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HSB Series LCD Display

Owner's Handbook

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HSB Series LCD Display Owner's Handbook

September 1999

SAFETY NOTICES

This radar 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 and scanner unit contain high voltages. Adjustments require specialised 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. ELECTROMAGNETIC ENERGY. The radar scanner transmits electromagnetic energy. It is important that the radar is turned off whenever personnel are required to come close to the scanner to perform work on the scanner assembly or associated equipment.

It is recommended that the radar scanner is mounted out of range of personnel (above head height).

Avoid looking directly at the antenna as your eyes are the most sensitive part of the body to electromagnetic energy.

When properly installed and operated, the use of this radar will conform to the requirements of ANSI/IEEE C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3Hz to 300 GHz and NRPB, Board Statement on Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation. *Doc NRPB, NO. 5 (1993)*.

3. NAVIGATION AID. This radar 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 radar unit should not be relied upon as a substitute for such prudence and judgement.

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Preface

This handbook covers the radar and chart aspects of the following HSB Series systems from Raytheon:

System	Display	Scanner	Chartplotter
Pathfinder Radar	RL70	Yes	No
Chartplotter	RC520	No	Yes
Combined Pathfinder Radar/Chartplotter	RL70RC	Yes	Yes
Repeater Display	RL70	No	No
Repeater Display	RL70RC	No	Yes
Repeater Display	RC520	No	Yes

Notes: Radar systems are supplied with an appropriate Raytheon scanner unit and inter-connecting cable. Details for installing the scanner are described in the Pathfinder Radar Scanner Owner's Handbook.

The chartplotter display unit includes 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.

Raytheons Product Support representatives or your local dealer will be available to answer any questions you may have.

Warranty

To register your HSB Series 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 Raytheon equipment and accessories are designed to the best industry standards for use in the leisure marine environment.

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

Raytheon equipment, guidelines are given at appropriate points throughout this handbook to enable you to ensure minimum interaction between different items of equipment, i.e. ensure optimum Electromagnetic Compatibility (EMC).

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

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Chapter 1: Overview

1.1 Introduction

This handbook describes the following HSB Series systems:

RL70 Pathfinder Radar, 7" LCD Display

RL70RC Combined Pathfinder Radar/Chartplotter, 7" LCD Display

RC520 Chartplotter, 7" LCD Display

If you have an HSB Series LCD display, it is possible to connect another HSB series LCD or CRT display to provide an integrated system. Connecting an HSB Series Pathfinder Radar display to a chartplotter provides similar functionality to the Combined Pathfinder Radar/Chartplotter display; the radar data can be repeated on the chart display and chart data repeated on the radar display.

If you are using the 7" LCD display unit as a repeater display refer to this handbook for details on the operating controls.

This handbook describes the display unit controls and details both radar and chart operations. Controls that are specific to either radar or chartplotter are described in radar or chart sections/chapters.

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.*

How to Use This Handbook

For an overview of the display unit, the radar and the chartplotter systems, read *Chapters 1 and 2* of this handbook. Having read these chapters you should be able to start using your system.

For detailed information on radar operations refer to *Chapters 3 and 4*.

For chartplotter operating details, refer to *Chapters 5 and 6*.

To change the system set up defaults, read *Chapter 7*.

If you are installing the display system yourself, you should read *Chapter 8* before you start the installation. This chapter also provides information that will be useful if you are connecting your HSB Series system to other equipment.

Details for installing a radar scanner are provided in the *Scanner User's Handbook* supplied with your scanner.

The handbook is organised as follows:

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

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

Chapters 3 provides detailed operating information for the main radar functions - adjusting the radar picture; measuring distances and bearings; setting guard zones and alarms.

Chapter 4 provides detailed operating information for integrated radar system functions, including using marks, man overboard and cursor echo.

Chapter 5 provides detailed operating information for the standard chartplotter functions - using chart cards, plotting waypoints and routes, following routes and showing tracks.

Chapter 6 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 7 provides instructions for setting up your system to suit your preferences. You should read this chapter to determine how to set up the radar and chartplotter system defaults.

Chapter 8 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. To install a complete radar system, you will also need to read to the Owner's Handbook supplied with the scanner.

Chapter 9 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 radar and for the chartplotter.

Appendix B provides details on connecting the display unit to specific GPS systems.

Appendix C defines the chart features shown on the chart display.

Appendix D defines the SeaTalk and NMEA data that is transferred on integrated systems.

A List of Abbreviations, Index and warranty information are included at the end of the handbook.

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

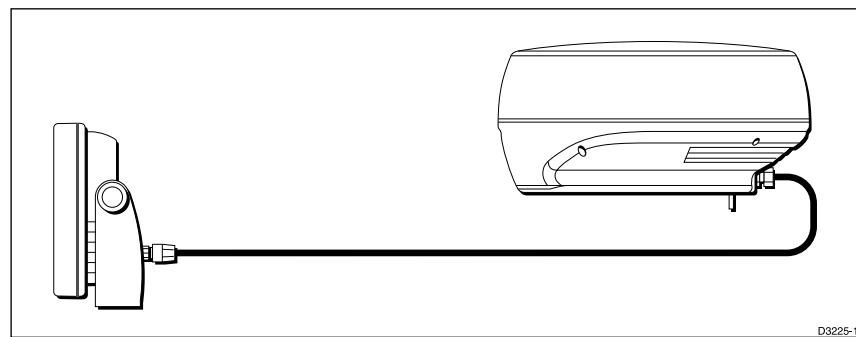
Terminology

The following terminology is used to describe radar and chartplotter systems:

Master	A unit capable of sourcing specific data (such as radar or chart data).
Repeater	A unit capable of displaying data, such as radar, from the HSB.
Radar Display	Unit providing Radar Master and Chart Repeater functionality.
Chart Display	Unit providing Chart Master and Radar Repeater functionality.
Combined Display	Unit providing both Radar and Chart Master functionality.
Integrated System	Additional instruments are connected via the HSB, Seatalk or NMEA interfaces.
HSB™	High Speed Bus - links compatible display units. For full display and control between HSB series display units, the units must be connected via HSB and SeaTalk.

General

The HSB Series Pathfinder Radar or Pathfinder Radar/Chartplotter, illustrated below, comprises the 7" LCD display unit, scanner unit and associated cables. The RC520 Chartplotter cannot be connected to the scanner unit.



Display Unit

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

The unit includes:

- 7" LCD display
- Trackpad
- Eleven dedicated (labelled) control keys
- Four soft keys (unlabelled) whose functionality changes
- The chartplotter (RC520) and combined Pathfinder Radar/Chartplotter (RL70RC) include two slots for the C-MAP NT® electronic chart cards

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

The HSB (High Speed Bus) connection enables transfer of data between two compatible units. For example, the radar data is transferred from the radar (the master display) via the HSB connection and can be displayed *and controlled* on any other HSB Series LCD or CRT display (repeater display). In particular, you can connect your HSB Series Pathfinder Radar to a remote HSB Series Chartplotter to provide similar functionality to the combined Pathfinder Radar/Chartplotter.

Full functionality of the HSB Series Pathfinder Radar is achieved when it is part of an integrated system, with other equipment (in addition to another HSB unit) connected via Seatalk or NMEA 0183. Data from this equipment including position and waypoints is displayed on the radar and is used in calculations. Details on connecting other equipment are given in *Chapter 8*.

Scanner

The HSB Series Pathfinder Radar is supplied with either a scanner unit which illuminates targets with microwave energy and then collects the returns from those targets. The scanner includes a sensitive low-noise front end receiver, and a variety of clutter attenuation controls to maintain target resolution.

Installation of the scanner is described separately in the Scanner Owner's Handbook. The scanner is adjusted and operated from the display unit, so these details are provided in this HSB Series LCD Display Handbook.

The scanner can be switched between transmit and standby modes. It also has a power-saving timed transmit mode which pauses between bursts of transmissions.

Display Unit Features

- Uses position information from GPS, dGPS or Loran-C technology
- Displays and transfers SeaTalk, NMEA and HSB data
- Provides full control of data from other HSB instruments
- Three full-screen operating modes: Radar, Chart, Data Log (if appropriate data is available)
- View radar and chart simultaneously
- Half-screen windows to display additional data: Course Deviation Indicator (CDI), Bearing and Distance Indicator (BDI), navigation data
- Cursor echo across SeaTalk, and between chart and radar windows
- Choice of orientation: Head Up, Course Up and North Up
- Chartplotter - Displays chart information from the C-MAP NT® chart cards (C-Cards)

Operating Modes

If you have a combined Pathfinder Radar/Chartplotter Unit, or have both an HSB Series Radar and Chartplotter connected, three full-screen modes are available – chart, radar and data log – as shown in the following illustration; you select the operating mode using the **DISPLAY** key as described in *Chapter 2*.

In addition, in chart or radar mode you can set *Windows On* to display supplementary data as described below. Alternatively, on a combined radar/chartplotter or repeat display, you can split the display into two half-screen windows for radar and chart display.

The following information, if available on your system, can be shown:

Full-screen Mode	Window Options
Radar Mode	CDI, BDI, Chart or Nav Data
Chart Mode	CDI, BDI, Radar or Nav Data
Data Log Mode	Windows not available

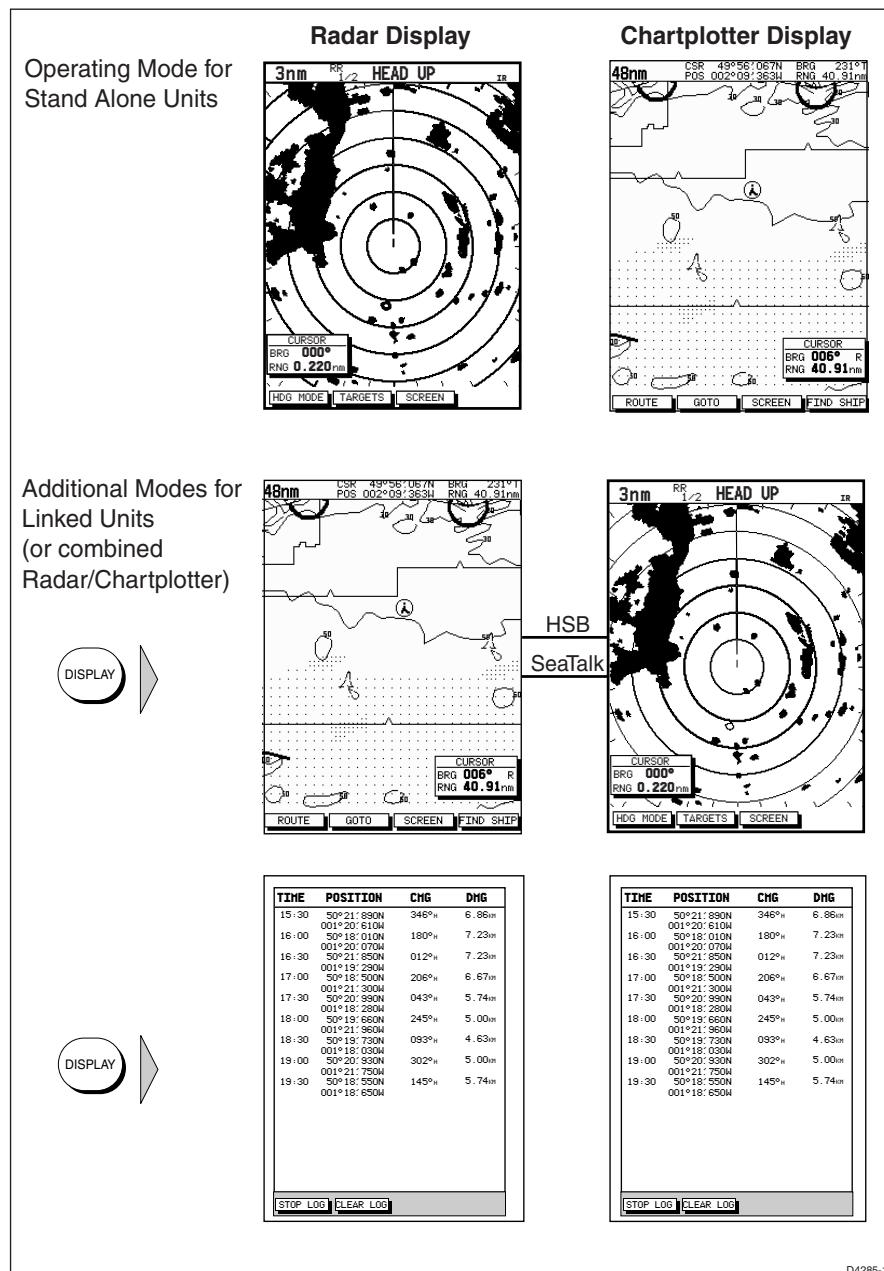
Window Options

You can choose one of the following for display in the lower 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.
- **Chart display (when in Radar mode)**
Radar display (when in Chart mode): If data is available, either as a function of the combined display unit or via the HSB link, it can be displayed.

- **Nav Data:** This shows nine 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 7.3 System Set Up Parameters*).

Details on selecting windows are given in *Chapter 2*.



1.2 The Pathfinder Radar Display

When a scanner is connected and the radar is in Transmit mode, the radar picture provides a map-like representation of the area in which the radar is operating. Typically, your ship's position is at the centre of the display, and its dead ahead bearing is indicated by a vertical heading line, known as the Ship's Heading Marker (SHM).

The radar picture can be viewed with a variety of fixed or customised range scales. A status bar at the top of the radar image displays range, current heading and mode indicators for the various options you can set.

An example radar picture is shown on the next page, with example radar returns (echoes) and default Pathfinder Radar information. The Status Bar indicator is also illustrated.

The radar display can show additional information, depending on your currently selected options, set up selections and the data available from other equipment. The example displays on the following pages show some of these features.

Functions are available to control the display as follows:

- Zoom the Display
- Offset your vessel from the centre of the radar picture

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

Pathfinder Radar Display Options

Set up options allow you to customise the radar image by choosing what is displayed, how it is displayed (including language and units), heading mode and how the radar operates with other HSB units. You can also 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. The cursor box and user-selected data boxes can be moved around the screen and they can be turned on or off.

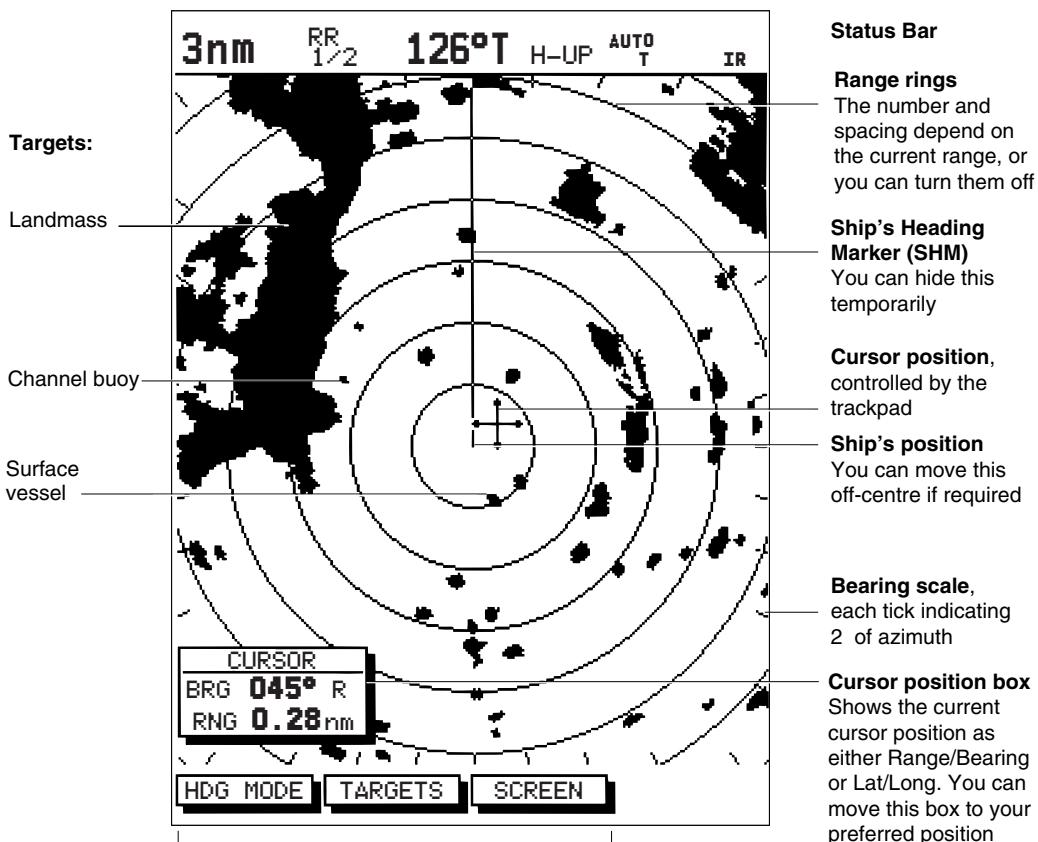
Display options are provided in System Set Up and Radar Set Up as described in *Chapter 7*. In addition, Screen Presentation Options, described in *Chapter 2* are provided to switch:

- Cursor Box and Databoxes On/Off
- Range Rings On/Off
- Waypoint Display On/Off

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

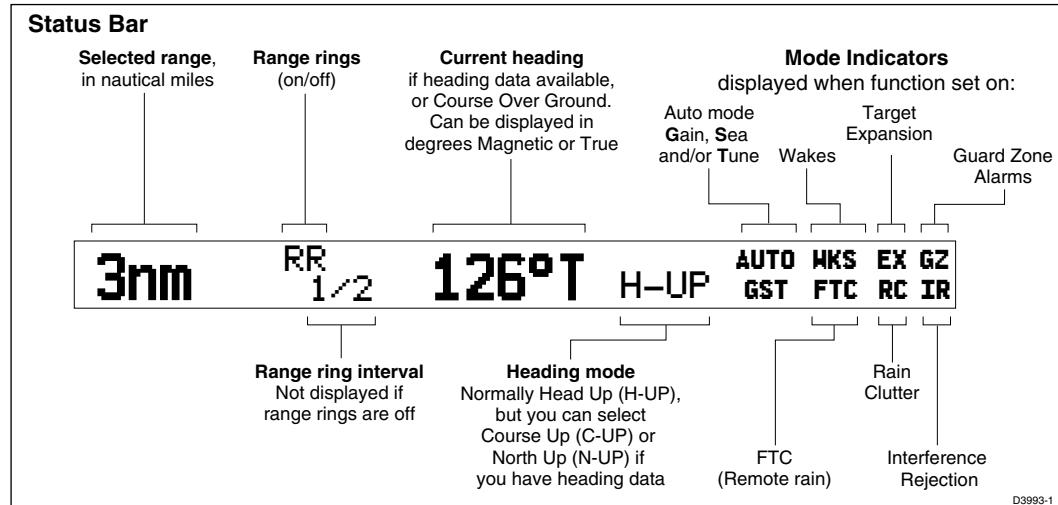
Radar
Display
Options

Default Display



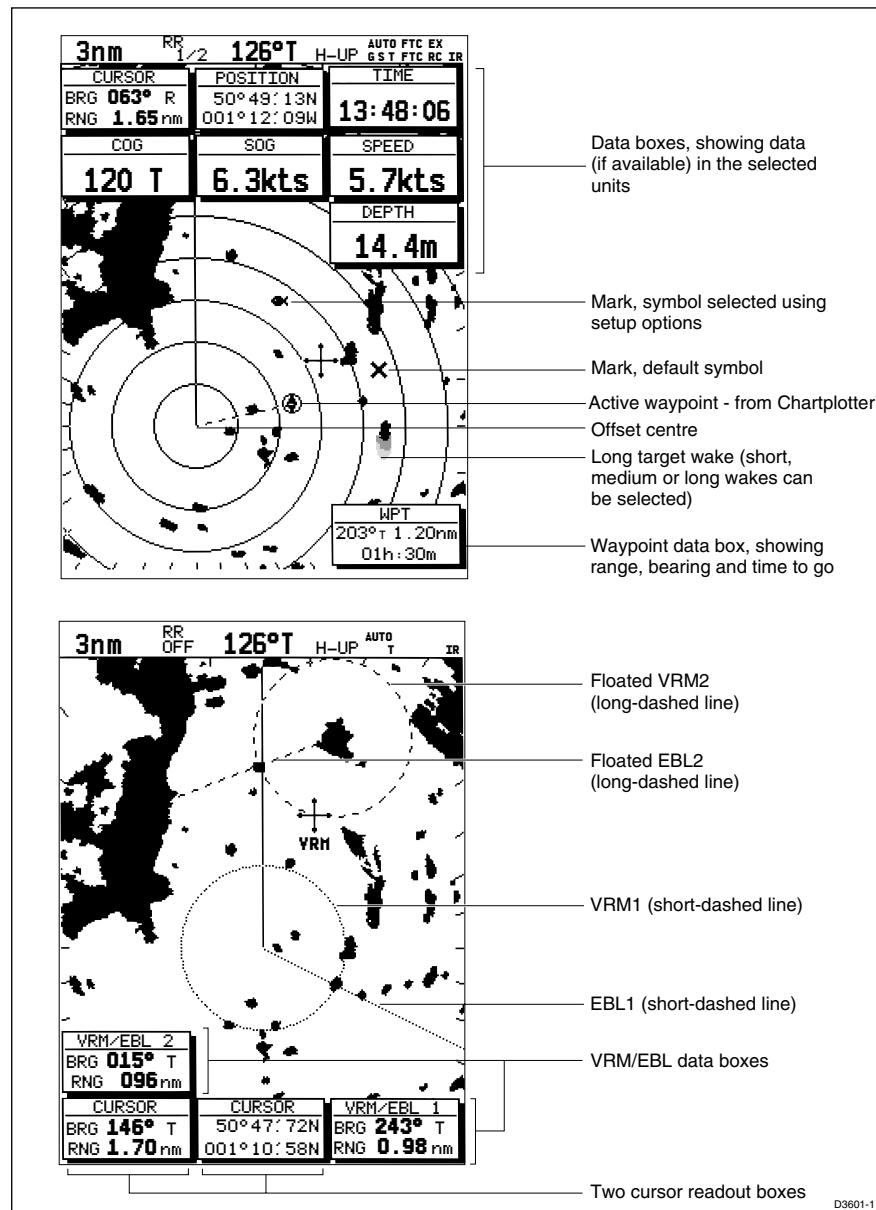
D3600-4

Status Bar



D3993-1

Radar Display Options



Radar Functions

The HSB Series Pathfinder Radar includes the following functions:

- Choice of range scales from $\frac{1}{8}$ nm to 72nm (dependent on scanner type).
- Automatic and manual control of tuning, gain and sea clutter.
- Two Variable Range Markers (VRMs) and Electronic Bearing Lines (EBLs), allowing target range and bearing measurements.
VRM/EBLs can be floated.
- Target wakes and target expansion mode.
- Two guard zones with alarms.
- Add marks to record important or dangerous locations.
- Man Overboard (MOB) to navigate back to a person or object.

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

1.3 The Chartplotter Display

The HSB Series LCD Display can include a Chartplotter. The chartplotter includes a small-scale world map and detailed navigation information is displayed when a cartographic chart card is installed. A plotter mode is provided to enable route plotting and tracking at large scales even when a chart card is not installed

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) and Course Over Ground (COG).

Any waypoints you have placed are displayed (unless you turned them off in Chart Set Up as described in *Chapter 7*) 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 Centre the Chart around the Vessel
- Synchronise the Chart and Radar (if radar data is available)

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

Chartplotter Display Options

Set up options allow you to customise the chart by choosing what is displayed (including cartographic features), how it is displayed (including language and units), heading mode and how the chartplotter operates with other HSB units. You can also 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. The cursor box and user-selected data boxes can be moved around the screen and they can be turned on or off.

Display options are provided in System Set Up and Chart Set Up as described in *Chapter 7*. In addition Screen Presentation Options, described in *Chapter 2* are provided to switch:

- Cursor Box and Databoxes On/Off
- Chart Grid On/Off
- Custom Chart Details On/Off

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

The chartplotter set up options include a sub-menu to customise 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.

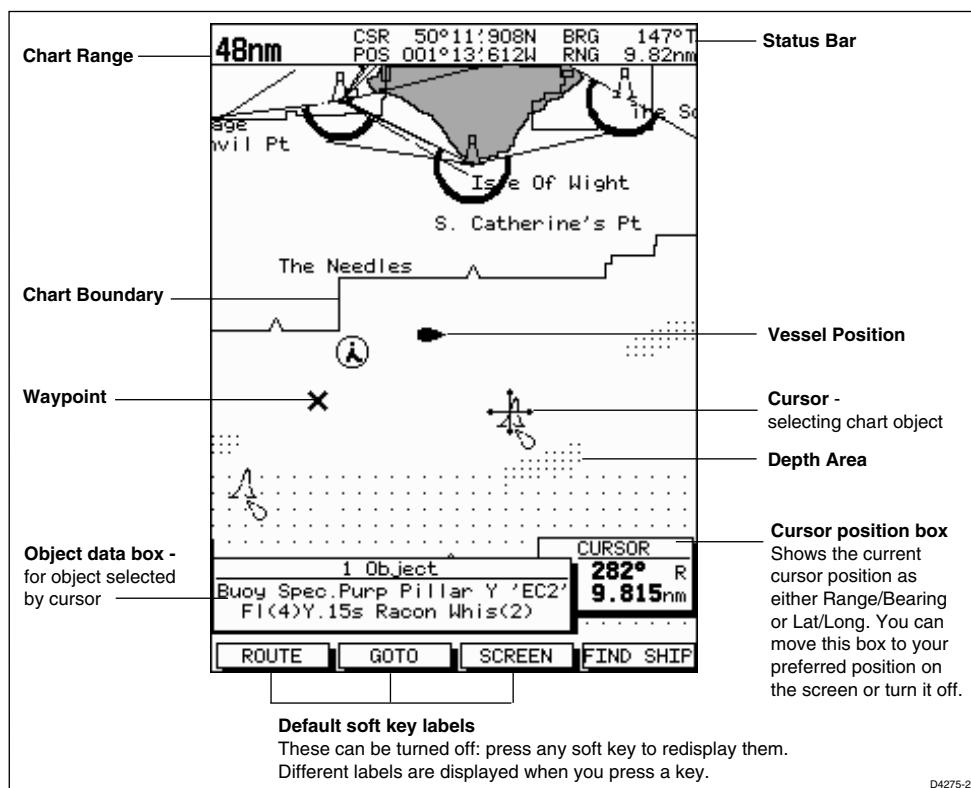
A complete list of chart features is given in *Appendix C*.

Chartplotter Functions

The HSB Series 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
- 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 *Chapters 5 and 6*.

Chartplotter Functions

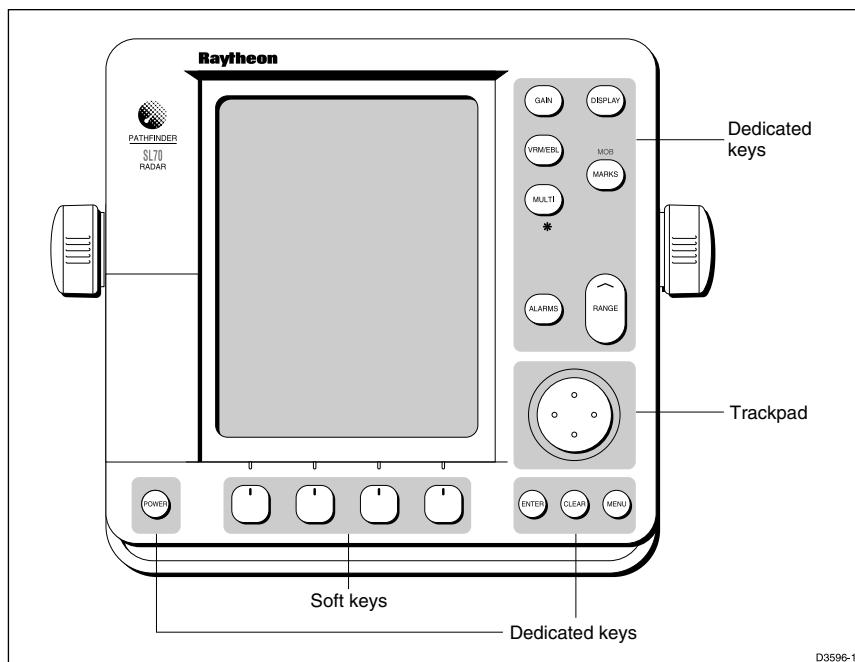
1.4 Operating Controls

You operate the radar and chart systems using a variety of on-screen controls as well as the keys on the display units. These controls include:

- A trackpad providing up, down, left, right and diagonal control of an on screen cursor.
- Eleven dedicated (labelled) 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 on the illustration below. 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 7*). The following paragraphs describe the controls and on-screen facilities.



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. guard zone on the radar, chart object on the chartplotter.
- Select an area of the radar image to zoom into or 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 follows:

Text Label	Feature	Radar/Chart
BOX	Data box (any type)	Both
MRK	Radar Mark	Both
MOB	Man Over Board marker	Both
WPT	Chart Waypoint	Both
CTR	Centre of radar	Radar
FLT	Floating EBL/VRM	Radar
GRD	Guard zone	Radar
SHM	Ships Heading Marker	Radar
VRM/EBL	VRM and EBL, 1 or 2	Radar
ZMB	Zoom box	Radar
A-B	Ruler line	Chart
COG	Course Over Ground vector	Chart

HDG	Heading vector	Chart
POS	Vessel's position	Chart
RTE	Route leg	Chart
TIDE	Tide vector	Chart
Chart Icons	Various	Chart

Some items on the radar screen, such as the cursor and man overboard marker have information associated with them. The information is displayed in a data box. The context-sensitive cursor allows you to move databoxes.

Dedicated Keys

The dedicated keys: **DISPLAY, MARKS, GAIN, VRM/EBL, MULTI, ALARMS, RANGE, ENTER, CLEAR, MENU** and **POWER** have fixed functions; the functions are similar on all HSB Series 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.

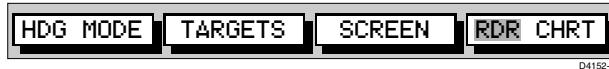
When you press a dedicated key, one of the following happens:

- a) The associated operation is actioned, e.g. change chart scale (**RANGE**).
- b) A pop-up menu is displayed, providing further options.
- c) 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 7*).

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.



D4152-2

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

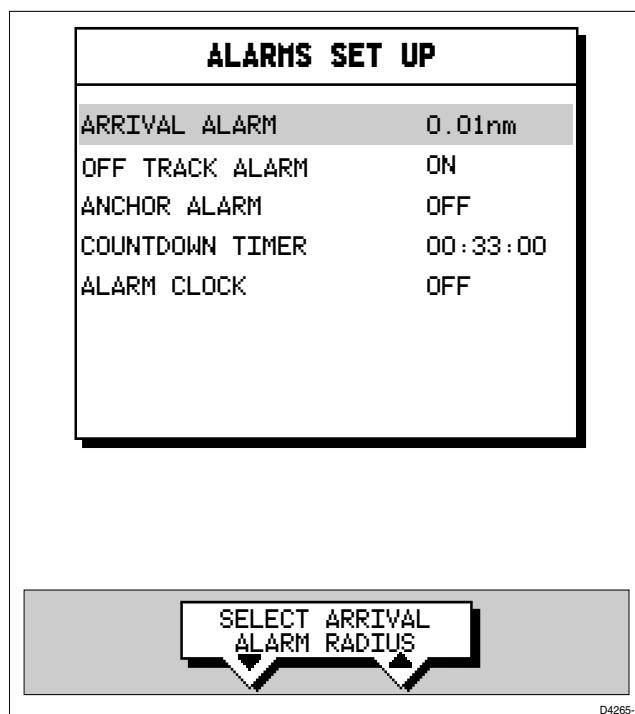
When you press a soft key one of the following happens:

- The associated operation is actioned, e.g. NORTH UP.
- A sub-set of soft keys is displayed, providing further functions.
- 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 7*).

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 the example below.

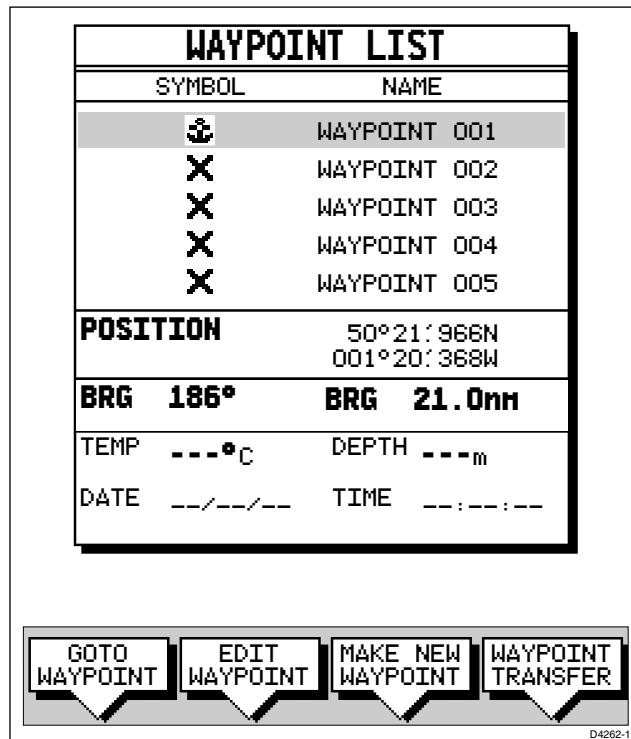


D4265-1

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.

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.



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, instructions and a simple exercise to get you started using the HSB Series LCD display. It will help you to become familiar with the display and the functions of the controls before you start using the radar or chartplotter for routine navigation. More detailed information on operating the radar display is provided in *Chapters 3 and 4*. Chartplotter operating details are given in *Chapters 5 and 6*.

Chapter 2
Getting Started

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, which allows you to practice operating your radar or chartplotter without data from the scanner or GPS system. You will need to use the set up options to switch the display to simulator mode, as described in *Section 2.2 Switching the Display Unit On/Off*. 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 8* for full details.
- After the display has been installed on your vessel, but while in the marina or at anchor.

The following section, *Switching the Display On and Off*, includes instructions to view simulated radar and chart images.

2.2 Switching the Display On and Off

If you have a combined Radar/Chartplotter, the factory default power-up mode is radar. Once you have used the display unit it powers-up in the last used mode.

The following sections describe the power-up sequence for radar and chart mode, how to adjust the lighting controls, and how to select simulator mode.

Radar Mode

This section explains how to switch the radar display and scanner on and off, and how to switch the scanner between Transmit, Standby and Scanner Off mode.

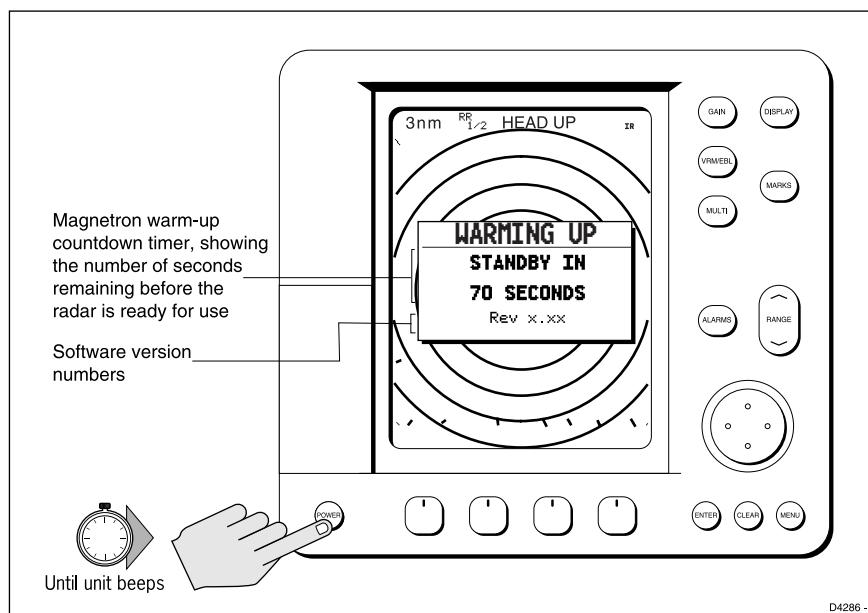
You normally operate your radar in transmit mode, but you can use the display unit without the scanner operating as follows:

Standby mode : You should use this mode when you are not operating the radar for short time periods. The scanner does not transmit and the antenna does not rotate, so the radar uses less power. However, the scanner remains powered so when you return to transmit mode, the magnetron does not need to warm up.

