3. Select a configuration.
4. Press the **SELECT DATA…** softkey.
5. In the Data Groups window, select **Engine**.
6. Select **Engine Tilt** or **Trim Tabs**.

Genset data

To display genset data:

1. Press the **SELECT DATA…** softkey.
2. In the Data Groups window, select **Genset**.

For a list of the data you can display for each genset, see *Table 19-1, Genset Data Options*.

Table 19-1: Genset Data Options

Data	Data type	Data range
Speed	Numeric or gauge	—
Total hours	Numeric	—
Coolant temperature	Numeric or gauge with numbers	0–150ºC 0–300ºF
Fuel temperature	Numeric or gauge	0–150ºC 0–300ºF
Oil pressure	Numeric or gauge with numbers	0–100 PSI 0–7 bar 0–750 KPa
Fuel rate	Numeric	—
Battery voltage	Numeric or gauge with numbers	8–24V
Average line voltage	Numeric or gauge with numbers	8–24V
Average AC frequency	Numeric	—
Status	Text	—
Load	Numeric or gauge	0–100%

To change the number of gensets

The default number of gensets is one. You can configure the unit to display data for up to four gensets:

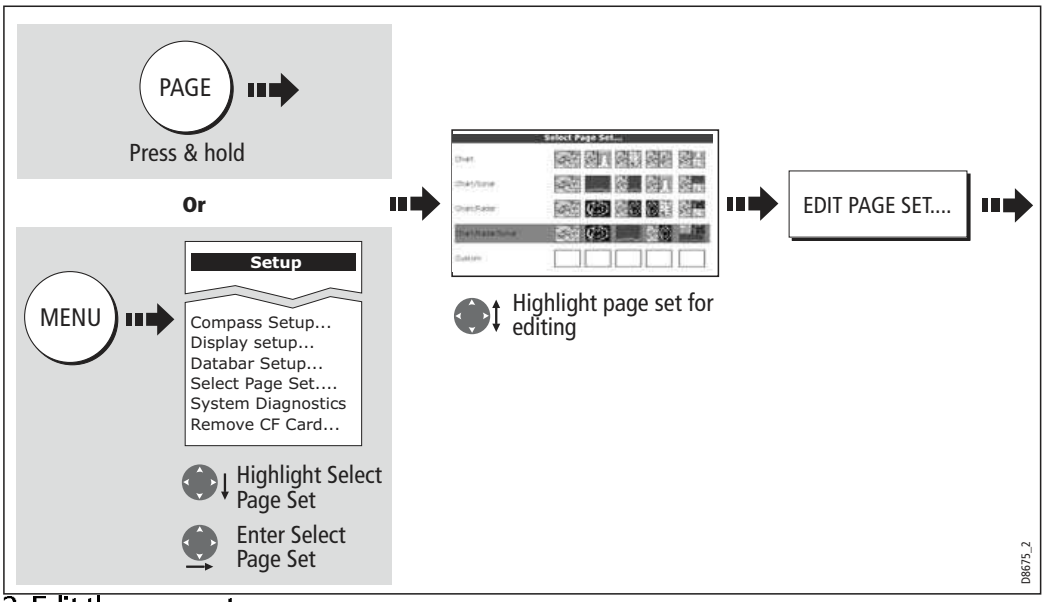
1. Press the **MENU** button.
2. Select **Panel Setup Menu…**

3. Select **Number of Gensets.**

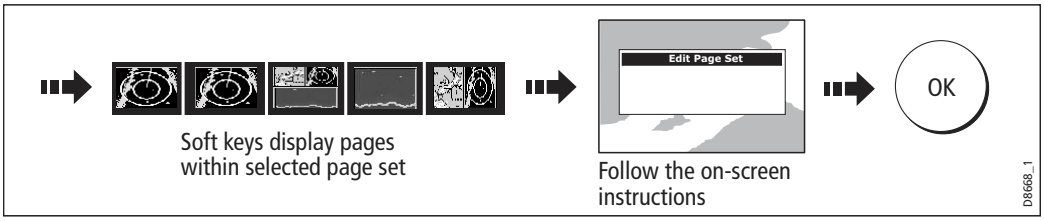
Reconfiguring the application and page layout

To change the configuration of applications and/or page layout or switch off pages:

1. Select the edit page set option:



2. Edit the page set:



Note: Only one video application can be viewed per page.

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

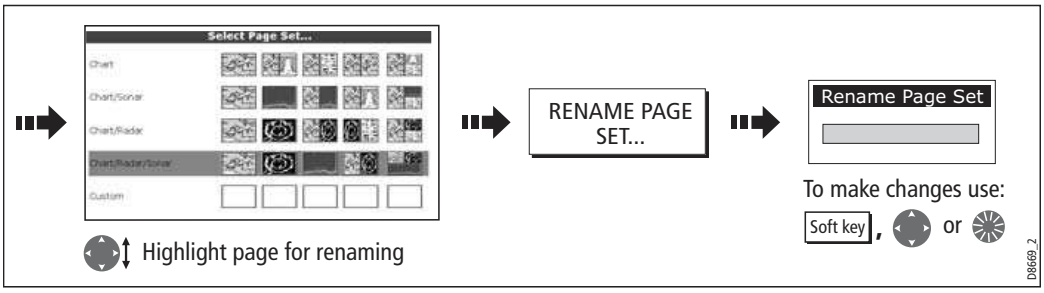
If you do not want to use all 5 pages in a page set, you can switch off individual pages. When you use PAGE to cycle through the pages, the system will now skip any pages that are set to OFF.

Note: A red cross will be overlaid on soft keys associated with pages set to OFF.

