from physical damage and protected from exposure to heat. Avoid running cables through bilges or doorways, or close to moving or hot objects.
- Acute bends must be avoided
- Where a cable passes through an exposed bulkhead or deckhead, a water-tight feed-through should be used.
- Secure cables in place using tie-wraps or lacing twine. Coil any extra cable and tie it out of the way.

You need to run the following cables:

- **Power/NMEA Input cable**, supplied with the display unit. This has a connector plug at one end for connecting the display unit, and 7 wires at the other end for connecting the power supply and optional NMEA inputs (see *Section 6.8, Integrated Systems*).
- **SeaTalk cable**, optional, with SeaTalk connector(s) at one or both ends.
- **NMEA Output cable**, optional, with an NMEA OUT connector at one end only.

Power Cable

The display system (i.e. with a scanner connected) is intended for use on ships' DC power systems rated at 12V, 24V or 32V.

A 5 ft. (1.5 m) power cable is supplied for connecting the ship's DC power to the display unit. Longer power cable runs may require larger wire gauges to minimise any voltage drop in the cable.

If a longer power cable run is required, use the supplied power cable to connect to the display unit. Then use a suitable connector block to connect the free end to the extension cable, taking particular care to ensure correct polarity. The supplied power cable has a cross-section of 2.0 mm^2.

6.5 Mounting the Display Unit

The display unit is waterproof to CFR46 and can be installed either above or below deck. The display unit can be mounted using the mounting bracket supplied, or console mounted using the optional flush-mounting kit (see *Section 6.2*).

Mounting Bracket

The display unit can be mounted on a dash, chart table, bulkhead or deckhead.

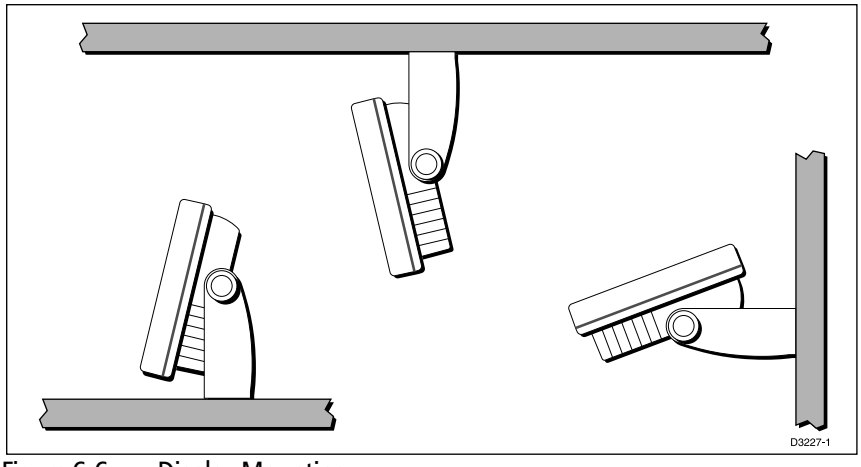


Figure 6-6: Display Mounting

1. Loosen the knobs and remove the mounting bracket from the display unit.
2. Mark the locations of the mounting bracket screw holes on the mounting surface.
3. Use the screws supplied to attach the mounting bracket at the marked locations.
4. Attach the display unit to the mounting bracket, adjust the display angle and tighten the knobs.

Console Mounting

The display unit can be console mounted if required, using the optional flush-mounting kit (M92708 or E55033).

CAUTION:
Make sure there are no hidden electrical wires or other items behind the location before proceeding. Make sure there is sufficient rear access for mounting and cabling.

1. A clear, flat area of the following dimensions is required:

Display	Width	Height	Depth behind Panel
7″ Mono Display	9 in (230 mm)	8¼ in (210 mm)	6 in (152 mm)
7″ Color Display	9 in (230 mm)	8¼ in (210 mm)	6.9 in (176 mm)
10.4″ Color Display	11.75 in (300 mm)	11.6 in (295 mm)	6.4 in (162 mm)

2. Unpack the flush-mounting kit.
3. Using the supplied template, trace out the display unit opening.
4. Drill a ½ in (12.7 mm) pilot hole in each corner of the cut-out area.
5. Using a suitable saw, cut along the inside edge of the cut-out line.
6. Remove the mounting bracket knobs and bracket from the display unit. Make sure that the unit fits in the cut-out area.

   If the optional screw fitting is required, drill four 3/16 in (5 mm) holes as indicated on the template.
   Screw the studs into the holes provided at the rear of the display.
7. Connect the DC power cable, inter-unit cable, and any other accessory cables to the display. Avoid tight bends in the cables.
8. Place the gasket on the unit and slide the unit into the panel cut-out.
9. Use the flush-mounting kit to secure the unit to the console.

   Alternatively, place a spacer over each of the four studs and secure with the thumb nuts.

6.6 System Connections

Grounding the System

It is important that an effective RF ground is connected to the system. You must ground the display by connecting the drain wire (shield) of the Power/ NMEA Input cable to the ship's RF ground; a single ground point should be used for all equipment.

If you need to extend the wire, the extension wire should be an 8 mm braid or AWG 10 (6.0 mm^2) multi-stranded cable.

If your vessel does not have an RF system, connect the drain wire to the negative battery terminal.

DC Power Connection

The display is intended for use on ships' DC power systems rated at 12 V, 24 V or 32 V.

The power connection to the display should be made at either the output of the battery isolator switch, or at a DC power distribution panel. Raymarine recommends that power is fed directly to the display via its own dedicated cable system and MUST be protected by a thermal circuit breaker or fuse, installed close to the power connection.

The DC system should be either:

- Negative grounded, with the negative battery terminal connected to the ships ground.
- Floating, with neither battery terminal connected to the ships ground.

CAUTION:
This system is not intended for use on "positive" ground vessels.

The power cable Ground (earth) connections must be connected to the ship's ground as described above.

Power for External Equipment

External equipment cannot be powered from the display's SeaTalk interface.
It must be powered from the ship's supply or via a SeaTalk bus.

Refer to *Section 6.8* for further details.

Display Unit Connection

The rear of the display provides the following connection sockets:

- **SeaTalk**, for SeaTalk data input and output.
- **NMEA Output,** for NMEA data output in an integrated system.
- **Power/NMEA Input**, for 12 V, 24 V or 32 V DC power connection, two NMEA 0183 inputs and one RF ground (screen) connection.