Scanner off mode: You should use this mode when you do not require the radar, but you are using the display unit say, for chart data or data from another source.

Scanner off mode removes power from the scanner.

- To switch the Radar on, press and hold the **POWER** key until the unit beeps. The keys light up, the display shows the start-up information as illustrated below, and the radar starts the magnetron warm-up sequence.

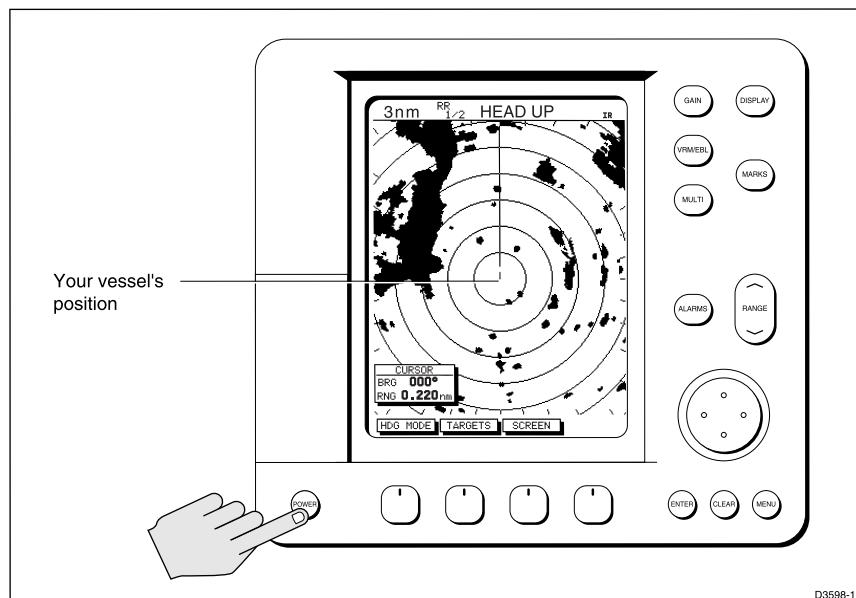


After 70 seconds, when the magnetron warm-up sequence is complete, the Standby screen is displayed, with the text STANDBY and a prompt to press the **POWER** key to enter Transmit mode.

- To switch the radar scanner from Standby mode to Transmit mode, press the **POWER** key.

The scanner transmits pulsed energy while it rotates, and the antenna sweep builds up the radar picture using echoes returned from targets.

Switching the
Display On/Off-
Radar Mode



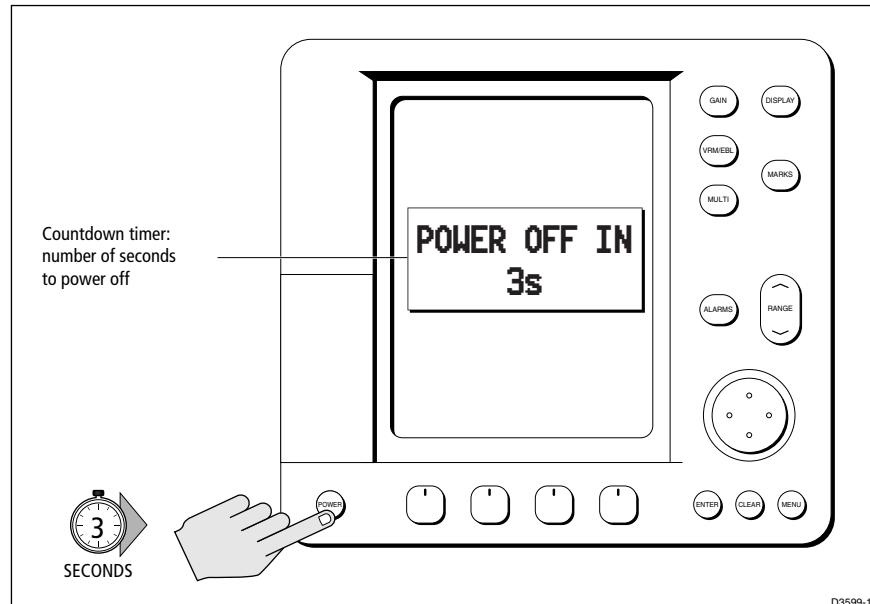
- You can switch on and adjust the display backlighting and contrast, if required, as described later in this chapter.
- To switch to Standby mode, press the **POWER** key.
The display returns to the Standby screen, and the scanner transmission and rotation stops.
- To use Scanner off mode:
 1. Ensure that the radar is in Standby mode, warming up, or (if the unit is a Repeater) displaying a message that radar data is not available.
 2. Press the **CLEAR** key. The message STANDBY. RADAR DATA NOT AVAILABLE appears in the radar picture. The scanner is powered down and the timer, if running, is cleared.

To return to radar operation, press the **POWER** key. The warm-up countdown is displayed and the radar goes into Standby mode. You press **POWER** again to switch to Transmit mode when required.

Switching the Display On/Off - Chart Mode

- To switch the scanner and display unit off, press and hold the **POWER** key for three seconds. A countdown timer is displayed as shown below; when it reaches zero a beep sounds, and the display unit switches off. Release the **POWER** key.

Note: Ensure you switch the display unit off before you remove the power cord.



D3599-1

Note: You do not need to change to Standby mode before turning off the display: if you turn the radar display off while it is in Transmit mode, the scanner is also de-activated.

Chart Mode

This section explains how to switch the display on and off in chart mode.

- To switch the chartplotter display on, press and hold the **POWER** key until the unit beeps. The keys light up, the Raychart graphic is displayed, followed by the caution:

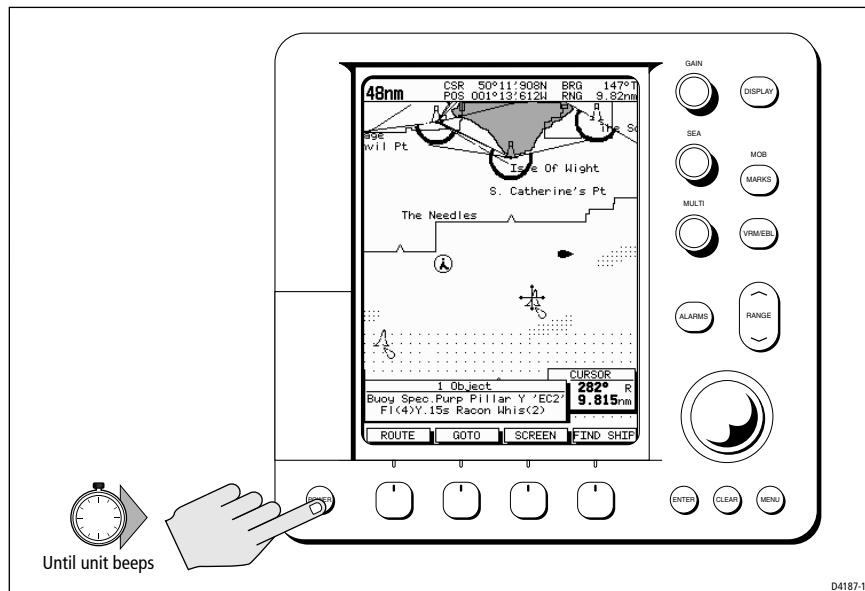
CAUTION

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.



- To switch the display off, press and hold the **POWER** key for three seconds. A countdown timer is displayed; when it reaches zero a beep sounds, and the display and the key back-lights go off.

Note: Ensure you switch the display unit off before you remove the power cord.

Simulator Mode

When simulator mode is switched on a simulator database 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 radar and chart image:



1. Press **MENU** followed by the **SYSTEM SET UP** soft key. The system 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. Press either **RADAR** to view a simulated radar image, **DATA** to view the chart display with simulated position, or **BOTH** to view simulated radar and chart data.
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 and Contrast

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:

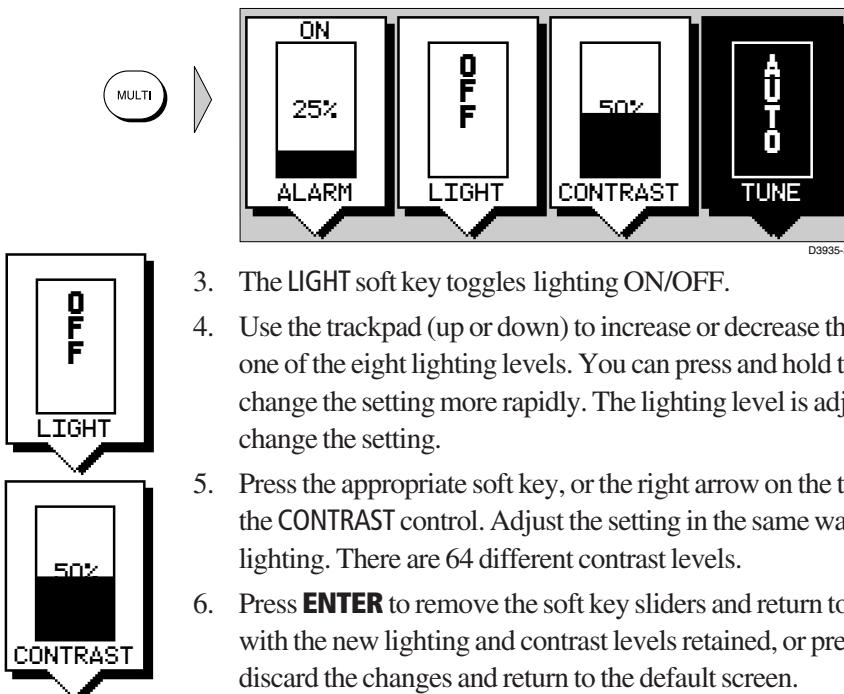
1. Press the **MULTI** key to display the soft key controls:

The last-used soft key is highlighted in inverse video (white text on a black background).

Note: 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. Press the **LIGHT** soft key if it is not already highlighted.

Alternatively, you can press the trackpad left and right edges to move sideways between the controls to select the **LIGHT** soft key.



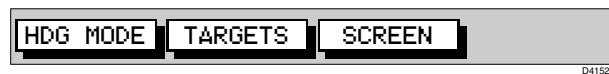
3. The **LIGHT** soft key toggles lighting ON/OFF.
4. Use the trackpad (up or down) to increase or decrease the setting, selecting one of the eight lighting levels. You can press and hold the trackpad to change the setting more rapidly. The lighting level is adjusted as you change the setting.
5. Press the appropriate soft key, or the right arrow on the trackpad, to select the **CONTRAST** control. Adjust the setting in the same way as for the lighting. There are 64 different contrast levels.
6. 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 42%. 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%

2.3 Controlling the Display

You control the radar 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** to return to the default screen; you may need to press **ENTER** several times to back-track through the soft key hierarchy.

Controlling the
Display

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.

This section describes how to:

- Select the full-screen mode and turn half-screen windows on/off.
- Customise the screen presentation options.
- Use the radar controls to enlarge a selected area, move the centre and momentarily hide the ship's heading marker (SHM).
- Use the chart controls to move around the chart display. Synchronising the chart and radar images is also described here.

The controls are summarised in the fold-out illustration on the following page.

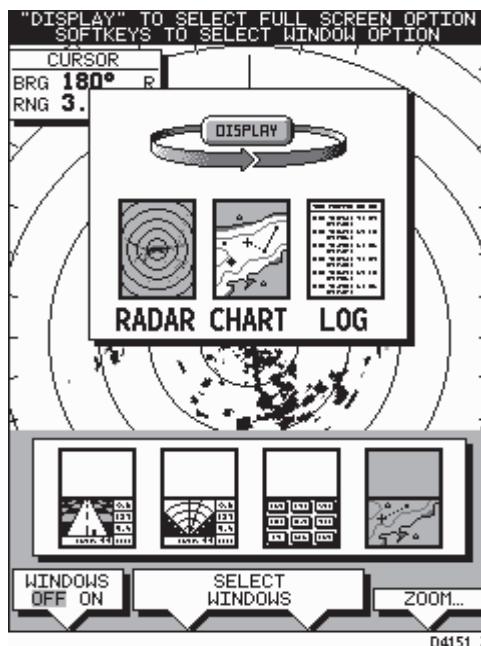
Selecting the Mode of Operation

You use the **DISPLAY** key to select the full-screen mode. If the data is available on your system, the following modes (described on *page 5*) can be selected:

- Radar
- 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 cycle through the modes available, shown in the following diagram.



The selected mode is shown by a greyed icon and black 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 Radar and 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.

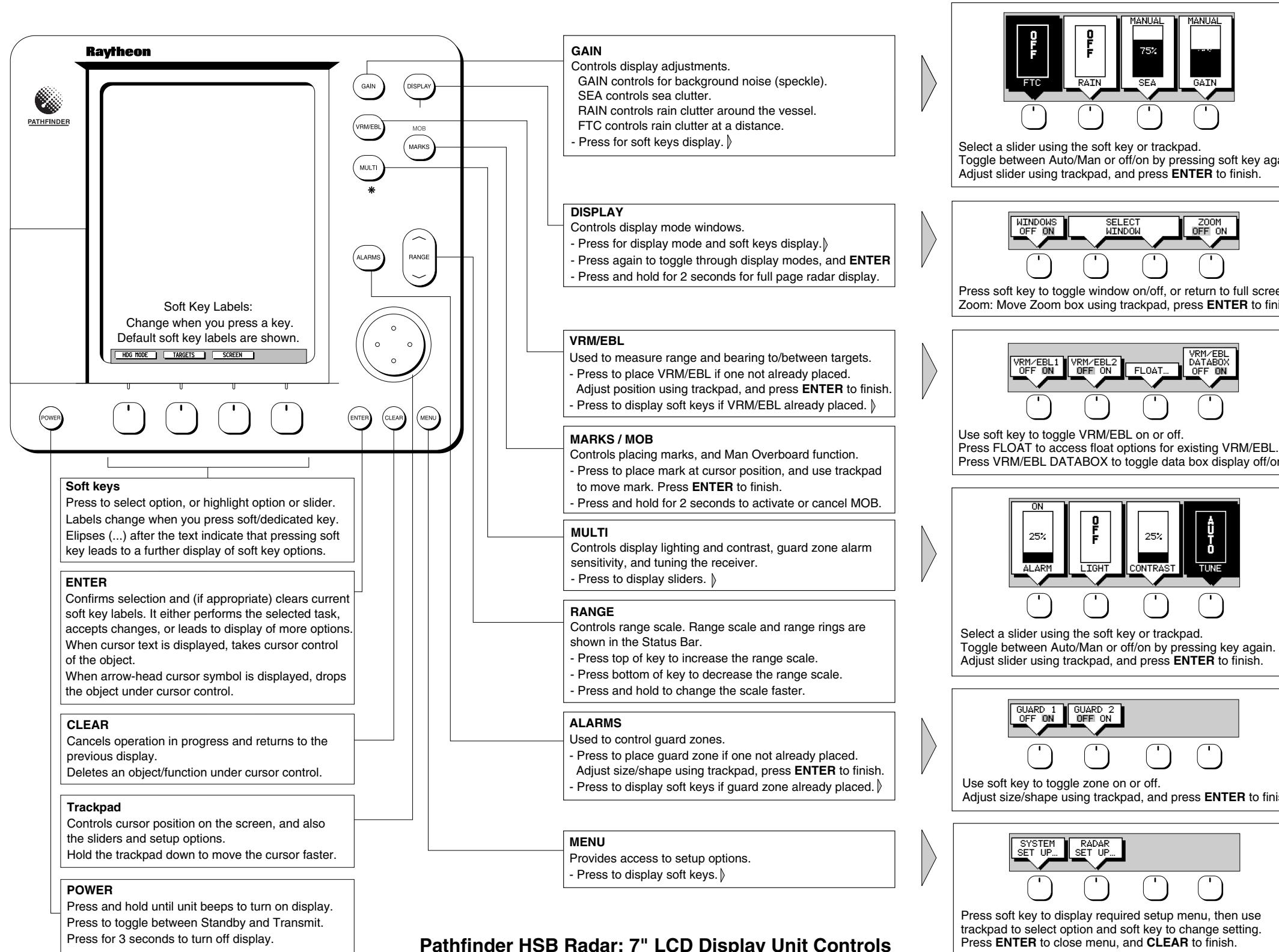
Selecting a Half-Screen Window for Display

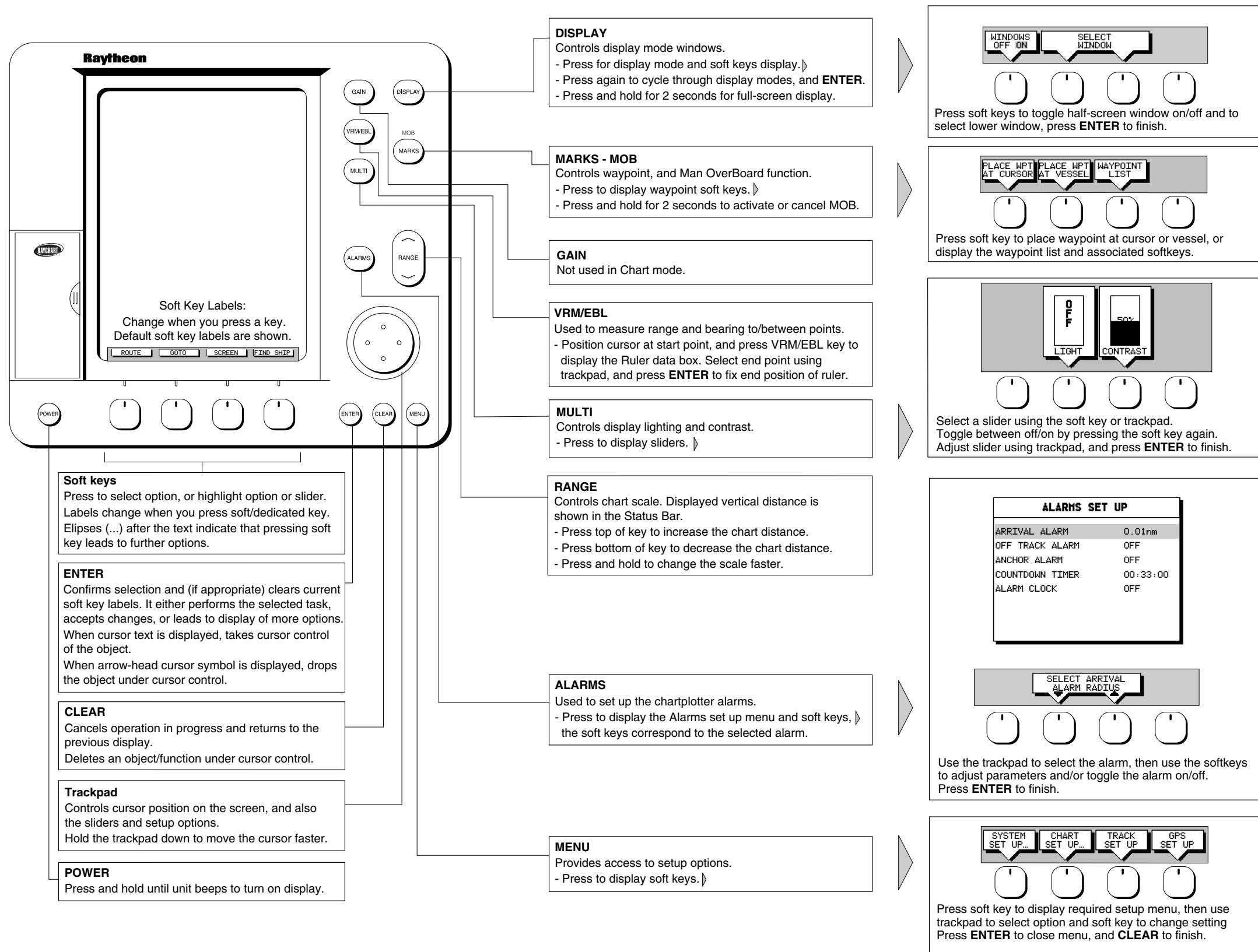
Note: Windows can only be used with Radar or Chart screens, they are not available on the data log screen.

► To select a window for display:

1. From the full-screen Radar mode, press the **DISPLAY** key.
The following soft keys 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, then press **ENTER**.
3. To toggle windows off, press the **WINDOWS OFF ON** soft key.



If any data boxes were displayed at the bottom of the full-screen image, they are moved to the upper window when you turn windows on.

The illustration on the following page shows the half-screen windows (in radar mode), and indicates the soft keys you need to use.

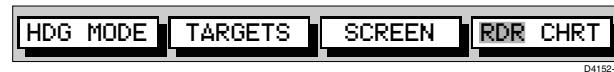
Selecting the
Mode of Operation

Switching Control Between Radar & Chart Screens

In a combined or integrated system, to switch control between radar and chart, you can change the full-screen mode. Alternatively, when you have both radar and chart displayed in half-screen windows the soft key **RDR CHRT** lets you toggle operating control between the radar and the chart window.

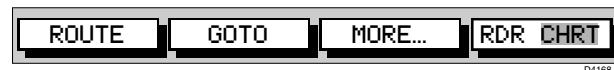
If a window is active , i.e. control of the cursor via the trackpad is available in that window, and you switch windows off, control automatically returns to the full-screen mode.

Radar:



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Chart:



D4168-1



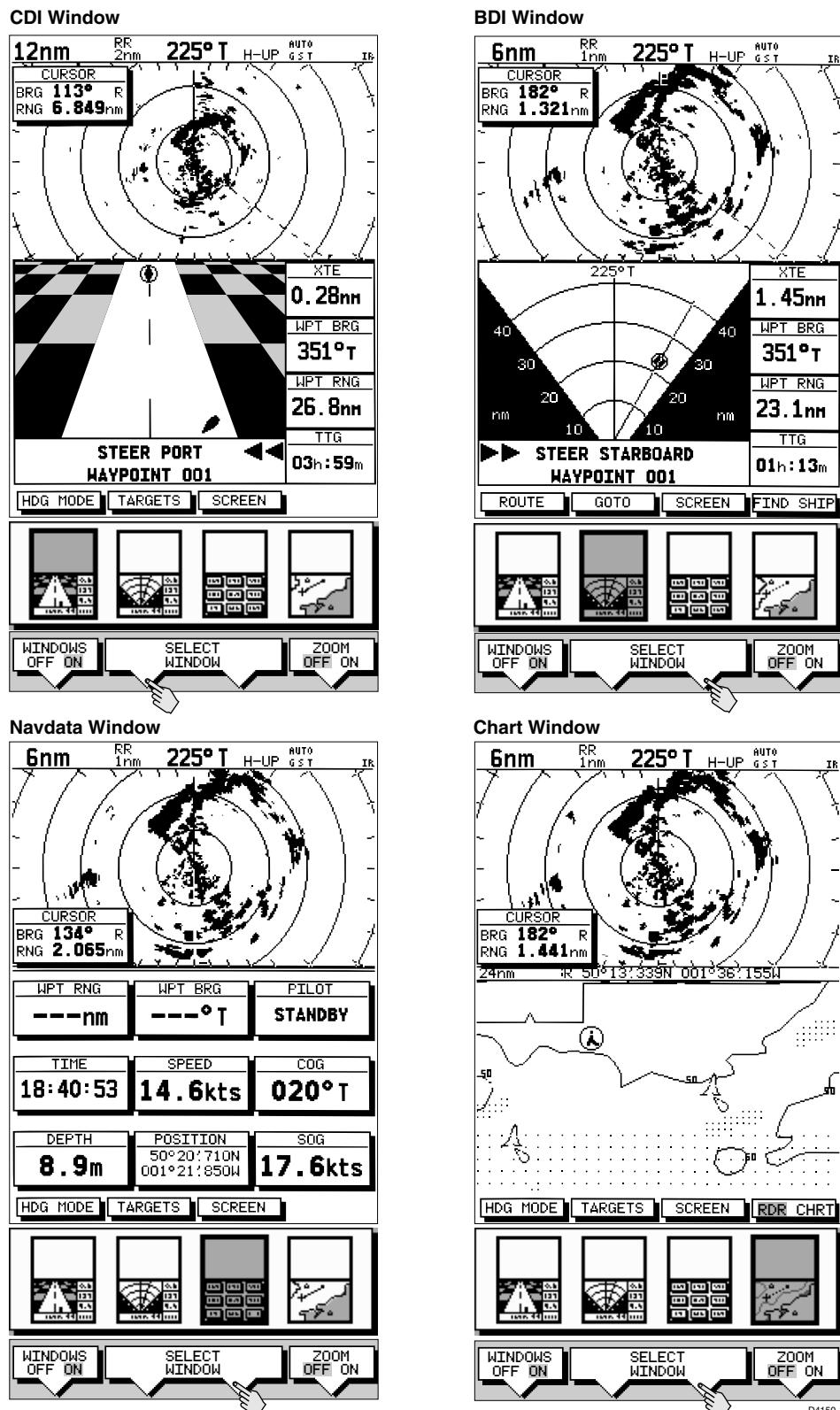
- To change the active window, press the **RDR/CHRT** soft key to toggle control between the radar and chart display. The current active display is highlighted in grey on the **RDR/CHRT** label and the cursor appears in that window.

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 without data boxes or windows:

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

Selecting the
Mode of Operation



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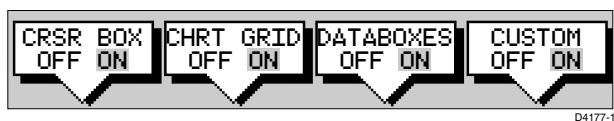
Customising the Screen Presentation Options

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

Radar:



Chart:



Customising the
Screen Presentation
Options

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 CCSR BOX 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**.

- You can also move the cursor data box using the context-sensitive cursor.

Switching Radar Range Rings or Chart Grid On and Off

The radar range rings can be turned on or off. They are normally left on, but you may wish to turn them off if you are using VRM/EBLs or guard zones (see *Sections 3.4 and 3.5*) to make the display clearer.

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.

If you are in Chart mode the RANGE RNGS soft key is replaced by the CHRT GRID soft key.

- To turn the range rings or chart grid on or off:



1. Press the SCREEN default soft key.
2. Press the RANGE RNGS or 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 7*.

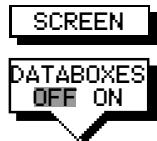
The default data box positions are along the bottom of the display. Each box can be moved to the required position on the screen using the context-sensitive cursor.

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

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 data boxes that can be displayed in the half-screen window.

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



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

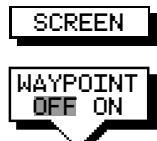
If you turn the data boxes on and none are displayed, you need to select the ones you require using the system set up menu, as described in *Section 7.3*.

- To move any data box:
 1. Use the trackpad to position the cursor over the box until the letters BOX are displayed.
 2. Press **ENTER** to take control of the box, use the trackpad to move it to the required position, and press **ENTER** again.

Waypoint Display - Radar mode

If you are currently going to a waypoint, you can display the active waypoint on the radar picture as a lollipop symbol. The waypoint may have been generated locally on the chartplotter, or received via the SeaTalk or NMEA interface.

- To display the active waypoint:

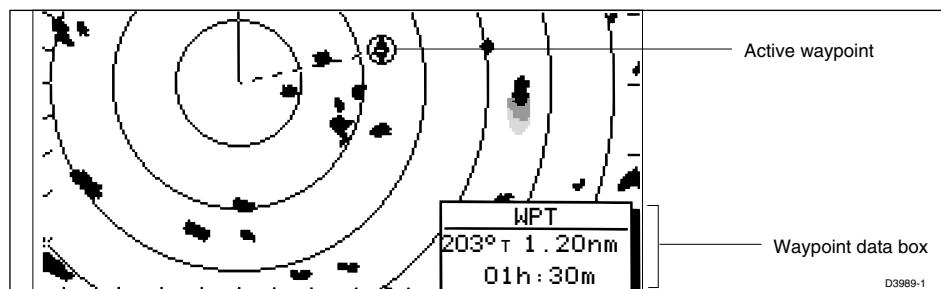


1. Press the SCREEN soft key.
2. Press the WAYPOINT soft key to toggle the setting from ON to OFF or from OFF to ON.

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

The standard radar picture is displayed again, with the active waypoint displayed as a lollipop symbol, joined to your vessel's position by a dotted line. If the waypoint is off-screen, the dotted line is extended to the edge of the radar picture.

A waypoint data box is also displayed, showing either the waypoint position or its range, bearing and time to go (TTG), depending on your set up selection (see *Chapter 7*).



Custom Options - Chart mode

When chart details have been customised in the Chart Set Up menu (as described in *Section 7.4*) 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 Customise 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 customised 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 Radar Display Control Functions

Using the Zoom Function

Radar Display-
Using the Zoom
Function

If you wish to see a section of the radar picture in more detail, you can use the Zoom function to magnify the selected area to twice its size. The enlarged area is displayed in a quarter-screen Zoom Window in the lower right corner of the screen. A box in the original radar picture indicates the enlarged area; you can move this using the context-sensitive cursor, changing the image in the Zoom Window.

Note: If the area you wish to enlarge is in the quarter of the screen that will be covered by the Zoom Window, you should offset the centre (see the next section) to move the area to another part of the screen before selecting Zoom mode.

Note: You cannot use Zoom and Windows at the same time: if you turn one on, the other is turned off automatically, and restored when the first is turned off again.

► To enlarge an area:

1. Press the **DISPLAY** key. The soft key labels are updated.



2. Press the ZOOM soft key to toggle the Zoom function ON.

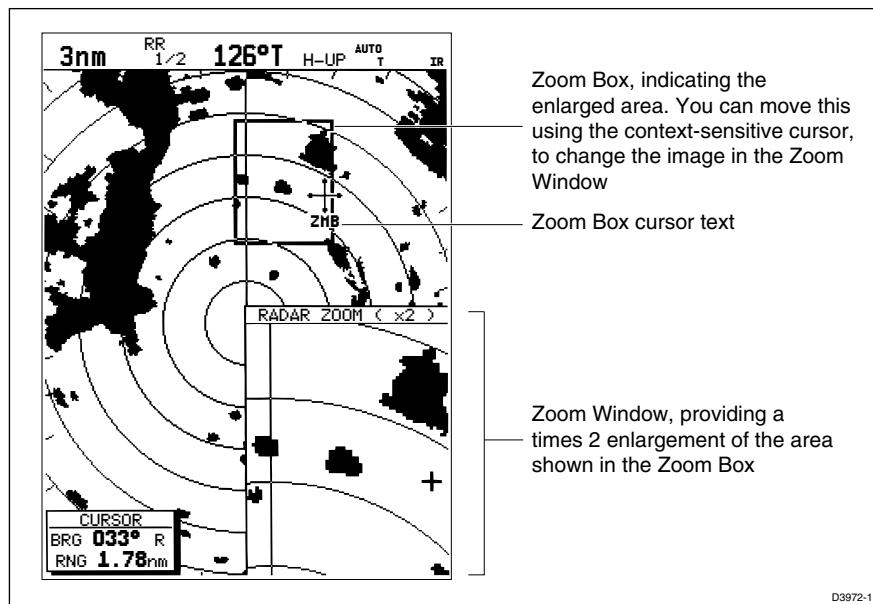
The labels are cleared, and the cursor has control of the zoom box that indicates the area to be enlarged. This is indicated by the letters ZMB in inverse video, and the four-headed cursor symbol. The zoom box defaults to its last-used position since power-on.

3. Use the trackpad to move the zoom box to the required area, and press **ENTER**.

The selected area is shown in an enlarged format in the quarter-screen Zoom window. The original radar picture occupies the rest of the screen.

► To move the enlarged area in view in the window:

1. Move the cursor over the edge of the zoom box in the original radar picture, until the letters ZMB appear under the cursor.
2. Press **ENTER** to take control of the zoom box. The cursor shape changes to a four-way arrow.
3. Use the trackpad to move the zoom box over the required area.
4. Press **ENTER** again to drop the zoom box, update the enlarged version, and return the cursor to normal control.



Radar Display -
Offsetting the
Centre

- To return to the normal display, press **DISPLAY** and then press the ZOOM soft key to set the function OFF.

Alternatively, you can press and hold **DISPLAY** for 2 seconds. This also removes any grouped data boxes.

Offsetting the Centre

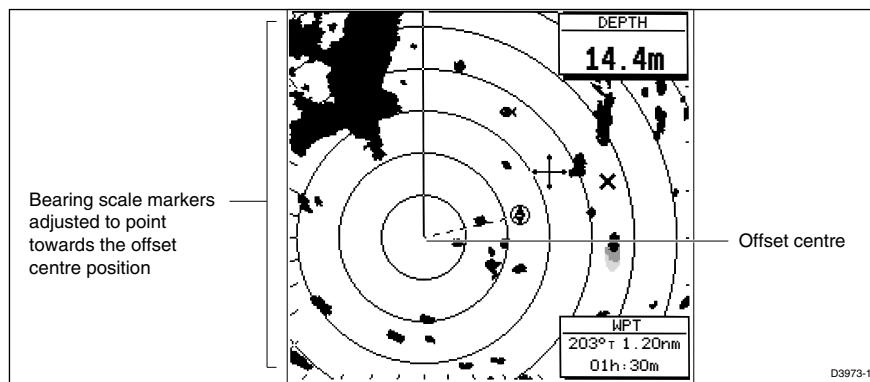
The radar picture is normally shown with your vessel at the centre of the display. However, you can move the centre, so that your vessel is offset by up to 66% of the radius, anywhere on the screen.

Note: You cannot offset the centre when the radar display is set to the longest range scale.

- To change the centre:

1. Move the cursor over the centre of the radar picture, until the letters CTR are displayed.
2. Press **ENTER** to take cursor control of the centre point. The cursor changes to a four-headed arrow.
3. Move the cursor to the required off-centre position.
4. Press **ENTER** again to set the position and return to normal cursor control.

Radar Display -
Hiding the Ship's
Heading Marker



- To return the centre of the radar picture to the centre of the screen, repeat step 1 and then press the **CLEAR** key. The centre is always reset to the centre of the display when you turn on the Radar display.

Note: When the centre is offset, additional range rings are displayed to the edge of the radar picture, at the standard ring interval for the current range. If you have selected the longest range scale, you cannot offset the centre.

Hiding the Ship's Heading Marker (SHM)

The radar picture includes the ship's heading marker, which is a line from your vessel's position to the edge of the picture at the vessel's current heading. In the standard Head Up mode, the heading marker is always a vertical line.

If you wish to check for small targets that may be hidden under the heading marker, you can hide it momentarily using the context-sensitive cursor.

- To hide the heading marker:
 1. Position the cursor over the heading marker, so that the text SHM is displayed.
 2. Press and hold **CLEAR**. The heading marker is hidden until you release the **CLEAR** key.

2.5 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; this function can also be used on a combined display to synchronise the radar and chart windows as described in *Using FIND SHIP*.

Chart Display -
Moving Around
the Chart

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

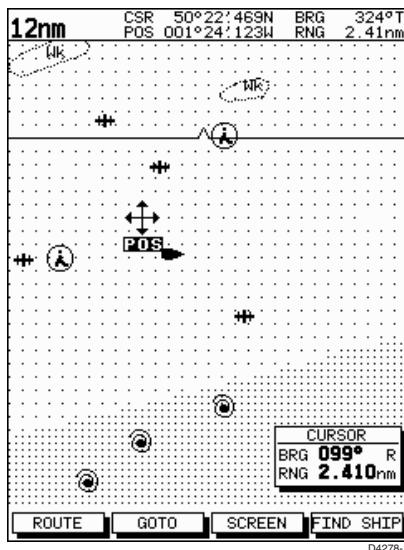
- Use the trackpad to move the cursor to the edge of the chart. The chart will pan across. This method is useful if the area you wish to see is only just off the screen.
- Use the context-sensitive cursor to change the chart centre.
- Automatically re-centre the vessel using the FIND SHIP soft key.
-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

Changing the Chart Centre

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

- To centre 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 centre of the screen.
- To move your vessel's position off-centre:
1. Move the cursor over your vessel's position until the letters POS are displayed.
 2. Press **ENTER** to take control of the chart position. The letters POS are now in inverse video, and the cursor symbol has changed to a four-way arrow. This indicates that the cursor can be used to move the chart in any direction.