Rename a page set

If required, you can customize the names of the page sets:

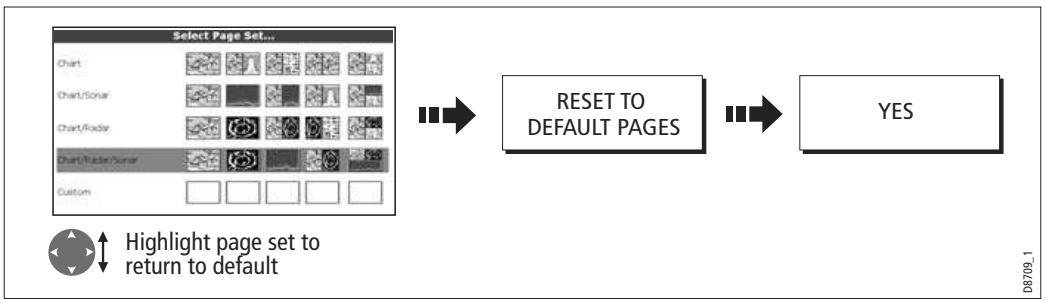
1. Display the Select Page Set Menu, as described on *page 275*
2. Rename the page set:



Return to default setting

To return a page set to the default configuration and name:

1. Display the Select Page Set Menu, as described on *page 275*.
2. Reset the page set to the default:



19.3 Changing the databar

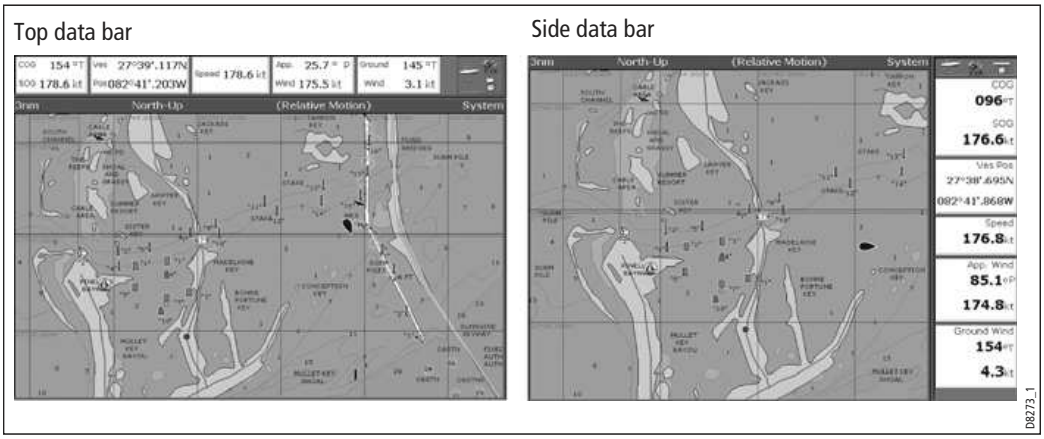
You can change the data bar to meet your own particular needs. This includes:

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

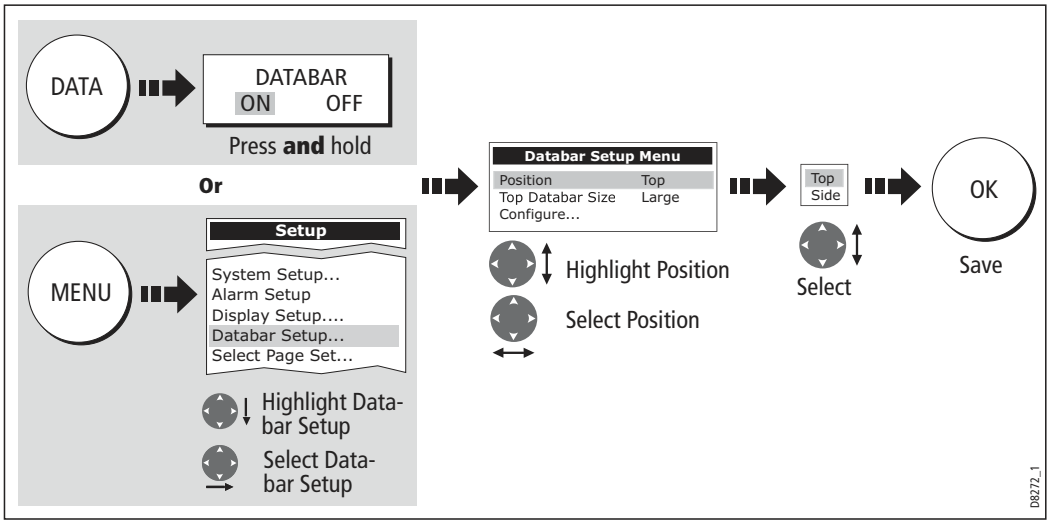
Note: *The databar configuration is a local setting and will therefore only affect the individual display on which you are working.*

Databar position

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

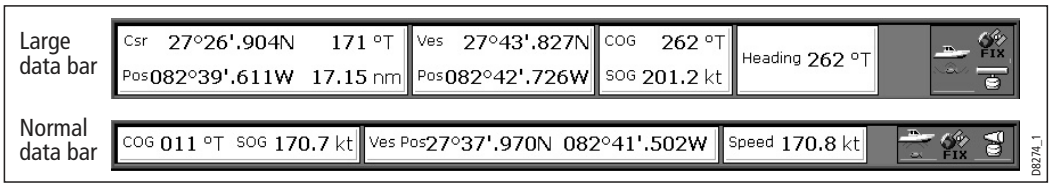


To change the data bar position:

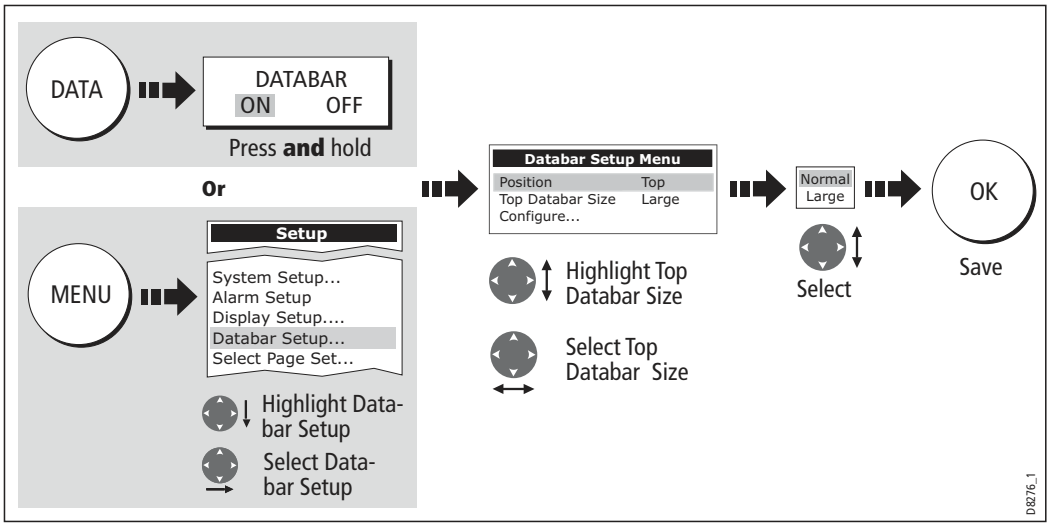


Data bar size

When the data bar is positioned at the top of your screen, you have the option of displaying the bar in either a Large or Normal format. The large bar provides more data:

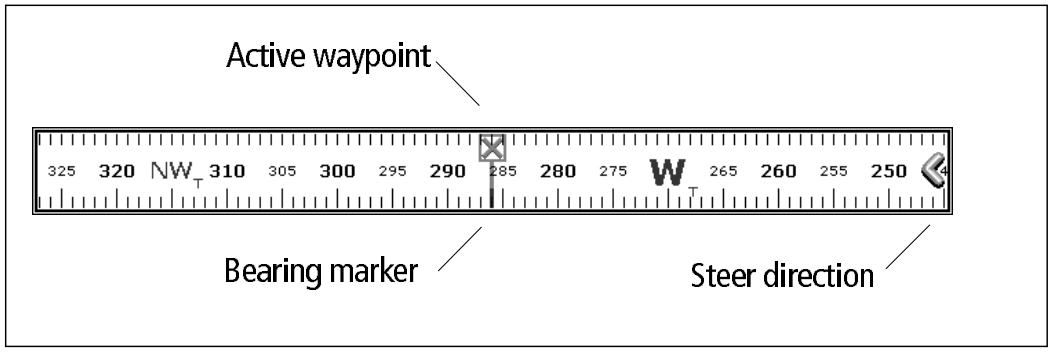


To change the data bar size:



19.4 Compass bar

The compass bar gives you a continuous readout centred on your current heading or course over ground (COG). Arrows at either end of the bar indicate current steer direction.



- In **heading** mode, the bearing marker is **RED**.
- In **COG** mode, the bearing marker is **GREEN**.
- When you use the compass bar with an **active waypoint**, the bearing marker is **BLUE** and the active waypoint symbol indicates the bearing to your waypoint.

Turning the compass bar on and off

You turn the compass bar on and off from the data toolbar.

- Press the **DATA** button.

Use the **DATABAR** softkey to turn the compass bar on or off.

Table 19-2: DATABAR Softkey Options

ON	Displays the standard databar, at the top or side of the screen depending on your setup options.
COMPASS	Replaces the standard databar with the compass bar, displayed along the top of the screen.
OFF	Removes both the databar and the compass bar from your display.

Note: *When the compass bar is displayed the transducer icons remain visible in the top-right section of the screen.*

Compass bar setup

The compass bar is set to open in heading mode. To change this setting, press the **MENU** button and go to the Databar Setup menu where you can select either Heading or COG.

Note: *If MOB is activated while the compass bar is open, the compass is replaced with the MOB toolbar. The compass bar returns when you cancel the active MOB.*

Customizing the contents of the data bar

You can customize your data bar so that it contains the particular information that you require. The table that follows, shows the available data.

Data groups	**Data** (abbreviations in brackets)
VESSEL	Vessel position (Ves Pos) Course over ground/Speed over ground (COG/SOG) Heading Speed Wind velocity made good (VMG Wind) Waypoint velocity made good (VMG Wpt) Log trip* Log Trip Ground Log/Trip 1 Ground Log Ground Trip 1 Ground Trip 2 Ground Trip 3 Ground Trip 4 Rudder
NAVIGATION	Cross track error (XTE) Waypoint (WPT)
DEPTH	Depth
ENVIRONMENT	Pressure Air temperature (Air Temp) Sea temperature (Sea Temp) Set drift
WIND	True wind Apparent wind (App Wind) Ground wind
TIME AND DATE	Local time Local date
CURSOR POSITION	Cursor position (Csr Pos)
TRANSDUCER STATUS	Transducer status

*** Trip log**

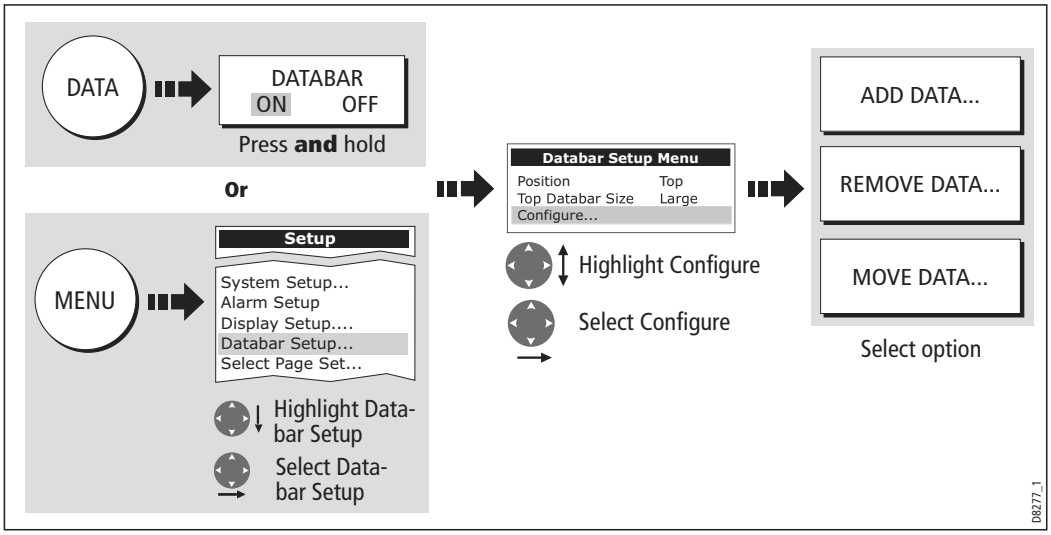
You can view the total distance travelled (Log) and the distance since you last applied a reset (Trip) based on your speed through water (STW).

In addition you can include in your data application or databar, ground log and four ground trip counters based on your GPS position. These counters are updated every minute.

If the GPS fix is lost or if the system simulator is switched on, the system will pause the ground log and trip counters. When the GPS fix returns, or the system simulator is switched off, the ground log and trip counters resume.