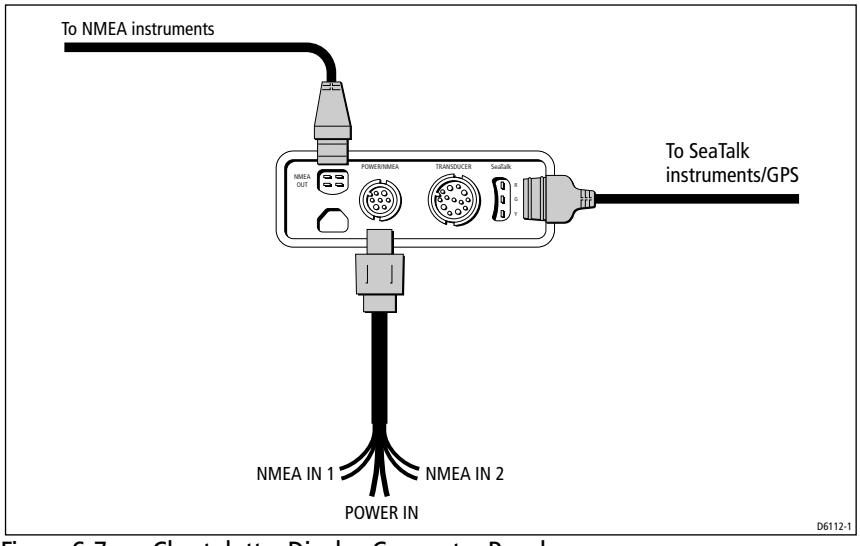
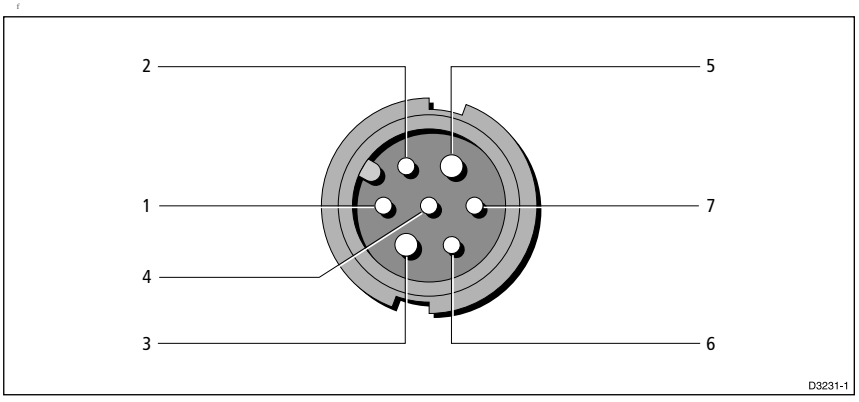


Figure 6-7: Chartplotter Display Connector Panel

The following sections detail the display unit connectors used when installing a display. The remaining connector details are provided in *Section 6.8*.

Power and NMEA Input Connection

The DC power and NMEA input should be connected at the rear Power/ NMEA seven-pin connector. The connector (viewed from the outside) and pin functions are shown in the following diagram and table. The NMEA Input is detailed in *Section 6.8*.



Pin No.	Function	Color
1	Channel 1 NMEA data input (+ve)	Orange
2	Channel 1 NMEA return (-ve)	Yellow
3	Battery negative	Black
4	Shield (drain wire)	No insulation
5	Battery positive (12/24/32 V systems)	Red
6	Channel 2 NMEA data input (+ve)	Green
7	Channel 2 NMEA return (-ve)	Blue

Figure 6-8: Power and NMEA Connector

Power Connection

CAUTION:

If the power connections are accidentally reversed the system will not work. Use a multimeter to ensure that the input power leads are connected for correct polarity.

Switch off the display unit before you remove the power cord.

The RED wire must be connected to the feed from the positive (+) battery terminal and the BLACK wire to the feed from the negative (–) battery terminal. The shielded wire (screen) should be connected to the ship's RF ground as previously described in *Grounding the System* on *page 6-12*.

Any unused wires should be insulated and taped back.

6.7 System Checks and Inital Switch On

Once you have installed your Chartplotter and made all the connections, you need to check your installation and perform the *System Checks* before using the system for navigation. It is strongly recommended that the System Checks are performed before connecting the display to other equipment in an integrated system. If you encounter any problems, refer to *Chapter 7*.

You may wish to read *Chapters 2 to 4*, and familiarise yourself with the operation of the system, before performing the initial set up and alignment.

System Check

Before performing the functional test, check the following:

- All securing bolts are fully tightened and mechanical locking arrangements as specified are in place.
- All connections have been made.
- All connecting wires are secured and protected as necessary.

Note: *If you are the boat owner and have performed the installation yourself, ask your authorised installation dealer to check the installation before going to sea.*

Switch On and Initial Setup

To switch on the display unit, press and hold the **POWER** key until the unit beeps.

If necessary, adjust the lighting (see *Changing the Lighting & Contrast - SL520 Mono Display* on *page 2-4* or *Changing the Brightness - SL530/631 Color Display* on *page 2-5*).

If required, change the default language settings as follows:

1. Press the **MENU** key to display the setup soft keys.

2. Press the SYSTEM SET UP soft key.
   The SYSTEM SET UP menu is displayed, listing the parameters and their current settings. The complete list, which you can scroll down, is shown in the following illustration.

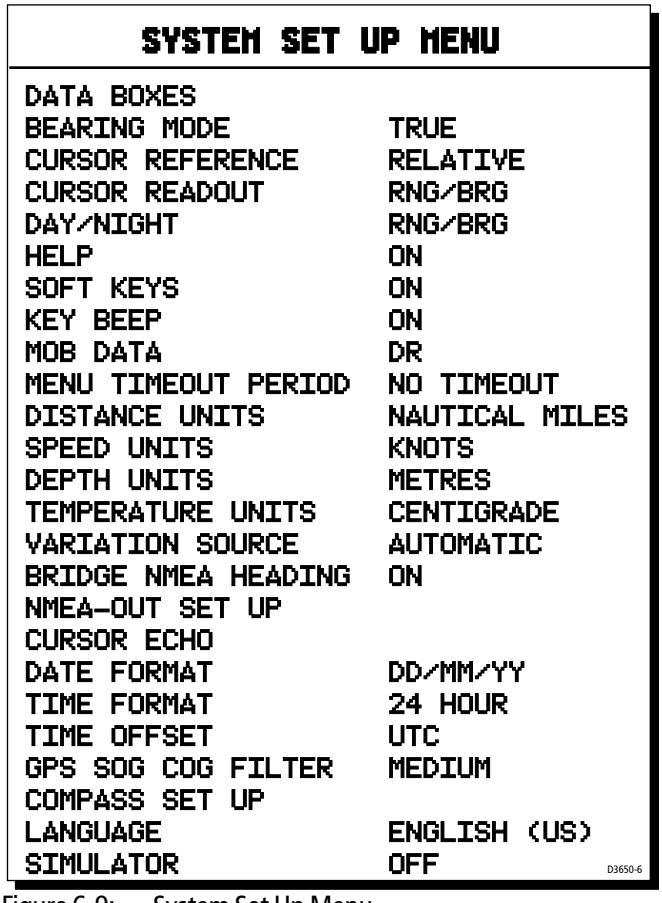


Figure 6-9: System Set Up Menu

3. Use the trackpad to move the selection bar down to the LANGUAGE option. The soft key labels are updated.
4. Use the soft keys to highlight the required language.
5. Press **ENTER** to return to the setup soft keys.
6. Press **CLEAR** to return to the normal screen.