Chart Display - Using FIND SHIP



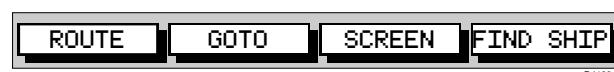
3. Use the trackpad to move the cursor to the required position.
4. Press **ENTER** to select the position and return to normal cursor control. The chart is redrawn with the vessel position at the cursor.
Alternatively, you can press **CLEAR** to abandon the move and leave the chart (and vessel) in its former position.

Using FIND SHIP

FIND SHIP has two functions, depending on your system configuration:

- In full-screen chart mode FIND SHIP is used to re-draw the chart with the vessel at the centre and the cursor homed onto the vessel.
- On a combined radar/chartplotter display, with chart and radar half-screen windows FIND SHIP can also be used to synchronise the radar and chart images.

Centre the Vessel



FIND SHIP

When you press FIND SHIP the following occur:

- The chart is re-drawn with the vessel's position in the centre.
 - 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 centre again.
 - Whilst homed, 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.

Synchronise the Radar and Chart

If you have a combined radar/chartplotter display, with chart and radar windows on and you have selected Radar/Chart Synch in Chart Set Up (see Chapter 7), FIND SHIP also synchronises the radar and chart images as follows:

- The chart is redrawn so that its centre position matches that of the radar display.
- The radar is redrawn to the scale and heading mode of the chart.

Note: Depending on the topology of the coastline, the radar returns may not relate to the charted shoreline, the radar image will therefore be different to the chart display. For example, a gently sloping beach with a cliff several hundred metres beyond the charted coastline, the cliff is not shown on the chart but will be displayed on the radar image.

Chart Display -
Changing the
Chart Scale

Changing the Chart Scale

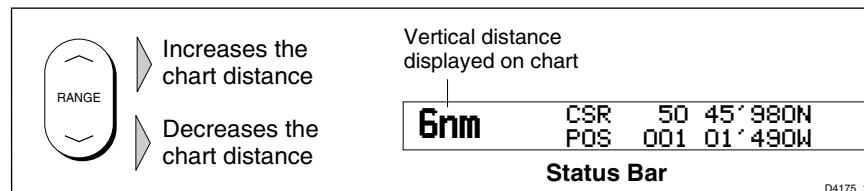
The **RANGE** key allows you to change the chart scale so that you can see a smaller or larger area on the screen.

Plotter mode is available to allow you to zoom into a smaller area, even when no chart data is available for that scale. Chapter 7 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 centred on the cursor.

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.



- 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.

Chart Display - Changing the Chart Scale

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

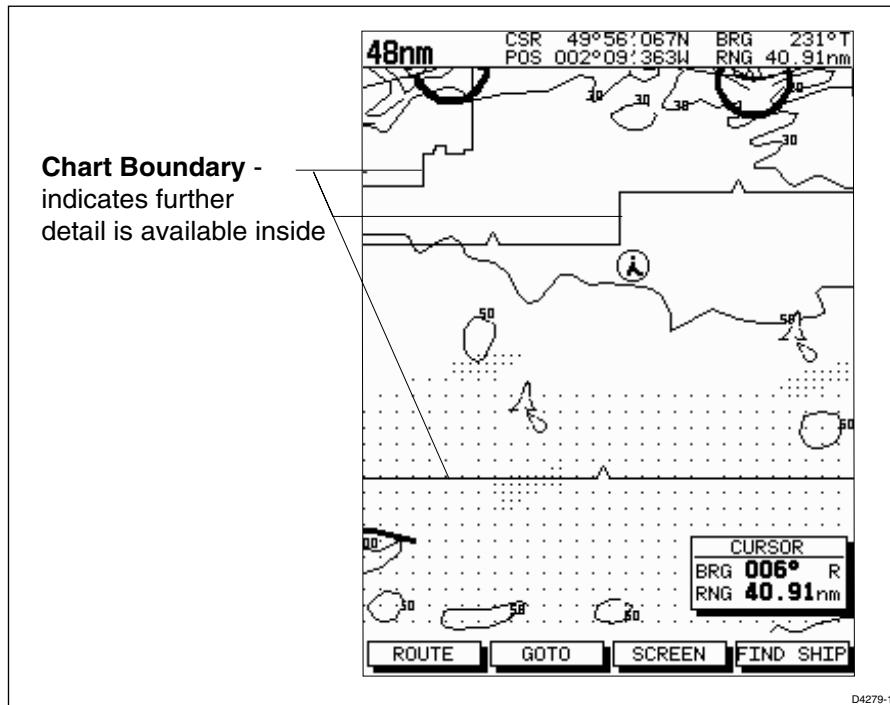
1. Use the trackpad to position the cursor in the area you wish to see in more detail.
2. Press the lower part of the **RANGE** key to zoom into the area.

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 centre 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 the following illustration.



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.
 - 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.

2.6 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 *Chapters 5 and 6*.

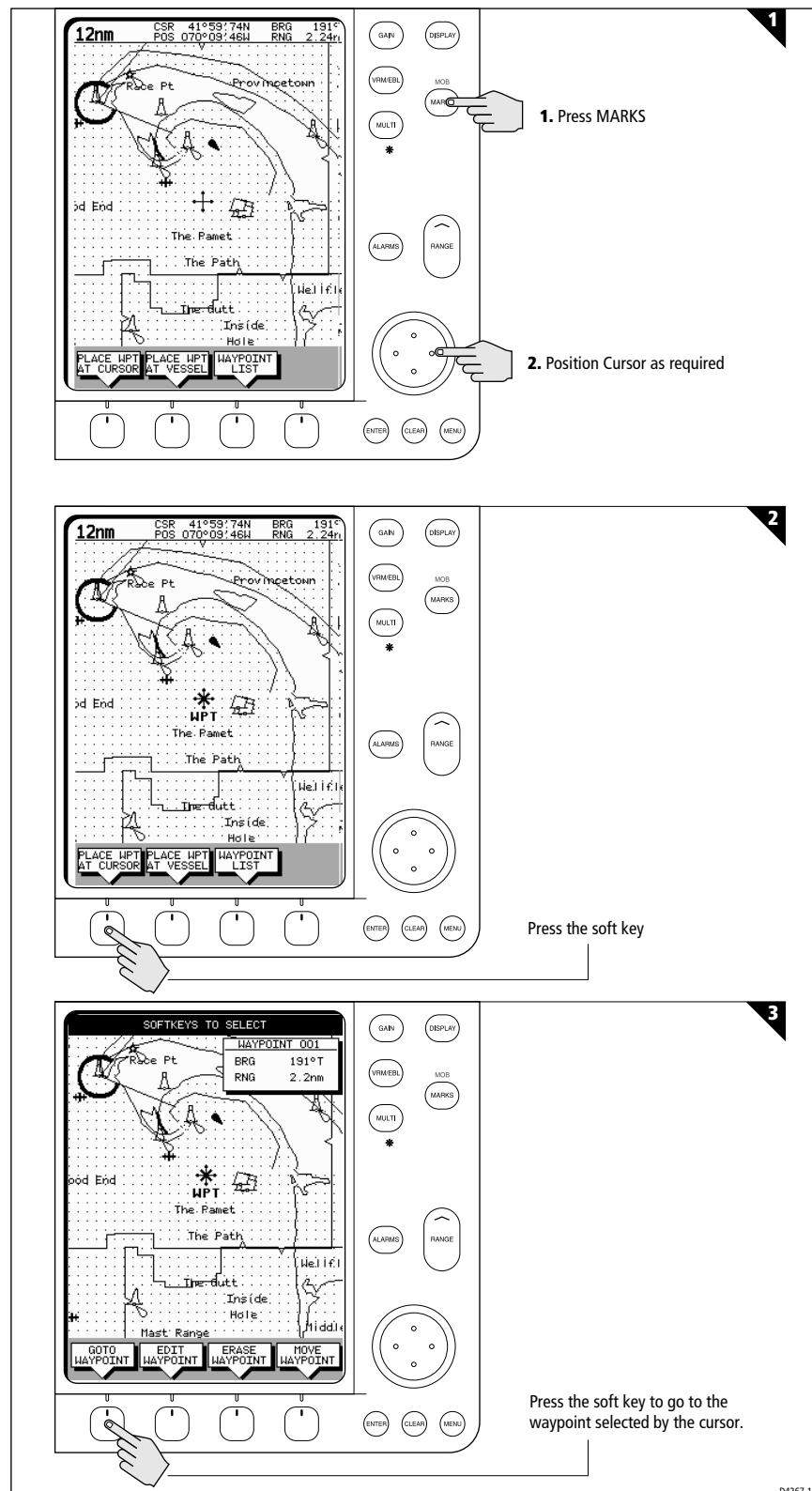
Operating guidelines are provided for the following scenarios:

- **Working with Waypoints**
Place a Waypoint
Goto a Waypoint
- **Make and Follow a Routes**
Create a Route
Follow a Route
- **Review the Passage Plan**
View Route Information
Change the SOG, Hours and ETA.
- **Displaying the Radar Image and Synchronising Radar & Chart**
Changing the Full-Screen Mode & Selecting Half-Screen Windows
Radar and Chart Synchronisation (Find Ship)
Cursor Echo

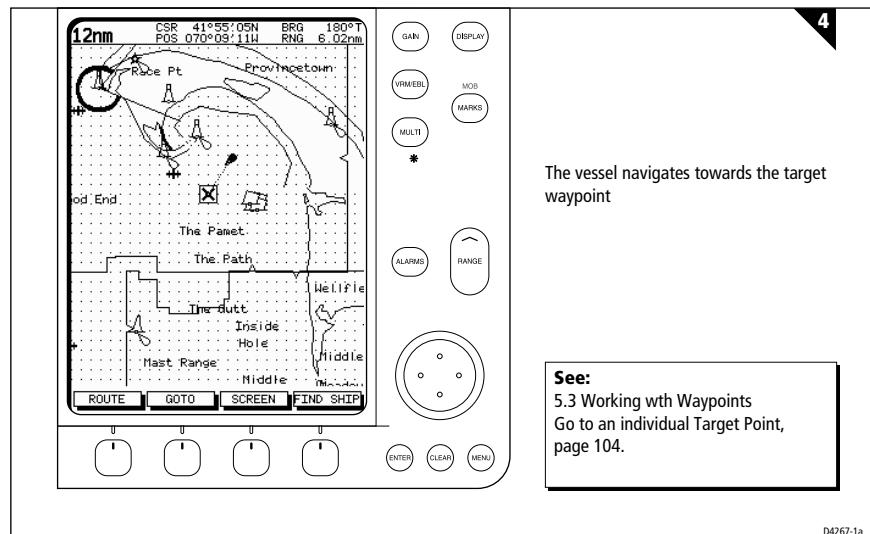
Typical Chart
Scenarios

Place and Goto A Waypoint

Place
Waypoint



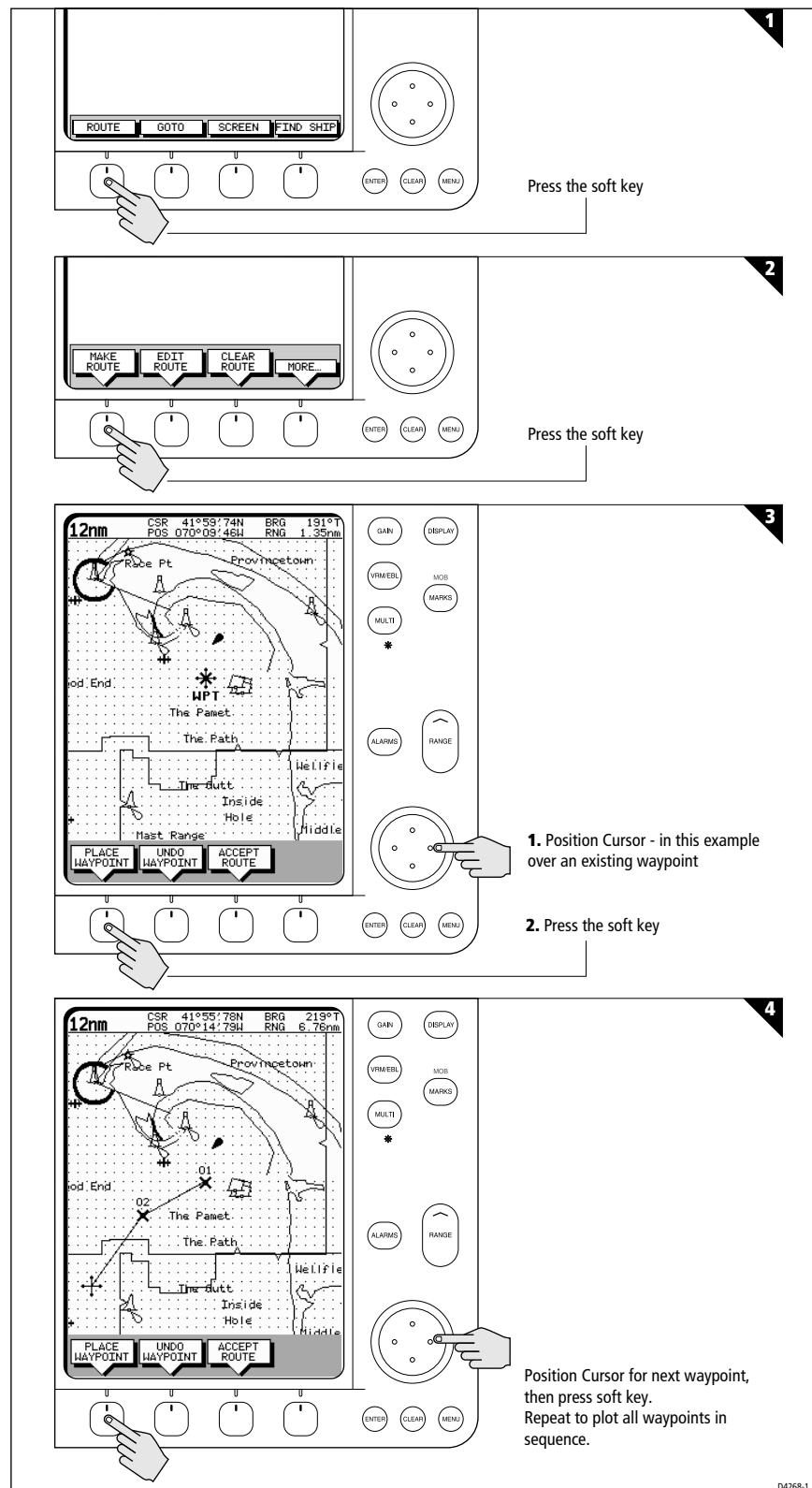
D4267-1

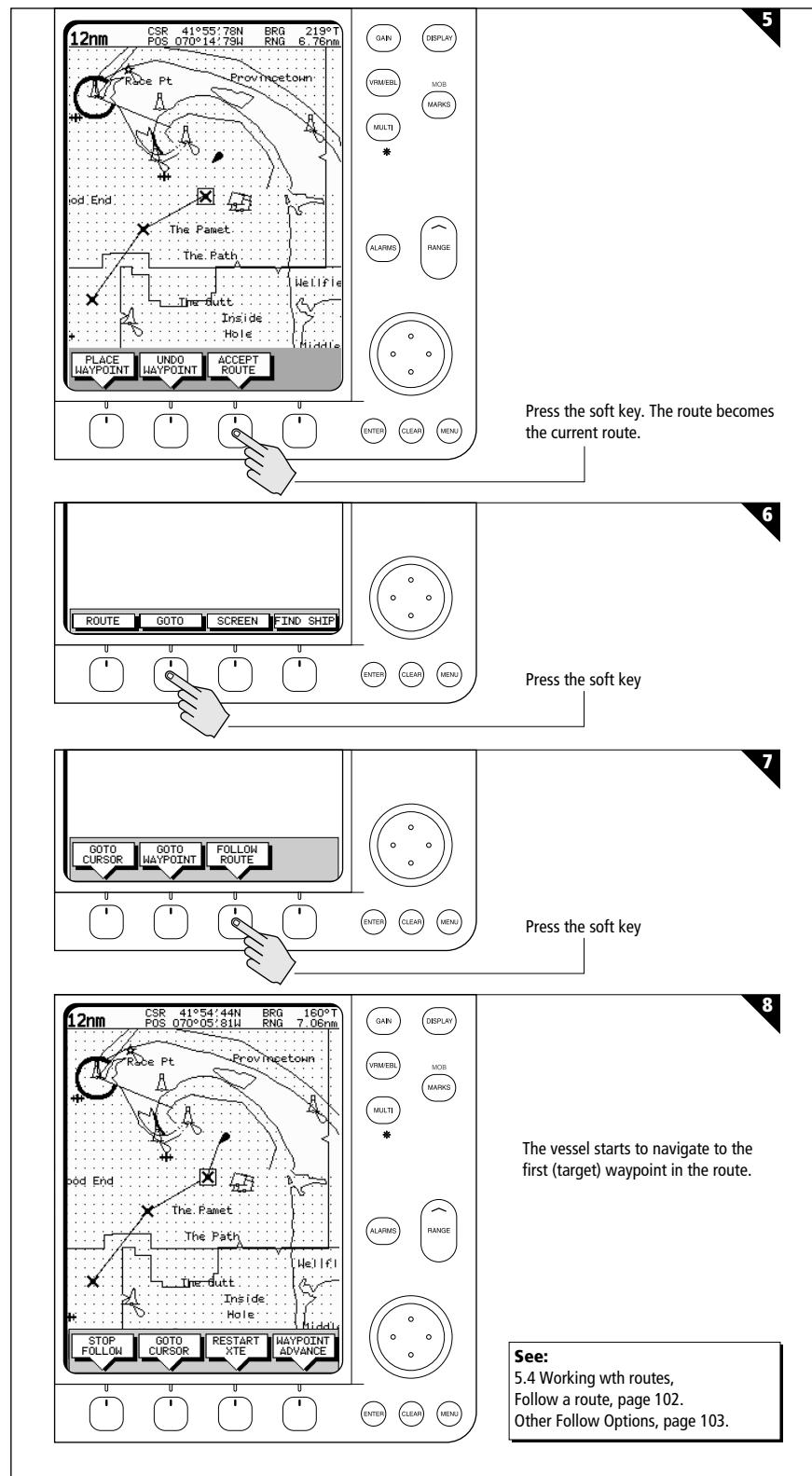


Place and Goto a
Waypoint

Make and Follow a Route

Make and Follow
a Route

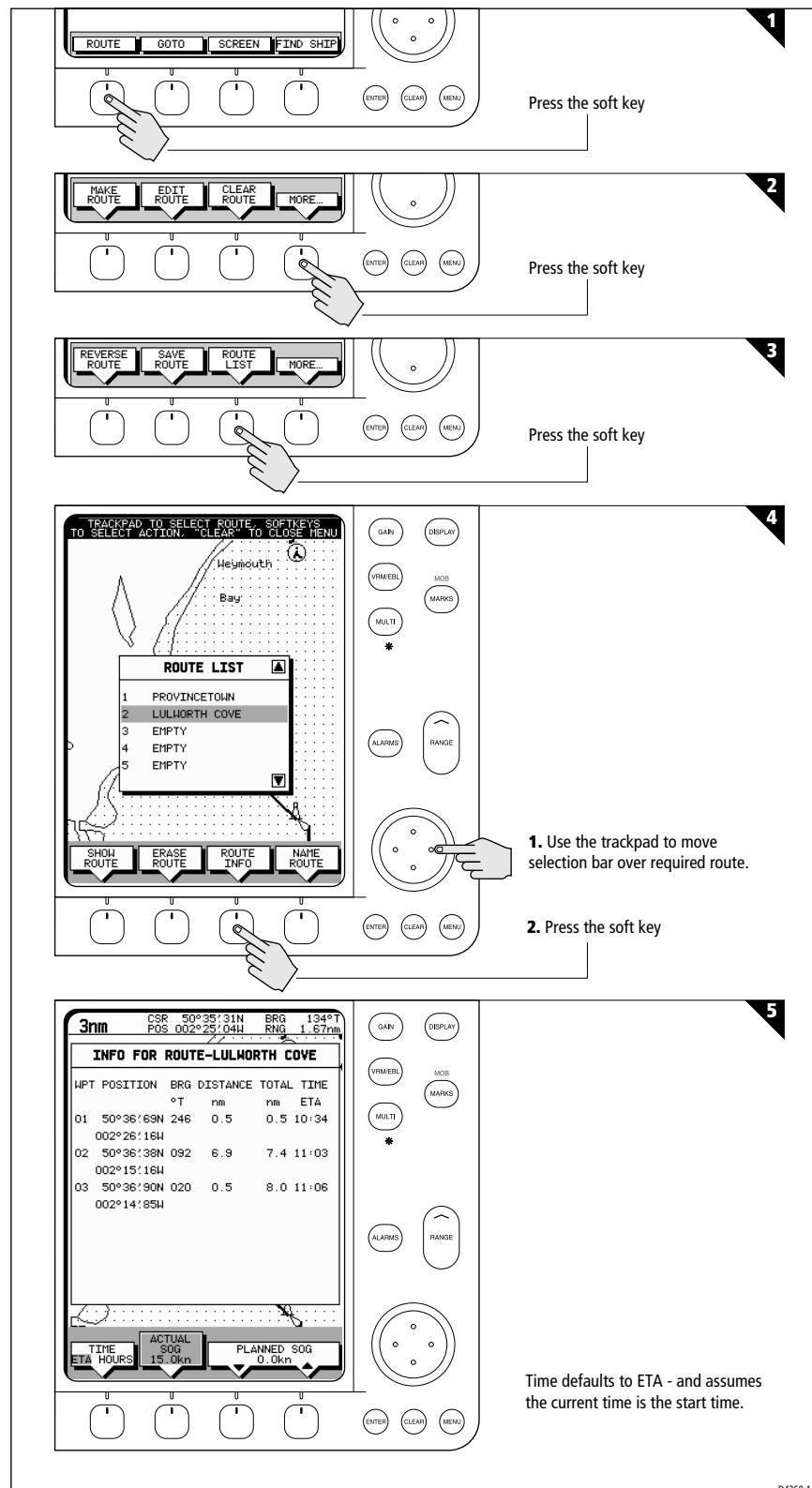


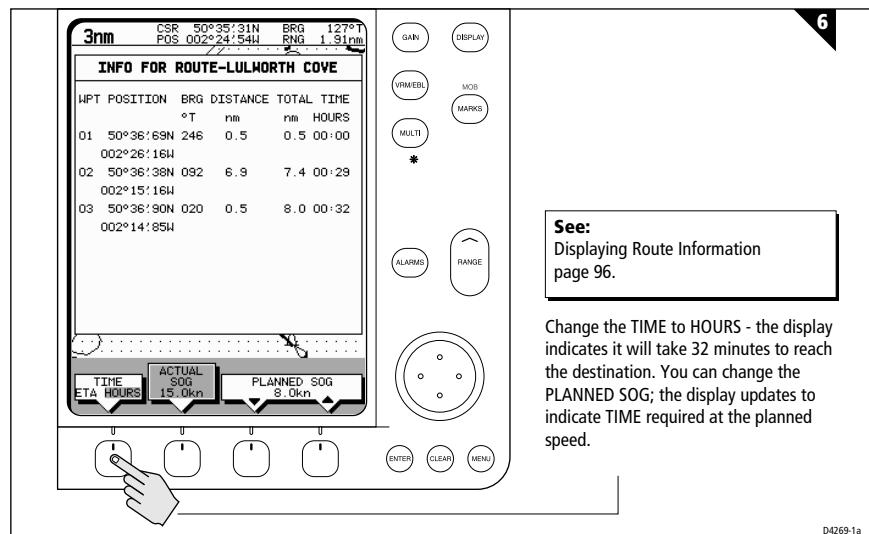


Make and Follow
a Route

Review Your Passage Plan

Review Your Passage Plan

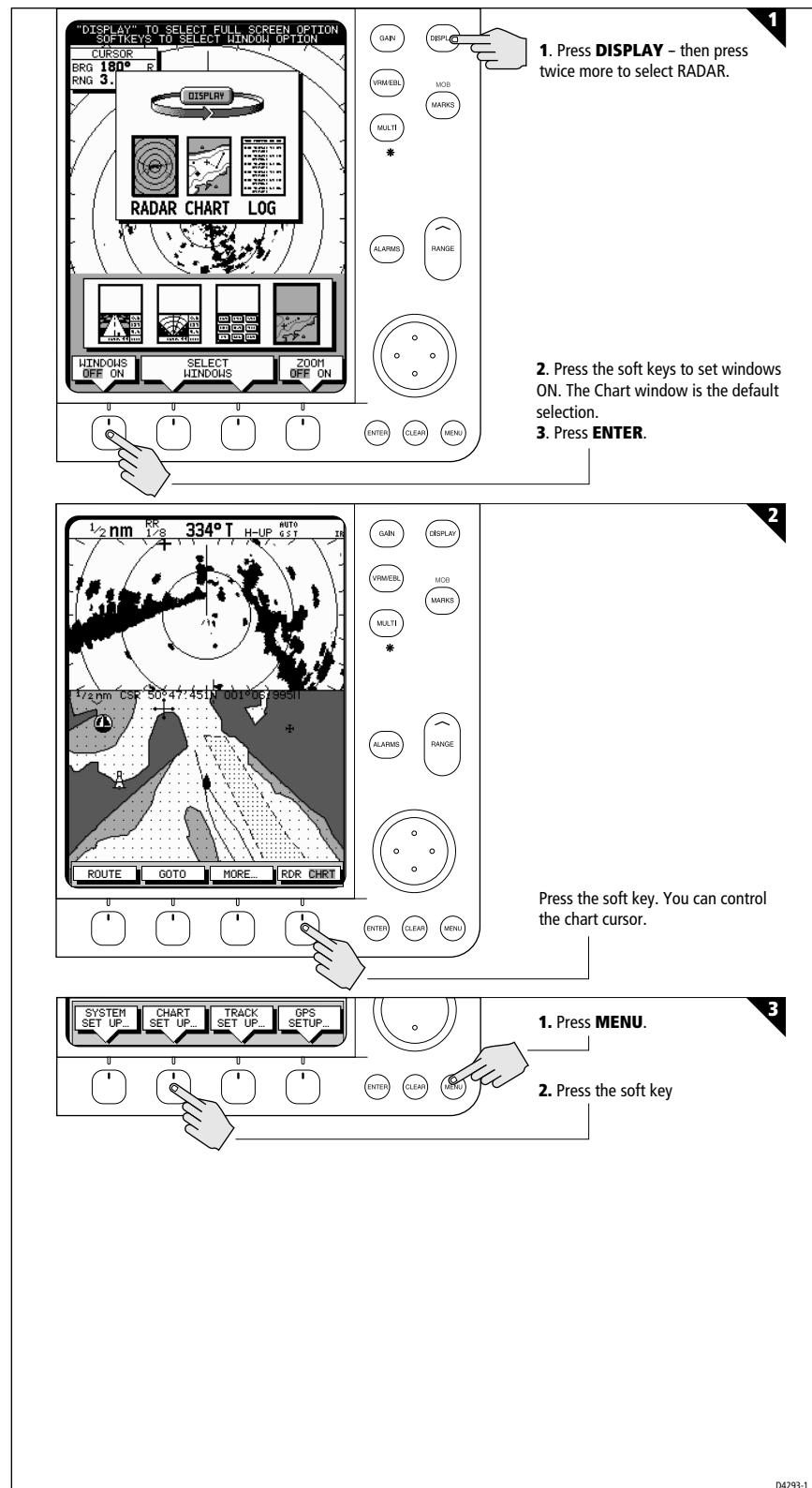


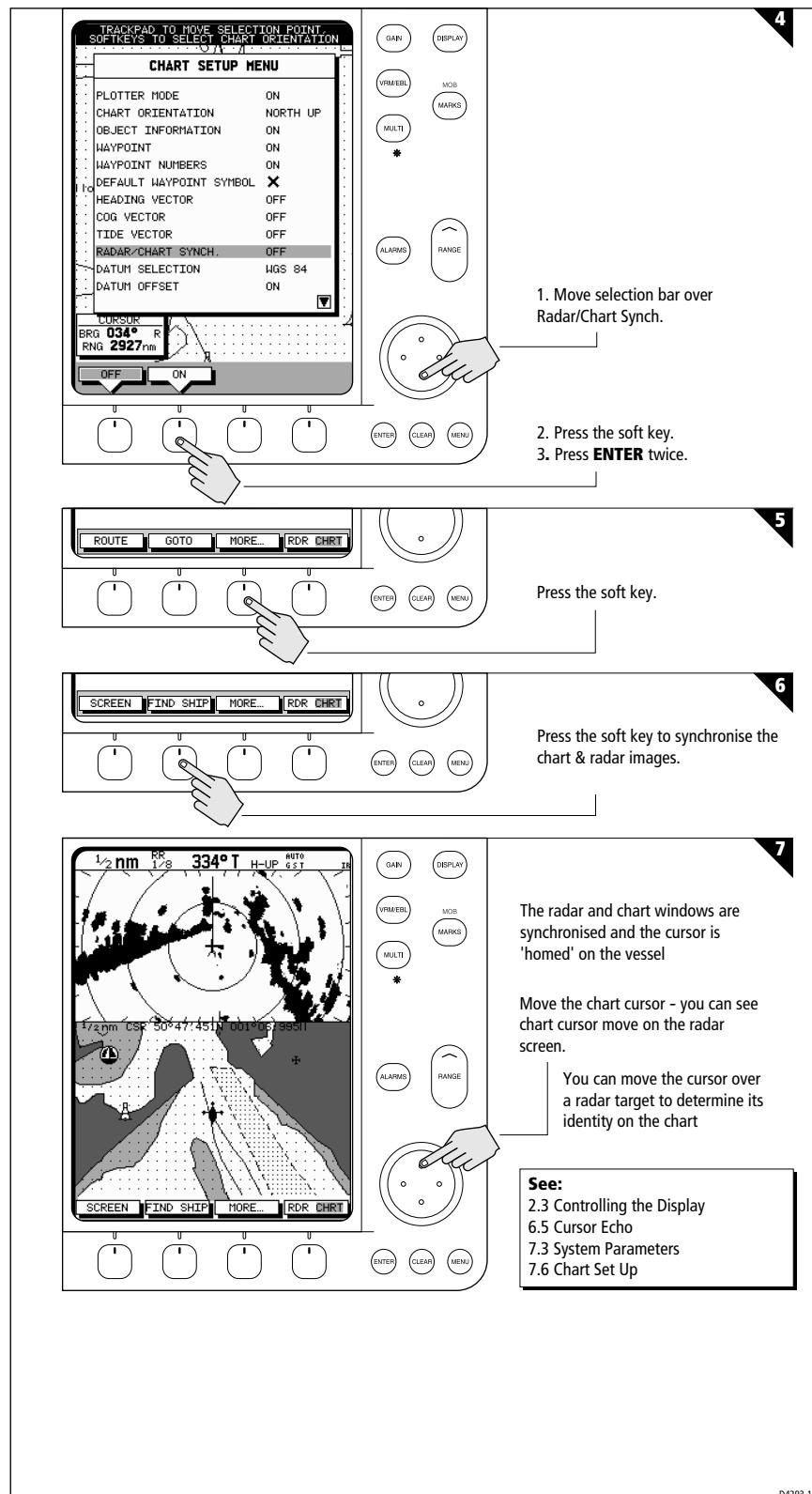


Review Your
Passage Plan

Displaying the Radar and Synchronising Radar & Chart

Synchronising
Radar and Chart





Synchronising
Radar and Chart



Chapter 3: Standard Radar Operations

3.1 Introduction

This chapter provides detailed instructions for the standard radar operations of your HSB Series Pathfinder Radar. Additional functions, that are available on integrated systems with appropriate data sources, are described in Chapter 4. If you have a combined radar/chart display refer to the *Chapters 5 and 6* for information on charting operations.

You can use this chapter with the radar display set to simulator mode, or on the water after you have installed and set up your HSB Series Pathfinder Radar system.

Chapter 3
Radar Operations

This chapter covers the following topics:

- Range control.
- Interpreting and adjusting the radar picture, including adjusting the gain, sea clutter and rain clutter, changing the targets display, and tuning the radar.
- Measuring range (distances) and bearings using Variable Range Markers (VRMs) and Electronic Bearing Lines (EBLs).
- Setting up guard zones and handling alarms.

Note: *Until you are familiar with interpreting the radar display, you should take every opportunity to compare the radar's display patterns with visual targets, such as other vessels, buoys and coastal structures. You should practice harbour and coastal navigation during daylight and in clear weather conditions.*

If you have a combined radar/chartplotter, or have an HSB series chartplotter as part of an integrated system, you can identify objects using the cursor echo feature: With cursor echo on (see Section 4.5 and Chapter 7) you can select an object on the radar display, the cursor is repeated on the chart display so you can check the object's identity.

3.2 Range Control

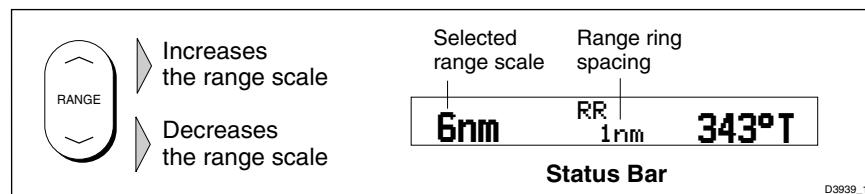
The radar picture can be viewed at various scales. The shortest range scale gives a maximum range of $\frac{1}{8}$ nautical miles, measured from the default centre to the top of the radar picture. The longest range scale gives a maximum range of between 24 and 72 nautical miles depending on your scanner.

- The *long* range scales provide the best overview of your vessel's relationship to land masses, weather fronts and large ship targets in or beyond view.
- The *short* range scales provide greater detail of the radar echoes close to your vessel, and should be used as you approach the coastline, harbour or other vessels in the area.

The Pathfinder Radar display includes concentric range rings, which you can use to help you to judge distances on the radar picture. Their number and spacing are adjusted automatically if you change the range scale. They can be turned off if required (see *Section 2.3*).

Range
Control

Changing the Range



- Each time you press the **RANGE** key, the range changes to the next available setting. The system will beep three times if no further range scale is available.
- To change the range quickly, press and hold the required arrow on the **RANGE** key.

The range scale and range ring interval indicators, at the left-hand end of the status bar, are updated whenever you change the range.

The Standard Range Scale

Details of the standard ranges that can be selected are shown in the table below.

If you wish, you can customise the range scales by specifying different ranges, as described in *Chapter 7*.

Maximum Range (nm)	Number of Range Rings	Range Ring Interval (nm)
1/8	2	1/16
1/4	2	1/8
1/2	4	1/8
3/4	3	1/4
1 1/2	6	1/4
3	6	1/2
6	6	1
12	6	2
24*	6	4
48*	6	8
72*	6	12

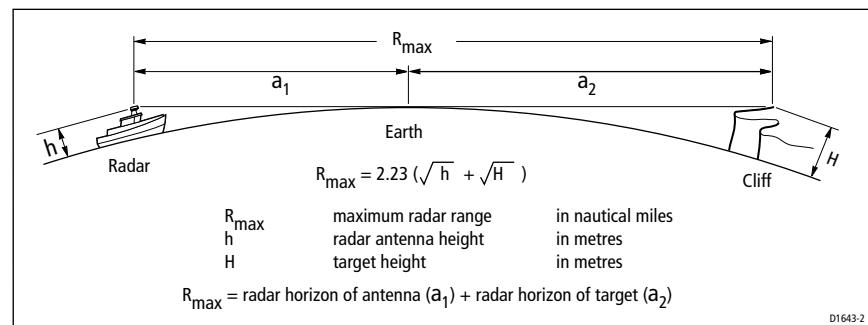
* The maximum range depends on your scanner type, as detailed in the *Pathfinder Radar Scanner Owner's Handbook*.

Determining Actual Radar Range

The number of range rings shown in the table is the number to the selected range. Additional range rings are displayed to the edge of the radar picture, at the standard ring interval for the current range, and are most noticeable when the centre is offset.

Determining Actual Radar Range

The actual maximum radar range is essentially line-of-sight, and is limited by the height of the scanner and the height of the target as shown in the following diagram. The table below lists some range examples:



Antenna Height	Target Height (m)	Maximum Range (nm)
3m	3m	7.8
3m	10m	10.9
5m	3m	8.9
5m	10m	12.0

Note: The ranges shown in the table are theoretical maximum ranges. The radar horizon is greater than the optical horizon, but the radar can only detect targets if a large enough target is above the radar horizon.