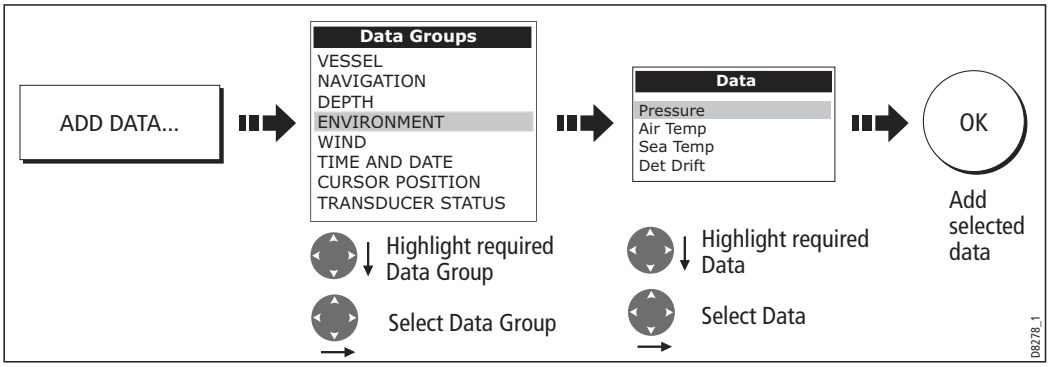
Selecting the configure options

To select the configure options for the data bar:



Adding data

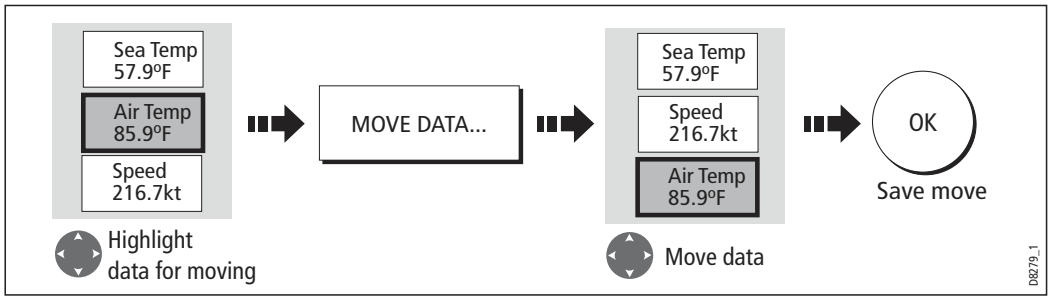
Once you have selected the configure option (see above), you can add new data:



When the data bar is positioned to the side of your screen, a new selection is added at the top of the bar. When the data bar is positioned across the top of your screen, a new selection is added on the left. Existing data moves down as new data is added.

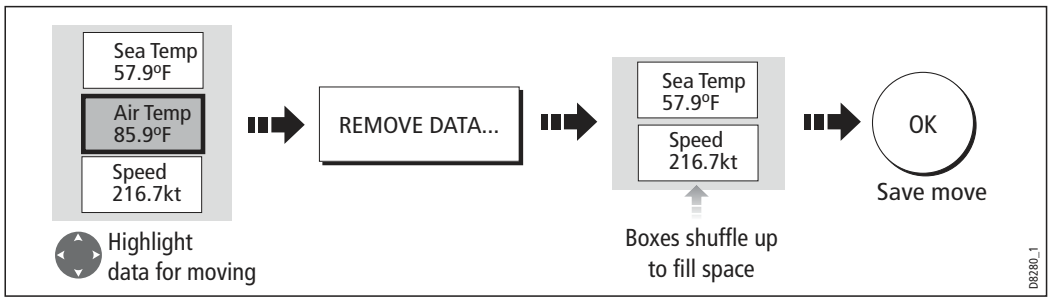
Moving data

Once you have selected the configure option (see above), you can move data within the bar.

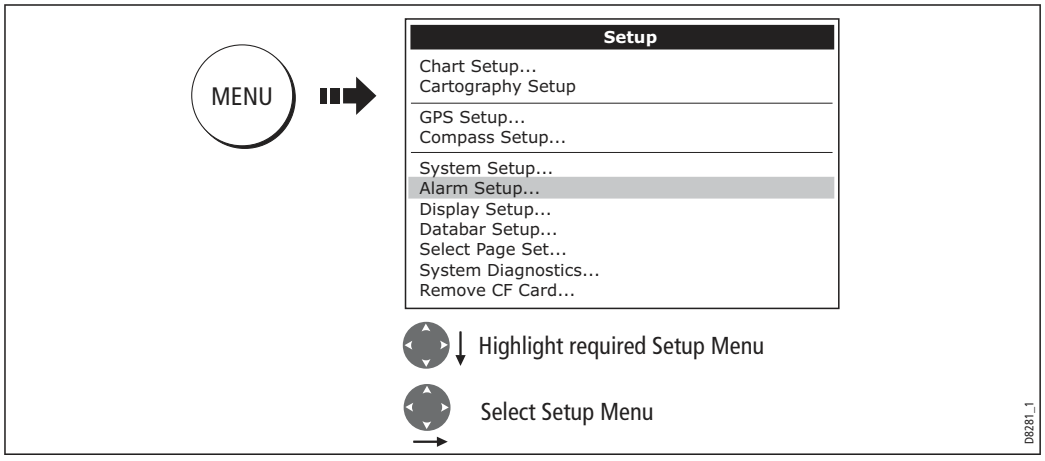


Removing data

Once you have selected the configure option (see above), you can remove data within the bar.



19.5 Changing the set up menu options



The Setup Menu contains application specific and system-wide menus:

Application specific

These menus relate to the application for the active window i.e. Chart, Cartography, Weather, Radar, Fishfinder, Video and Engine Monitor Setup.

For further details please refer to the appropriate chapter.

External equipment menus

These menus provide options to set-up external equipment that is connected to your system. They include AIS, Navtex, GPS and Compass setup.

The options that are available depend on what is connected to your system.

System-wide menus

These menus control functions throughout the system.

When you first power on your display the default values are used. The tables that follow show the sub-menus, default settings and options available.

In an E-Series Networked system, changes you make on one display affect all displays in the network, with the exception of Display Setup, Databar Setup and Select Page set.