EMC Conformance

Always check the installation before going to sea to make sure that it is not affected by radio transmissions, engine starting etc.

6.8 Integrated Systems

The displays can be linked to other equipment to transfer data as follows:

- Data can be received via SeaTalk or NMEA, some of which will increase the functionality of the display. Other data can be viewed on the display.
- Data can be transmitted via SeaTalk and NMEA to enhance other equipment.
- Some incoming data can be converted across the communication link and re-transmitted - see *Data Conversion* on *page 6-23*.

Power for External Equipment

External equipment cannot be powered from the display's SeaTalk interface. It must be powered from the ship's supply or via a SeaTalk bus. Ensure correct polarity of the SeaTalk connection.

For systems where the ship's power source is 24 V only, you may need to install a 24 V to 12 V DC converter. This is only necessary if the products being connected to the display are:

- SeaTalk compatible (for example, compass, GPS and instruments), and there is no existing SeaTalk bus
- NMEA compatible, but operate only from 12 V (for example, compass, GPS and some navigators)

The DC~DC converter must conform to the following specification:

Table 6-2: DC-DC Converter for External Equipment

Input	21 to 32 V DC
Output	13.6 V DC, isolated
Load	Continuous current rating, in excess of required load

SeaTalk® and NMEA In

The display can receive a comprehensive range of data. The primary data is described below:

Table 6-3: Function of SeaTalk and NMEA Data

Data	Primary Uses	Suggested Source
Heading	Heading Modes MOB (if Speed data also available)	Autopilot, Compass connected to SeaTalk bus NMEA Compass*
Position	MOB (also requires speed and HDG data) Position data in data box and Nav Window Waypoints Own vessel position Data Log	SeaTalk GPS connected via Auxiliary JB Existing GPS Navigator via SeaTalk bus Existing GPS (or Loran-C) navigator with NMEA output
Waypoint	Waypoint transfer	Existing GPS Navigator via SeaTalk bus Existing GPS (or Loran-C) navigator with NMEA output

Heading data should ideally contain both magnetic and true heading. If only one is available then variation needs to be provided either manually or automatically - see *Variation Source* on *page 5-8*.

Some other radars and chartplotters can exchange their cursors via SeaTalk.

Locked heading should be used for Course Up if available via SeaTalk.

Other data connected via a SeaTalk bus or via NMEA is generally displayed in data boxes, e.g. depth, apparent wind angle and speed, time.

Note: *The Raymarine Fishfinder uses its own depth data, rather than any other depth data on SeaTalk. If there is no other depth data on SeaTalk, Fishfinder depth is transmitted. If speed and temperature data are available on SeaTalk the Fishfinder uses this data; if this data is not on SeaTalk from other instruments, it is transmitted by the Fishfinder.*

For details of received data refer to the table in *Appendix C:SeaTalk and NMEA Data Received and Transmitted*.

SeaTalk

The SeaTalk standard was originally developed by Autohelm (part of Raymarine), and allows compatible instruments to be connected by a single cable carrying power and data in/out. This means that additional instruments and functions can be added to a SeaTalk system, simply by plugging them into the network.

SeaTalk is a precise, high-speed, bi-directional protocol which is flexible enough to adapt to any number of instruments, without a central processor. SeaTalk equipment can also communicate with non-SeaTalk equipment via the NMEA standard.

SeaTalk Connection

SeaTalk data, if present, is the primary source for all navigational data except heading.

The SeaTalk input/output should be connected at the rear SeaTalk 3-pin connector. This appears as follows, when viewed from outside:

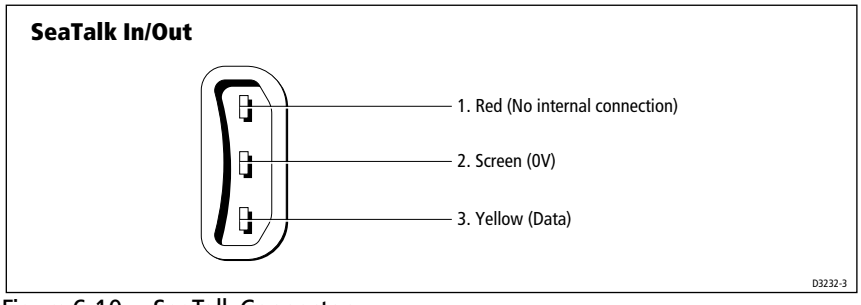


Figure 6-10: SeaTalk Connector

Table 6-4: Sea Talk Connections

Pin No.	Function	Color
1	+12 V	Red
2	0 V	Shield
3	Data	Yellow

Note:

1*. If you use the SeaTalk connector you must fit the supplied ferrite to the cable for EMC CE conformance. The ferrite must be clipped to the cable as close to the connector as possible.*

2*. The display does not supply 12 V via the SeaTalk connector, neither does the SeaTalk connector require 12 V to operate.*
12 V is required for other SeaTalk units.

3*. If you are connecting an active compass, the NMEA input has priority. You should, therefore use an NMEA input channel (see Power and NMEA Input Connection) rather than the SeaTalk interface, unless the compass only has a SeaTalk output.*

To connect the display unit to the SeaTalk bus, connect a standard SeaTalk cable between the SeaTalk connector on the rear of the display and a SeaTalk instrument or the SeaTalk bus.

Standard SeaTalk cables are available in a range of lengths (part numbers W284 to W287), and cables for connecting to SeaTalk units with round connectors are also available (part numbers D187 or D188), see *Section 6.2* for further details.

NMEA 0183

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

The information is passed in "sentences", each of which has a three-letter sentence identifier. When you check to see if one item will "talk" to another, make sure that the two items both use the same sentence identifiers. For example: VTG carries Course and Speed Over Ground data; GLL carries latitude and longitude; DBT carries water depth; MWV carries relative wind angle and wind speed data.

The NMEA 0183 standard carries similar information to SeaTalk. However, it has the important difference that one cable will only carry information in one direction. For this reason NMEA 0183 is generally used to connect a data receiver and a transmitter together: for example, a compass sensor transmitting heading to a radar, or a GPS sensor (or Chartplotter) transmitting position and navigation data to a radar.

NMEA Input Connection

The two NMEA/Power input connectors are normally used for non-SeaTalk Compass (heading) data or GPS. It can also be used for additional navigation data (if not provided via SeaTalk).