3.3 Interpreting and Adjusting the Radar Picture

Navigational echoes may be large, small, bright or faint, depending not only on the size of the object but also on its orientation and surface. Different objects reflect the radar signals in different ways. For example, vertical objects such as cliffs reflect signals better than sloping ones such as sandbanks.

High coastlines and mountainous coastal regions can be observed at the longest radar range. However, the first sight of land may be a mountain several miles inland from the coastline. The actual coastline may not appear on the radar until the vessel is close to the line of sight distance.

The radar indication may not be similar to your visual observation; a nearby small object may appear to be the same size as a distant large object on the radar. However, with experience the approximate size of different objects can be determined by the relative size and brightness of the echoes.

Some targets, such as buoys and small boats, can be difficult to differentiate, since they bob and toss about in the waves and do not present a consistent reflecting surface. Consequently, these echoes have a tendency to fade and brighten and, at times, to disappear momentarily. Buoys and small boats often resemble each other, but boats can usually be distinguished by their motion.

Not all radar echoes are produced by hard navigational items. Some echoes may be received from irregularities on the surface of the water, particularly at close range (sea clutter), or from rain or snow either around the vessel or in the distance. In addition, some echoes may be indirect returns to the radar scanner, providing false echoes or multiple echoes.

The effects of many false echoes can be minimised, and the target presentation clarified using the controls summarised below. This section explains how to interpret the radar picture and how the controls affect the display. It provides instructions for adjusting the settings, describes the circumstances in which they should be adjusted, and how they interact with each other.

Key	Option	Function	Default Setting
GAIN	GAIN SEA RAIN FTC	Controls the strength of the target returns Reduces sea returns Reduces close rain or snow returns Reduces distant rain or snow returns	AUTO AUTO-HARBOUR OFF OFF
TARGETS	INT REJ EXPANSION WAKES	Turns interference rejection on/off Turns target expansion on/off Turns wakes on/off and selects wakes length	ON OFF OFF
MULTI	TUNE	Fine tunes the receiver	AUTO

Identifying False Echo Returns

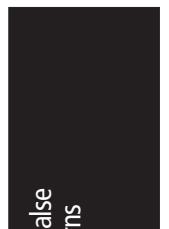
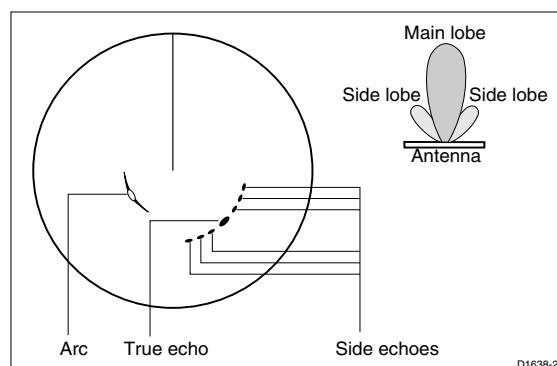
Not all echoes are direct returns to the radar antenna. Occasionally signals appear at positions where there is no actual target. These are called *false echoes*, and may be caused by side lobes, ghost images, indirect echoes or multiple echoes.

This section briefly describes the echo patterns that can be produced by false echoes and the likely cause. It should be noted that the radar operator, through observation, practice, and experience, can generally detect these conditions very quickly. These effects can usually be minimised using the radar controls.

Side Lobes

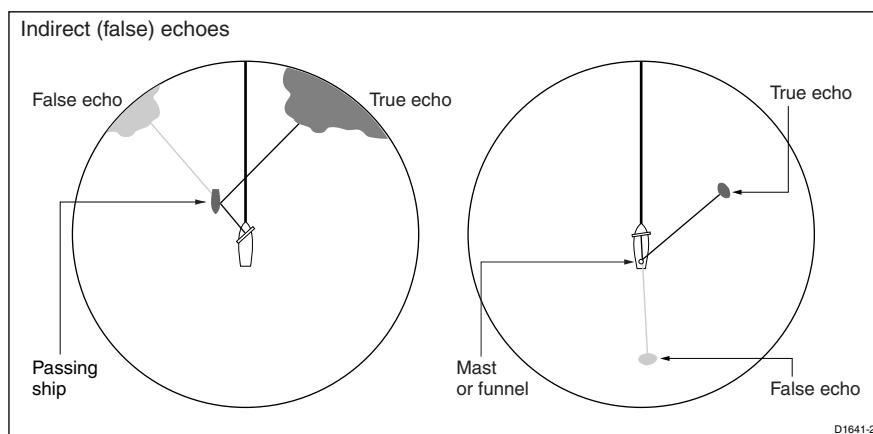
A small part of the RF energy from each transmitted pulse is radiated outside the single narrow beam. This produces side lobe patterns.

Side lobes have no effect on distant or small surface objects. However, the echo from a large object at short range may produce an arc on the radar screen similar to a range ring or a series of echoes forming a broken arc. Side-lobe echoes normally occur at ranges below 3nm, and can be reduced by adjusting the SEA control.



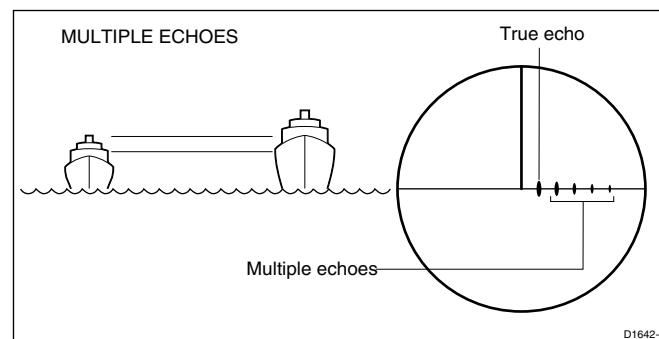
Indirect Echoes

There are several types of indirect echoes or ghost images. These sometimes have the appearance of true echoes, but in general they are intermittent and poorly defined.



Multiple Echoes

Multiple echoes appear if there is a large target with a wide vertical surface at a comparatively short range. The transmitted signal will be reflected back and forth between the target and your own ship. Multiple echoes therefore appear beyond the true target's echo on the same bearing (as shown below). This is not very common.



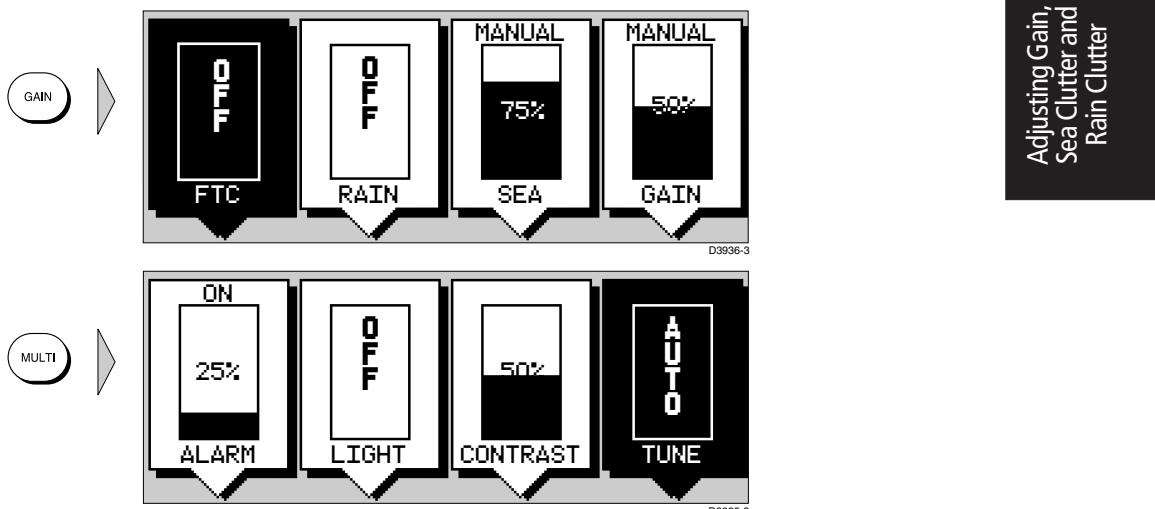
Blind Sectors or Shadow Effect

Funnels and masts, when located near the antenna array, may cause shadows. In shadow areas beyond the obstruction there will be a reduction of the beam intensity, although not necessarily a complete cut-off. However, there will be a blind sector if the subtended angle is more than a few degrees. There may also be multiple echoes which extend behind the obstruction. This should be avoided by careful selection of the scanner site prior to installation (see *Chapter 8*).

Adjusting Gain, Sea Clutter and Rain Clutter

Automatic adjustment of Gain, Sea and Tune is available, alternatively you can set any of these parameters to manual and use the trackpad to adjust its value. Rain clutter is adjusted manually using the RAIN or FTC control. GAIN, SEA, RAIN and FTC are accessed from the **GAIN** key; TUNE is accessed from the **MULTI** key.

Note: Gain, Sea and Tune can only be adjusted if the control is set to Manual adjustment.

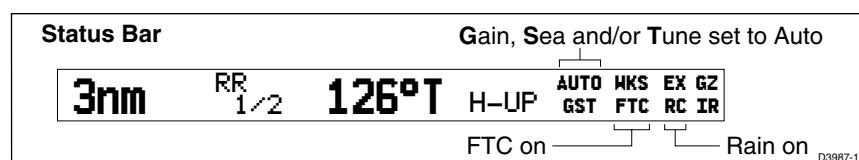


Adjusting Gain,
Sea Clutter and
Rain Clutter

When you select manual GAIN, SEA or TUNE adjustment the soft key icon shows a vertical slider bar. As you press the trackpad, the value is indicated in the slider.

When you switch FTC or RAIN On, the soft key icon shows a vertical slider bar. As you press the trackpad, the value is indicated in the slider.

If you change the settings, the new GAIN, SEA and TUNE modes (auto or manual) and values remain set even when you turn the radar off and on again; Rain and FTC are reset to Off at power-on. The status bar indicates which controls are switched to Auto or On.



- To adjust a parameter:
 1. Select a range appropriate to the adjustment you wish to make. The optimum Tune setting varies slightly for different ranges, depending on the pulse width used.

2. Press **GAIN** or **MULTI**. The slider soft keys are displayed. The last-used slider is highlighted (displayed in inverse video) to show that it is selected.
3. Press the required soft key so that the slider box is highlighted.
The TUNE and GAIN soft keys toggle the control between Auto and Manual mode. The SEA soft key toggles the control between Auto-Harbour, Auto-Offshore and Manual mode. If you select Manual mode the last auto setting is retained. You can only move the slider if the control is set to Manual.
4. Use the trackpad to move the slider up or down. You can press and hold the control to move the slider quickly rather than in single steps.
The image on the screen changes as you move the slider, so that you can see the effect of your adjustment.
The tuning slider displayed in Manual mode shows the current received signal strength, in 8 steps. Adjust the slider to obtain the maximum reading on the indicator.

Note: Because the changes to the settings are made immediately, you cannot revert to the previous setting by pressing **CLEAR**.

5. When you have set all the controls to the levels you require, press **ENTER**, or **CLEAR** to clear the slider display. The status bar is updated to indicate which controls are switched to Auto or On.

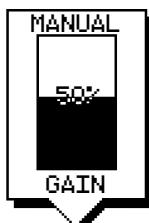
Gain Control and Sea Control

The **GAIN** control can be set to either Auto or Manual. In Auto mode, the Pathfinder radar optimises the setting. The **SEA** control can be set to Auto-Harbour (default), Auto-Offshore or Manual mode. In Auto-Offshore mode, the Pathfinder Radar optimises its settings to account for the effects of sea clutter.

In harbours or close proximity to land different auto settings may be necessary to cater for the effects of land clutter. To avoid losing small targets it is therefore advisable to set the Sea control to Auto-Harbour mode. Alternatively, set both Sea and Gain to Manual mode then adjust the settings to ensure that all close small targets are visible.

The **GAIN** control adjusts the level of the display of signals received from the scanner; it is equivalent to a volume control on a radio.

Because the **SEA** control affects the gain, you may need to manually readjust it if you manually change the Gain setting.



Gain Control

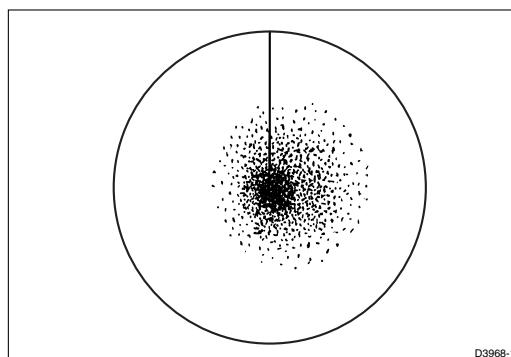
When the Gain control is set to Manual, you should check it every time you change the range scale.

On long range settings, the gain should be set to give a slight speckle in the background of the radar picture. Do not set the gain too low, or you may miss small or weak targets.

On shorter ranges, you may wish to reduce the gain slightly to reduce the speckle and therefore improve target definition.

Sea Clutter Control

Radar returns from waves around your vessel can clutter the centre of the radar picture, making it difficult to detect real targets. Such *sea clutter* usually appears as multiple echoes on the display at short range scales, and the echoes are not repetitive or consistent in position. With high winds and extreme conditions, echoes from sea clutter may cause dense background clutter in the shape of an almost solid disc.



Adjusting Gain,
Sea Clutter and
Rain Clutter

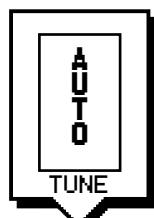
The Sea control reduces the gain level in the areas near your vessel, extending up to 3 to 5nm depending on the wave and sea conditions. This has the effect of reducing the sea returns to intermittent small dots, while small targets are still visible. Gain levels further from your vessel remain unchanged.

You can use the gain and Sea control to help minimise the effects of side lobes (see *Identifying False Echo Returns* above).

Note: On short range scales, do not set the Sea control so high that all clutter is removed, since this could stop you seeing echoes from close targets.

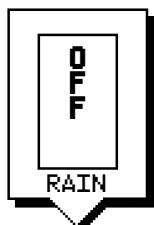
Tuning the Receiver

The TUNE control is used to fine tune the receiver in the scanner for maximum target returns on the display. In Auto mode, the radar tunes itself automatically on all range scales. **We recommend that you leave the TUNE control in Auto mode.**



If you do set the TUNE control to Manual, you will need to adjust it about 10 minutes after you have turned on the radar, since the required setting changes once the magnetron has warmed up.

If you cannot tune the radar successfully, refer to *Section 7.5* for information on the Tune Preset function.

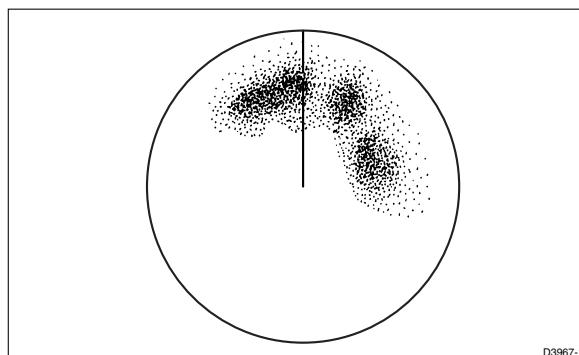


Rain Clutter Control, using RAIN and FTC

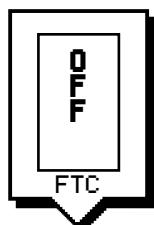
The radar can see echoes from rain or snow. Returns from storm areas and rain squalls consist of countless small echoes that continuously change size, intensity, and position. These returns sometimes appear as large hazy areas, depending on the intensity of the rainfall or snow in the storm cell.

The RAIN and FTC controls are used to reduce this clutter, so that targets masked by the clutter can be seen on the radar picture.

- The RAIN control is used to reduce large clutter masses around your vessel caused by rain or snow.
- The FTC (Fast Time Constant) control is used to reduce rain clutter at a distance from your vessel, such as that shown below.



D3967-1



When the FTC control is turned up, only the leading edge of large (rain clutter) echoes is displayed, while the effect on smaller (ship) echoes is only slight. This means that you can also use the control on shorter ranges to distinguish between two very close echoes on the same bearing, which may otherwise merge and appear as one echo.

When the FTC control is turned up, the receiver is less sensitive, and there is a reduction of background noise and fill-in returns from land and large targets. You should therefore turn the control down when its use is not required. Since storm cells are usually visible for long distances due to their extreme altitude, you may wish to leave them displayed so that you can observe the location of bad weather.

If you turn the RAIN or FTC control Off (equivalent to setting the level to 0%), the actual setting is stored, and restored when you turn the control on again.

Note: *RAIN and FTC are reset to Off at power-on.*

Changing the Targets Display

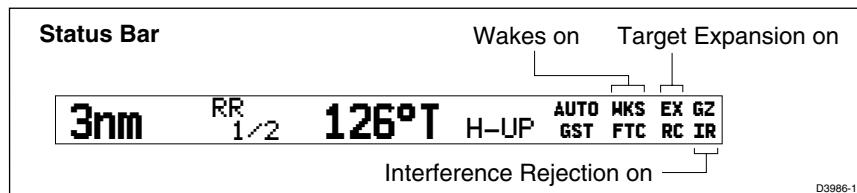
The Pathfinder Radar allows you to improve target visibility by changing the following:

- Interference rejection
- Target expansion
- Target wakes

These parameters are accessed from the default soft key TARGETS.

This section explains how to change these modes and describes the effect of each mode. The current settings are shown at the right-hand end of the status bar.

Changing the
Targets Display



Note: You can also toggle the target presentation between day (black targets are displayed on a white background) and night (white targets on a black background) using the System Set Up menu (see Chapter 7).

► To change the settings of the target modes:

1. Press the TARGETS default soft key.

The target option soft keys are displayed, with the current selections highlighted.



2. Press the appropriate soft key to toggle the required setting between OFF and ON.

Note: If an option is not available for the current setting, its soft key label is blank. When you press the key, the system beeps and the setting remains OFF.



For the Wakes mode, press the WAKES soft key to step the highlighted selection across the wake options.

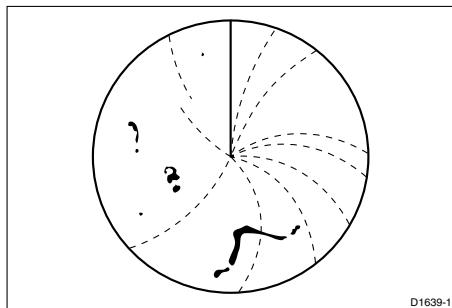
You can use the soft keys to change the settings of any or all the modes on this display, if required.

3. When the required options are highlighted, press **ENTER**. The screen returns to the default display with the new mode(s) in operation. The status bar is updated to indicate which controls are switched on.

Interference Rejection



Mutual radar interference is likely when two or more radar-equipped vessels are operating within range of each other. This usually appears as a series of small dots moving to and from the display centre in a straight line or a long, sweeping curve. This type of interference is most noticeable at long ranges.



D1639-1

The Pathfinder Radar includes a mechanism that automatically reduces such interference. This mechanism is normally left switched on. However, if you wish to detect the presence of other radars in the vicinity, you can turn off the interference rejection.

Target Expansion



On radome scanner ranges from $\frac{1}{2}$ nm to 3 nm and open array ranges from $\frac{1}{8}$ to 3 nm you can make targets easier to see by expanding them. Target expansion overrides the normal pulse length, thereby increasing the size of the target seen on the screen. However, this is at the expense of range resolution.

Target Wakes

You can see the direction and speed with which targets are moving relative to your vessel by selecting the target wakes display option.



When wakes are switched on, the target is displayed at the brightest level and the previous positions of targets are retained at successively fainter levels on the screen. You can select long, medium or short wakes, which retain information from previous scans at a reduced video level.



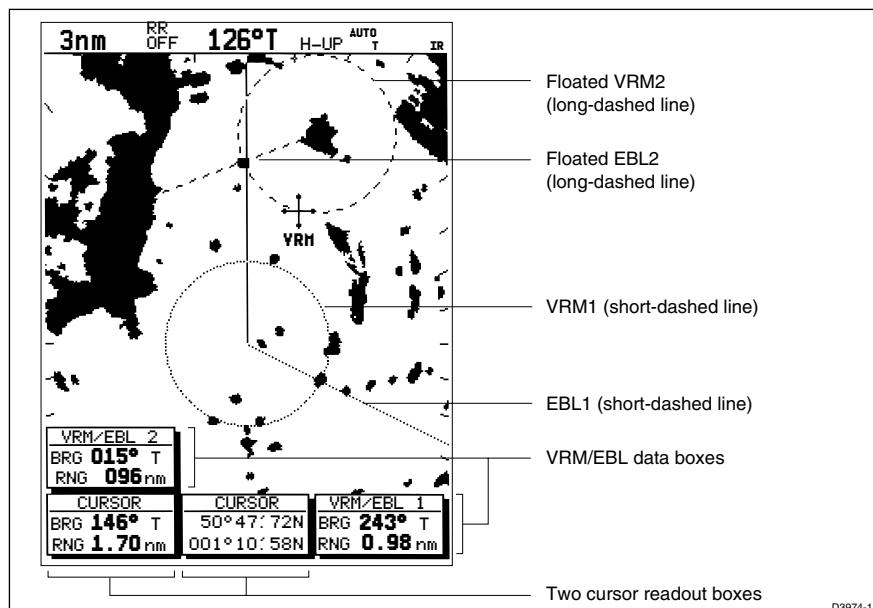
You can clear existing wakes from the display by pressing the CLEAR WAKES soft key. The soft key is only available when wakes are switched on; the display starts showing new wakes as soon as the old wakes have been cleared.

When wakes are switched off, no new wakes are displayed, but existing wakes are retained.

3.4 Measuring Range and Bearing Using VRM/EBLs

The Pathfinder Radar display allows you to specify up to two Electronic Bearing Lines (EBLs), each with an associated Variable Range Marker (VRM), using the **VRM/EBL** key.

A standard VRM is displayed as a circle with its centre on your vessel's position, and it's EBL is displayed as a line from the origin to the edge of the radar picture display. However, each pair can be *floated*, so that the origin can be moved.



Measuring Range
& Bearing Using
VRM/EBLs

Note: When using VRM/EBLs, you may wish to turn off the range rings to make the VRMs clearer (see Section 2.4).

VRMs move if you change the range scale, so that the actual range you have marked is maintained. VRM/EBLs also move if you offset the centre.

When a VRM/EBL pair is active, its bearing and range are displayed in its associated data box, which can be moved, deleted or reinstated.

The bearing information is displayed as either the bearing relative to your vessel's heading or (if heading data is available from a position fixer or compass) the actual bearing in degrees magnetic or degrees true. These are controlled by the setup parameters (see Chapter 7).

The VRM/EBL functions allow you to perform the following tasks:

- Measure the range of a target or point from your vessel's position, using a VRM
- Measure the bearing of a target or point from your vessel's position, using an EBL

- Measure the range and bearing between any two points on the radar, using the FLOAT function

Note: An alternative method of measuring range and bearing is to use the cursor data box: If the cursor readout is set to display range and bearing (rather than Lat/Long), you can determine the range and bearing by moving the cursor over the target and checking the cursor data box readings. You can also estimate the range to a target by reference to the range rings.

Measuring Range
& Bearing to Target
from Vessel

Measuring Range and Bearing to Target from Vessel

To measure the range and/or bearing of a target or point from your vessel's position, you need to place a VRM/EBL and move it so that it crosses the target or point for which you require the bearing or range.

When you turn on a VRM/EBL, it is displayed in its last-used position.

Note: If the VRM's last-used position is outside the radar picture at the current range setting, it is placed at its default position instead. This is one third of the range for VRM1, and two-thirds for VRM2.

Placing a VRM/EBL

Placing and positioning VRM/EBLs on the Pathfinder Radar display is quick and easy.

- If a VRM/EBL is not already displayed, you can place one with a single press of the **VRM/EBL** key.
- If you have already placed a VRM/EBL, pressing the **VRM/EBL** key provides soft key control of additional functions.

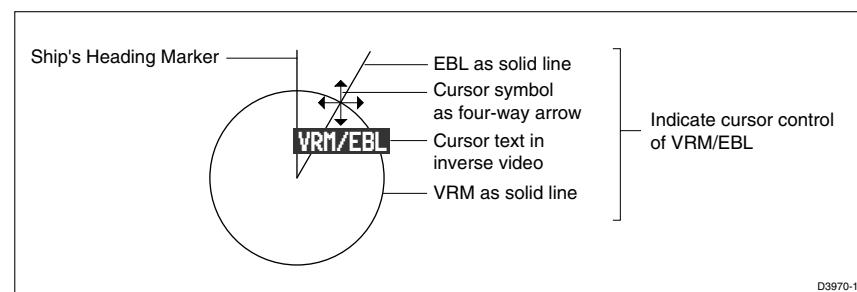
► To place a VRM/EBL when one is not already displayed:

1. Press **VRM/EBL**.



The radar picture shows VRM/EBL1, together with its associated data box in its last-used position.

The cursor is positioned over the intersection of the VRM circle and the EBL line, and has control of the VRM/EBL as indicated by the four-way arrow, the solid VRM/EBL line, and the text VRM/EBL.



2. If required, use the trackpad controls to change the radius (range) of the VRM circle and the angle of the EBL until they cross the required target. The range and bearing information in the VRM/EBL data box is updated as you move the cursor.
3. Press **ENTER** to drop the VRM/EBL. The radar shows this VRM/EBL as a short-dashed line, and the cursor returns to normal control.
4. Read the range and bearing to the target or point, which is shown in the VRM/EBL data box.
5. If required, you can move or delete the VRM/EBL data box using the context-sensitive cursor.

► To place a VRM/EBL when one is already displayed:

1. Press **VRM/EBL** to display the VRM/EBL soft keys.



Measuring Range
& Bearing to Target
from Vessel

The labels for the two left-hand soft keys indicate the current status of the two VRM/EBLs.

2. Press the soft key for the VRM/EBL you require, to toggle the setting from OFF to ON.
- The soft key labels are cleared, and the radar picture shows the VRM/EBL and its associated data box.
3. Position the EBL/VRM using the trackpad, and press **ENTER** to drop it. The radar shows the VRM/EBL as a short-dashed line (VRM/EBL1) or a long-dashed line (VRM/EBL2), and the cursor returns to normal control.

Moving an Existing VRM/EBL

You can move an existing VRM/EBL using the context-sensitive cursor. You can control the VRM and EBL separately or both together.

► To move the VRM and/or EBL:

1. Move the cursor over the VRM or EBL you wish to change. If you wish to change the VRM and EBL together, move the cursor over the intersection of VRM/EBL. The cursor text indicates the current object as VRM, EBL, or VRM/EBL.
2. Press **ENTER** to take control of the object. The object(s) under control is displayed as a solid line, and the cursor as a four-headed arrow.
3. Move the EBL to the new angle and/or change the VRM radius (range) using the trackpad controls.

4. Press **ENTER** again to drop the VRM/EBL in its new position, or **CLEAR** to abandon the operation and return the VRM/EBL to its previous position.

The radar shows the VRM/EBL as a short-dashed line (VRM/EBL1) or a long-dashed line (VRM/EBL2), and the cursor returns to normal control.

Deleting an Existing VRM/EBL

- You can delete a VRM/EBL by using the **VRM/EBL** key to display the soft keys, and pressing the required VRM/EBL soft key to toggle the setting from ON to OFF.
- Alternatively, you can delete an existing VRM/EBL using the context-sensitive cursor. To do so:
 1. Move the cursor over the VRM/EBL you wish to control, until the letters VRM, EBL, or VRM/EBL are displayed.
 2. Press **CLEAR**.

This has the same effect as turning the VRM/EBL off using the VRM/EBL soft keys. It turns off the VRM/EBL pair, irrespective of the cursor text: you cannot turn off VRMs and EBLs independently.

Measuring Range
and Bearing
between Targets

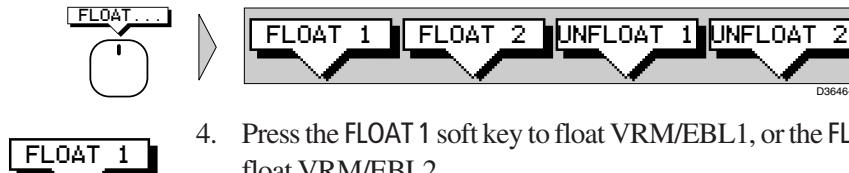
Measuring Range and Bearing Between Targets (FLOAT)

You can measure the range and bearing between any two points on the radar, such as two targets, using the Pathfinder Radar's Float function. This allows you to move the origin of a VRM/EBL away from your vessel's position and onto a target. You can then change the angle of the EBL, relative to its new origin, to obtain the bearing between two points. The radius of the VRM can also be adjusted to determine the distance between two points.

Floating a VRM/EBL

Note: You can float a VRM/EBL pair using either the soft keys or the context-sensitive cursor. The procedure for using the cursor is the same as for moving or unfloating a VRM/EBL pair, as described below; however, as it is more difficult to locate the VRM/EBL origin when it is over the centre, you will probably find it easier to use the keys in this case.

- To float a VRM/EBL pair using the keys:
 1. If one is not already present, place a VRM/EBL pair as described in the previous section.
 2. Press **VRM/EBL** to display the VRM/EBL soft keys.
 3. Press the **FLOAT** soft key. The soft keys are updated, with the relevant options displayed.



4. Press the FLOAT 1 soft key to float VRM/EBL1, or the FLOAT 2 soft key to float VRM/EBL2.

The soft keys are cleared, and the radar picture shows the VRM/EBL as a solid line. The cursor is positioned over the origin of the VRM/EBL, over your vessel. The cursor has control of the VRM/EBL, as indicated by the four-headed arrow, the text **FLT** in inverse video, and the solid VRM/EBL line.

5. Use the trackpad to move the origin of the VRM/EBL to the required position (over the first target).
6. Press **ENTER** to drop the VRM/EBL in its new position, or **CLEAR** to abandon the operation and return the VRM/EBL to its previous position.
The radar shows the VRM/EBL as a short-dashed line (VRM/EBL1) or a long-dashed line (VRM/EBL2), and the cursor returns to normal control.
7. Use the context-sensitive cursor to take control of the VRM and/or EBL, to obtain the range and/or bearing to a second target, as previously described.
8. Read the range and bearing information from the VRM/EBL data box.

Measuring Range
and Bearing
between Targets

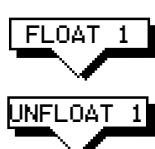
Moving and Unfloating a Floating EBL

You can move or unfloat a VRM/EBL that has been floated. You can unfloat a VRM/EBL either by using the context-sensitive cursor or by using the FLOAT soft key options.

- To move or unfloat a floating VRM/EBL using the cursor:
 1. Move the cursor over the origin of the VRM/EBL you wish to control, until the letters **FLT** are displayed.
 2. If you wish to unfloat the VRM/EBL, press **CLEAR**. The origin of the VRM/EBL is reset to your vessel's position.
 3. Alternatively, if you wish to move the floating VRM/EBL, press **ENTER** to take control of it and move it using the trackpad.

Press **ENTER** again to drop the VRM/EBL in its new position, or **CLEAR** to abandon the operation and return the VRM/EBL to its previous position.

- To unfloat a floating VRM/EBL using the keys:
 1. Press **VRM/EBL** to display the VRM/EBL soft keys.
 2. Press the **FLOAT** soft key.
 3. Press the **UNFLOAT 1** soft key to unfloat VRM/EBL1, or the **UNFLOAT 2** soft key to unfloat VRM/EBL2.



The soft keys are cleared, and the VRM/EBL is repositioned with its origin at your vessel's position.

Controlling VRM/EBL Data Boxes

- To move a VRM/EBL 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.

Each VRM/EBL data box is switched on and off with its associated VRM/EBL. However, when one or both VRM/EBLs are active, you can turn the data box(es) off at any time, if required.

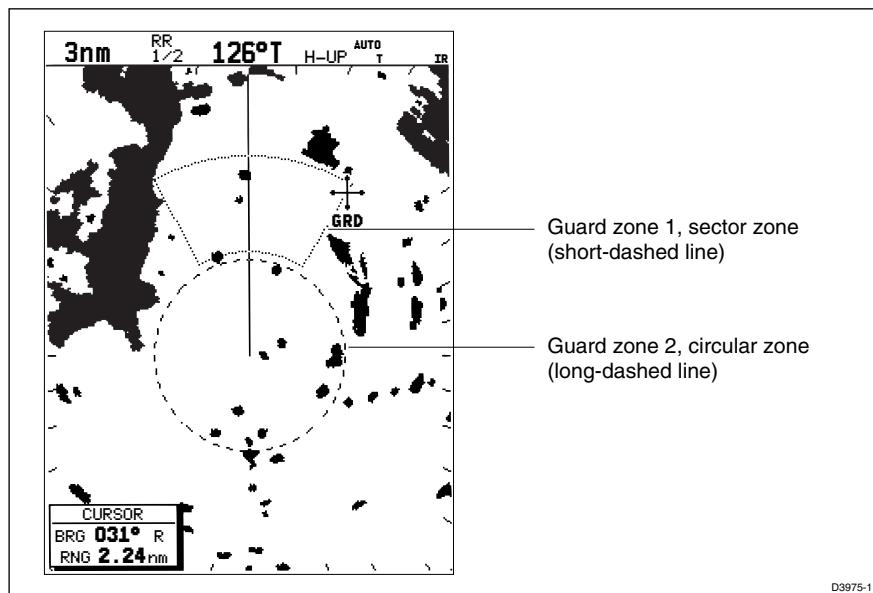
- To control the VRM/EBL data boxes:
1. Press **VRM/EBL** to display the **VRM/EBL** soft keys.
 2. Press the VRM/EBL DATABOX soft key to toggle the setting from OFF to ON or from ON to OFF.
 3. Press **ENTER**.

Note: VRM/EBL data boxes are not affected by the setting of the **DATABOXES** soft key accessed using the **SCREEN** default soft key. This only controls the set of data boxes available for integrated systems (see Chapter 2).

3.5 Setting Guard Zones and Alarms

The Pathfinder Radar display allows you to set up one or two guard zones, using the ALARMS key. You can set up sector zones or 360° (circular) zones.

Note: *You can only view and control guard zones if you are using the Master display (that is, the display to which the scanner is connected).*



Setting Guard
Zones and Alarms

Guard zones are fixed with respect to the ship's heading marker (SHM), moving as the SHM moves. They also move if you offset the centre, or if you change the range scale, so that the area you have marked is maintained.

The guard alarm sounds when a target enters a guard zone, exceeding the target density threshold within the zone; the alarm also sounds on a repeater display. The alarm sensitivity control allows you to set the threshold above which a new target will trigger an alarm, and also to turn the alarm on or off.

Note: *A guard zone only operates when the whole zone is displayed on the screen, or could be displayed by offsetting the centre. In addition, a guard zone is inactive for 10 seconds after it is placed or re-sized, to avoid inappropriate alarms during positioning.*

This section covers the following topics:

- Placing a guard zone
- Moving, reshaping or deleting a guard zone
- Controlling guard zone alarms

Placing a Guard Zone

Placing and positioning guard zones on the Pathfinder Radar display is quick and easy.

- If a guard zone is not already displayed, you can place one with a single press of the **ALARMS** key.
- If you have already placed a guard zone, pressing the **ALARMS** key allows you to toggle either guard zone on or off.

Placing a Guard Zone

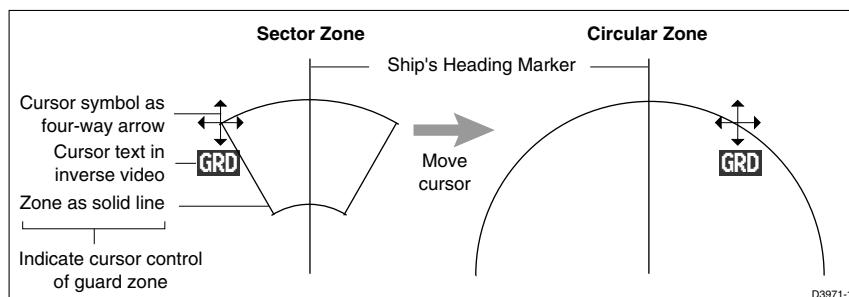
Note: When you turn on a guard zone, it is normally displayed in its last-used position and shape. However, if this position is off-screen at the current range setting, or within one quarter of the current range from your vessel, the guard zone is placed at its default position and shape instead. This is at one third (Zone 1) or two thirds (Zone 2) of the current range, as a sector zone occupying 30° either side of the ship's heading marker.