System Setup

MENU ITEM	OPTIONS (Default in **bold**)
Position Mode Controls whether the position is expressed in latitude and longitude co-ordinates or Loran TDs.	**Lat/Long** TD's
TD Setup If the *Position Mode* is set to TD's, this function controls the selected chain identifier, slave and ASF.	Various
Simulator ON - allows operation of display without data from antenna and/or external data sources. Demo - a series of slides with descriptions to demonstrate the various system functions.	**OFF** ON Demo
Bearing Mode Mode of all bearing and heading data displayed. This does not affect how the chart or radar are drawn.	**True** Magnetic
MOB Data Type Selects whether position data or dead reckoning displayed on screen. Assuming your boat and the MOB are subject to same tide and wind effects, dead reckoning normally gives a more accurate course.	**Dead Reckoning** Position
Variation Source This allows you to compensate for the naturally occurring offset of the earths magnetic field. When set to AUTO, the value the system would use (or is using) is noted in the menu e.g. 4^0W. To enter your own variation value, set to MANUAL.	**Auto** Manual
Manual variation If Variation Source is set to MANUAL then use this setting to enter the variation value. This value is transmitted to any other SeaTalk instruments.	**0°E** Range 0 - 30° east/west
Language Selected language used for screen text, labels, menus, options and display format for lat/lon position information.	Selection available will vary according to your location.
Extended Character Set Controls whether additional accented characters are made available when you are entering text.	**OFF** ON
Ground Trip Reset... Resets the chosen ground trip distance counter to zero.	Ground Trip 1 - 4 Reset

MENU ITEM	OPTIONS (Default in **bold**)
Settings Reset Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are NOT removed.	
Settings and Data Reset Resets all system setup menus, including page sets and the data bar to the factory default. Waypoints, routes and tracks are deleted. *Networked systems only* - On the data master, the complete system database is deleted. On other displays, only routes, waypoints and tracks entered on that display are deleted. However, they will be restored by the Data Master display if available.	
Date /Time Setup	See sub-menu below
Units Setup	See sub-menu below
System Integration	See sub-menu below
Waypoint Password Set-up... Allows you to set up a password to protect access to your waypoint and route databases.	See *page 25*.

Date/Time Setup Menu

MENU ITEM	OPTIONS (Default in **bold**)
Date Format Displays date as day/month/year or month/day/year	mm/dd/yy **dd/mm/yy**
Time Format Displays either 12 or 24 hour clock	**12hr** 24hr
Local Time Offset Specify local time in increments of 0.5 hours (+/- 13) from the Universal Time Constant. Use rotary control for 0.5hr increments and trackpad to individually adjust the value of the tens, units, and tenths - system rounds to nearest 0.5 hr.	+/- 13hrs from UTC

Units Setup Menu

MENU ITEM	OPTIONS (Default in **bold**)
Distance Unit Choose the units you require distances to be displayed in.	**NM** Miles km

MENU ITEM	OPTIONS (Default in **bold**)
Speed Units Choose the units that you require speed to be measured in.	**Knots** MPH KPH
Depth Units Choose the units that you require depths to be measured in.	Meters **Feet** Fathoms
Temperature Units Select required temperate unit.	**Fahrenheit** Celsius
Pressure Units Select required pressure unit.	Bar **Psi** Kpa
Volume Units Select required volume unit.	US Gallons **Imp Gallons** Litres

*Note: When data figures are displayed at ranges of less than 1000 units, and with the distance units set to **NM** or **SM** the system changes default display units to **feet (ft)**, apart from **KM**, which defaults to **meters (m)**.*

System Integration Setup Menu

MENU ITEM	OPTIONS (Default in **bold**)
DSC Message When set to ON, details of distress DSC messages are displayed on screen	ON **OFF**
SeaTalk Alarms When set to enabled, all SeaTalk system alarms are received and displayed on the chartplotter.	**Enabled** Disabled
Data Master When set to ON, the display you are working on is defined as the master.	**ON** OFF
Bridge NMEA Heading Used to prevent NMEA heading data being bridged onto the SeaTalk bus. Switch this function off if you are using MARPA with an external fast heading sensor.	ON **OFF**
NMEA Output Setup Allows you to switch off individual NMEA out sentences	APB, BWC, BWR, DBT, DPT, GGA, GLL, MTW, RMA, RMB, RMC, RSD, RTE, TTM, VHW, VLW, VTG, WPL, ZDA

MENU ITEM	OPTIONS (Default in **bold**)
NMEA Port Setting Select the appropriate setting dependent on the equipment attached to the NMEA port for each individual display. When Navtex 4,800 or 9,600 selected, the option to view the Navtex message list is available.	**NMEA 4,800** Navtex 4,800 Navtex 9,600 AIS 38,400
ST290 System Select ON if your E-Series is connected to a SeaTalk^2 system.	**OFF** ON
SeaTalk^2 Keyboard When connecting a SeaTalk^{2}keyboard to your system select ALL or ONE. When ONE selected press button on required keyboard - display beeps to indicate keyboard selected.	**OFF** ALL ONE

Note: Networked displays - If AIS or Navtex has been set on any display in the system, the menu options will be available on all displays. Navtex and AIS are available simultaneously.

Alarm Setup Menu

The Alarm Setup Menu is divided into these sub-menus:

- System Alarms Setup.
- Navigation Alarms Setup.
- Radar Alarms Setup.
- Fishfinder Alarms Setup.
- AIS Alarms Setup.

Note: To silence any alarms, press **ACKNOWLEDGE.**

System Alarms Setup

System alarms will sound in all applications.

MENU ITEM	**OPTIONS** (Default in **bold**)
Anchor Alarm Switches the anchor alarm on or off.	**OFF** ON
Anchor Alarm Radius If the *Anchor Alarm* is set to ON, an alarm is triggered when you drift from your anchor position by more than the specified distance.	0.01 - 9.99 nm **0.10nm** (or equivalent in the selected *Distance Unit*)
Timer Switches the countdown timer alarm on or off	**OFF** ON
Timer Period If the *Timer* is set to ON, the system counts down from the time you specify. An alarm is triggered when zero is reached.	00h01m - 99hrs 59mins **00h00m**
Alarm Clock Switches the alarm clock on or off.	**OFF** ON
Alarm Clock Time If the *Alarm Clock* is set to ON, an alarm is triggered when the time you specify is reached.	00.01 - 24:00hrs **00:00**
Temperature Alarm If this alarm is set to ON, an alarm is triggered if the temperature moves into or out of the range that you have specified in *Lower Temperature Limit*/ *Upper Temperature Limit*.	**OFF** ON
Lower Temperature Limit Specifies the lower limit of the temperature range that is to trigger the *Temperature Alarm*.	**60°F** 0°-99.8°F
Upper Temperature Limit Specifies the upper limit of the temperature range that is to trigger the *Temperature Alarm*.	**75°F** 0.2°-99.9°F

Navigation Alarms Setup

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

MENU ITEM	OPTIONS (Default in **bold**)
Arrival Alarm Radius The distance from the target waypoint or the closest point of approach to the target waypoint that triggers the arrival alarm to sound.	**0.1nm** 0.01 - 9.99nm
Offtrack Alarm Switches the off-track alarm on or off	**OFF** ON
Offtrack Alarm XTE If the *Offtrack Alarm* is set to ON, an alarm is triggered when the XTE for any current navigation, exceeds the value that you have specified.	**0.3nm** 0.01 - 9.99nm (or equivalent in the selected *Distance Unit*)

Radar Alarms Setup

These alarms will only sound when you are in the radar application.