Connect the input(s) to the orange and yellow wires (Channel 1) and/or the green and blue wires (Channel 2). Refer to *Power and NMEA Input Connection* on *page 6-14* for further details.

For example, to connect a Raymarine Heading Sensor to the NMEA Channel 1 input, connect the cables and power supply using a suitable connector block, as shown in the diagram below. If installed, it may be convenient to connect the power to the SeaTalk auxiliary junction box described in the following section.

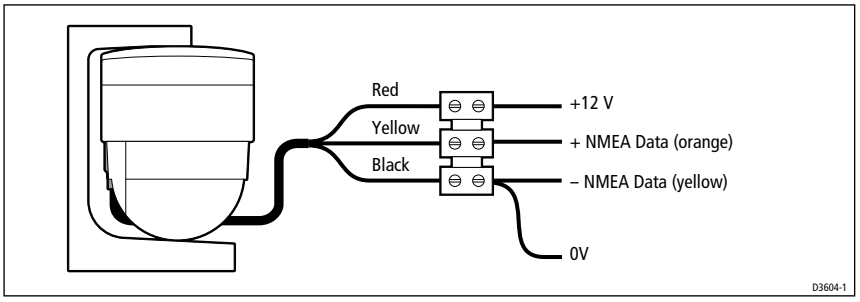


Figure 6-11: NMEA Input Connection

Using the SeaTalk Auxiliary Junction Box

A junction box (provided with the chartplotter display) is used to connect the SeaTalk system to the display unit. This junction box enables the SeaTalk bus, power and GPS to be connected.

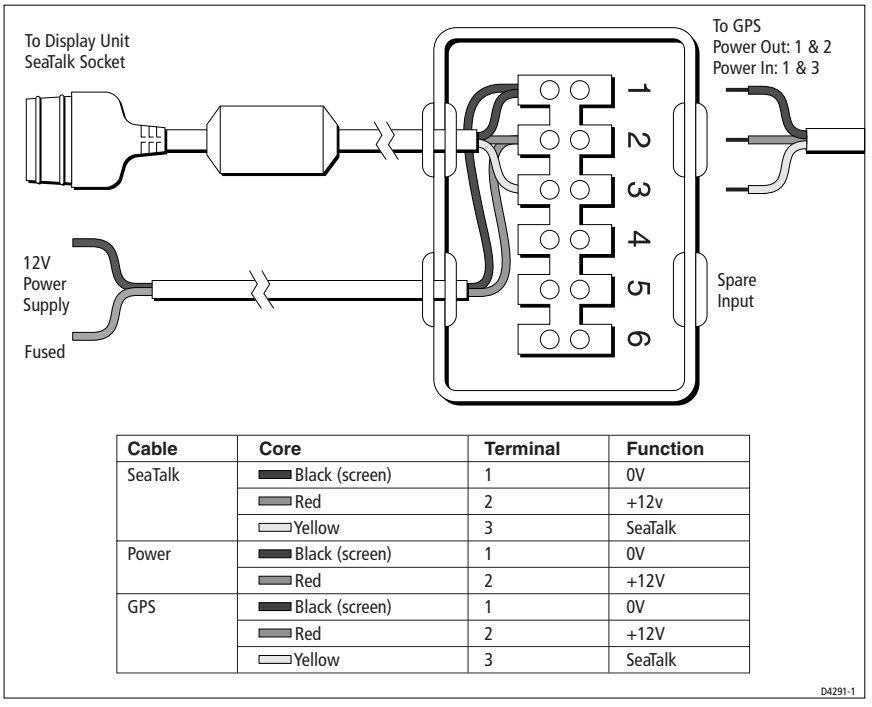
If power is not already available (via another SeaTalk instrument), the junction box can be used to apply power to the SeaTalk bus for other applications. The junction box may also be used for other purposes, e.g. supplying power to a flux gate compass and routing the compass data to the display NMEA In connection, or alternatively, for connecting a NMEA GPS system.

The junction box includes:

- SeaTalk cable and connector to attach to display unit
- Power cable to connect to 12 V power (if required)
- Input connections to connect SeaTalk cable from external equipment
- Spare connections for another instrument

CAUTION:
Ensure correct polarity of the 12 V supply before applying SeaTalk power. It is recommended that a multimeter is used to check the connections.

Figure 6-12 shows how to connect the junction box; for details specific to your GPS, refer to the handbook supplied.



Cable	Core	Terminal	Function
SeaTalk	Black (screen)	1	0V
	Red	2	+12v
	Yellow	3	SeaTalk
Power	Black (screen)	1	0V
	Red	2	+12V
GPS	Black (screen)	1	0V
	Red	2	+12V
	Yellow	3	SeaTalk

Figure 6-12: Using the Auxiliary Junction Box

Data Output

Data is transmitted in SeaTalk and NMEA formats as detailed in *Appendix D* and can be used to enhance other equipment as required. You can disable the transmission of individual NMEA output sentences - refer to *NMEA Out Set Up* on *page 5-9*.

The SeaTalk input/output connection is detailed in *SeaTalk Connection* on *page 6-19*.

The NMEA output connector is a 4-pin connector as illustrated below. The 1.5 m NMEA OUT cable has a ferrite clamp attached to ensure EMC conformance.

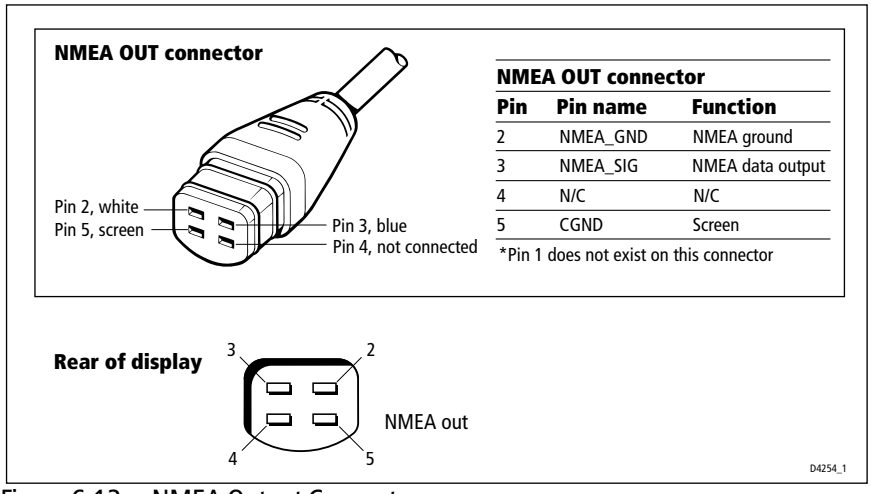


Figure 6-13: NMEA Output Connector

Data Conversion

The displays convert some information across the communications links as follows:

NMEA In to NMEA Out and SeaTalk
SeaTalk to NMEA Out

This enables data received by the display to be passed to other instruments.