- To place a guard zone when one is not already displayed:

1. Press **ALARMS**.

The radar picture shows the guard zone as a four-sided shape bounded by a solid line (or a circle if previously set as one).

The cursor is positioned over an outer corner of the zone. The cursor has control of this corner, as shown by the text **GRD** in inverse video, the four-headed arrow, and the solid guard zone boundary.



2. If necessary, use the trackpad to move the corner of the guard zone to the required position. As you move the corner, the width and/or height of the zone changes, but its general sector shape is retained.

Note: To create a 360° guard zone, rather than a sector guard zone, you can either move the corner all the way round to form a circle, or move it back to just the other side of the other outer corner.

3. Press **ENTER** to drop the corner in its new position and redraw the zone, or **CLEAR** to abandon the operation and return the corner to its previous position.

The display shows this zone boundary as a short-dashed line, and the cursor returns to normal control.

4. If required, use the context-sensitive cursor to reposition other corners/sides of the zone in turn, as described below.
- To place a guard zone when one is already displayed:
1. Press **ALARMS** to display the soft keys for guard zones.
- 
- The soft keys indicate the current status of the two guard zones.
2. Press the soft key for the guard zone you require, to toggle the setting between OFF and ON.
- The soft keys are cleared. If you turned a guard zone on, it is displayed in its last-used position with one corner under cursor control.
3. If necessary, adjust the zone size and shape using the trackpad, and press **ENTER** to drop the corner in its new position. The display shows the zone boundary as a short-dashed line (Zone 1) or a long-dashed line (Zone 2), and the cursor returns to normal control.
 4. If required, use the context-sensitive cursor to reposition other corners of the zone in turn, as described below.

Moving, Reshaping
or Deleting a
Guard Zone

Moving, Reshaping or Deleting a Guard Zone

- You can move, reshape or delete an existing guard zone using the context-sensitive cursor. To do so:
1. Move the cursor over the guard zone corner or side that you wish to control, until the letters GRD are displayed.
 2. If you wish to delete the whole zone, press **CLEAR**.
 3. Alternatively, if you wish to move the corner or side, press **ENTER** to take control of it. The zone boundary is displayed as a solid line, and the cursor as a four-headed arrow.
 4. Move the corner or side to the new position, as described on the previous page.

Note: *To convert a 360° guard zone back to a sector guard zone, take control of any point on the circle, and move it to open up the circle.*

5. Press **ENTER** again to drop the corner or side in its new position, or **CLEAR** to abandon the operation and return it to its previous position.
- The radar shows the zone boundary as a short-dashed line (Zone 1) or a long-dashed line (Zone 2), and the cursor returns to normal control.
6. If required, reposition the cursor and repeat steps 3 to 5 to move the other corners or sides.

- You can also delete (turn off) a zone by pressing the **ALARMS** key, and then pressing the appropriate guard zone soft key to toggle the setting from ON to OFF.

Controlling Guard Zone Alarms

The guard alarm is triggered when a target enters a guard zone which exceeds the target density threshold. You can set the threshold above which a new target will trigger an alarm, and can also turn the alarm on or off.

Controlling Guard
Zone Alarms

When the alarm is triggered, the unit beeps and a text message is displayed.

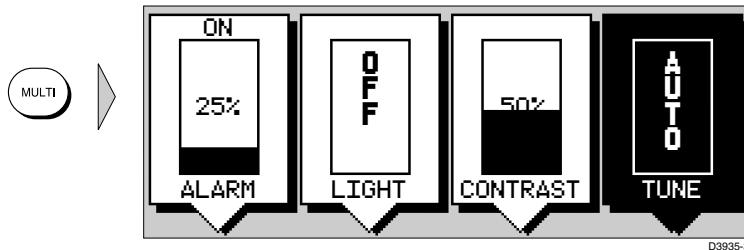
- To clear the alarm, press **any** key (on the master or repeater display).

The alarm will sound again after 10 seconds, unless you perform one or more of the following actions:

- Turn the guard zone off
- Adjust the guard zone size/shape to reduce the number of targets in the zone
- Turn the alarm off
- Decrease the alarm sensitivity

- To change the alarm setting:

1. Press **MULTI** to display the sliders.



2. Press the **ALARM** soft key to highlight the Alarm slider.
3. If required, press the soft key again to toggle the setting between OFF and ON. You can only move the slider if the control is set to ON.
4. Use the trackpad to increase or decrease the alarm slider setting. You can press and hold the trackpad to change the value more rapidly.

The higher the setting, the more sensitive the alarm, and the smaller the target density required to set it off.

5. Press **ENTER** to clear the slider display.

Chapter 4: Integrated Radar Operations

4.1 Introduction

This chapter explains how to use and display non-radar information that may be available from other units connected to your system. It also explains how to use the man overboard (MOB) function.

You can use this chapter with the radar display set to *simulator mode*, or on the water after you have installed and set up your HSB Series Pathfinder Radar system.

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

Data	Example source	Integrated functions available
Heading	Compass* Autopilot	- Heading value in status bar - North Up or Course Up heading modes (as alternatives to Head Up) - MOB (if speed data also available)
Waypoint data	Chartplotter	- Waypoint display and data
Position	GPS system	- Marks - Position data in Data Box and Nav Window - MOB - COG, SOG and time
Other data	Transducers	- Data Box and Nav Window data displays, including speed, depth, wind
Chart display	Chartplotter, either combined or via HSB connection	- Chart display as full-screen or half-window display

Chapter 4
Integrated Radar
Operations

* If heading data is available via both NMEA and SeaTalk, NMEA data takes priority. For all other data, SeaTalk data takes priority (see Section 6.3).

This chapter covers the following topics, see also *Chapter 2* for information on HSB displays:

- Changing the heading mode of the radar picture
- Using marks
- Man Overboard (MOB)
- Cursor echo

Note: Until you are familiar with interpreting the radar display, you should take every opportunity to compare the radar's display patterns with visual targets, such as other vessels, buoys and coastal structures. You should practice harbour and coastal navigation during daylight and in clear weather conditions.

4.2 Changing the Heading Mode

The radar picture is normally shown with your vessel's dead ahead bearing straight up, as indicated by the Ship's Heading Marker at 0° relative bearing. This is the Head Up orientation.

If heading information is available via a SeaTalk or NMEA connection, you can choose a different heading mode.

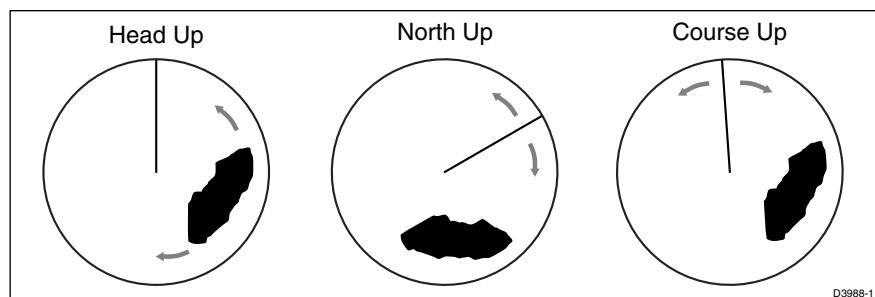
Press the HDG MODE default soft key to obtain the following display, when heading information is available:



The currently selected mode is shown highlighted, and is also indicated in the status bar at the top of the screen.

Heading Modes

The heading modes are as follows:



- **Head Up:** The radar picture is displayed with the vessel's current heading upwards. As the heading changes the picture will rotate.
- **North Up:** The radar picture is stabilised and displayed with north upwards. As you change heading, the ship's heading marker moves.
- **Course Up:** The radar picture is stabilised and displayed with the currently selected course upwards. As you change heading, the ship's heading marker moves. If you select a new course, the picture resets to display the new course upwards.

The reference used for the Course Up depends on the information available.

The first available in the following list is used:

1. A locked heading over a SeaTalk connection
2. The heading at the time Course Up was selected

If 1. is in use and a new course (locked heading) is selected, the picture automatically rotates to the new Course Up.

If 2. is in use, press the HDG MODE soft key then COURSE UP to manually reset the Course Up to the new course.

Selecting the Heading Mode

► To change the heading mode:

HDG MODE

1. Press the HDG MODE default soft key.
2. Press the soft key corresponding to the mode you require. The radar picture changes to selected mode.
3. Press **ENTER** to clear the heading mode soft keys. The current orientation is indicated in the status bar.

Changing the
Heading Mode

If you re-select Course Up when this is already the current mode, the Course Up reference is reassessed according to the current data.

Effect on VRM/EBLs

VRM/EBLs do not move on the screen, unless you change the range, offset the centre, or change the heading mode.

- In Head Up mode, the VRM/EBLs are fixed with respect to the ship's heading marker.
- In North Up mode, the VRM/EBLs are fixed with respect to North.
- In Course Up mode, the VRM/EBLs are fixed with respect to the selected course.

4.3 Using Marks

The Marks function allows you to place a mark anywhere on the radar picture. You can also move existing marks or delete them. You should be aware that radar marks are not the same as chart waypoints and cannot be used in routes.

Marks are placed with the default mark symbol at either cursor or vessel position. If you wish to use a different symbol, you can change the default setting from the RADAR SET UP menu (see *Section 7.4*). Mark symbols are always displayed within a circle.

Marks are stored with their latitude, longitude and symbol; the information is retained when the radar is turned off. Up to 100 marks can be stored in each display unit.

Note: When you use the **MARKS** key to access the Marks function, simply press the key momentarily and release it. If you hold it down for two seconds, the Pathfinder Radar will enter man overboard (MOB) mode, as described in *Section 4.4*.

The Marks function is only available when your vessel's position is known via the SeaTalk or NMEA connection.

Placing a Mark

► To place a mark symbol:

1. Press the **MARKS** key. The soft keys PLACE MRK AT CURSOR and PLACE MRK AT VESSEL are displayed.
2. To place a mark at the cursor, position the cursor at the required point. If you are displaying the cursor position box showing the lat/long position, you can check the coordinates to place the mark accurately.
Press the PLACE MARK AT CURSOR softkey. The mark is placed using the default symbol.
3. To place a mark at the vessel position, press PLACE MRK AT VESSEL. The mark is placed using the default symbol.



Note: If the Mark database is full, a warning message is displayed, with the position (in latitude and longitude) of the oldest mark. You have the following options:

- Press the YES soft key to replace this old mark with the new mark.
- Press the NO soft key to keep the old mark and display the next oldest mark. You can keep pressing NO to step through the mark database until a mark you wish to replace is displayed, and then press YES.
- Press **CLEAR** to keep all the existing marks, and cancel the new mark placement.

Moving or Deleting a Mark

You can move or delete marks using the context-sensitive cursor.

- If you have placed a mark and wish to move it later:
 1. Move the cursor over the mark until the letters MRK are displayed.
 2. Press **ENTER** to take control of the mark.
 3. Move the mark to the new position using the trackball.
 4. Press **ENTER** again to drop the mark in its new position, or **CLEAR** to abandon the operation and return the mark to its previous position.
- To delete an individual mark, move the cursor over the mark until the letters MRK are displayed, then press **CLEAR**.

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 immediately.

Man Overboard

Note: *To obtain an 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

You can select the type of data used for the MOB position using the Set Up Menus (see *Chapter 7*).

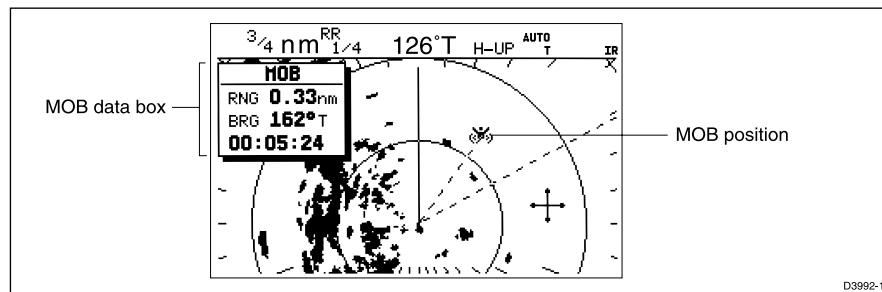
- To initiate the MOB procedure, press and hold the **MARKS** key for two seconds.

The Pathfinder Radar then performs all the following tasks automatically:

- Switches the range scale to $\frac{1}{4}$ nm.
- Marks the current position with a MOB symbol 

The MOB waypoint 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.
- As your vessel moves away from the MOB position, a dotted line is displayed connecting the MOB position and the vessel's current position.



- Sounds a 4-second alarm pattern every 30 seconds.
 - Sends an MOB message to other units in the system, via the SeaTalk connection.
- To cancel the MOB, press and hold the **MARK** key for 2 seconds.

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

Cursor Echo

4.5 Cursor Echo

In a combined radar/chart display, or in a system with any chart display connected via Seatalk, you can set the display to enable cursor transfer. Cursor echo (accessed from the Set Up Menu) enables you to 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).

The following options are provided:

- **Local cursor:** echoes the cursor position between chart and radar windows on a combined display.
- **Remote Radar or Chart Cursor (SeaTalk):** displays the cursor from a radar or chart display connected via SeaTalk.
- **Cursor Out:** outputs the displays cursor(s) onto the SeaTalk bus.

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 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.

Refer to *Chapter 7* for cursor echo setup details.

Chapter 5: Standard Chart Operations

5.1 Introduction

This chapter explains how to use the chart functions to navigate with your HSB Series 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.
- Going to waypoints and following routes.
- Transferring Waypoints and Routes
- Using tracks, including showing tracks, track set up and saving tracks.

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 6*.

Chapter 5
Standard Chart
Operations

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.

5.2 Using Chart Cards

The chartplotter has a built-in world map; most areas are covered on a scale of about 500 nm per inch on the screen (200 nm per cm), although some populated areas have details down to 300 nm on the screen.

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 screen to the bottom of the screen.

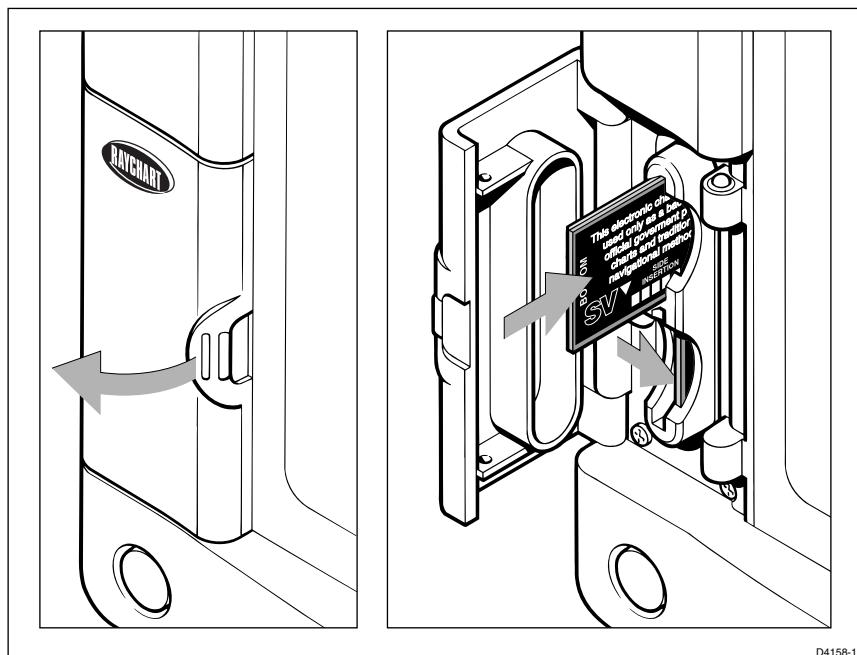
Note: *You can remove and insert cards while a chart is displayed. The chart information is retained on-screen until the chartplotter redraws the screen: for example, when you pan outside the current area, or use the **RANGE** key to change the chart scale.*

Data on a chart card is also available to a repeater display, which can be used independently of the master. When the master display is switched off chart data is retained on the repeater screen until the chart is redrawn.

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 the correct way round. 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 so that it clicks shut, to prevent water entering the display unit.



Displaying
Chart Data

Removing a Chart Card

► To remove a chart card:

1. Open the card cover, at the lower left of the display front panel.
2. Press down 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 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.

If a chart repeater is connected, the chart can also be accessed by the repeater display. To see the chart you may need to zoom or pan, to redraw the chart area to the screen.

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 *Chapter 7*.)

► 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 greater the amount of detail that is available when you zoom in.

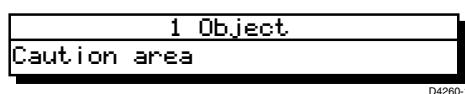
If you have switched on **Plotter Mode** (see *Section 7.6, Chart Set Up*), you can zoom in further than the most detailed chart; all chart functions remain available.

Displaying Object Information

Chart cards include a number of displayed objects for which information is available, such as lights and buoys. If your chart includes port and tide data, this can be displayed along with information for the nearest port facility (for a selected position). Chart source data is also available. You use the context-sensitive cursor to identify the object and display detailed information.

► To obtain the chart object, port or tide information:

1. Move the cursor over the symbol for which you require the information. An Object data box such as the following is displayed at the lower left corner of the screen:



2. To view further details, press **ENTER**. The details available are listed on-screen in an object information pop-up.
Use the trackpad to move the selection bar over the required item then press **ENTER** to display the full details.
3. Press **CLEAR** to remove the pop-up from the screen.

Chart Source Data

The chart card contains additional background data for most chart objects, icons, lines, open sea areas etc. Some of these items automatically provide an information data box, as described above. For other chart objects, such as bridges and territorial lines, you need to press **ENTER** to display the object information pop-up.

► To obtain chart source data, move the cursor so that it is not over a symbol, then press **ENTER**.

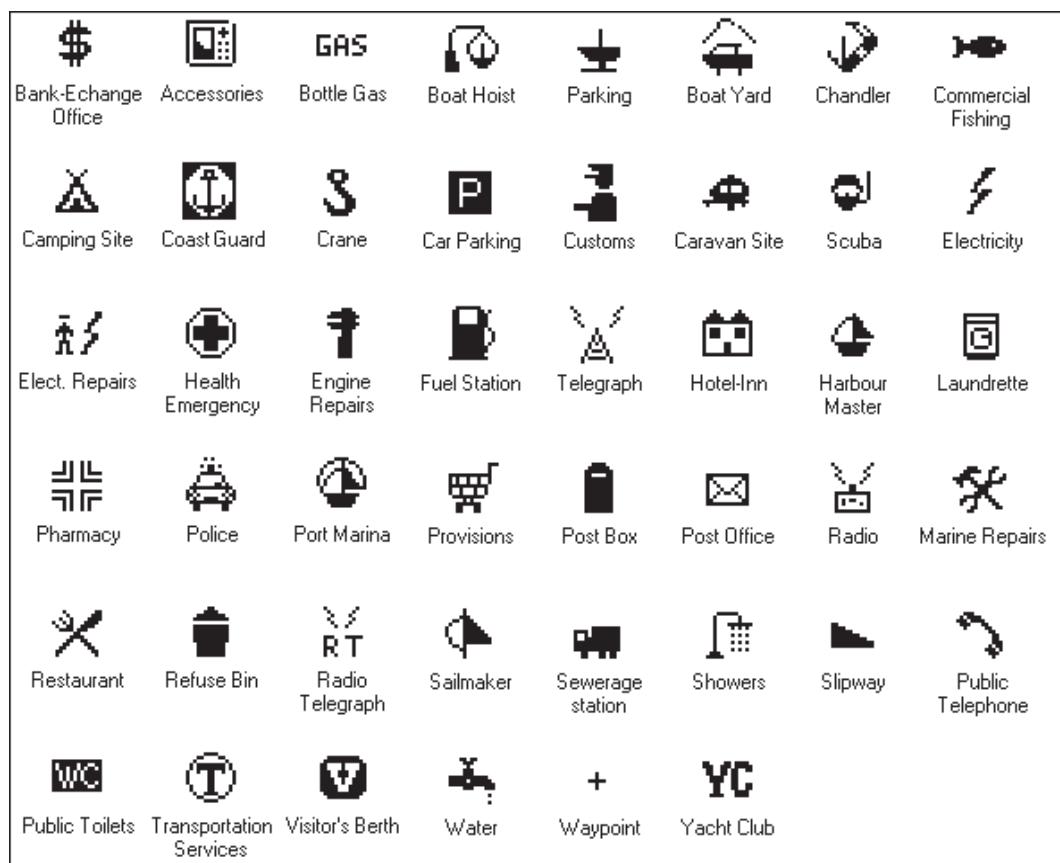
An object information pop-up is displayed, providing source information for the selected land or depth area.

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 accomodation, 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 defined below.

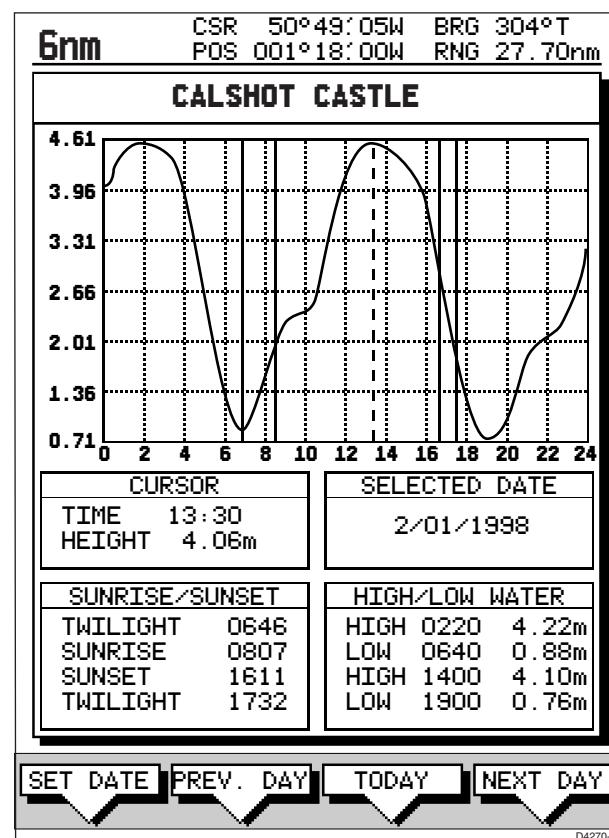


Displaying Object Information

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 below.

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.*



Displaying Object Information

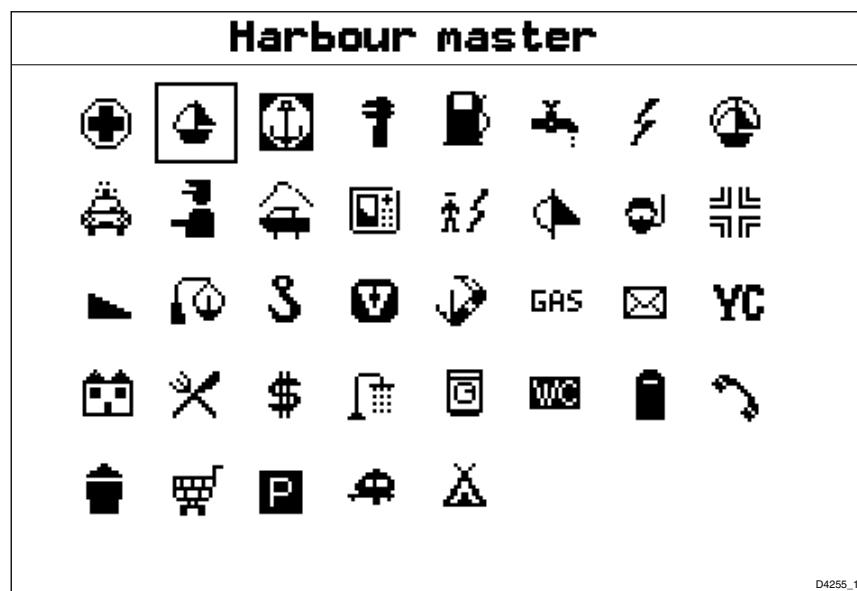
The cursor, represented by a dotted vertical line on the graph, is used to select a time for which the tide height is displayed.

You can use the soft keys and trackpad to change the date for which tide information is shown.

- 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

- To obtain the information for the nearest port facility:
1. Move the cursor to the required position – this can be anywhere on the chart and may be over an object – then press **ENTER** to display the object information pop-up.
 2. Press the **NEAREST** soft key. The port facility symbols are displayed.
 3. Use the trackpad to highlight the required facility, then press **ENTER**.
 4. The nearest ports providing that facility are listed with distance and bearing to the port.
If you highlight a port name, then press **ENTER**, details for that facility are displayed.
Press **CLEAR** to return to the port list.
Press **CLEAR** to return to the facility symbols.
 5. Press **CLEAR** to return to the default display.



5.3 Working with Waypoints

Introduction

The HSB series Chartplotter enables you to place up to 998 waypoints: 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 7*. You can select a waypoint, either on-screen or from the list, for editing.

The waypoint is usually placed at the cursor position, you can also place a waypoint 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. Both types of waypoint can be included in a route. You can place waypoints, using simulator mode, before you install the chartplotter on your vessel.

Note: *Radar marks may also be displayed on the screen if your chartplotter is a combined radar/chartplotter or is part of an integrated system; these are screen annotations - you cannot go to marks, nor can they be included in routes.*

When you place a new waypoint, it is displayed using the default symbol of a cross. 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, another HSB series chartplotter or ST80 Masterview. You can also transfer waypoints between the chartplotter and other NMEA or SeaTalk instruments using the Waypoint Transfer functions.

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

Placing a Waypoint

The *Place and Goto a Waypoint Scenario in Chapter 2* provides a simple example of how to place a waypoint.

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



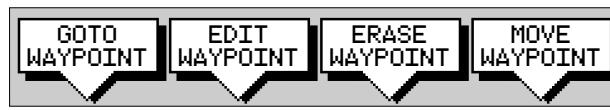
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- To place a waypoint at the cursor position or at the vessel position:



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**.



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

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



- To place 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.

WAYPOINT LIST

SYMBOL	NAME
●	WAYPOINT 001
×	WAYPOINT 002
×	WAYPOINT 003
×	WAYPOINT 004
×	WAYPOINT 005

POSITION	50° 21' 966N
-----------------	--------------

001° 20' 368W

BRG 186°	BRG 21.0nm
-----------------	-------------------

TEMP ---°C	DEPTH ---m
------------	------------

DATE ---/---/---	TIME ---:---:---
------------------	------------------



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 Placing a
Waypoint



2. Press the MAKE NEW WAYPOINT soft key.

The waypoint is placed at the current vessel position, or if not available, the cursor position. 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** three times.

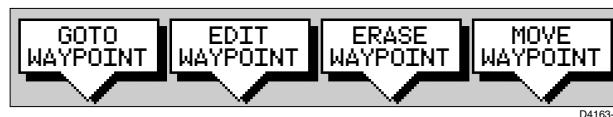
Selecting a Waypoint

Positioning the cursor over a waypoint selects that waypoint and accesses the waypoint soft keys. These keys enable you to go to (described in *Section 5.5*), 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* below) 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 grey 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

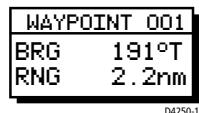
Waypoint data can be viewed in two ways: you can use the context-sensitive cursor to select the waypoint and thus display the waypoint data box, or you can view waypoint details on the waypoint list.

Note: *To permanently display the target waypoint data box, select it in the System Set Up menu (see Chapter 7) 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 the system set up menu).

Whilst 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:

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

Editing the Waypoint Details

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

- To edit a waypoint:



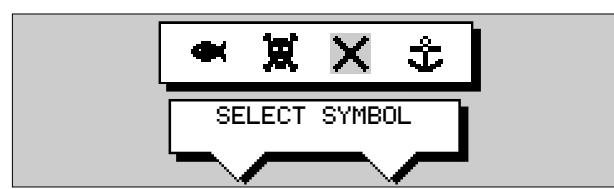
1. Select the waypoint, using the cursor or the waypoint list, as previously described. The waypoint soft keys are displayed.
2. Press the EDIT WAYPOINT soft key. The Edit Waypoint soft keys are displayed:



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. 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* in Section 5.4.

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.



- 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

- 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*.



Moving a
Waypoint

5.4 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.

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 5.5*.

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).

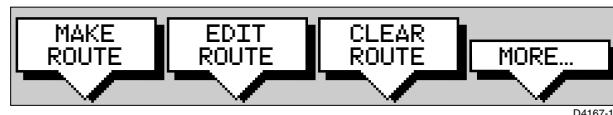
Notes:

1. *The route database is stored locally, in the display unit on which it was created. Although the current route is automatically transferred, you need to use the WAYPOINT TRANSFER function, described in Section 5.6, to transfer the complete route database to a repeater display connected via HSB.*
2. *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.

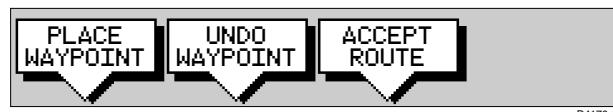
The *Make and Follow a Route* scenario in Chapter 2 provides a simple example of how to create a route.

You can edit a route after you have finished making it, as described in *Editing a Route* in the following sections.

- To make a new route by placing waypoints:

Note: You can pan the chart and change the scale whilst 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 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.

Creating a
New Route

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.

8. Press the MORE soft key to access the SAVE ROUTE function, or **ENTER** to return to the default display.

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.

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:

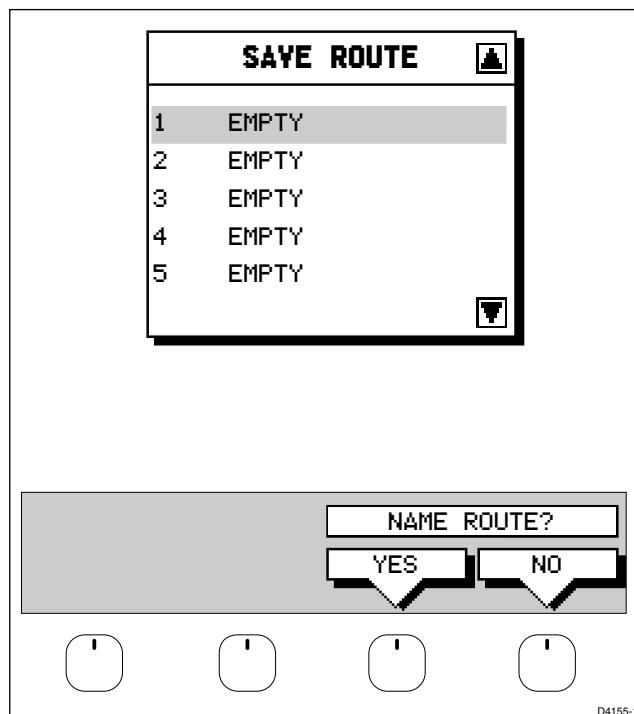


1. To access the SAVE ROUTE soft key, press the ROUTE soft key, followed by MORE.



2. Press the SAVE ROUTE soft key. The Route List pop-up and the NAME ROUTE soft keys are displayed.

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).



4. If you do not wish to name or re-name the route, press the NO soft key (or **ENTER**) 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.

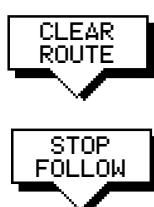
5. Press **ENTER** to finish and clear the Name List, or press **CLEAR** to cancel the operation. To return to the default soft key display, press **ENTER** again.

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**.



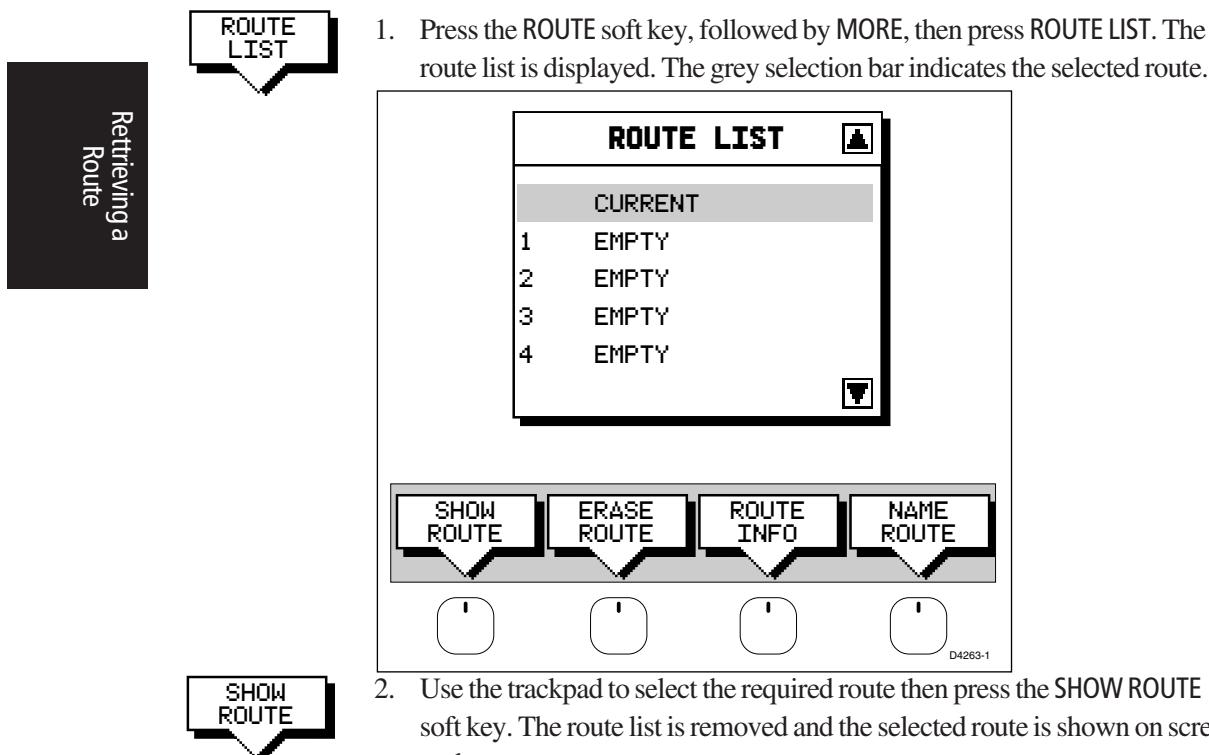
3. If the route has not been saved the **SAVE ROUTE** soft keys are displayed. To clear the route, without saving it in the route database, press **NO**. To save the route in the database, press **YES**. The **NAME ROUTE** soft keys are displayed and you should continue as described in the previous section,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

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:



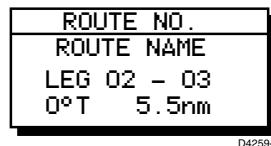
Displaying Route Information

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.



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**.

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:

Displaying Route Information

- 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 *Review Your Passage Plan scenario in Chapter 2* provides a simple example of how to use the route information.

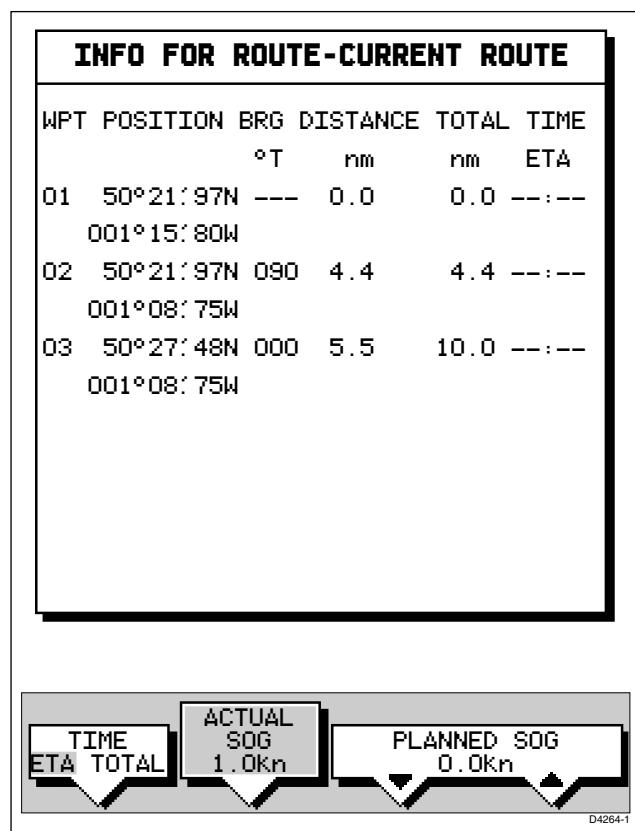
- To display information about any route in the database:



1. Press the ROUTE soft key, followed by MORE, then press ROUTE LIST. The route list is displayed. The grey 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, listing the waypoints in the route and detailing 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.