MENU ITEM	OPTIONS (Default in **bold**)
Guard Zone Sensitivity Ensure that this is not set too low or targets will be missed.	**50%** 0 - 100%

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

Fishfinder Alarms Setup

MENU ITEM	OPTION (Default in **bold**)
Fish Alarm Switches the fish alarm on or off.	**OFF** ON
Fish Alarm Sensitivity If the *Fish Alarm* is set to ON, an alarm is triggered when the fish return strength reaches the sensitivity that you specify.	**5%** 10% - 100%
Fish Alarm Depth Limits If the *Fish Alarm* and this alarm is set to ON, an alarm is triggered (2 beeps) if any target meets the sensitivity level and is within the *Shallow Fish Limit* and *Deep Fish Limit* that you specify.	**OFF** ON
Shallow Fish Limit Specifies the lower value for the *Fish Alarm Depth LImit*.	**2ft** (0002 ft - 1000ft)

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

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

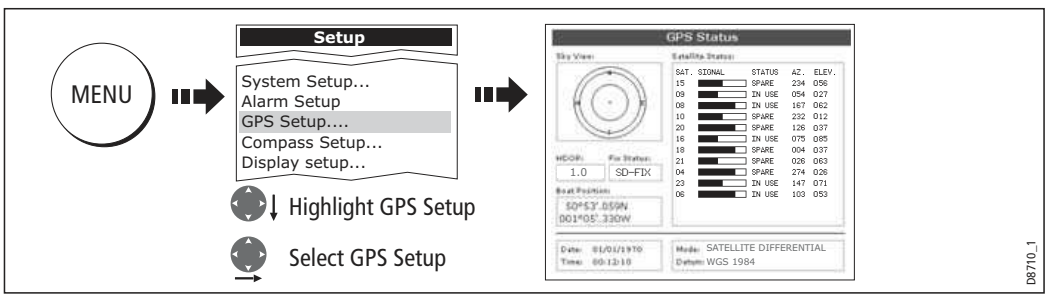
AIS Alarms Setup

Dangerous Targets Alarm Switches the alarm for dangerous targets to on or off. When OFF, the AIS alarm off icon is displayed in the status bar.	OFF **ON**
AIS Alarm List Details the identity, description, time and acknowledgement of alarm messages received from an AIS receiver.	See "AIS Alarms" on page 218.

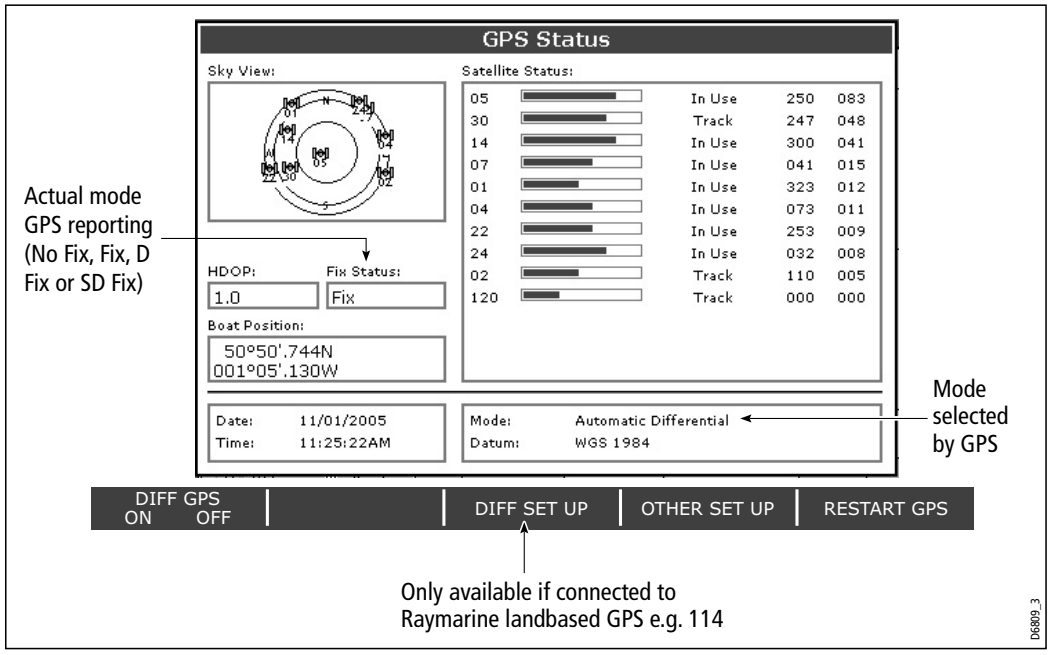
GPS Status

The GPS is used to position your boat on the chart. You can set up your Global Positioning System (GPS) and check its status using the GPS status icons and the GPS Status page of the Setup menu.

To access the GPS Status page:



This screen provides, for each tracked satellite, the satellite number, a graphical signal strength bar, status, azimuth angle and its elevation angle from your vessel. The sky view graphic shows the position of these satellites.