You can prevent NMEA heading data being bridged onto the Seatalk bus - refer to *Bridge NMEA Heading* on *page 5-8*.

Note: *To transfer NMEA data, or to convert the data, the display must be powered On.*

6.9 Integrated System Checks

Chart Display

When you have connected your display unit to the required equipment ensure that position data is available at the display via NMEA or SeaTalk.

To confirm your chartplotter is operating correctly, perform the following checks:

1. Without a chart card installed, select the Chart display mode and select a suitable range scale. Verify that the world map is visible.
   Use the trackpad to check cursor movement and normal scrolling action.
2. To ensure that the display is responding to position data:
   Press FIND SHIP, check the cursor is fixed on the vessel symbol which is correctly positioned at the center of the chart display.
3. Insert a chart cartridge for the area of your vessel.
   Use the **RANGE** key to zoom-in to check that the chart data is being displayed.

Received Data

If either SeaTalk or NMEA In is connected, verify that the expected data is displayed.

1. Press **DISPLAY** and select the NAV DATA WINDOW ON.
   Check that the expected data is displayed.
2. If heading data is connected, select Chart mode and check it is displayed in the heading data box .

Transmitted Data

If SeaTalk or NMEA Out is being transmitted to other equipment, check that the data is being received correctly.

An NMEA Out connector is used to transmit navigation data. The NMEA Output cable should be connected to the upper, left connector on the rear of the display unit.

Note: *The NMEA Output cable has a ferrite clamp attached to ensure EMC conformance.*

Chapter 7: Maintenance and Problem Solving

This chapter provides information on routine maintenance and on possible causes of problems you may experience with your display unit.

7.1 Maintenance

WARNING:
The display unit contains *high voltage*. Adjustments require specialized service procedures and tools only available to qualified service technicians - there are no user serviceable parts or adjustments and the operator should not attempt to service the equipment. *The operator should not remove the rear cover of the display.*

Switch off the display unit before removing the power cord.

Routine Checks

The display is a sealed unit. Maintenance procedures are therefore limited to the following periodic checks:

- Wipe the display clean with a damp cloth (ensure power is off).
- Examine the cables for signs of damage, such as chafing, cuts or nicks.
- Check that the cable connectors are firmly attached.

Cleaning Instructions - SL530/631 PLUS Color Display

Cleaning the Display

CAUTION:
Take care when cleaning the display. Avoid wiping the display screen with a dry cloth - this could scratch the screen coating.
Do not use acid, ammonia based or abrasive products.

- Ensure power is off, wipe the display clean with a damp cloth.
- If necessary, use IPA (iso-propyl alcohol) or a mild detergent solution to remove grease marks.

EMC Servicing and Safety Guidelines

- Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and 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/connectors when power is being supplied to the equipment.
- When powered up, 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 minimise these effects and enable you to get the best possible performance from your Raymarine equipment, guidelines are given in the installation instructions, 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. In general this will not damage the equipment but it can lead to spurious resetting action, or momentarily may result in faulty operation.

7.2 Resetting the System

There are three types of reset available for the display:

- **Factory Reset:** This resets **all** values back to their original factory settings.

CAUTION:
The factory reset clears the Waypoints and Routes databases.

- **Power-On Reset:** When you turn the display off and on again, the screen reverts to the chart picture with all windows cleared.
- **Picture Reset:** Press and hold the **DISPLAY** key for two seconds to return the screen to the full-screen picture of the top window with all windows cleared.

At power-on, the last-used values are retained for all the options, except for those listed in the following table which are reset to the factory default each time.

Table 7-1: Power On Default Settings

Item	Power-on setting
Heading Mode	North Up
Alarm	ON, with last-used value
Windows	OFF
Lighting & contrast (mono display)	Lighting 40%, contrast 50%
Brightness (Color Display))	ON at 100%.

➤ To perform a factory reset:

1. Press **MENU**.
2. Press the SYSTEM SET UP soft key to display the System Set Up page (see *Section 5.3* for details).
3. Press and hold **MENU** for 5 seconds.

   A countdown timer is displayed. If you release the **MENU** key before the timer reaches zero, the reset is not performed.

   When the reset request has been accepted, the system restarts.

The factory default settings are listed in *Section 5.3*

7.3 Problem Solving

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if this unit should develop a fault, please refer to the following table to identify the most likely cause and the corrective action required to restore normal operation.

If you still have a problem after referring to the table below, contact your local dealer, national distributor or Raymarine Technical Services Department for further advice.

Always quote the product serial numbers. The display unit serial number is printed on the back of the unit.

Common Problems and Their Solutions

Table 7-2: Common Problems

Problem	Correction
Display does not function	1. Make sure that the power supply cable is sound and that all connections are tight and free from corrosion. 2. Check the system fuse.

Technical Support:

Please visit out website at:

www.raymarine.com/recreational/support

where you will find a Questions & Answers database, service information and e-mail access to the Technical Support department.

Alternatively, if you don't have access to the world wide web, call:

1-800-539-5539 extension 2444 or
(603) 881-5200 extension 2444

Our Technical Support Specialists are available to answer questions about installing, operating and trouble-shooting all Raymarine products.

How to Contact Raymarine (US)

For Marine Product and Services Information

Visit the Raymarine World Wide Web site for the latest information on the newest Raymarine electronic equipment and systems at:

www.raymarine.com

For Accessories and Parts

Many Raymarine accessory items and parts can be obtained directly from your authorized Raymarine dealer. However, if you are in need of an item not available from the retailer, please contact Raymarine Technical Services at:

1-800-539-5539 extension 2333 or (603) -881-5200.

Technical Service is available Monday through Friday 8:15 AM to 5:00 PM Eastern Standard Time.

Please have the Raymarine item or part number ready when calling if placing an order. If you are not sure which item is appropriate for your unit, you should first contact the Technical Support Department at:

1-800-539-5539 ext. 2444 or

(603)-881-5200 to verify your requirements.

For Product Repair and Service

In the unlikely event your Raymarine unit should develop a problem, please contact your authorized Raymarine dealer for assistance. The dealer is best equipped to handle your service requirements and can offer timesaving help in getting the equipment back into normal operation.

In the event that repairs can not be obtained conveniently, product service may also be obtained by returning the unit to:

Raymarine Product Repair Center
22 Cotton Road, Unit D
Nashua, NH 03063-4219

The Product Repair Center is open Monday through Friday 8:15 a.m. to 5:00 p.m. Eastern Standard Time or Eastern Daylight Savings Time. All products returned to the Repair Center are registered upon receipt. A confirmation letter will be sent to you acknowledging the repair status and the product's reference number. Should you wish to inquire about the repair status of your unit, contact the Product Repair Center at:

1-800-539-5539

Please have the product reference number, or unit serial number, ready when you call. We will do everything possible to make the repair and return your unit as quickly as possible.