4. Press **ENTER** to remove the Route Information window, then **ENTER** or **CLEAR** to return to the route soft keys.
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:



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

- Inserting a Waypoint into the route
- Adding waypoints at the end of the route
- Removing a Waypoint
- Reversing a Route
- Moving a Waypoint as described in *Section 5.3*

Editing a Route

Any changes you make to the route 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 re-numbered 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. 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.

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

3. Place as many waypoints as required, and press the ACCEPT ROUTE soft key, the default soft keys are displayed.



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*.

If the route has *not* been saved, the waypoint is erased.

If the route has been saved, 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.

5.4 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
- Altering the route, 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.

Following Routes &
Going to Points

An alarm is triggered when you approach a waypoint, this section describes what happens when you arrive at waypoints. *Chapter 6* 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 5.7*.

- 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:

GOTO

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

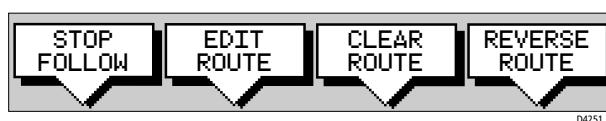
Alternatively, to follow a route:

FOLLOW ROUTE

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:



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These options are described in the following sections.

- To follow the current route in reverse:

REVERSE ROUTE

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.

GOTO

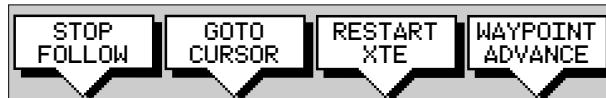
Alternatively:

FOLLOW ROUTE

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.

The soft keys change as follows:



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These options are described in the following sections.

Target Point Arrival

You can set up target alarms (see *Chapter 6*) to alert you when the vessel is approaching the target point. The arrival alarm is defined as a circle (not visible on the screen), with a specified radius around the target.

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.

Target Point Arrival
& Other Follow
Route Options

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 5.3*, or remove a waypoint from the route as described in *Section 5.4*.

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:

GOTO

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



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WAYPOINT ADVANCE

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)

Whilst 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.

Going to a
Target Point

GOTO
RESTART XTE

- 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.



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Alternatively, you can select the waypoint from the waypoint list as described in *Section 5.3*.

2. Press the GOTO WAYPOINT soft key.

Navigation to the selected waypoint begins. The soft key STOP GOTO is displayed.

GOTO WAYPOINT

3. To return to the default soft key display, move the cursor away from the waypoint.
 - 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.
Note: *The temporary waypoint is not added to the waypoint list; when the GOTO is complete, or is stopped, the temporary waypoint is erased.*
 - 3. To return to the default soft key display, move the cursor away from the waypoint or press CLEAR.

Stop Follow or Stop Goto

- To stop following the route or target point either:



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

Or:

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 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.

Stop Follow and
Stop Goto

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

- If waypoints are transmitted by other equipment on SeaTalk or NMEA, you can receive them on the chartplotter.

When this option 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.
- You can transfer the waypoint **and** route lists from one chartplotter to another across an HSB link using COPY WPTS FROM HSB.

CAUTION

The function **COPY WPTS FROM HSB** replaces the existing waypoint and route lists with the transferred lists.

- 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 RECEIVING WAYPOINTS**.

The waypoint and route lists are transmitted from the chartplotter to other instruments on NMEA.

► To receive the waypoint and route lists via HSB:

CAUTION

Copying waypoints from another HSB instrument overwrites any existing waypoint and route lists.



1. Display the waypoint list as previously described, then press the **WAYPOINT TRANSFER** soft key.

2. Press the soft key **COPY WPTS FROM HSB**, you are prompted to confirm.

Press **NO** to cancel the operation, then **ENTER** if you wish to remove the route list.

Press **YES** to continue. The waypoint list is transmitted to the chartplotter from another instrument on HSB. Whilst the data is being transferred the soft key is blanked; when the transfer is complete the soft key is re-displayed.

Transferring
Waypoints and
Routes

5.7 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 turned on, it is recorded in the display unit's memory. You specify the interval at which track points are made, a line is drawn on-screen between each point. Up to 5000 track points can be saved in total, in up to 10 track files (each a maximum of 500 points).

The track remains on-screen, even following a power off/on, until you clear the track.

A track can be saved and retrieved for display at a later date. For example, you may wish to display a previous track, and then place waypoints along it that you can follow. 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:

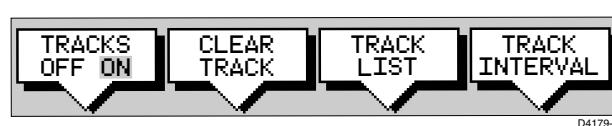
- Setting up a track, including how to specify the interval.
- Clearing the current track.
- Managing tracks, using the track list, including Saving, Naming, Erasing and Showing a track.

► 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 at which track points are saved. The interval default is a distance of 0.1nm. The maximum track length is 500 points, when the track has reached this length, the first points are overwritten. The track is saved until you switch it off.

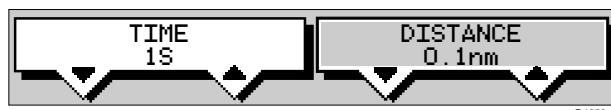
► To set up a track:



1. Press the TRACK INTERVAL soft key.

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.



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

Your vessel's 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:

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.

Managing
Tracks

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.

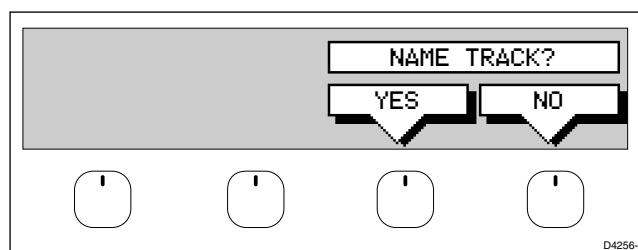
Saving and Naming a Track

You can save up to 10 named tracks in the Track List. These tracks can be re-displayed at a later date.

► To save and name the current track:



1. Press 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).
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 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.
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:



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



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.



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

Press YES to erase the track from the list, then **ENTER** to remove the track list.



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.

Chapter 6: Further Chart Operations

6.1 Introduction

This chapter explains how to use the additional functions that are provided on the HSB series chartplotter and combined radar/chartplotter.

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 HSB, SeaTalk, or NMEA link:

Data	Example source	Integrated functions available
Heading COG	Compass* GPS	- North Up or Course Up heading modes - MOB (if speed data also available)
Radar data	Radar system (via- HSB)	- Radar data, either full-screen or in a half-screen window
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

Chapter 6
Further Chart
Operations

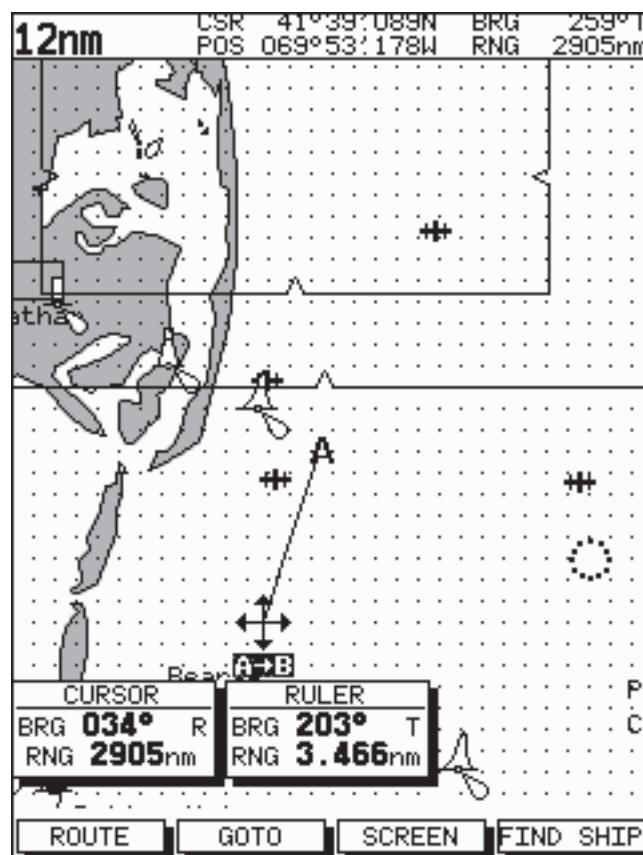
* If heading data is available via both NMEA and SeaTalk, NMEA data takes priority. For all other data, SeaTalk data takes priority (see *Section 6.3*).

6.2 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.



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.

Measuring
Distances Using
the VRM/EBL Key

► 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.

Measuring
Distances Using
the VRM/EBL Key

6.3 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.
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** key menu.

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.

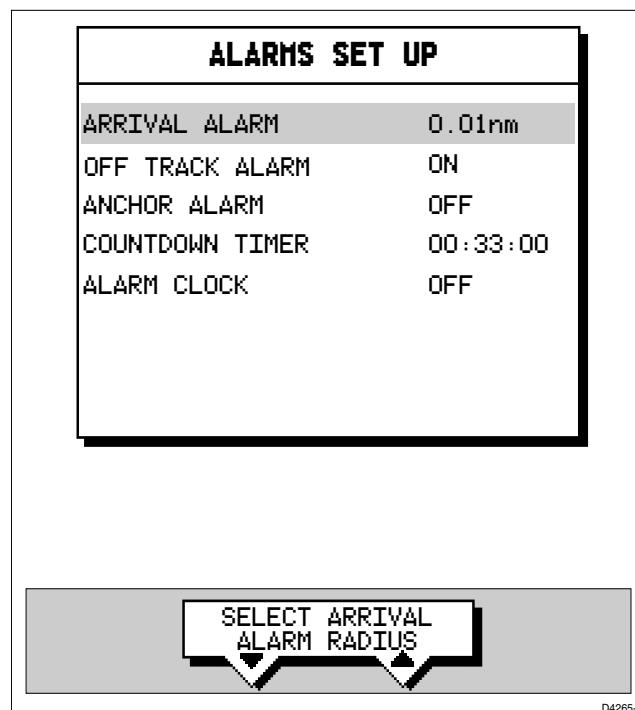
Alarms &
Timers

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 list is displayed, showing the current settings.



2. Use the trackpad to move the selection bar up or down the list. As each line is highlighted, the soft key labels are updated to show the current settings and controls, as shown in the example above.
3. Use the up or down soft keys to change the variable controlling the alarm. For example, for the arrival alarm you can adjust the radius from the waypoint at which the arrival alarm will be triggered.

The alarm distances can be set in the range 0.01 to 9.99 nm, in steps of 0.01nm. The timer is set in 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.

6.4 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.

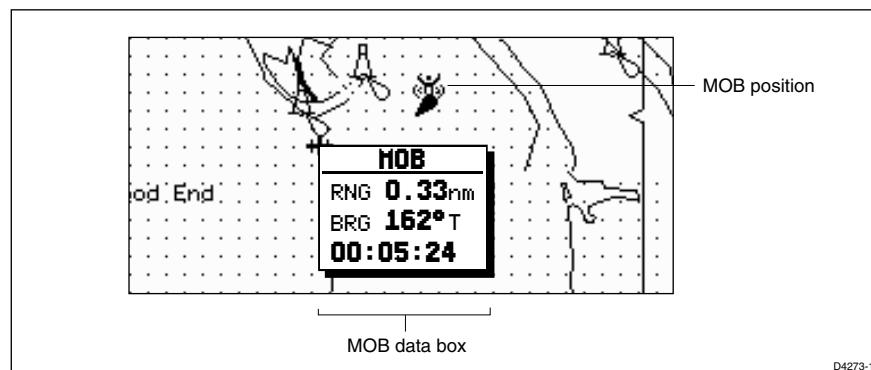
You can select the type of data used for the MOB position using the set up menus (see *Chapter 7*).

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.
 - As your vessel moves from the MOB position, a dotted line is displayed connecting the MOB symbol and the vessel's current position.

Man Overboard
(MOB)



- 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.
- 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.*

6.5 Cursor Echo

In a combined radar/chart display, or 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 *Chapter 7*) 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 are provided:

- **Local cursor:** echoes the cursor position between chart and radar windows on a combined display.
- **Remote Radar or Chart Cursor (SeaTalk):** displays the cursor from a radar or chart display connected via SeaTalk.
- **Cursor Out:** outputs the displays cursor(s) onto the SeaTalk bus.

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 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.

Cursor Echo

6.6 GPS Setup

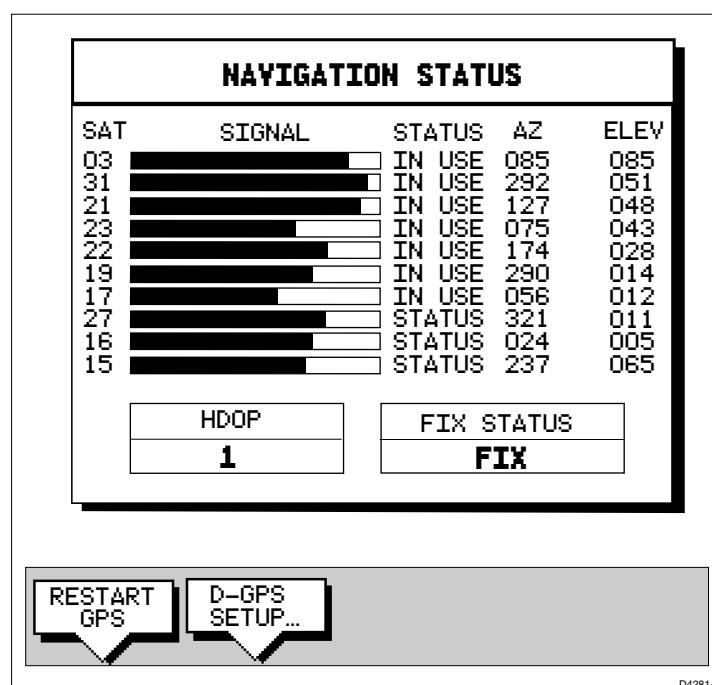
GPS set up page provides you with information and the status of the tracked navigation satellites for a SeaTalk GPS. It also enables you to SET UP a SeaTalk Differential GPS, by manually retuning it to a different differential beacon.

- To select GPS Set Up:



Press **MENU**, then press the **GPS SETUP...** soft key.

The Navigation Status pop-up window shown below is displayed. This window provides, for each tracked satellite, the satellite number, its signal strength, azimuth angle and elevation angle from your vessel.



GPS Setup

- To tune a differential SeaTalk GPS to another beacon:



1. Press **D-GPS SETUP**, the Differential GPS Setup pop-up is displayed with **MODE** and **BEACON SELECT** soft keys.
2. Press **MODE AUTO MAN** to toggle the GPS to manual tuning.
3. Press **BEACON SELECT**, use the soft keys to set the required beacon frequency and bit rate.

The status of the selected beacon is displayed in the pop-up.

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

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

6.7 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, you can use the **DISPLAY** key to change full-screen mode; data continues to be logged, but you must change to Data Log Mode to view it.

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

► 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 the following illustration, 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.

START LOG

Data Log Mode

TIME	POSITION	CMG	DHG
15:30	50° 21' 890N 001° 20' 610W	348° M	6.86KM
16:00	50° 18' 010N 001° 20' 070W	180° M	7.23KM
16:30	50° 21' 850N 001° 19' 290W	012° M	7.23KM
17:00	50° 18' 500N 001° 21' 300W	206° M	6.67KM
17:30	50° 20' 990N 001° 18' 280W	043° M	5.74KM
18:00	50° 19' 660N 001° 21' 960W	245° M	5.00KM
18:30	50° 19' 730N 001° 18' 030W	093° M	4.63KM
19:00	50° 20' 930N 001° 21' 750W	302° M	5.00KM
19:30	50° 18' 550N 001° 18' 650W	145° M	5.74KM

STOP LOG **CLEAR LOG**

D4284-1

Data Log Mode

- 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,:

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

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

Chapter 7: Setting Up the System Defaults

7.1 Introduction

Once you have installed your display unit and are familiar with its basic operation (described in *Chapters 1 and 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.

Note: *Although the factory default settings are suitable for normal radar or chart operation, it is important that you check the bearing alignment when you first install your Radar, and correct for any error using the alignment control in the Radar Setup parameters (see Chapter 9).*

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 customised 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
- Radar-specific parameter functions and default settings
- Advanced Radar functions
- 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.

Note: *If you have a combined Radar/Chartplotter display, the SYSTEM SET UP menu option from the radar display is the same as that accessed from the chart display SYSTEM SET UP menu.*

7.2 Changing the Set Up Parameters

The set up parameters are divided into four sections:

- **System**, to control the aspects of the system that are not specific to the radar or chart.
- **Radar**, includes bearing alignment, display preferences and the timed transmission option.
- **Advanced**, to control specialist settings such as display timing, STC preset and tune preset (see *Section 7.5* for instructions on how to access these functions).
- **Chart**, to control the chartplotter display, including waypoint information, vectors and radar/chart synchronisation.

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.

Radar



Chart



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 highlighted. 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. The menu page is cleared so that you can see the effect of the slider adjustment on the radar picture. When you have finished the adjustment, press **ENTER** to re-display the menu page.

5. Once you have reset 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 normal display.

You can return all the settings to their original factory settings, if required, by performing a factory reset as described in *Chapter 9*.

Changing
the Set Up
Parameters

7.3 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.

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	
XTE	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	MAG	
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	
MENU TIMEOUT PERIOD	NO TIMEOUT 10, 20, 30 SECONDS	NO TIMEOUT	

Menu	Options	Factory Default	New Default
DISTANCE UNITS	NAUTICAL MILES STATUTE MILES KILOMETRES KILOYARDS	NAUTICAL MILES	
SPEED UNITS	KNOTS MILES PER HOUR KILOMETRES PER HOUR	KNOTS	
DEPTH UNITS	METRES FEET FATHOMS	METRES	
TEMPERATURE UNITS	CENTIGRADE FAHRENHEIT	CENTIGRADE	
VARIATION SOURCE	AUTO MANUAL value	AUTO	
CURSOR ECHO			
LOCAL CURSOR	OFF or ON	ON	
REMOTE CURSOR	OFF or ON	OFF	
DATE FORMAT	DD/MM/YY MM/DD/YY	DD/MM/YY	
TIME FORMAT	12 HOUR 24 HOUR	24 HOUR	
TIME OFFSET	UTC, or local offset value: Plus or minus up to 12 hours, in whole hours	UTC	
LANGUAGE	ENGLISH (UK), ENGLISH (US), DANISH, FRENCH, GERMAN, DUTCH, ITALIAN, NORWEGIAN, PORTUGUESE, SPANISH, SWEDISH, FINNISH	ENGLISH (UK)	
SIMULATOR	OFF DATA RADAR BOTH	OFF	

System Set Up
Parameters

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 on the radar.

Note 1: A fixed set of nine of these data items are available for display in the Nav Data half-screen window (see Chapter 2).

Note 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 radar picture can still be seen. The ones you select here can be turned on and off as a group (see Section 3.4) during normal operation, and you can also move them around the screen individually using the context-sensitive cursor (see Chapter 4).

Bearing Mode

The mode (magnetic or true) of all the bearing and heading data displayed. This is indicated in the radar 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. This option is only available in Radar mode if you have heading data from a compass.

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.

Note: The bearing type for the EBL display can be selected separately (see Section 7.4).

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 Chapter 2).

Day/Night

This option allows you to change the target presentation between day and night modes.

In the normal day presentation, black targets are displayed on a white background. If you select NIGHT presentation, the picture is reversed, so that white targets are shown on a black background to reduce the intensity of the image.

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.

System Set Up
Parameters

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. However, the distance units do not affect the instrumented range of the radar, which is always in nautical miles.

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 radar 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.*

Cursor Echo

You can set up your system so that radars and chartplotters 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 another radar on the chart display or chart window (default - OFF).
- **Chart Cursor In:** displays the cursor from another or chartplotter on the radar display or radar window (default - OFF).

Note: *The remote display must have SeaTalk Cursor Out enabled.*

- **SeaTalk Cursor Out:** enables the output, onto SeaTalk, of the display's own cursor (default - OFF).
- **Cursor Echo Local:** echoes the cursor position between open windows on the same display (default - ON).

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

System Set Up
Parameters

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 12 hours, in hourly steps.

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 radar display without data from the antenna and/or external data sources. The options have the following functions:

- **Data** provides simulated numerical data, and a waypoint display.
- **Radar** provides a simulated radar picture, with example targets. The picture does not change if you change the range, although the range rings are adjusted (see *Chapter 3*).
- **Both** provides simulated data and radar picture.

Note: *On a radar master display, you cannot view a simulated image whilst the scanner is in transmit mode.*

If you switch the simulator on during transmit mode, the scanner is set to

standby, and you cannot select transmit mode whilst the simulator is on.

However, you can view a simulated image on a repeater display whilst the master display is in transmit mode.

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

7.4 Radar Set Up Parameters

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

Note: *Some parameters can only be changed if you are using the Master display (that is, the display to which the scanner is connected).*

The following table lists the Radar 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.

Parameter	Options	Factory Default	New Default
EBL DISPLAY	MAG/TRUE RELATIVE	RELATIVE	
TIMED TRANSMISSION	OFF ON	OFF	
TRANSMIT PERIOD	10 scans 20 scans 30 scans	20 scans	
STANDBY PERIOD	3 minutes 5, 10 or 15 mins	10 minutes	
DEFAULT MARK SYMBOL	Fish, skull, X or anchor symbol	X	
MARK DISPLAY	OFF ON	ON	
CLEAR MARKS	Press soft key to clear marks database	N/A	
CUSTOM SCALE	OFF ON SET RANGES...	OFF	
BEARING ALIGNMENT	Slider value	0°	

Radar Set Up
Parameters

EBL Display

The mode of the bearing data displayed for Electronic Bearing Lines (EBLs).

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.
This option is only available if you are obtaining data from a compass.

If you choose this mode, the selection you made for Bearing Mode determines whether °M or °T is displayed in the EBL data boxes. The current units are shown for the heading value in the status bar at the top of the screen.

Timed Transmission Option

The TIMED TRANSMIT parameter, together with the TX PERIOD and STANDBY PERIOD parameters, controls the radar's timed transmission power-saving mode.

When TIMED TRANSMIT is set to ON, the scanner performs the number of scans specified by TX PERIOD and then shuts down for the number of minutes specified by STANDBY PERIOD. While it is shut down, the scanner does not rotate, and the display is in standby.

Set the TIMED TX parameter to OFF for normal operation. In this case, the TX PERIOD and STANDBY PERIOD values are ignored.

Note: *Timed Transmision is not available on a Repeater Display.*

Marks Options

You can select the mark symbol that will be used when you place a mark (see *Section 4.4*).

If you turn the MARK DISPLAY option OFF, any marks you have placed are hidden on the display, but retained in the marks database. You can turn the option on again to display them at any time.

To clear all stored marks from the marks database, press the CLEAR MARKS soft key, and the YES soft key to confirm the deletion.

Custom Scale

You can set up your own range scale. When switched ON, this is used instead of the Pathfinder Radar default range scale (see *Section 3.2*).

To set up a scale, press the SET RANGES soft key. The Custom Range Setup Menu is displayed, which allows you to change the maximum range for each range selection.

The following table lists the ranges, shows the factory default setting, and provides a space for you to make a note of your new setting.

Range	Default Setting (nm)	New Setting (nm)
1	0.125	
2	0.25	
3	0.5	
4	0.75	
5	1.5	
6	3.0	
7	6.0	
8	12.0	
9	24.0*	
10	48.0*	
11	72.0*	

* The maximum range depends on your scanner type, as detailed in the Pathfinder Radar Scanner Owner's Handbook.

To change the range scale, highlight the required range and use the soft keys to change the value. Start at the top of the list and work down, since each value must be greater than the value for the previous range in the list. The following scale increments are available:

Range Scales (nm)	Scale Increments (nm)
0.125 to 0.5	0.125
0.5 to 4.0	0.5
4.0 to maximum for scanner	2.0

When you have finished setting up the new scale, press **ENTER** to return to the Radar Set Up Menu, and press the **ON** soft key to select your new scale.

Bearing Alignment

The bearing alignment is normally set when you first install your system, and is described in *Section 8.8*.

The bearing alignment corrects for display azimuth error. It can be set to a value in the range -180° to $+179.5^\circ$, in increments of 0.5° .

7.5 Advanced Settings

The ADVANCED SET UP option allows you to set up values for the following three parameters that affect the fine-tuning of the radar. Advanced settings are only available from the Master radar display (that is, the display connected to the scanner).

Parameters	Function	Slider Range
Display timing	Corrects for display range error	0m to 153m
STC preset	Equalises target levels across display	0-preset maximum
Tune preset	Allows adjustment of the tuning range controlled by the TUNE control	0-255

Note: Under normal circumstances you will not need to adjust these settings, as they are set automatically at the factory. If these parameters are set incorrectly the performance of the radar will be adversely affected. Access to the menu is therefore via a hidden key press.

- To change the settings:
 1. Press the **MENU** key to display the set up soft keys.
 2. Press and hold the blank soft key directly to the right of the RADAR SET UP soft key for 5 seconds. The Advanced Settings menu is then displayed.
 3. Use the trackpad to move the selection bar to the required option.
 4. Use the soft keys to increase or decrease the slider setting. As soon as you start to adjust the setting, the menu page is cleared so that you can see the effects of the adjustment on the radar picture, and the radar is set to 1/8nm range.
 5. Press **ENTER** to display the menu again.
 6. Press **CLEAR** to return to the Menu soft keys, and **CLEAR** again to return to normal operation.
- If required, you can recall the factory defaults for this page. To do so, move the selection bar to the SCANNER RESET option, press the ADVANCED SETTING RESET soft key, and press the YES soft key to confirm.

Display Timing

If you extended the inter-unit cable, you should have set the display timing when you first installed your system, as described in *Section 8.9*.

Under certain circumstances, it may be easier to adjust the display timing with MBS (Main Bang Suppression) off; press the MBS soft key to toggle the setting OFF. MBS is reset to ON automatically when you finish adjusting the display timing.

STC Preset

The Sensitivity Time Control can be adjusted to equalise targets levels across the display. The factory setting should provide an even display, but if you find that targets are brighter or dimmer nearer the centre than at the edge of the display, you can adjust this slider until the required display is achieved.

Note: *Caution should be observed when adjusting this parameter as poor adjustment can adversely affect auto gain and sea controls.*

Tune Preset

The radar tuning is controlled either automatically or manually using the TUNE control (see *Section 3.3*). However, this only controls a restricted range of tuning values. If the actual tuning peak falls outside this range, you will need to adjust the Tune Preset slider to move the controlled range over the tuning peak.

Press the INITIATE SET UP soft key to enable slider control, and adjust for maximum image intensity.

If required, you can press the RESTORE PREVIOUS soft key to reset the Tune Preset to the value before you pressed INITIATE SET UP.

Advanced
Radar Settings

7.6 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.

Parameter	Options	Factory Default	New Default
CUSTOMISE CHART	See below for details		
PLOTTER MODE	OFF ON	ON	
CHART ORIENTATION	NORTH UP COURSE UP HEAD UP		NORTH UP
OBJECT INFORMATION	OFF ON		ON
WAYPOINT SYMBOLS	OFF ON		ON
WAYPOINT NUMBERS	OFF ON		OFF
DEFAULT WAYPOINT SYMBOL	Fish, skull, X or anchor symbol	X	
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	OFF ON		OFF
DATUM SELECTION	WGS 84, LOCAL		WGS 84

Customise 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 *Customising the Screen Presentation Options in Chapter 2*).

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

- chart text (**on**, off, custom)
- 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)
- 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 stabilised 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:

1. A locked heading over a SeaTalk connection
2. The heading at the time Course Up was selected

To update the Course Up reference whilst 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 or OFF. When set ON, object information is displayed in normal chartplotter operation when the cursor is placed over a chart object for two seconds. When set OFF, no information is displayed.

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

If you have a combined radar/chartplotter display you can select Radar Chart Sync ON or OFF. When set ON with chart and radar windows displayed, FIND SHIP can be used to synchronise the radar and chart images.

The chart is redrawn so that its centre matches that of the radar display. The radar is redrawn to the scale and heading mode of the chart.

Datum Selection

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

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.

CAUTION

Changing the chart datum does *not* cause any waypoint or routes stored in the chartplotter to move. Waypoints and routes may therefore appear to be at different positions when you change the datum.

When adding waypoints numerically to the waypoint list, or via SeaTalk, NMEA or HSB, it is important that they are referenced to the same datum that the chart is to be operated in.

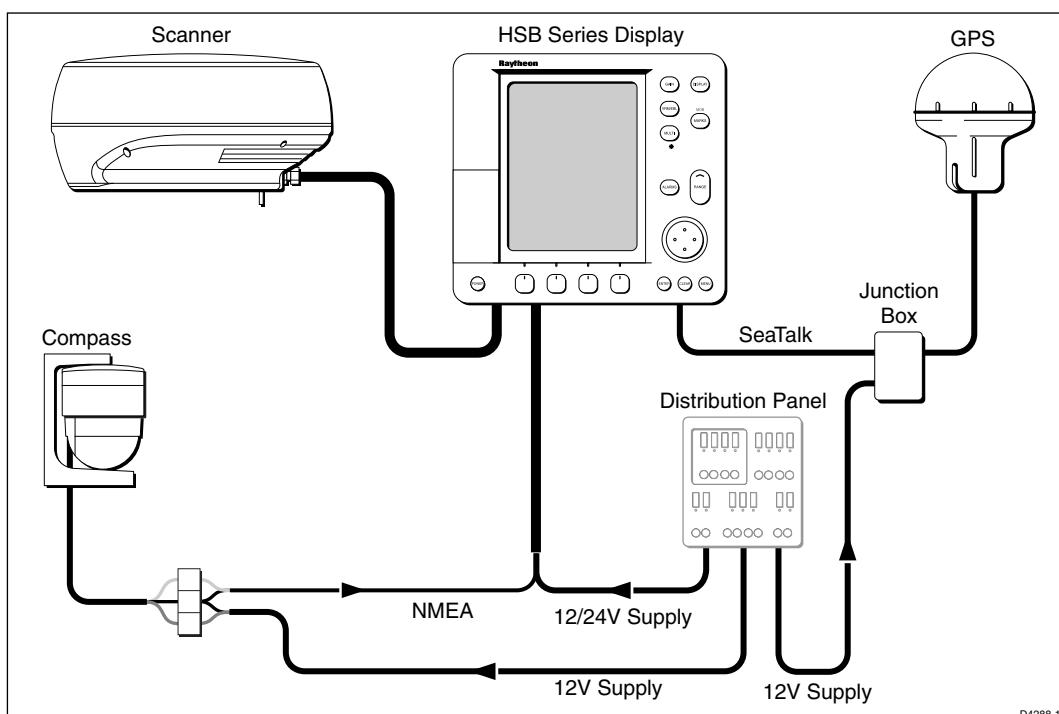
Chart Set Up
Parameters



Chapter 8: Installation

8.1 Introduction

This chapter provides instructions to assist you in the installation of the HSB Series LCD Display aboard your vessel, whether you are installing a simple system such as that shown below, or an integrated system such as those shown in *Section 8.8 Integrated Systems*.



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Note: If you wish to practice using the display before installation, you can set it up by connecting a 12V or 24V DC power supply (connecting the red core from the power lead via a 6.3A quick blow fuse to positive and the black core to negative) and using the simulator mode, as described in Chapter 2 Getting Started.

If you are connecting your display to other equipment (including another HSB series display unit) it is strongly recommended that you install, test and align the master radar display as described in *Sections 8.2 to 8.7. Details on installing the scanner are provided in the Pathfinder Radar Scanner Owner's Handbook*. Once this display is installed and operating correctly, you can connect it to other equipment as described in *Section 8.8*, taking particular care to ensure the correct polarity of the SeaTalk supply. *Section 8.8* includes descriptions of the HSB, SeaTalk and NMEA interfaces, and defines data that can be transferred.

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

- Heading data enables the radar and chart to operate in North Up and Course Up modes. If speed data is also available the MOB function operates.
- Position data is required for full functionality of the chart display.

Full details of heading, position and other data are given in *Section 8.8 Integrated Systems*.

The remaining sections of this chapter cover the following topics:

- Unpacking and Inspecting the Components
- Location of the Display Unit
- Cable Runs
- Mounting the Display Unit
- Display Unit Connections
- Radar System Tests and Post Installation Alignment
- Integrated Systems
- Integrated System Checks

Planning the Installation

Before you install your display unit, you should spend some time planning the installation, giving consideration to:

- Siting the display unit, as described in *Section 8.3 Selecting the Display Unit Site*.
- Cable Runs, including cables for an integrated system (to provide heading and position data etc.), as described in *Section 8.4 Cable Runs*.

Planning the
Installation

EMC Installation Guidelines

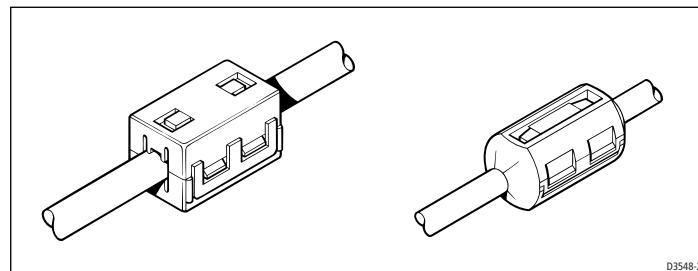
All Raytheon equipment and accessories are designed to the best industry standards for use in the leisure marine environment.

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.

For optimum EMC performance it is recommended that:

- All Raytheon equipment and cables connected to it are
 - At least 1m (3ft) 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 2m (7ft).
 - More than 2m (7ft) 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 than that used for engine start. Voltage drops below 10.7 V in the power supply to our products can cause the equipment to reset. This will not damage the equipment, but may cause the loss of some information and may change the mode of operation.
- Raytheon specified cables are used at all times. Cutting and rejoining these cables can compromise EMC performance and so should be avoided unless doing so is detailed in this handbook.
- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite has to be removed during installation it must be reassembled in the same position. *The Pathfinder Radar Scanner Owner's Handbook* includes instructions on fitting a ferrite.
- Ensure you follow the installation instructions in *Sections 8.6 to 8.8*, particular with reference to earthing details.

The following illustration shows typical cable suppression ferrites fitted to Raytheon equipment. Always use the ferrite specified by Raytheon.



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If your Raytheon equipment is to be connected to other equipment using a cable not supplied by Raytheon, a suppression ferrite MUST always be fitted to the cable close to the Raytheon unit.

8.2 Unpacking and Inspecting the Components

Unpack your system carefully, to prevent damage to the equipment. It is good practice to save the carton and packing for future use, in case you need to return any units for service.

Check that you have all the correct system components. These depend on your system package, as follows:

Item	Part No.	Supplied with:	Option for:
7" LCD Display	M92662 M92732 M92670 M92733 R32005 R32007	Light grey: RL70 Dark grey: RL70 Light grey: RL70RC Dark grey: RL70RC Light Grey: RL70RC Dark Grey: RC520	- - - - - -
7" LCD Display Accessories			
Sun cover (light grey)	D331	Light grey: RL70, RC520, RL70RC	- -
Sun cover (White)	D356	Dark grey: RL70, RC520, RL70RC	- -
Handbook, Radar/Chart	81163	All	-
Quick Reference Card, Radar	86032	RL70	RL70RC
Quick Reference Card, Chart	86033	RC520,	RL70RC
Mounting bracket assy.	W143	All	-
Trunnion knobs (x2)	W145	All	-
Flush mount kit	M92708	-	All
Power cable	W144	All	-
Seatalk cable assembly			
Flat moulded plugs both ends:			
1 m (3 ft 3 in) long	W284	-	All
3 m (9 ft 9 in) long	W285	-	All
5 m (16 ft 3 in) long	W286	-	All
9 m (29 ft 3 in) long	W287	-	All
Flat to male round connector:			
0.3 m (12 in) long	D187	-	All
Flat to female round connector:			
0.3 m (12 in) long	D188	-	All
Flat moulded plug one end only:			
1 m (3 ft 3 in) long	D229	-	All
Ferrite clamp	R55007	-	All
Seatalk junction box	D244	-	All
Seatalk auxiliary junction box	R55006	RC520,	RL70RC
HSB cable assy			
- 1 m (3 ft 3 in)	R55001	-	All
- 3 m (9 ft 9 in)	R55002	-	All
- 6 m (19 ft 6 in)	R55003	-	All
- 10 m (32 ft 6 in)	R55004	-	All
NMEA OUT cable assy.			
1.5 m (4 ft 11 in)	R55005	All	-

8.3 Selecting the Display Unit Site

The display unit can be mounted using the trunnion (yoke) bracket already fitted, or console mounted using the optional flush-mounting kit.