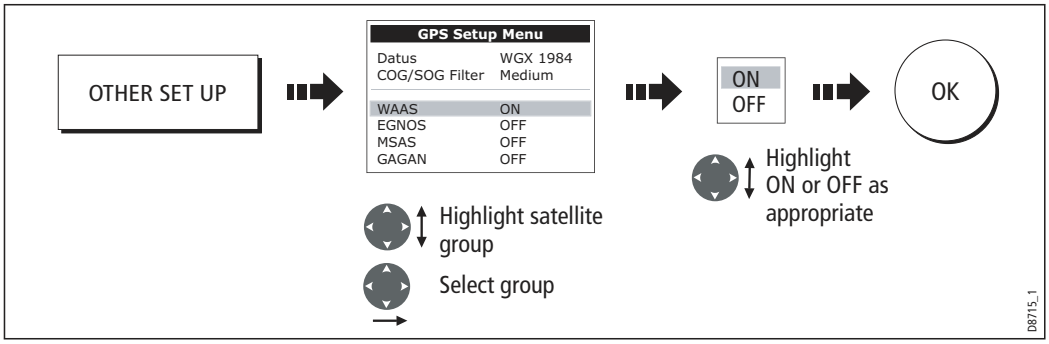
Positional accuracy is dependent upon these parameters; in particular, the azimuth and elevation angles are used in a triangulation process to calculate your position. Horizontal Dilution of Position (HDOP) is a measure of this accuracy; a higher figure signifies a greater positional error. In ideal circumstances, the figure should be in the region of 1.0.

Selecting the satellite differential system

You should select the satellite group(s) appropriate to your area, via the Other Set Up soft key:

- WAAS - United States
- EGNOS - Europe
- MSAS - Japan
- GAGAN - India

Note: The EGNOS, MSAS and GAGAN systems may not currently be active. Check with your local government for operational status.



Selecting the COG/SOG filter

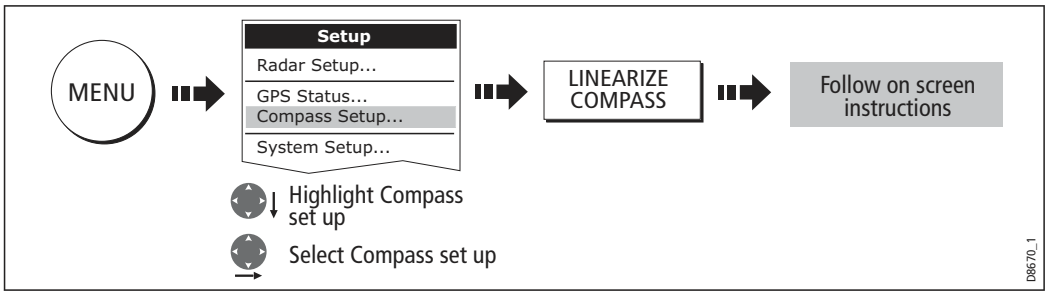
The COG/SOG filter should be set to the level appropriate to your boat's use and to the level of oscillation being experienced by the GPS:

- HIGH - for use when trawling or when there is a high level of oscillation.
- MEDIUM - for general use
- LOW - for use when travelling at speed

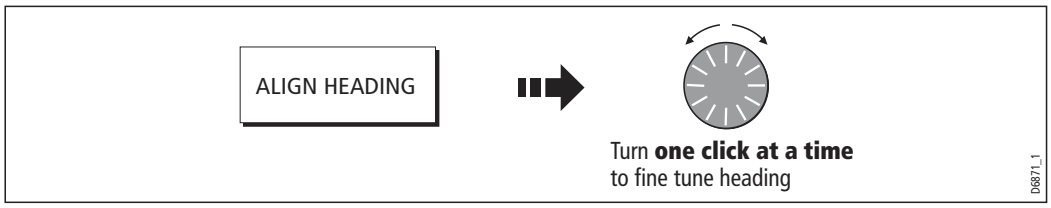
Compass Setup

This option can be used to linearize a Raymarine ST80 active compass or Smart Heading sensor connected on SeaTalk. To linearize ('swing') your compass proceed as follows:

1. Select the LINEARIZE COMPASS option:



2. When instructed to align heading:



Display Setup

MENU OPTION	OPTIONS (Default in **bold**)
Soft key Autohide Controls whether the soft key bar is automatically hidden if not used for a period of 10 seconds. Pressing any key re-displays the soft key bar.	**OFF** ON
Cursor Autohide Controls whether the cursor is automatically hidden if not used for 10 seconds. Pressing any key re-displays the cursor.	**OFF** ON
Key beep Controls whether a noise is made when you press a key.	**OFF** ON
Text size Controls the size of the text on the screen	**Small** Large

Databar Setup

This sub-menu accesses the Configure Data Bar Menu - refer to *page 277* for full details.

Select Page Set

This sub-menu accesses the Select Page Sets Menu. For details of how to reconfigure the page sets, please see *page 275*.

System Diagnostics

This sub-menu is for diagnostic use by authorized dealers.

Remove CF Card

This sub-menu allows you to safely remove the Compact Flash card that is currently in use.

CAUTION: Improper use of this setting may cause loss of data or damage to the card. Ensure you have read the instructions on *page 19* thoroughly before attempting to remove or insert a CF card.

Appendix A: Specification for the E80 and E120 Displays

General

Approvals CE - conforms to FCC - compliant with	 Essential requirements of 1995/5/EC, 1989/336/EC. CFR47 Parts 2 & 80
Size: E80 E120	 283 x 210 x 154 (including cabling) 356 x 264 x 154 (including cabling)
Weight: E80 E120	 4.18 kg 7.35 kg
Mounting	Either trunnion or flush mount option
Supply voltage	12V or 24V DC nominal (10.7-32V DC maximum)
Power consumption: E80 E120	 20W (full brightness) 32W (full brightness)
Environmental: Operational/Non-operational temperature range Humidity limit	Waterproof to CFR46 & IPX6; suitable for external mounting -10° C to +50° C up to 95% at 35°C non-condensing
Controls	9 defined keys, 5 soft keys, trackpad and rotary control
Cursor	Context sensitive, provides range/bearing or lat/lon or depth/range on fishfinder
Display type	High brightness color TFT LCD
Resolution: E80 E120	 640 x 480 pixels (VGA) 800 x 600 pixels (SVGA)
Display size: E80 E120	 8.4 in 12.1 in
Display Windows	Chart, Radar, Fishfinder, CDI, Video, Data, Weather and Engine Monitor.
Illumination	Screen and keypad: 0 to 100% in 64 steps Day/Night Mode
Languages	The selection available will vary according to your location.