How to Contact Raymarine (Europe)

In Europe, Raymarine support, service and accessories may be obtained from your authorised dealer, or contact:

Raymarine Company
Anchorage Park, Portsmouth
PO3 5TD, England
Tel +44 (0)23 9269 3611
Fax +44 (0)23 9269 4642

Or visit the Raymarine World Wide Web site:

www.raymarine.com

Accessories and Parts

Raymarine accessory items and parts are available through your authorized Raymarine dealer. Please refer to the lists of component part numbers and optional accessories in the Installation chapter of this manual, and have the Raymarine part number ready when speaking with your dealer.

If you are uncertain about what item to choose for your Raymarine unit, please contact our Customer Services Department prior to placing your order.

Worldwide Support

Please contact the authorized distributor in the country. A list of worldwide distributors is supplied with your system.

Appendix A: Specification

SL520/530/631 PLUS Displays

General

Approvals:		
CE - conform to		1999/5/EC, EN60945:1997
FCC - conforms to		Part 80 (47CFR) and Part 2 (47CFR)
Size:	7″mono	223 x 204 x 75mm (8.8" x 8" x 3"), excluding bracket
	7″ color	223 x 205 x 152 mm (8.8" x 8.1 " x 6"), excluding bracket
	10.4″ color	292 x 289 x 139 (11.5″ x 11.4″ x 5.46), excluding bracket
Weight	7″mono	1.2 kg(2.6lbs)
	7″ color	3.5 kg (7.7 lbs)
	10.4″ color	5.75 kg (12.65 lbs)
Mounting		Bracket with panel mount option
Power		External 10.7 - 44 V DC required Floating earth/fully isolated
	7"mono	10 W consumption with full backlighting
	7″ color	20 Wmax. consumption with full brightness
	10.4″ color	30W max.consumption with full brightness
Environmental:		Waterproof to CFR46; suitable for external mounting
Op/Storage Temp. Range -mono		-10°C to +70°C
- color		-10°C to +50°C
Humidity limit		up to 95% at 35°C non-condensing
Controls		11 defined keys, 4 soft keys and trackpad
Cursor		Context sensitive, provides range/bearing or lat/lon
Display Type: - mono		7" Film Super Twist Neumatic (FSTN) LCD, monochrome with 4 gray scales
- color		color TFT LCD
Resolution:	7"mono	320 x 240 (1/4 VGA)
	7″& 10.4″ color	640 x 480 (VGA)
Display Size	7"mono	7" diagonal - 143 mm x 111 mm
	7" color	136 mm x 100 mm
	10.4″	211 mm x 154.4 mm
Mono LCD Contrast		100 levels, selectable via soft keys.
Languages		UK English, US English, Danish, French, German, Dutch, Italian, Icelandic, Norwegian, Portuguese, Spanish, Swedish, Finnish
Connectors		3 pin SeaTalk input/output 4 pin NMEA output7 pin power including 2 NMEA input channels

Interfaces	1 x SeaTalk, receive and transmit 1 x NMEA 0183, transmit 2 x NMEA 0183, receive C-MAP cartridge reader - 2 slots
Cursor Echo	Cursor Echo between radar and chart on separate displays connected via SeaTalk.
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 dependent on function
Data Boxes	Up to six user selectable information boxes

Chartplotter Features

Cartography	C-MAP® NT micro cartridges available from C-MAP® Chart of the world built in
Display Windows	Chart, Data Log, BDI, CDI, Navdata
Chart Scaling	1/64 nm (if cartographic data is available) to 4000 nm
Presentation Modes	North up (selectable True or Magnetic) Head up or Course up
Waypoints	1000 waypoints entered via cursor, lat/lon, range and bearing from present position or at vessels position. 16 character name can be assigned Additional storage available on User Cartridges
Waypoint Transfer	Current route via Seatalk, NMEA
Routes	A route plan may contain up to 50 waypoints. Up to 20 routes can be stored in the units internal memory Additional storage available on User Cartridges SmartRoute to create a route from a track history
Track History	5 tracks with up to 750 points in each can be stored in the units internal memory Additional storage available on User Cartridges
Alarms	Programmable arrival, cross track error, anchor drift, grounding, position fix/data loss warning, countdown timer and alarm clock
Navigation Information	Own ships position in Lat/Lon, XTE, TTG and SOG/COG selectable. Mileage scale ruler. Bearing and distance to waypoint. Bearing and distance to cursor, SeaTalk data (see 'interfacing' section)
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual

Interfacing

SeaTalk Input	Depth, Speed Over Ground & Course Over Ground, Position, Waypoint number, range, bearing and time to go, Speed through water, Time, Cross Track Error, Heading, Wind, Date, Log/Trip, Pilot Status, Temperature, Man Overboard, and cursor position
NMEA Input	NMEA 0183 (GLL, GGA, GLC, GTD, VTG, BWC, BWR, RMA, RMB, RMC, XTE, VHW, HDG, HDM, HDT, DBT, DPT, APB,VLW, MWV, MTW,WPL, RTE and ZDA)
SeaTalk Output	Cursor data, Guard zone alarm and Navigational data bridged from NMEA
NMEA Output (User selectable)	APB, BWC, BWR,DBT, DPT,GGA, GLL, MTW, RMA, RMB, RMC, RSD, TTM, VLW, VHW, VTG, WPL, ZDA

Appendix B: C-MAP Chart Card Features

The C_MAP chart cards display cartographic features which are derived from a library of symbols. The library includes a set of 16 x 16 pixel bitmaps which provide realistically shaped icons for many chart objects. However, these complex icons can overlap and clutter the display at some scales, so it possible for the user to select smaller, simple icons. Some chart objects are represented by text; in such cases conventional abbreviated text is used, for example, M – mud, R – rock, Wk – wreck

The chartplotter set up menu provides the sub-menu CUSTOMISE CHART, which lets you determine how chart features are displayed. You can set the icon display of many features to custom; you then use the CUSTOM soft key to switch the customized icons off/on. The factory default for the CUSTOM options is on.
The chart features controlled from the Customize Chart menu are grouped as detailed below, some groups are sub-divided into categories

Menu Option	Chart Features		
CHART TEXT	Names		
CHART BOUNDARIES	Chart Boundaries		
SPOT SOUNDINGS	Spot Soundings		
DEPTH SHADING LIMIT	Reference Depth		
DEPTH CONTOURS	Depths (Bathymetric Lines) Depth Labels		
DEPTH CONTOUR DISPLAY	Depth Contour Range		
NAV MARKS	Lights: Light; Light moire' effect; Light float; Light vessel	Buoys and Beacons: Buoy, cardinal Buoy, installation Buoy, isolated danger Buoy, lateral Buoy, safe water Buoy, special purpose Buoy, generic Beacon, cardinal Beacon, isolated danger Beacon, lateral Beacon, safe water Beacon, special purpose Beacon, generic	Signals Anchor Cairn Chain/Wire Fog signal Radar reflector Top mark Nav aid, generic Extended nav- aid, generic Radar station Radar transponder beacon Radio station
LIGHT SECTORS	Light Sectors		