The dimensions of the display unit, including the bracket, are shown in the following diagram.

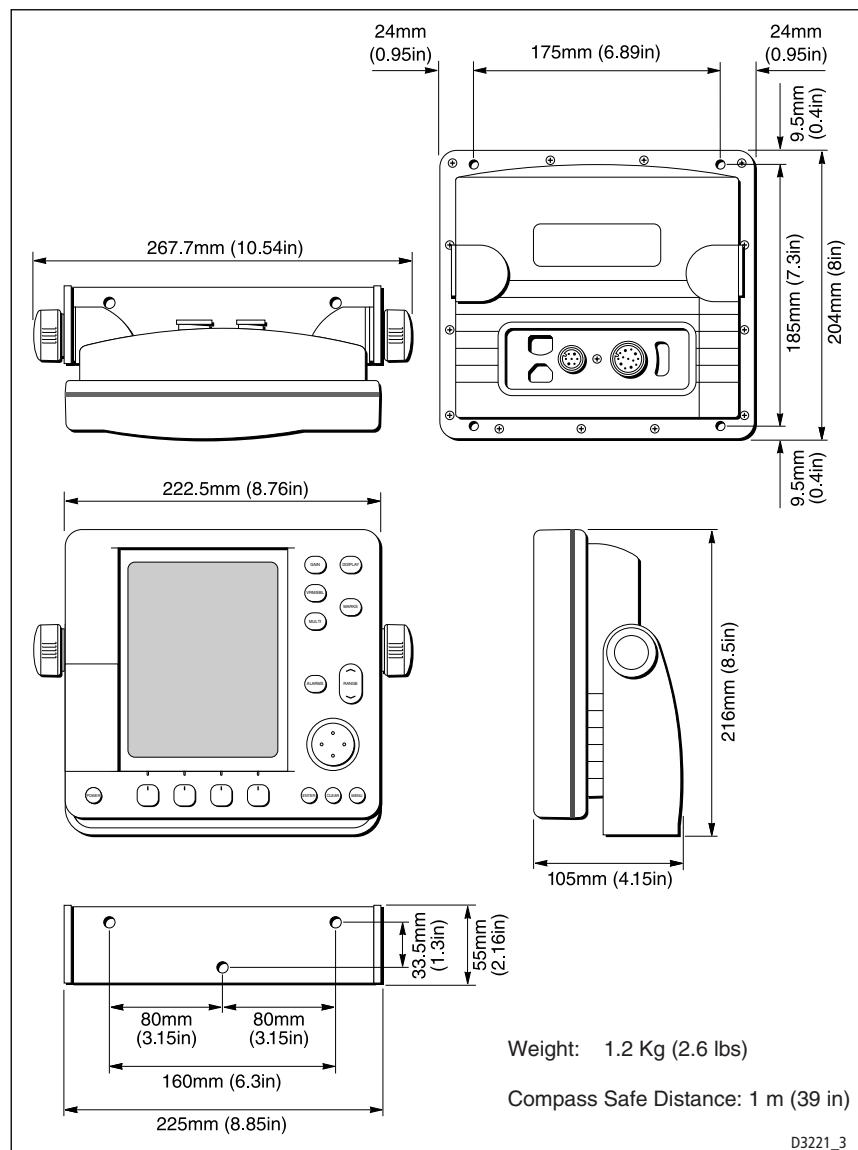
When planning the installation of your display unit, the following points should be considered to ensure reliable and trouble free operation:

- **Convenience:** The display unit should be installed in a convenient position, where it can be viewed straight on or with a viewing angle of less than 35°. You may wish to apply power before you install the display unit, to determine the best viewing angle prior to fixing.
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 1m away from a magnetic compass.
- **Cable runs:** The display unit must be located near a DC power source. The power cable supplied is 1.5m (4.9 ft), but a longer cable can be used if required: refer to *Section 8.4 Cable Runs*.

The maximum length of cable between a master display and the scanner unit should not normally exceed 20 m (60 ft). If you need to use a longer cable, refer to the *Pathfinder Radar Scanner Owner's Handbook*.

- **Environment: Do not restrict airflow at the rear of the display unit; ventilation is required at the rear to prevent the unit overheating.**
The display should be protected from physical damage and excessive vibration. Although the display is waterproof, it is good practice to mount it in a protected area away from prolonged and direct exposure to rain and salt spray.

Selecting the
Display Unit Site



8.4 Cable Runs

You need to consider the following before installing the system cables:

- You need to fit the power cable and, on a master display, the inter-unit cable. Additional cables will be required if you are installing an integrated system.
- All cables should be adequately cleated and protected from physical damage and 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 watertight gland or *swan neck* tube should be provided.

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 cores at the other end for connecting the power supply and (optionally) NMEA inputs (see Section 8.8).
- **Inter-unit cable**, supplied with the scanner unit. This is Vinyl-covered and shielded, with a connector plug at one end for connecting to the display unit or extension cable.
- **SeaTalk cable**, optional, with SeaTalk connector(s) at one or both ends.
- **HSB cable**, optional.
- **NMEA Output cable**, optional, with a NMEA OUT connector at one end only.

Power Cable

The HSB Series display is intended for use on ships' DC power systems operating in the 10.7 to 44 V DC range (that is, 12 V, 24 V systems and 32 V systems). If the display is a master connected to a 2D or 4D radome scanner only a 12 V or 24 V system must be connected. A 1.5 m (5 ft) power cable is supplied for connecting the ship's DC power to the radar via the display unit.

Cable Runs

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 mm².

In particular, for radar systems on vessels with *12 V power systems*, longer power cable runs may require larger wire gauges to minimise any voltage drop in the cable. The scanner type and the length and type of the inter-unit cable also affect the wire gauge required for the extension power cable.

For further details on the master display power cable length refer to the *Pathfinder Radar Scanner Owner's Handbook*.

Inter-Unit Cable

The inter-unit cable entrance is at the rear of the scanner unit. If the unit is mounted on a hollow mast the cable may be run inside the mast and then fed through the radar's cable entrance. Make sure that the cable does not chafe where it enters the mast.

Note: *Route the cable from the display up to the scanner, since this will require the smallest clearance hole.*

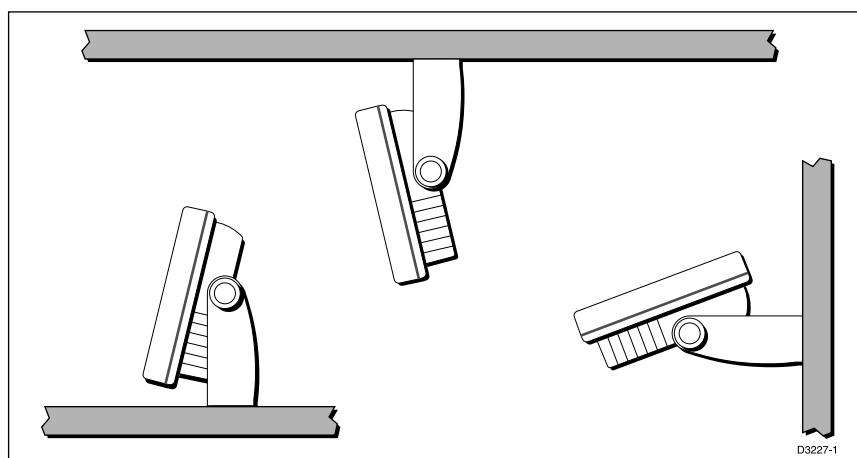
The type of inter-unit cable, for connecting the scanner to the display unit, depends on your scanner package. Refer to the *Pathfinder Radar Scanner Owner's Handbook* for details, which include length considerations and bending radii.

8.5 Mounting the Display Unit

The display unit can be mounted using the trunnion (yoke) bracket already fitted, or console mounted using the optional flush-mounting kit (see *Section 8.2*).

Trunnion (Yoke) Mounting

The display unit can be conveniently mounted on a dash area, chart table, bulkhead or deckhead, as shown in the following diagram.



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

Mounting the
Display Unit

Console Mounting

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

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. Check the selected location for the unit. A clear, flat area at least 230 mm (9 in) wide by 210 mm (8¼ in) high, with at least 152 mm (6 in) of clearance behind the panel, is required.
2. Unpack the flush-mounting kit.
3. Using the supplied template, trace out the display unit opening.
4. Drill a 12.7 mm (½ in) pilot hole in each opposing corner of the cut-out area.
5. Using a suitable saw, cut along the inside edge of the cut-out line.
6. Remove the trunnion (yoke) knobs and bracket from the display unit. Make sure that the unit fits in the cut-out area.
- 6a. If the optional screw fitting is required, drill four 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 avoiding 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. Fitting of the trunnion ratchets is shown on the template drawing.
- 9a. Alternatively, fit a spacer over each of the four studs and secure with the thumb nuts.

8.6 Display Unit 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 (screen) of the Power/NMEA Input cable to the nearest ground point of the ship's RF ground system.

If you need to extend the wire, the extension wire should be an 8 mm braid or 6.0 mm² (AWG 10) multi-stranded cable.

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

DC Power Connection

The HSB Series display is intended for use on ships' DC power systems as follows:

12 V and 24 V systems -	Radome Scanners
12 V, 24 V and 32 V -	Open Array Scanners and RayChart 520

The power connection to the radar should be made at either the output of the battery isolator switch, or at a DC power distribution panel. Raytheon recommends that power is fed directly to the radar via its own dedicated cable system and MUST be protected by a thermal circuit breaker or fuse, fitted close to the power connection. Refer to the *HSB Series Radar Scanners Owner's Handbook* for full details.

The DC system should be either:

- Negative grounded, with the negative battery terminal connected to the ship's ground.
- Floating, with neither battery terminal connected to the ship's ground.

CAUTION:

This radar is not intended for use on "positive" ground vessels.

The power cable Earth screen connections must be connected to the ship's ground as described above.

Display Unit
Connections

Power for External Equipment

External equipment cannot be powered from the display's SeaTalk interface.

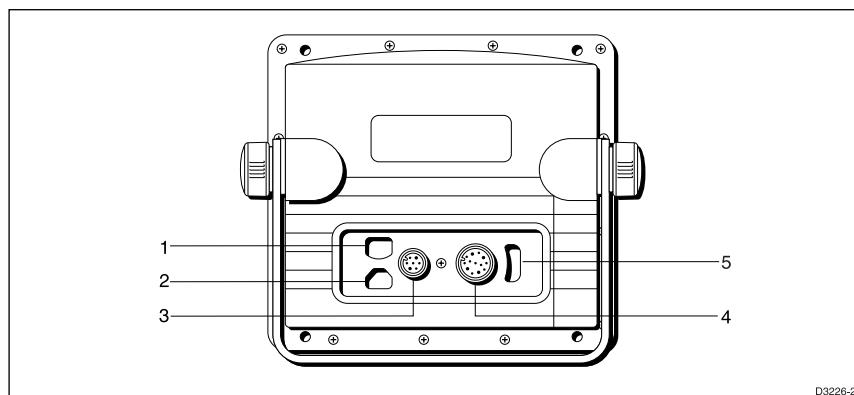
It must be powered from the ship's supply or via a SeaTalk bus.

Refer to *Section 8.8 Integrated Systems* for further details.

Display Unit Connection

The rear of the HSB Series display provides the following connection sockets:

- **Scanner (antenna)** connection
- **HSB**, in/out connector for connecting to another HSB Series display (such as a chartplotter or second radar display).
- **SeaTalk**, for SeaTalk data input and output and connecting to another HSB Series display (such as a chartplotter or second radar display).
- **NMEA Output**, for NMEA data output in an integrated system.
- **Power/NMEA Input**, for 12 V, 24 V and 32 V DC power connection, two NMEA 0183 inputs and one RF ground (screen) connection.



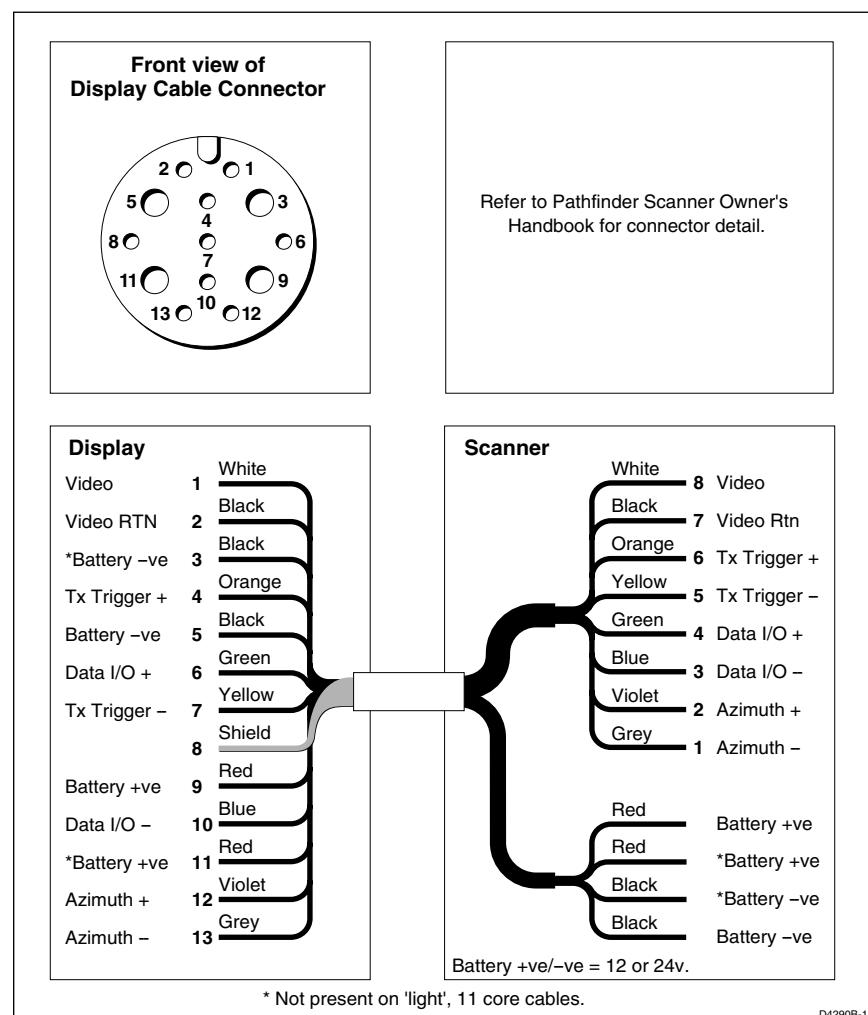
1 NMEA Output **2** HSB **3** Power and NMEA Input **4** Scanner **5** SeaTalk

The following sections detail the display unit connectors used when installing a single HSB Series LCD Display. The remaining connector details are provided in *Section 8.8 Integrated Systems*.

Scanner Connection (master displays)

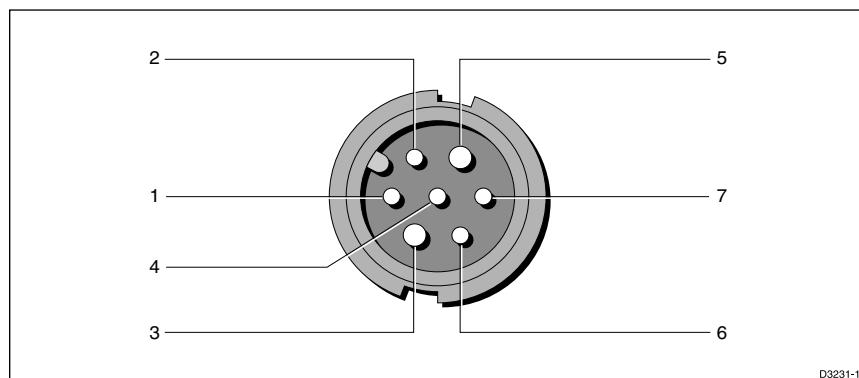
Connect the inter-unit cable plug to the rear scanner connector. If you are using an inter-unit extension cable, connect this to the display unit, and connect the supplied cable to the extension cable.

The scanner connector pins are shown in the following diagram, together with the connections and core colours.



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 8.8 Integrated Systems*.



Pin No.	Function	Colour
1	Channel 1 NMEA data input (+ve)	Orange
2	Channel 1 NMEA return (-ve)	Yellow
3	Battery negative	Black
4	Screen (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

Power Connection

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 Radar System*.

Any unused cores should be insulated and taped back.

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.

8.7 Radar System Tests and Post Installation Alignment

Once you have installed your Pathfinder Radar System and made all the connections, you need to check your installation and perform the *System Tests* before using the system for navigation. It is strongly recommended that the System Tests are performed before connecting the radar to other equipment in an integrated system. If you have extended your inter-unit cable, you will also need to check the display timing. If you encounter any problems, refer to *Chapter 9*.

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.
- Scanner and power connections have been made.
On the open array scanner, set the power switch (on the pedestal) ON.
- 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. Since the display is a radar master, the magnetron warm-up sequence should start, after which the unit should enter Standby mode.

The display switches on in the last used mode. If it is necessary to change the mode, press **DISPLAY** to show the Display pop-up. Press **DISPLAY** again, as necessary, to select Radar mode, then press **ENTER**.

If necessary, adjust the lighting and contrast (see *Section 2.2*).

If required, change the default language settings as follows:

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



System Tests and
Post Installation
Alignment

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.

SYSTEM SET UP MENU	
DATA BOXES	
BEARING MODE	TRUE
CURSOR REFERENCE	RELATIVE
CURSOR READOUT	RNG/BRG
DAY/NIGHT	RNG/BRG
HELP	ON
SOFT KEYS	ON
KEY BEEP	ON
MOB DATA	DR
MENU TIMEOUT PERIOD	NO TIMEOUT
DISTANCE UNITS	NAUTICAL MILES
SPEED UNITS	KNOTS <input checked="" type="checkbox"/>
DEPTH UNITS	METRES
TEMPERATURE UNITS	CENTIGRADE
VARIATION SOURCE	AUTOMATIC
CURSOR ECHO	
DATE FORMAT	DD/MM/YY
TIME FORMAT	24 HOUR
TIME OFFSET	UTC
LANGUAGE	ENGLISH (UK)
SIMULATOR	OFF

D3650-3

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 radar screen.

Radar System
Checks and
Adjustments

Radar System Checks and Adjustments

When the display is connected to a scanner unit you should perform the checks and adjustments detailed below.

Transmission Check

WARNING:

The radar scanner transmits electromagnetic energy. Ensure that the scanner has been installed according to the recommendations given in the *Pathfinder Radar Scanner Owner's Handbook*, and that all personnel are clear of the scanner, before switching to transmit mode.

Ensure the display unit is in Radar mode.

To switch to transmit mode, press and release the **POWER** key. The antenna sweep should start to build up the radar picture.

Run through the operations described in *Chapter 3* and check that all the expected data is displayed.

Bearing Alignment

When the system is correctly installed, you must check the bearing alignment to ensure that targets appear at their correct bearing relative to the ship's bow, and adjust the alignment if necessary.

To adjust the alignment, you need to select a visible target of known bearing that is displayed on the radar, and then use the setup options to adjust the radar until the correct bearing reading is obtained.

- To determine the alignment error, use one of the methods detailed below.
 1. Visually identify a suitable target, such as a buoy that can be seen towards the edge of the radar screen. Typically, this will be on the 1.5 nm range.

2.1 If the vessel is moored:

- a. Determine the accurate bearing of the target relative to the ship's bow with the aid of a hand bearing compass. i.e. Subtract the ship's head bearing from the target visual bearing.

Example 1

$$\text{Visual bearing} = 065^{\circ}\text{M}$$

$$\text{Ship's head} = \underline{021^{\circ}\text{M}}$$

$$\text{Relative bearing} = 044^{\circ}\text{R}$$

Example 2

$$\text{Visual bearing} = 030^{\circ}\text{M}$$

$$\text{Ship's head} = \underline{042^{\circ}\text{M}}$$

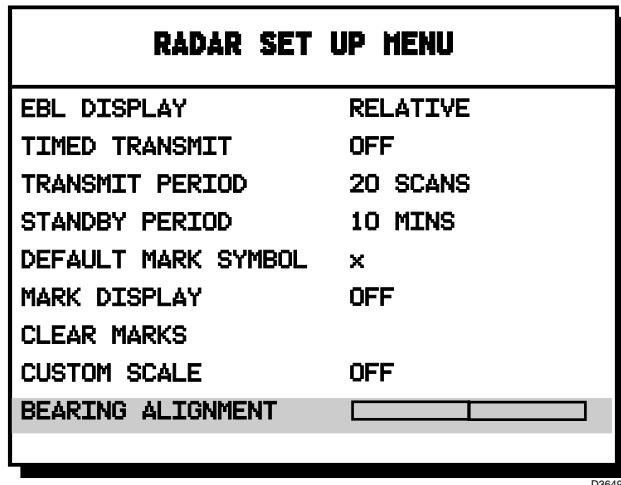
$$\text{Relative bearing} = -012^{\circ}(+360) = 348^{\circ}\text{R}$$

- b. Measure the relative bearing of the target on the radar using an EBL.
- c. If there is a difference in the two bearings (alignment error), adjust the radar as detailed below.

2.2 If the vessel is under way (in reasonably calm conditions):

- a. Align the vessel's bow to the target.
- b. Note the position of the target relative to the Heading marker.
- c. If the target is **not** under the Heading marker, there is an alignment error and the radar can be adjusted as detailed below.

- To adjust the radar to eliminate the alignment error:
1. If a visual relative bearing of a target has been determined, as in 2.1 above, set an EBL to this relative bearing.
 2. Press the **MENU** key to display the setup soft keys and select RADAR SET UP.



3. Use the trackpad to move the selection bar on the Radar Set Up Menu to BEARING ALIGNMENT.
4. Use the soft keys to adjust the Bearing Alignment slider and to rotate the radar picture. As soon as you start the adjustment, the menu is cleared so that the rotation of the picture can be seen. The keys can be pressed and held, to rotate the picture quickly, rather than in single steps.
5. Rotate the picture to place the target under the EBL, or Heading Marker, depending on the method used to obtain the correct relative bearing.
6. When the bearing alignment error has been eliminated press **ENTER** to re-display the Radar Set Up menu.
7. Press **ENTER** again to return to the set up soft keys, then press **CLEAR** to return to the normal radar screen.
8. After adjusting the radar, always check the bearing alignment at the next opportunity. Usually the *Bow alignment to target* (2.2 above) is the most convenient method.

Radar System
Checks and
Adjustments

Display Timing Adjustment

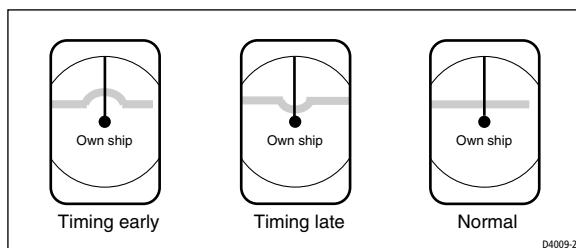
The display timing can be affected by the length of the cable used to connect the scanner to the display unit. This in turn affects the short range accuracy shown on the display. If you have extended (or reduced) your inter-unit cable, you will need to check the display timing before using the system for navigation.

Incorrect timing is most noticeable on the $\frac{1}{8}$ nm or $\frac{1}{4}$ nm range scales. Targets such as bridges or piers appear bent or bowed.

Note: Under normal circumstances you do not need to adjust these settings, as they are set automatically at the factory. If these parameters are set incorrectly the performance of the radar will be adversely affected. Access to this menu is therefore via a hidden key press.

► To adjust for correct timing:

1. Select the $\frac{1}{8}$ nm range.
2. On the radar locate a straight dock, seawall or bridge that is facing your ship. If the image is bent or bowed, as shown in the following diagram, then you need to adjust the timing.



3. Press the **MENU** key to display the setup soft keys.
4. Press and hold the blank soft key directly to the right of the RADAR SET UP soft key for 5 seconds. The Advanced Set Up menu is then displayed.
5. Use the trackpad to move the selection bar down to the Display Timing option.
6. Use the soft keys to adjust the Display Timing slider. As soon as you start the adjustment, the menu page is cleared so that you can see the effects of the adjustment on the radar picture, and the radar is set to $\frac{1}{8}$ nm range.
7. When the displayed image appears straight, press **ENTER** to return to the Advanced Set Up soft keys.
8. Press **CLEAR** to return to the setup soft keys, and **CLEAR** again to return to the normal radar screen.

Alternatively, you can use a VRM in conjunction with a target at a known distance and adjust the picture so the target co-incides with the VRM.

EMC Conformance

1. Always check the installation before going to sea to make sure that it is not affected by radio transmissions, engine starting etc.
2. 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 can lead to spurious resetting action, or momentarily may result in faulty operation.

8.8 Integrated Systems

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

- A second, repeater display which can be either CRT or LCD can be connected via HSB (and SeaTalk) to provide radar and/or chart information at a remote location.
- 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.

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:

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

HSB™ High Speed Bus

The High Speed Bus (HSB) provides extremely rapid transfer of data between master and repeater displays. Any two devices that conform to the HSB standard can be inter-connected. With an HSB and a SeaTalk connection most data available can be controlled and displayed by either unit (Guard zones cannot be viewed or controlled on the chartplotter display, nor on a repeater display that is not directly connected to a scanner. Likewise, radar timed transmission is not available on a repeater display).

For example, you could connect an HSB Radar display and an HSB Chartplotter display, to enable you to display and control both radar and chart data on either or both displays. The HSB Series displays allow you to select either type of data for display, or display both types at the same time, in half-screen windows.

When two displays are used, the following functionality will be obtained at each display (assuming a radar scanner is connected to Display 1)

Scanner Connected	Display 1		Display 2	
	Type	Functionality	Type	Functionality
Yes	RL70	Radar master	RL70	Radar repeater
Yes	RL70	Radar master Chart repeater	RC520/ RL70RC	Chart master Radar repeater
Yes	RL70RC	Radar master Chart master	RL70	Radar repeater Chart repeater
Yes	RL70RC	Radar master Chart master Chart repeater (disp.2)	RC520/ R70RC	Chart master Chart repeater (disp. 1) Radar repeater
No	RC520	Chart master	RL70	Chart repeater
No	RC520	Chart Master Chart repeater (disp. 2)	RC520/ RL70RC	Chart master Chart repeater (disp. 1)

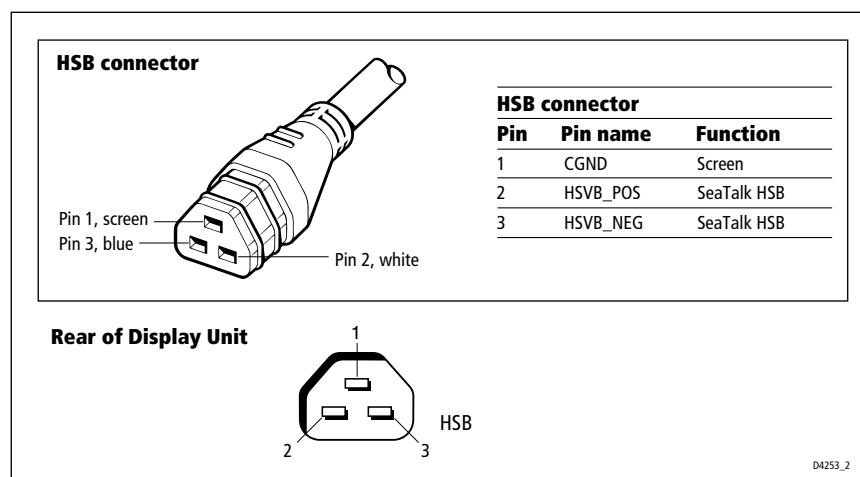
Any HSB Series display can be combined with the 7" LCD display to create two display systems.

HSB
High Speed Bus

HSB Connection

An In/Out connector is provided for an HSB series repeater or chartplotter display.

Note: *The HSB cables are fitted with ferrite clamps at each end to ensure EMC conformance. The cables are available in lengths of 1, 3, 6, 10 and 20 m.*



The HSB cable is supplied with a blanking plug for the inter-unit cable port. This should be fitted to the repeater display. If the repeater display is fitted in an exposed position seal the blanking plate with silicon compound.

SeaTalk® and NMEA In

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

Data	Primary Uses	Suggested Source
Heading	Radar: North Up, Course Up modes Chart: modes/ vectors	NMEA Compass Compass connected to SeaTalk bus
Position	Chart: own vessel position MOB Radar: Waypoints and Marks	SeaTalk GPS connected via Auxiliary JB Existing GPS Navigator via SeaTalk bus Existing GPS (or Loran-C) navigator with NMEA output
Speed	MOB (also requires HDG data) TTG and ETA calculations	As for position data Log (speed through water)
Waypoint	Radar: graphical display Chart: Waypoint and route 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 a source of magnetic variation should be connected.

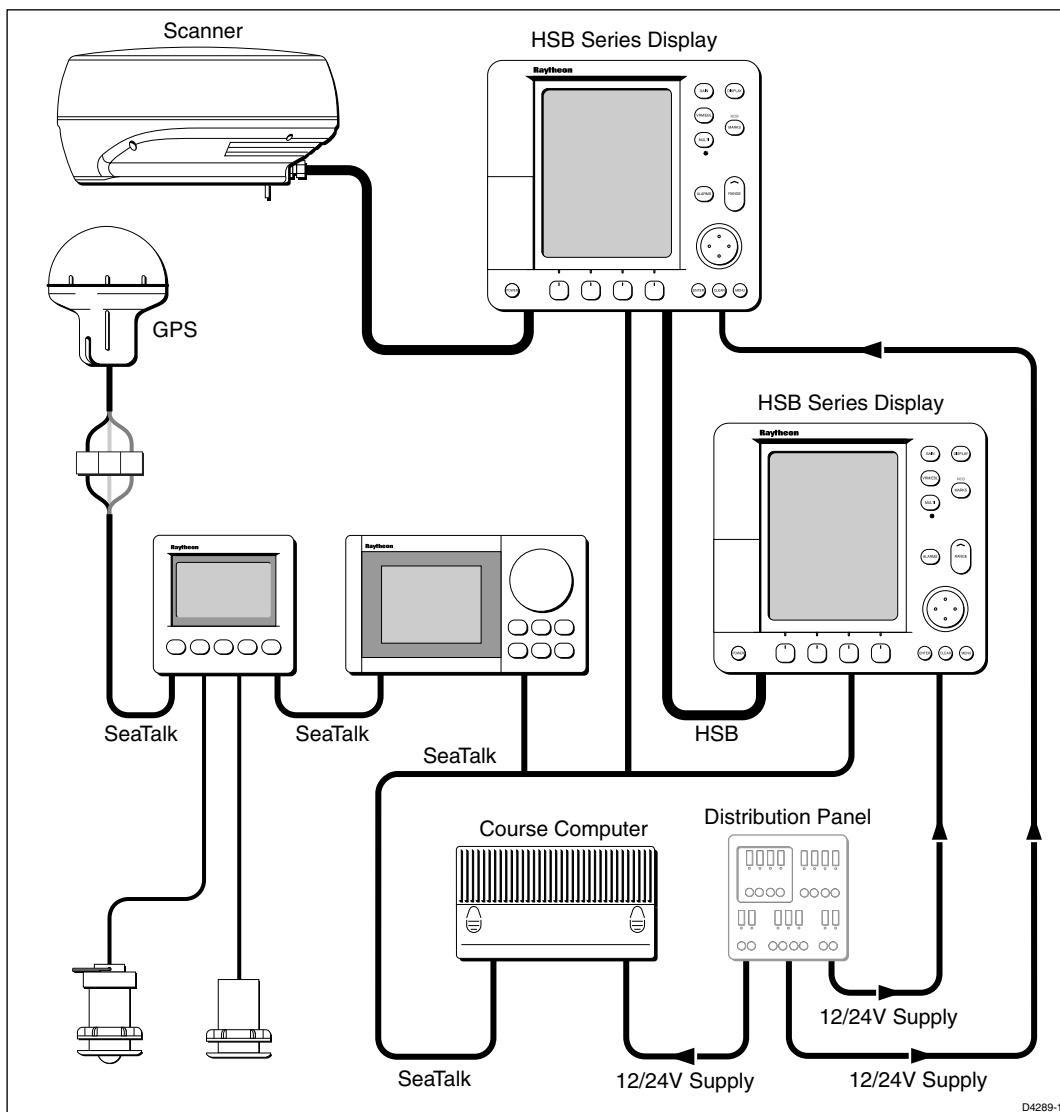
Some other radars and chartplotters can exchange their cursors via SeaTalk.

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.

For details of received data refer to the table in *Appendix 4*.

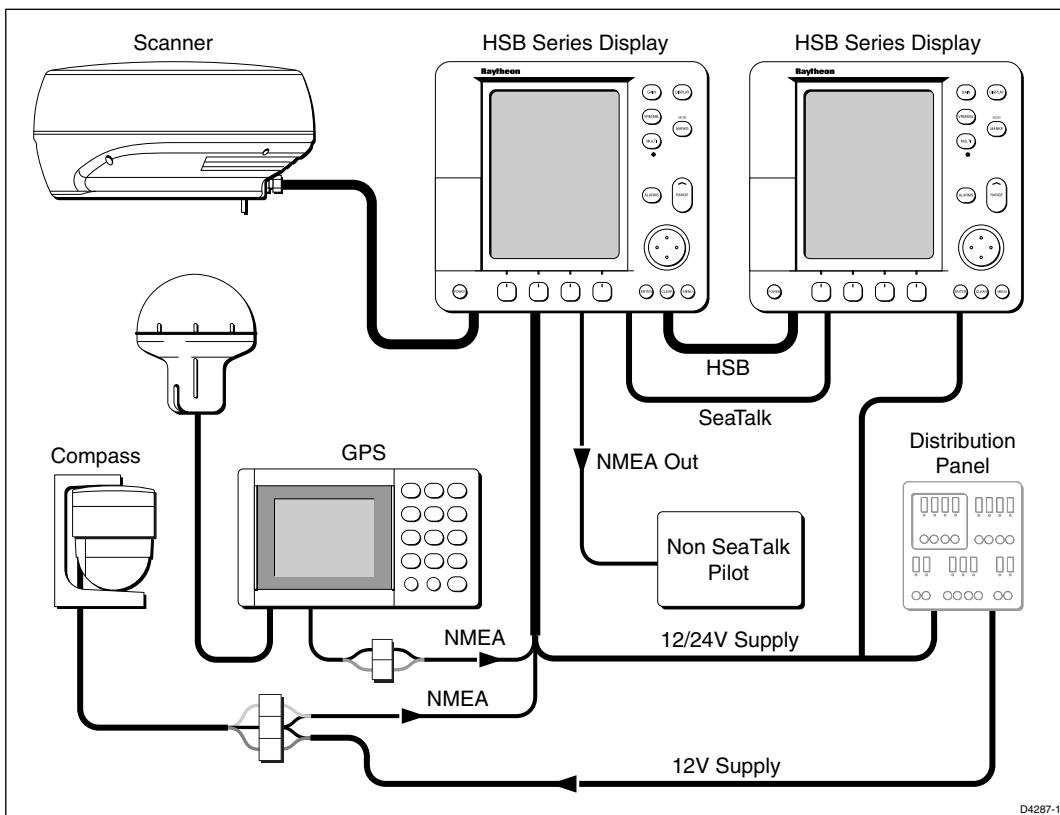
Examples of SeaTalk and NMEA systems are shown in the illustrations below.



Integrated System with Repeater Display and SeaTalk Instruments

SeaTalk and
NMEA In

D4289-1



Integrated System with Repeater Display and NMEA Instruments

SeaTalk

The SeaTalk standard was originally developed by Autohelm (part of the Raytheon group), 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 instrument heads, without a central processor. SeaTalk equipment can also communicate with non-SeaTalk equipment via the NMEA standard.