Menu Option	Chart Features	
CAUTION & ROUTING DATA	Caution Areas Caution area Fishing facility Marine farm/culture Cable, submarine Cable area Offshore prod'n area Pipeline Pipeline area Anchor berth Anchorage area Cargo transhipment area Contiguous zone Continental shelf area Custom zone Dumping ground Exclusive economic zone Fishery zone Fishing ground Free port area Harbour area (administrative) Incineration area Log pond National territorial area Sea area Spoil ground Straight territorial sea baseline Submarine transit lane Territorial sea area Restricted area Sea Plane landing area Military practice area	Tracks and Routes Deep water route part Deep water route centerline Fairway Ferry route Navigation line Precautionary area Radar line Radar range Radio calling Recommended route centerline Recommended track Recommended traffic lane part Traffic separation line Traffic separation scheme boundary Traffic separation scheme crossing Traffic separation scheme lane part Traffic separation scheme roundabout Traffic separation zone Two-way route part
MARINE FEATURES	Tideways & Currents Tideway Water turbulence Tide height	Seabed bottom Sand waves Seabed area Spring Weed/Kelp

Menu Option	Chart Features		
LAND FEATURES	Natural Features Coastline Dune Hill Land elevation Land region Land Salt pan Slope topline Tree Vegetation area Natural Features - Rivers Canal Canal bank Rapids River River bank Waterfall Lake Lake shore	Cultural Features Airport area Built-up area Railway Road crossing Road part Runway Sloping ground Square Cable, overhead Fence Pipeline, overhead Pylon Telepheric Tunnel entrance	Building, religious Building, single Cemetery Fortified Structure Siloway route part Tank Chimney Dish aerial Flagstaff/flagpole Flarestack Mast Monument Radar dome plane landing area Tower Windmill Windmotor
ICON DISPLAY	Complex (detailed) object/Simple object		

The following chart features are always displayed:

Menu option	Chart features		
PORTS	Ports: Berthing facility Causeway Checkpoint Crane Dam Distance mark Dock area Dry dock Dyke area Dyke crown Floating dock Gate Gridiron Harbour facility Hulk Landing place Landing stairs Lock basin Oil barrier Pile Pontoon Ramp Shoreline construction Slipway Weir Small craft facility	Services Coastguardstation Pilot boarding place Rescue station Signal station, traffic Signal station, warning	Port Information Port area Harbour master Coast Guard Police Customs Health emergency Post office Yacht club Boat yard Accessories Electrical/electronic repairs Engine repairs Sailmaker Fishing/diving gear, SCUBA Hotel/Inn Restaurant Bank/Exchange office Pharmacy Port/Marina Slipway Boat hoist Crane Fuel station Water Electricity Showers Launderette Public toilets Post box Public telephone Refuse bin Visitor's berth Chandler Provisions Bottle gas Car Parking Parking for boat and trailers Caravan site Camping site Sewerage pump-out station
CARTOGRAPHIC OBJECTS	Line, generic Area, generic		
NATURAL FEATURES	Land area Bridge		

The following chart features are always displayed:

Menu option	Chart features
ROCKS	Underwater Rock
WRECKS	Wrecks
DEPTHS 1	Depth area
DEPTHS 2	Dredged area
DEPTHS 3	Intertidal area
PORTS	Mooring/Warping facility
CAUTION AREAS	Fish haven
OFFSHORE INSTALLATIONS	Diffuser Obstruction Production installation Offshore platform
AREAS, LIMITS	No data area
CARTOGRAPHIC OBJECTS	Incomplete survey area
NATURAL FEATURES (Ice)	Ice area Pingo
COMPOSITE OBJECTS	Airport
	Anchorage Channel edge Deep water route Defined water Harbour Range system Lighthouse Mooring trot Navigation mark, afloat Navigation mark, fixed in point Traffic Separation Scheme System
CARTOGRAPHIC AREAS	Cartographic II25 area

Appendix C: SeaTalk and NMEA Data Received and Transmitted

The following table defines the data received on the NMEA/SeaTalk ports. Data sources are listed in order of priority except where indicated.

Data Received	Source
Position (LAT/LON)	SeaTalk, GGA, RMC, RMA, GLL
Position (Loran C TD's)	GLC, RMA, GTD
Speed and Course Over Ground	SeaTalk, RMC, RMA, VTG
Waypoint Data	SeaTalk, RMB, APB, BWC, BWR, RMB, XTE
Depth	SeaTalk, DBT, DPT
Apparent Wind Angle and Speed	SeaTalk, MWV (relative)
Boat Speed Through Water	SeaTalk, VHW
Total Log and Trip Log	SeaTalk, VLW
Water Temperature	SeaTalk, MTW
Average Boat Speed through the Water	SeaTalk only
Heading	SeaTalk, HDG, HDM, HDT, VHW
Locked Heading	SeaTalk only (Autopilot / Steering Compass)
Magnetic Variation	SeaTalk, RMC, RMA, HDG
Rudder Angle (not displayed)	SeaTalk only
Time (No priority)	SeaTalk, ZDA, GGA, RMC, GLL, BWC, BWR
Date	SeaTalk, ZDA, RMC
MOB data	SeaTalk only
Autopilot Status (Standby / Auto / Vane / Track)	SeaTalk only
Cursor Range and Bearing (from Chartplotter) Cursor Range and Bearing (from Radar)	SeaTalk only SeaTalk, RSD
Global Alarms - Watch alarm, Wind alarm, Autopilot alarms, Depth alarms. Waypoint arrival	SeaTalk Only SeaTalk, RMB, APB
Waypoint/Route Transfer	SeaTalk, WPL, RTE

* If Magnetic Heading is not available, the True Heading and Variation (if available) are used to generate the magnetic heading.

The display unit transmits the following data, if available, on SeaTalk:

Data Output	SeaTalk	NMEA Out
Position (LAT/LON)	✔	GGA, GLL, RMC, RMA
Position (Loran C TD's)	✔	RMA
Speed Over Ground and Course Over Ground	✔	RMC, VTG, RMA
Waypoint Data	✔	RMB, APB, BWC, BWR
Depth	✔	
Apparent Wind Angle and Speed	✔	—
Boat Speed Through Water	✔	—
Total Log and Trip Log	✔	
Water Temperature	✔	
Heading	✔	VHW
Magnetic Variation	✔	RMA, RMC
Time	✔	ZDA
Date	✔	ZDA
MOB data	✔	—
Cursor Range & Bearing	✔	RSD[2]
Heading mode	—	RSD[2]
Waypoint/Route Transfer	—	WPL, RTE
Global Alarm Waypoint Arrival Alarm	SeaTalk	— APB, RMB

[4] Bridged from NMEA if selected in the System Set Up menu.