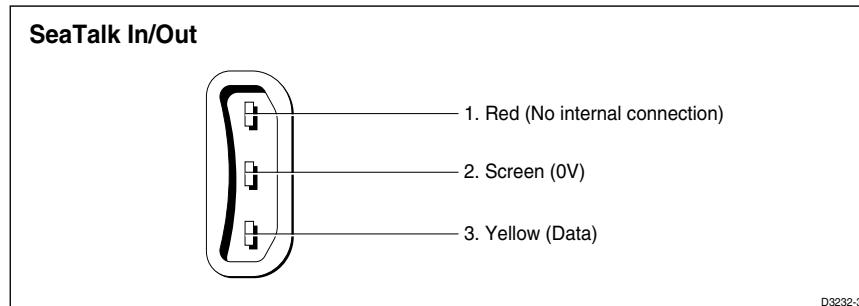
SeaTalk and
NMEA In

SeaTalk Connection

This connection is necessary for full functionality between HSB Series displays.

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:



The pin functions are as follows:

Pin No.	Function	Colour
1	+12 V	Red
2	0 V	Screen
3	Data	Yellow

Notes:

1. If you use the SeaTalk connector, you must fit a ferrite (part number R55007) 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 (except where SeaTalk is connected only between two HSB displays).
3. If you are connecting an active compass to the radar, 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 8.2 for further details.

SeaTalk and
NMEA In

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.

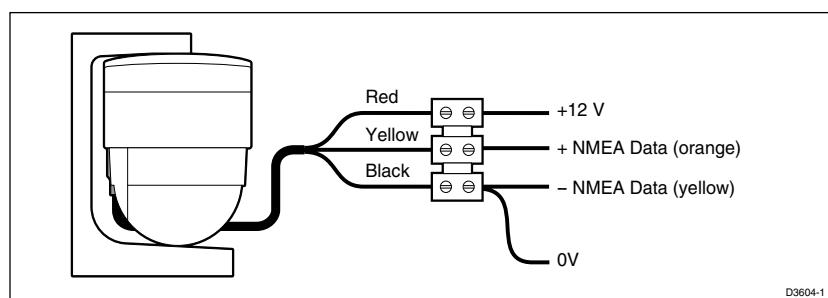
NMEA Input Connection

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 cores (Channel 1) and/or the green and blue cores (Channel 2). Refer to *Section 8.6, Power and NMEA Input Connection* for further details.

For example, to connect a Raytheon 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 fitted, it may be convenient to connect the power to the SeaTalk auxiliary junction box described in the following section.

SeaTalk and
NMEA In



Using the SeaTalk Auxiliary Junction Box

A junction box (provided with the RL70RC and RC520, optional with the RL70) is used to connect the SeaTalk GPS system (or any other SeaTalk instrument) to the HSB Series 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 HSB Series display NMEA In connection, or alternatively, for connecting a NMEA GPS system.

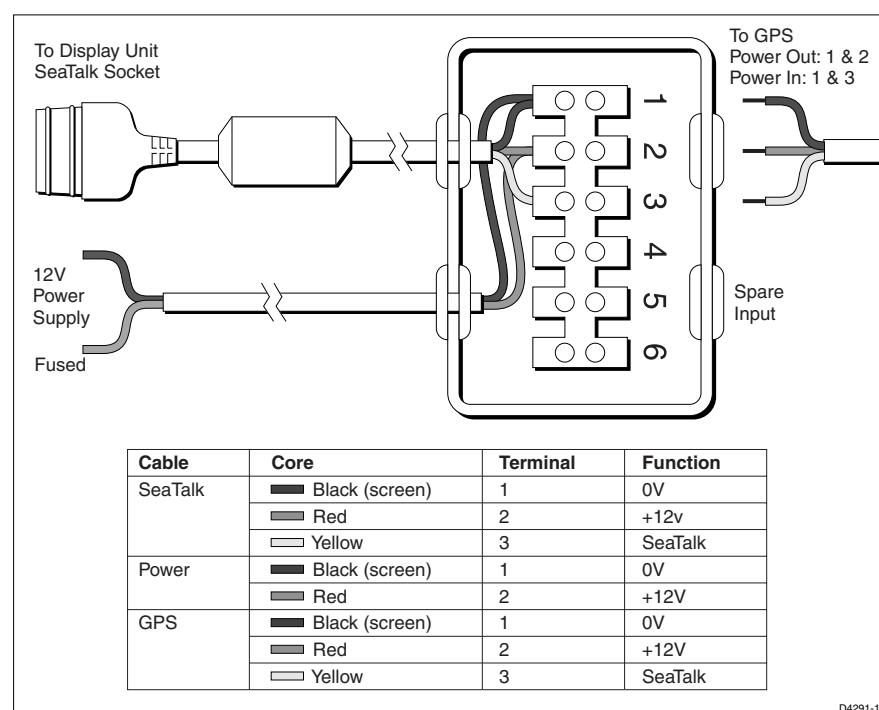
The junction box includes:

- 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

The illustration below shows how to connect the junction box; *Appendix B* provides connection details for specific Raytheon, Apelco and Autohelm GPS and Beacon Receiver systems.

CAUTION

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



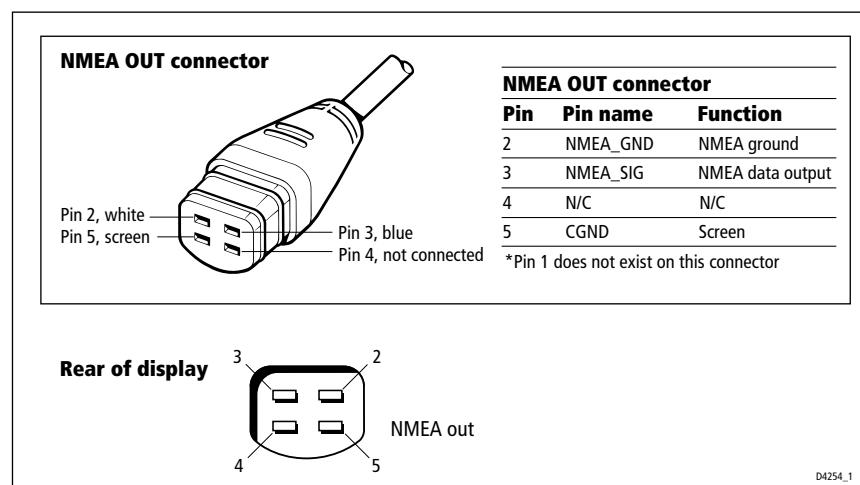
Using the SeaTalk
Auxiliary Junction
Box

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.

The SeaTalk input/output connection is detailed on *page 163*.

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



Data Conversion

The HSB Series 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. For example, if you have a master and a repeater display, you only need to connect NMEA In to the master display, which will pass the data to the repeater via SeaTalk.

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

8.9 Integrated System Checks

Chart Display - RL70RC, RC520

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 fitted, select the Chart display mode and select a suitable range scale. Verify that the world map is visible.
Use the trackball 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 centre 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, or select Radar mode and check heading is displayed in the Status Bar.

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 is fitted with a ferrite clamp to ensure EMC conformance.*



Chapter 9: Maintenance and Problem Solving

This chapter provides information on routine maintenance and on possible causes of problems you may experience with your HSB Series display unit. Refer to the *Pathfinder Radar Scanner Owner's Handbook* for scanner maintenance details.

9.1 Maintenance

Warnings



The display unit and scanner unit contain *high voltage*. Adjustments require specialised 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 or any internal covers in the scanner.*

Always turn the radar system off before carrying out any routine maintenance on the scanner or nearby equipment. Switch off the display unit before removing the power cord.

Routine Checks

The LCD display is a sealed unit. Maintenance procedures are therefore limited to the following periodical 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.

EMC Servicing and Safety Guidelines

- Raytheon equipment should be serviced only by authorised Raytheon service engineers. They will ensure that service procedures and replacement parts used will not adversely affect performance. There are no user serviceable parts in any Raytheon product.
- High voltages are generated in both the scanner and the display unit. Never handle the cables/connectors when power is being supplied to the equipment.
- Always report any EMC related problem to your nearest Raytheon dealer. We will use any such information to improve our quality standards.

9.2 Resetting the System

There are four types of reset available for the Pathfinder Radar:

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

CAUTION:

The factory reset clears the radar unit's Marks database, and in chartplotter units, the Waypoints and Routes databases.

- **Advanced Settings Reset:** Radar units only – this resets the advanced radar settings back to their factory defaults (see *Section 7.5*).
- **Power-On Reset:** When you turn the display off and on again, the screen reverts to the radar or 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 with all windows and grouped data boxes 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.

Item	Power-on setting
Heading Mode	Head Up (radar); North Up (chart)
Rain	OFF (but value stored) – radar only
FTC	OFF (but value stored) – radar only
Alarm	ON, with last-used value
Zoom	OFF
Windows	OFF
Contrast Level	Within 30-70% range, if last-used value outside this range
Backlight Level	ON at 42% if previously selected

► To perform a factory reset:

1. Put the radar into Standby mode.
2. Press **MENU**.
3. Press the SYSTEM SET UP soft key to display the System Set Up page (see *Section 7.3* for details).
4. 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 radar system restarts, with the magnetron countdown sequence.

The factory default settings are listed in *Section 7.5*.

9.3 Problem Solving

All Raytheon products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programmes. 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 Raytheon Product Support Department for further advice.

Always quote the product serial numbers. The display unit serial number is printed on the back of the unit, and the scanner serial number is on the back of the scanner near the gland.

Common Problems and Their Solutions

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.
"Scanner not responding" message.	Check that the cable connecting the scanner to the radar display unit is firmly attached and undamaged.
The bearing displayed on the radar display is not the same as the actual bearing.	Perform the bearing alignment procedure described in section 8.7.

How to Contact Raytheon (US)

For Marine Product and Services Information

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

www.raymarine.com

For Accessories and Parts

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

1-800-539-5539 extension 2333 or (603) 647 7530 extension 2333.

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

Please have the Raytheon 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. 2065 to verify your requirements.

For Technical Support:

For technical support, call:

1-800-539-5539 extension 2444 or (603) 647-7530 extension 2444.

The Raytheon Fax number is 1-603-634-4756.

Our Technical Support Specialists are available to answer questions about installing, operating and trouble-shooting all Raytheon products. Questions may be addressed directly to our Technical Support Department via e-mail at:

rmc_tech_raytheon@raymarine.com.

For Product Repair and Service

In the unlikely event your Raytheon unit should develop a problem, please contact your authorized Raytheon 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 :

Raytheon Product Repair Center
676 Island Pond Road
Manchester, NH 03109-5420

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 extension 2118.

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 Raytheon (Europe)

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

Raytheon Marine Company
Anchorage Park, Portsmouth
PO3 5TD, England
Tel : (+44) 1705 693611
Fax: (+44) 1705 694642

Our technical support staff may also be reached via e-mail. Questions may be addressed directly to:

techsupra@raytheon.com.

Or visit the Raytheon Marine World Wide Web site:

www.raymarine.com

Technical Support

The Customer Services Department handles enquiries concerning installation, operation, fault diagnosis and repair.

Accessories and Parts

Raytheon accessory items and parts are available through your authorised Raytheon dealer. Please refer to the lists of component part numbers and optional accessories in the Installation chapter of this manual, and have the Raytheon part number ready when speaking with your dealer.

If you are uncertain about what item to choose for your Raytheon unit, please contact our Customer Services Department prior to placing your order.

Worldwide Support

Please contact the authorised distributor in the country. A list of worldwide distributors is supplied with your system.

How to Contact
Raytheon (Europe)



Appendix A: Specification

HSB Series 7" LCD Displays

General

Approvals	
CE - conforms to	89/336/EEC (EMC), EN60945:1997
FCC - conforms to	Part 80 (47CFR) and Part 2 (47CFR)
Size	222 x 204 x 75 mm (8.8" x 8" x 3"), excluding bracket
Weight	1.2 Kg (2.6 lbs)
Mounting	Trunnion with panel mount option
Power	External 10.7 - 44 V DC required 10 W consumption with full backlighting Floating earth/fully isolated
Environmental	Waterproof to CFR46; suitable for external mounting Temperature range: -10°C to +70°C Humidity limit: up to 95% at 35°C
Controls	11 defined keys, 4 soft keys and trackpad
Cursor	Context sensitive, provides range/bearing or lat/lon
Display Type	7" Film Super Twist Neumatic-(FSTN) LCD, monochrome with 4 grey scales
Resolution	320 x 240 (1/4VGA) portrait
Display Size	7" diagonal (143 x 111 mm)
LCD Contrast	64 levels, selectable via soft keys.
Illumination	Screen: 8 levels of backlighting Keypad: 3 levels of backlighting
Languages	UK English, US English, Danish, French, German, Dutch, Italian, Norwegian, Portuguese, Spanish, Swedish, Finnish
Connectors	13 pin scanner 3 pin HSB input/output 3 pin SeaTalk input/output 7 pin power including 2 NMEA input channels 4 pin NMEA output
Interfaces	1 x SeaTalk, receive and transmit 1 x HSB, receive and transmit 2 x NMEA 0183, receive 1 x NMEA 0183, transmit C-MAP cartridge reader - 2 slots (RL70RC and RC520)

Cursor Echo	Cursor Echo between radar and chart on split screen and/or 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

Radar Features

Range Scales (Range Rings)	0.125 (0.0625), 0.25 (0.125), 0.5 (0.125), 0.75 (0.25), 1.5 (0.25), 3 (0.5), 6 (1), 12 (2), 24 (4), 48 (8) or 72 (12) nm selectable (dependent on scanner). Performance limited by the scanner type and position. Range scales can be customised
Range Ring Accuracy	Better than +/- 1.5% of the max. range scale in use, or 22 m (72 ft), whichever is the greatest
Bearing Accuracy	+/- 1°
Variable Range Markers	2xVRMs, readout nm, kyds, sm, km
Electronic Bearing Lines	2xEBLs, floating if required, resolution 1°
Bearing Scale	360° graduated at 10° intervals
Minimum Range	23 m (25 yds)
Range Discrimination	23 m (25 yds)
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic)
Scanner Control	Interference rejection, standby/transmit modes, pulse selection, Tune, Rain, FTC, and Sea controls, with selection of manual or automatic control of gain, sea clutter and tune (Auto GST™)
Magnetic Sensor	NMEA or Seatalk
Waypoint Navigation	Lollipop symbol, WPT range, bearing, TTG or lat/lon readout
Marks	100 Mark database
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual
Guard Zone Alarm	2 guard zones, selectable sensitivity level, audible alarm
Radar/Chart Synchronisation	User selectable in split screen mode provided chart data available
Zoom Mode	x2, from 0.25 nm to maximum range, in 1/4 window

Off Centre Function	66% of radius (except maximum range)
Display Windows	Radar, Chart, CDI, BDI and Navdata
Wakes	Short, medium, long, off
Target Expansion	Operator selectable (0.5 nm to 3 nm ranges only)
Timed TX	Rotation periods: 10, 20 or 30 scans Repetition periods: 3, 5, 10 or 15 minutes

Chartplotter Features

Cartography	C-MAP® NT micro cartridges available from C-MAP® Chart of the world built in
Display Windows	Chart, Radar, 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
Waypoint Transfer	HSB, 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
Track History	10 tracks with up to 500 points in each can be stored in the units internal memory
Alarms	Programmable arrival, cross track error, anchor drift, 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
Chart/Radar Synchronisation	User selectable in split screen mode provided radar/chart data available

Interfacing

High Speed Bus	Fully independant use of remote Chart data if present on HSB. Full remote control and display of Radar data if present on HSB
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 and ZDA)
SeaTalk Output	Cursor data, Guard zone alarm and Navigational data bridged from NMEA
NMEA Output	APB, BWC, CGA, GLL, RMB, RMC, VTG, WPL, ZDA

Appendix B: Using the Auxiliary Junction Box to Connect a SeaTalk GPS and Differential Beacon Receiver

Note: *With the exception of the Raystar 114, when you use the following Differential Beacon Receiver configurations, the receiver must be set to AUTO MODE in the GPS Set-Up page. Manual selections will not be accepted. Refer to Chapter 6 for details.*

The recommended method of providing position, course over ground and speed over ground information to the HSB displays is by connection to a SeaTalk GPS. The HSB series chartplotter displays are supplied with an Auxiliary Junction Box, whose main purpose is to make this connection easier. The junction box has two flying leads, one with a SeaTalk plug for connection to the display and the other lead is for connection to a 12V power supply (the display does **not** provide power for the GPS).

The following sections detail the connections to the Auxiliary Junction Box for several different types of GPS, including a beacon receiver if fitted. Except for Raystar 114, the differential beacon receivers used are Raytheon NRD-2A, Apelco BR101 and the Autohelm Beacon Receiver.

The connections detailed in the following sections ensure that the GPS will always operate in SeaTalk mode. Note that the Raystar 112LP must be the SeaTalk version.

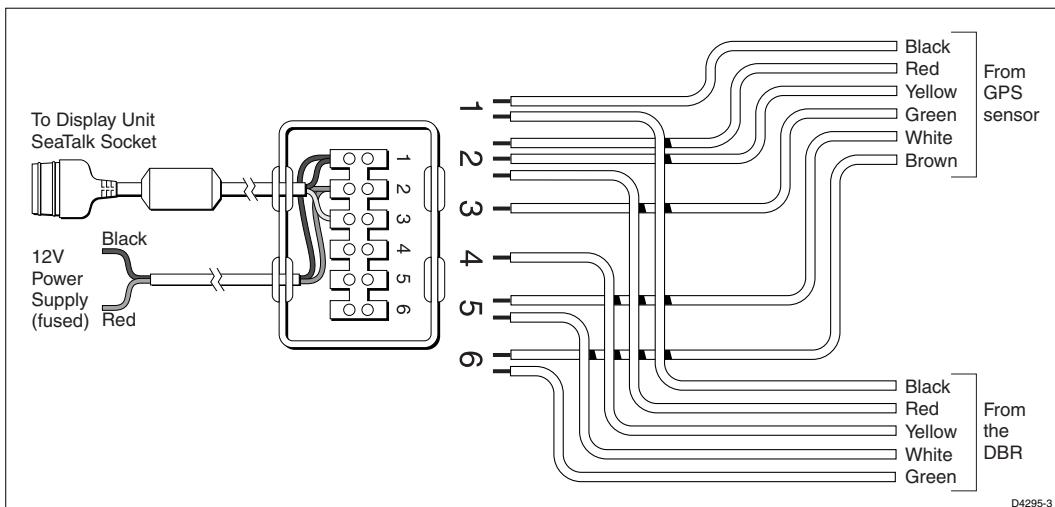
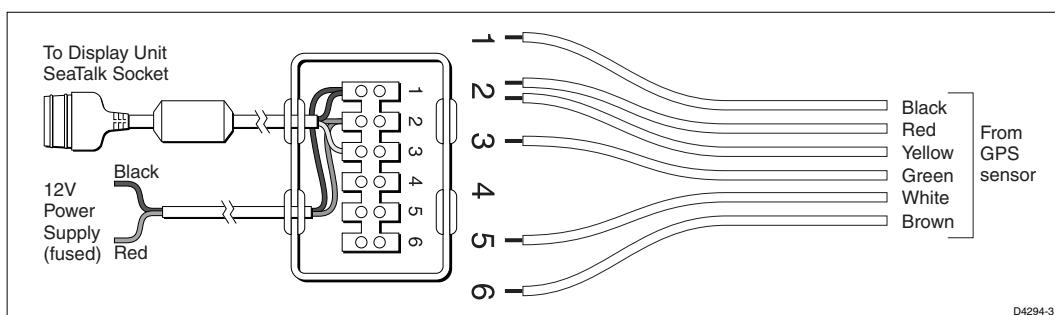
Raystar 112, 105, Apelco 182 and 182XT

In order to connect your GPS to your Chartplotter or Combined Radar/Chartplotter, you must first cut off the 6-pin connector and strip back the insulation on all the wires. Connect to the Auxiliary Junction Box as shown in the first illustration below.

To connect your Differential Beacon Receiver, you must cut off the 5-pin connector (Raytheon and Apelco versions), strip back the insulation on all the wires and connect to the Auxiliary Junction Box as shown in the second illustration below.

CAUTION

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



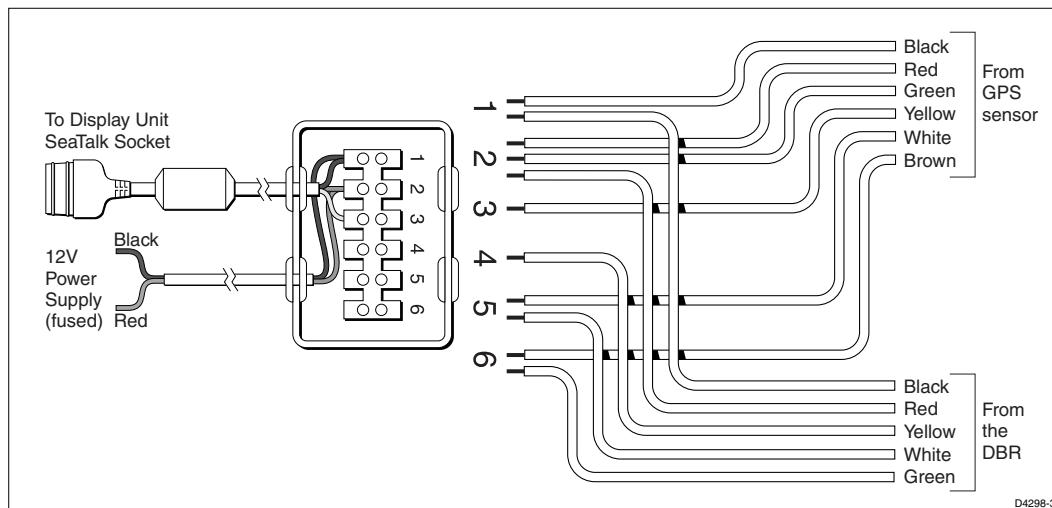
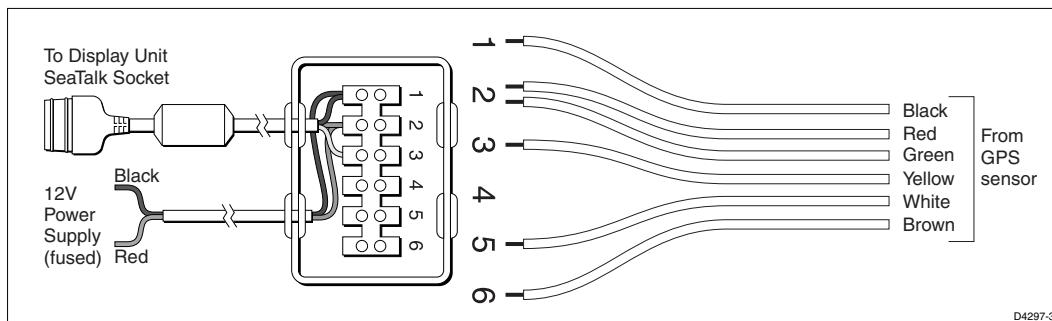
Autohelm GPS, Z260 and Z273

To connect your GPS to your Chartplotter or Combined Radar/Chartplotter connect the wires as shown in the first illustration below.

To connect your Differential Beacon Receiver, you must cut off the 5-pin connector (Raytheon and Apelco versions) strip back the insulation on all the wires and connect to the Auxiliary Junction Box as shown in the second illustration below.

CAUTION

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



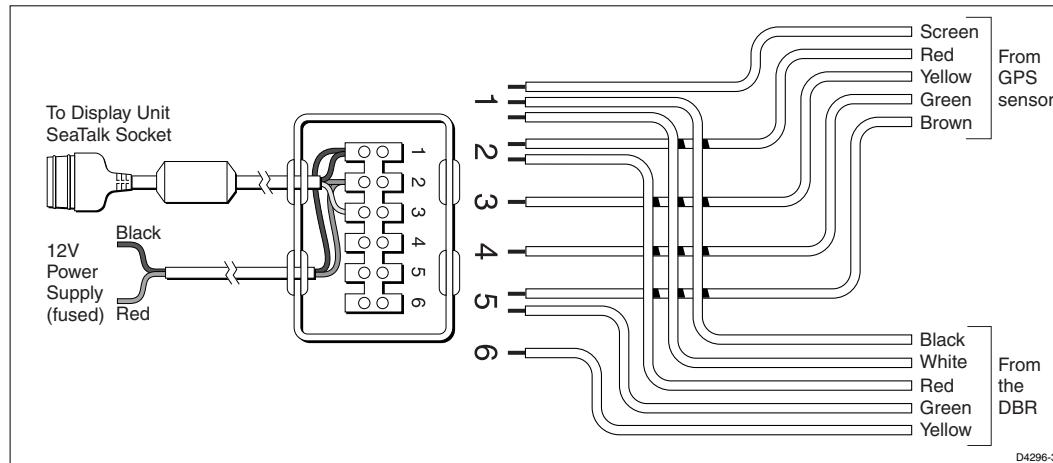
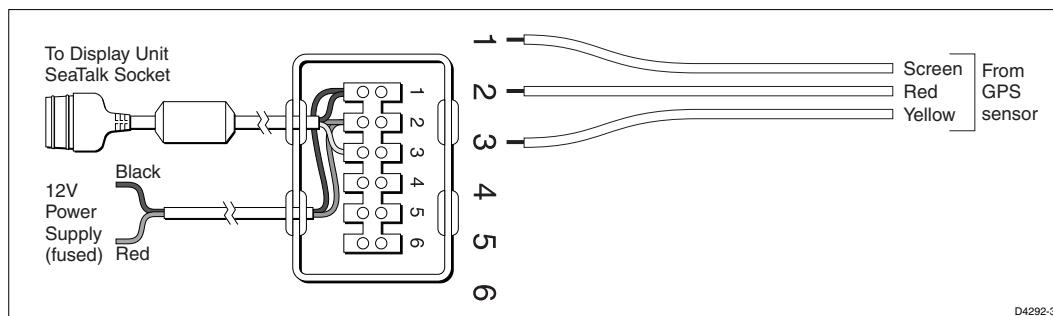
Raystar 112LP (SeaTalk version)

To connect your Raystar 112LP to your Chartplotter or Combined Radar/Chartplotter, refer to the first illustration below or follow the instructions in *Chapter 8*.

To connect the Raystar 112LP and your Differential Beacon Receiver, cut off the 5-pin connector and strip back the red, black and green wires. Remove the sleeve from the end of the Raystar 112LP cable to expose the green and brown wires, then connect to the Auxiliary Junction Box as shown in the second illustration below.

CAUTION

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



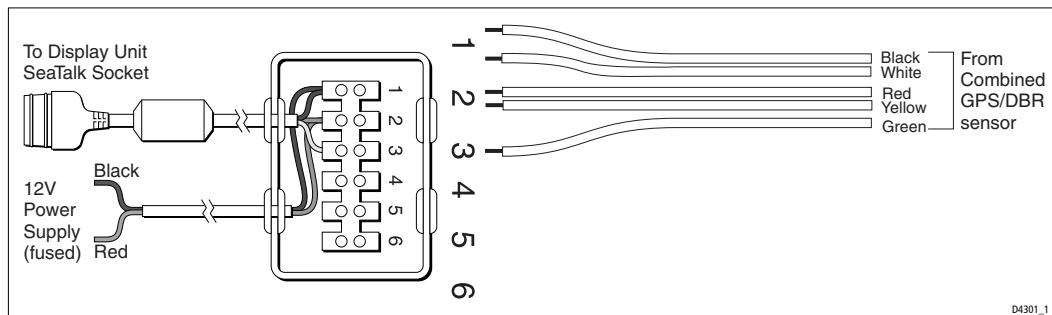
Raystar 114 Combined GPS and Differential Beacon Receiver

To connect your Raystar 114 Combined GPS and Differential Beacon Receiver to your Chartplotter or Combined Radar/Chartplotter, cut off the 5-pin connector, strip back the insulation on all the wires and connect to the Auxiliary Junction Box as shown in the illustration below.

CAUTION

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

Note: You can use the GPS Set-Up page to manually tune the Raystar 114. Refer to Chapter 6 for details.





Appendix C: 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, Sh – shingle, R – rock.

The chartplotter RC520 and RL70RC 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 customised icons off/on. The factory default for the CUSTOM options is on.

The chart features controlled from the Customise 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 trans- -ponder beacon Radio station
LIGHT SECTORS	Light Sectors		

CAUTION & ROUTING DATA	Caution Areas	Tracks and Routes
Caution area	Deep water route part	
Fishing facility	Deep water route centreline	
Marine farm/culture	Fairway	
Cable, submarine	Ferry route	
Cable area	Navigation line	
Offshore prod'n area	Precautionary area	
Pipeline	Radar line	
Pipeline area	Radar range	
Anchor berth	Radio calling	
Anchorage area	Recommended route centreline	
Cargo transhipment area	Recommended track	
Contiguous zone	Recommended traffic lane part	
Continental shelf area	Traffic separation line	
Custom zone	Traffic separation scheme boundary	
Dumping ground	Traffic separation scheme crossing	
Exclusive economic zone	Traffic separation scheme lane part	
Fishery zone	Traffic separation scheme roundabout	
Fishing ground	Traffic separation zone	
Free port area	Two-way route part	
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		

MARINE FEATURES	Tideways & Currents	Seabed bottom
Tideway	Sand waves	
Water turbulence	Seabed area	
Tide height	Spring	
	Weed/Kelp	

LAND FEATURES	Natural Features	Cultural Features	Landmarks
Coastline	Airport area	Building, religious	
Dune	Built-up area	Building, single	
Hill	Railway	Cemetery	
Land elevation	Road crossing	Fortified structure	
Land region	Road part	Siloway route part	
Land	Runway	Tank	
Salt pan	Sloping ground	Chimney	
Slope topline	Square	Dish aerial	
Tree	Cable, overhead	Flagstaff/Flagpole	
Vegetation area	Fence	Flare stack	
Natural Features - Rivers		Pipeline, overhead	Mast
Canal	Pylon	Monument	
Canal bank	Telepheric	Radar dome plane landing	
Rapids	Tunnel entrance	area	

River	Tower
River bank	Windmill
Waterfall	Windmotor
Lake	
Lake shore	
ICON DISPLAY	Complex (detailed) object/Simple object

Appendix C:
C-Map Chart Card
Features

The following chart features are always displayed:

PORts	Ports:	Services	Port Information
Berthing facility	Coastguard station	Port area	
Causeway	Pilot boarding place	Harbour master	
Checkpoint	Rescue station	Coast Guard	
Crane	Signal station, traffic	Police	
Dam	Signal station,	Customs	
Distance mark	warning	Health emergency	
Dock area		Post office	
Dry dock		Yacht club	
Dyke area		Boat yard	
Dyke crown		Accessories	
Floating dock		Electrical/electronic repairs	
Gate		Engine repairs	
Gridiron		Sailmaker	
Harbour facility		Fishing/diving gear, SCUBA	
Hulk		Hotel/Inn	
Landing place		Restaurant	
Landing stairs		Bank/Exchange office	
Lock basin		Pharmacy	
Oil barrier		Port/Marina	
Pile		Slipway	
Pontoon		Boat hoist	
Ramp		Crane	
Shoreline construction		Fuel station	
Slipway		Water	
Weir		Electricity	
Small craft facility		Showers	
		Laundrette	
		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
ROCKS	Underwater Rock
WRECKS	Wrecks
DEPTHES 1	Depth area
DEPTHES 2	Dredged area
DEPTHES 3	Intertidal area
POR TS	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 D: 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 Identifier	SeaTalk, RMB, APB, BWC, BWR
Bearing to Waypoint	SeaTalk, RMB, BWC, BWR
Distance to Waypoint	SeaTalk, RMB, BWC, BWR
Cross Track Error (XTE)	SeaTalk, RMB, APB, 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	HDG, HDM, HDT, VHW, SeaTalk,
Locked Heading	SeaTalk only (Autopilot / Steering Compass)
Magnetic Variation	SeaTalk, RMC, RMA, HDG
Rudder Angle	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)	SeaTalk only
Cursor Range and Bearing (from Radar)	SeaTalk only
Global Alarms - SeaTalk Only	Watch alarm, Wind alarm, Autopilot alarms, Depth alarms, Waypoint arrival
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 HSB Series display unit transmits the following data, if available, on SeaTalk:

Data Output	SeaTalk	NMEA Out
Position	✓	CGA, GLL, RMC ¹
Speed Over Ground and Course Over Ground	✓	RMC, VTG ¹
Waypoint Data	✓	RMB, APB, BWC, BWR ¹
Depth	✓	
Apparent Wind Angle and Speed	✓	
Boat Speed Through Water	✓	
Total Log and Trip Log	✓	
Water Temperature	✓	
Heading	✓	
Magnetic Variation	✓	
Time	✓	ZDA
Date	✓	ZDA
MOB data	✓	
Cursor Range & Bearing	✓	RSD ²
EBL/VRM Data	—	RSD ²
Heading mode	—	RSD ²
Radar display range	—	RSD ²
Waypoint/Route Transfer	—	WPL, RTE

¹ When available, NMEA OUT data is transmitted from RL70RC and RC520, or from RL70 if connected to a Chart display via HSB.

² When available, NMEA OUT data is transmitted from RL70 and RL70RC, or from a RC520 if connected to a Radar display via HSB

Abbreviations

A	Amp
ANSI	American National Standards Institute
AWG	American Wire Gauge
BDI	Bearing and Distance Indicator
Brg	Bearing
CDI	Course Deviation Indicator
CFR	Code of Federal Regulations
CMG	Course Made Good
COG	Course Over Ground
CRT	Cathode Ray Tube
CTR	Centre
dB	deciBels
DC	Direct Current
DMG	Distance Made Good
DR	Dead Reckoning
EBL	Electronic Bearing Line
EMC	Electro Magnetic Compatability
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
HDG	Heading
HSB	High Speed Bus
Hz	Hertz
GHz	GigaHertz
MHz	MegaHertz
IEEE	Institute of Electrical & Electronic Engineers
in, "	inch
Kg	kilogram
kW	kilo Watt

Abbreviations

Abbreviations

lat	latitude
lbs	pounds
LCD	Liquid Crystal Display
lon	longitude
M	Magnetic
m	metres
MBS	Main Bang Suppression
mm	millimetre
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
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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Limited Warranty Certificate

Raytheon Marine Company warrants each new Light Marine/Dealer Distributor Product to be of good materials and workmanship, and will repair or exchange any parts proven to be defective in material and workmanship under normal use for a period of 2 years/24 months from date of sale to end user, except as provided below.

Defects will be corrected by Raytheon Marine Company or an authorized Raytheon dealer. Raytheon Marine Company will, except as provided below, accept labor cost for a period of 2 years/24 months from the date of sale to end user. During this period, except for certain products, travel costs (auto mileage and tolls) up to 100 round trip highway miles and travel time of 2 hours, will be assumed by Raytheon Marine Company only on products where proof of installation or commission by authorised service agents, can be shown.

Warranty Limitations

Raytheon Marine Company Warranty policy does not apply to equipment which 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.

Except where Raytheon Marine Company or its authorized dealer has performed the installation, it assumes no responsibility for damage incurred during installation.

This Warranty does not cover routine system checkouts or alignment/calibration, 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 Raytheon Marine Company or authorized service agent at the time of request for Warranty service.

Consumable items, (such as: Chart paper, lamps, fuses, batteries, styli, stylus/drive belts, radar mixer crystals/diodes, snap-in impeller carriers, impellers, impeller bearings, and impeller shaft) are specifically excluded from this Warranty.

Magnetrons, Cathode Ray Tubes (CRT), hailer horns and transducers are warranted for 1 year/12 months from date of sale. These items must be returned to a Raytheon Marine Company facility.

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.

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 Raytheon Marine Company facility or an authorized dealer at owner's expense 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.

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(1) THIS WARRANTY IS STRICTLY LIMITED TO THE TERMS INDICATED HEREIN, AND NO OTHER WARRANTIES OR REMEDIES SHALL BE BINDING ON RAYTHEON MARINE COMPANY INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(2) Raytheon Marine Company shall not be liable for any incidental, consequential or special (including punitive or multiple) damages.

All Raytheon Marine Company 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 Raytheon equipment.

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