Appendix D:Abbreviations

A	Amp
ANSI	American National Standards Institute
AWG	American Wire Gauge
BDI	Bearing and Distance Indicator
Brg	Bearing
CCFL	Cold Cathode Fluorescent Lamp
CD	Course Deviation Indicator
CFR	Code of Federal Regulations
CMG	Course Made Good
COG	Course Over Ground
CRT	Cathode Ray Tube
CTR	Center
dB	deciBels
DC	Direct Current
DMG	Distance Made Good
DR	Dead Reckoning
EBL	Electronic Bearing Line
EMC	Electro Magnetic Compatibility
ETA	Estimated Time of Arrival
FCC	Federal Communication Commission
FLT	Float - floating EBL/VRM
ft	feet
FTC	Fast Time Constant
GPS	Global Positioning System
dGPS	differential Global Positioning System
GRD	Guard Zone
GHz	Giga Hertz
HDG	Heading
Hz	Hertz
MHz	Mega Hertz
IEEE	Institute of Electrical & Electronic Engineers
in, "	inch
Kg	kilogram
kW	kilo Watt
lat	latitude
lbs	pounds

LCD	Liquid Crystal Display
lon	longitude
M	Magnetic
m	meters
MBS	Main Bang Suppression
mm	millimeter
MOB	Man OverBoard
MRK	Mark
nm	nautical mile
NMEA	National Marine Electronics Association
POS	Position (of vessel)
RF	Radio Frequency
Rng	Range
rpm	Revolutions Per Minute
SSB	Single Side Band
SHM	Ships Heading Marker
SOG	Speed Over Ground
STC	Sensitivity Time Control
T	True
TFT	Thin Film Transistor
TTG	Time To Go
V	Volts
VHF	Very High Frequency
VMG	Velocity Made Good
VRM	Variable Range Marker
WPT	Waypoint
XTE	Cross Track Error
yds	yards
ZMB	Zoom Box

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Warranty Certificate

The Raymarine warranty terms and conditions as described below do not affect the customer's statutory rights.

Limited Warranty

Raymarine warrants each new Light Marine Product to be of good materials and workmanship. Raymarine, or it's approved agents, will repair or exchange under warranty any parts proven to be defective in material or workmanship under normal use, for a period of 2 years/24 months from date of sale to end user, or 30 months from date of shipment from Raymarine – whichever expires first, except as provided below.
Raymarine Limited Warranty covers the parts and labor associated with any warranty repair as described above, provided that the unit is returned to Raymarine or one of it's appointed agents.

Installed Warranty

In addition to the **Limited Warranty** cover as described above, Raymarine will, except as provided below, cover travel costs (auto mileage and tolls) up to 100 round trip highway miles (160 kilometers) and travel time of 2 hours, to enable onboard warranty service to be carried out on products where proof of installation or commission by Raymarine certified installers, can be shown.
The **Installed Warranty** provides for onboard repair or exchange, by Raymarine or it's approved service agents, for a period of 2 years/24 months, from date of sale of the boat to the end user – where the equipment has been installed by a Raymarine certified installer, or from commissioning of the installation by a Raymarine certified installer, or 30 months from date of shipment of the equipment from Raymarine – whichever expires first, except as provided below.

Obtaining Warranty Service

In the event of Warranty service being required, contact Raymarine or the nearest Raymarine certified service agent – a full list of local service agents are available on the Internet or can be requested from the nearest Raymarine agent.
A suitable proof of purchase, showing date, place of purchase, and serial number must be made available to Raymarine or authorized service agent at the time of request for Warranty service.
In cases where a Raymarine certified installer has not installed the product; i.e. **Limited Warranty**, the affected unit must be returned to the local Raymarine approved service agent, with a copy of proof of purchase and/or completed warranty card. Subject to the Limitations below, the unit will be repaired/replaced at no further cost to the user and promptly returned to the user.
In cases where the equipment has been installed by a Raymarine certified installer (boat builder, installer dealer etc.), i.e. **Installed Warranty**, the nearest local service agent should be contacted and onboard service requested, the warranty card, correctly completed and stamped by the installing agent, must be available as authorization for onboard service.

Warranty Limitations

Raymarine Warranty policy does not apply to equipment that has been subjected to accident, abuse or misuse, shipping damage, alterations, corrosion, incorrect and/or non-authorized service, or equipment on which the serial number has been altered, mutilated or removed.
Raymarine assumes no responsibility for damage incurred during installation or as a result of improper installation.
This Warranty does not cover routine system checkouts, alignment/calibration, sea-trials or commissioning, unless required by replacement of part(s) in the area being aligned.
A suitable proof of purchase, showing date, place, and serial number must be made available to Raymarine or authorized service agent at the time of request for Warranty service.
Consumable items, (such as: fuses, batteries, drive belts, radar mixer diodes, snap-in impeller carriers, impellers, impeller bearings, and impeller shaft) are specifically excluded from this Warranty.
All costs associated with transducer replacement, other than the cost of the transducer itself, are specifically excluded from this Warranty.
Overtime/premium labor portion of services outside of normal working hours is not covered by this Warranty.

Continued . . .

Travel cost allowance on certain products with a suggested retail price below $2500.00 is not authorized. When/or if repairs are necessary, these products must be forwarded to a Raymarine facility or an authorized dealer at owner's expense and then will be returned via surface carrier at no cost to the owner.
Travel costs other than auto mileage, tolls and two (2) hours travel time, are specifically excluded on all products. Travel costs, which are excluded from the coverage of this Warranty, include but are not limited to: taxi, launch fees, aircraft rental, subsistence, customs, shipping and communication charges etc. Travel costs, mileage and time, in excess to that allowed must have prior approval in writing.
TO THE EXTENT CONSISTENT WITH STATE AND FEDERAL LAW:
(1) THIS WARRANTY IS STRICTLY LIMITED TO THE TERMS INDICATED HEREIN, AND NO OTHER WARRANTIES OR REMEDIES SHALL BE BINDING ON RAYMARINE INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABLE OR FITNESS FOR A PARTICULAR PURPOSE.
(2) Raymarine shall not be liable for any incidental, consequential or special (including punitive or multiple) damages.

All Raymarine products sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any Raymarine equipment.

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Stick barcode label here

Purchased from

Purchase date

Dealer address

Installed by

Installation date

Commissioned by

Commissioning date

Owner's name

Mailing address

This portion should be completed and retained by the owner.