System Alarms	Alarm clock, Anchor, Arrival, Deep depth, MOB, Offtrack, Shallow depth, Temperature, Timer
Navigation Alarms	Arrival alarm, offtrack XTE alarm.
Connectors	13 pin Radar scanner 3 pin SeaTalk + 3 pin alarm out 5 pin NMEA 0183 5 pin SeaTalk2/NMEA 2000 3 pin Power SeaTalk High Speed 15 pin VGA out 9 pin Video in
Interfaces	Pathfinder Radar scanner 1 x SeaTalk High Speed/ethernet 1 x SeaTalk, receive and transmit 1 x NMEA0183, receive and transmit 1 x SeaTalk^2/ NMEA2000 1 x Video In 1 x VGA out CompactFlash card slot Video in
Configurations	Single, dual or multiple configurations.
Network	Supports 8 devices/displays.
Waypoints	1200 waypoints entered via cursor, lat/lon, range and bearing from present position or at boat's position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards.
Waypoint Transfer	Waypoints database via NMEA and CompactFlash cards. Software also available to convert waypoints to Excel file.
Man Overboard (MOB Mode)	Mark placed with course line; readout shows range, bearing, lat/lon of MOB and time elapsed since MOB.
Screen functions	Full, half and quarter screens available dependant on function. Also 3 window page with 2 x 1/4 page windows and 1 x 1/2 page window.
Information	Displayed in horizontal or vertical data bar and includes boat data, navigation data, depth, environmental data and Wind data. Data and engine monitor windows also available.

* See your boat dealer for details.

Chart features

Cartography	Navionics Charts on CompactFlash cards Chart of the world built in.
Chart scaling	$^{1}/_{32}$nm (if cartographic detail is available to 4000nm).
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic). Relative, Autorange or True Motion. Screen offset. Radar or 3D synchronization.
Waypoints	1200 waypoints entered via cursor, lat/lon, range and bearing from present position or at boats position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards
Waypoint Transfer	Waypoints database via NMEA
Routes	A route plan may contain up to 50 waypoints. Up to150 routes can be stored in the units internal memory. Additional storage available on CompactFlash cards. SmartRoute to create a route from track history.
Track History	10 tracks with up to 1000 points in each can be stored in the units internal memory. Track optimization reduces number of points used or user selectable time or distance interval. Additional storage available on CompactFlash cards
Radar/Chart overlay	Radar image can be overlaid on all screen charts.
Radar/Chart synchronization	To synchronize radar range and chart scale
3D/Chart synchronization	To synchronize 3D and 2D chart scales and orientation.
Aerial overlay	Overlay of aerial photograph on the chart
AIS overlay	Switch AIS symbols on/off. Display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.
Navigation information	Own boats position in lat/lon, XTE, TTG and SOG/COG selectable. Bearing and distance to waypoint. Bearing and distance to cursor and ETA.
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual

3D Chart features

Cartography	Navionics Charts on CompactFlash cards Chart of the world built in.
Presentation Modes	Active motion mode, planning mode, Adjust rotation and pitch, port, starboard, forward and aft view, multiple views, Vessel offset
Waypoints	Waypoints entered at vessel or lat/lon position. 16 character name can be assigned. Waypoint symbols and groups Additional storage available on CompactFlash cards
Display	Declutter, Transducer cone, Depth scale, Waypoint name, Adjust exaggeration, 3D view locator
Aerial overlay	Overlay an aerial photography on the chart

Radar features

Range Scales (Range Rings)	1/8 (1/16)nm to 72 (12) nm dependant on scanner Performance limited by scanner type and position.
Range Ring Accuracy	Better than +/- 1.5% of the max. range scale in use, or 22m (72 ft.), whichever is the greatest.
Bearing accuracy	+/- 1°
Variable Range Markers	2 x VRM's, readout nm, sm, km
Electronic Bearing Lines	2 x EBL's, floating if required, resolution 1°
Bearing scale	360° graduated at 10° intervals 2° small ticks 10° large ticks
Minimum range	23m (25 yds)
Range Discrimination	23m (25 yds)
Presentation Modes	Head up, Course up or North up (selectable True or Magnetic) Relative or True Motion
Scanner Control	Interference rejection, standby/transmit modes, pulse selection, Tune, Rain, FTC and Sea controls, with selection of manual or automatic control of gain, sea clutter and tune (Auto GST™)
Magnetic Sensor	NMEA (required for fast heading data, suitable for MARPA), or SeaTalk
Waypoint Display	Create waypoints and target waypoint displayed with User control of symbols and groups

MARPA	Manual acquisition of 10 targets, automatic tracking, dangerous target alarms, safe zone, target history, true or relative vectors, CPA graphics and indication of target speed/ course, bearing/ range, CPA and TCPA.
Variation Source	Auto (SeaTalk/NMEA/Internal algorithm) or Manual
Guard Zone Alarm	2 guard zones, selectable sensitivity level, audible alarm
Auto GST	Auto control of gain, sea clutter and tune.
Off Centre function	In Relative Motion, $^{1}/_{3}$ or $^{2}/_{3}$ selectable)
Wakes	10s, 30s, 1 min, 5 min, 10 min, OFF
Target Expansion	Operator selectable with 2 levels available, OFF
Timed TX	Rotation periods: 10, 20 or 30 scans Repetition periods: 3, 5, 10 or 15 minutes
AIS overlay	Switch AIS symbols on/off. Display heading/speed vectors and ROT. View detailed AIS data, safety critical target data, ALR and SRM messages. Set up a safe zone.

Fishfinder features

Transducer	Transom-mount, in-hull or thru-hull
Digital Sounder Module	Uses DSM 300
Output power: Standard transducer High performance transducer	 Adjustable to 600 watts RMS Adjustable to 1000 watts RMS
Frequency	Dual 50 kHz and 200 kHz
Pulse length	100 usec to 4 msec
Sonar display	A-scope real time.
Maximum Transmit Rate	1580 pulses/ min at 50 ft range
Depth: Standard transducer High performance transducer	 3 ft (1m) to 3000 ft (1000m) 3 ft (1m) to 5000 ft (1700m)
Alarms	Fish alarm, fish alarm depth, shallow and deep fish limit

Data features

Panel type	5 panels available. Pre-defined (Navigation, Waypoint, Route, Fishing or Sailing) or user-configured.
Data available	Vessel position, active waypoint, TTG, VMG - Waypoint, depth, COG SOG, heading, speed, set/drift, trip, log, ground log, ground trip, rudder, local time and date, sea temperature, app wind, true wind, VMG wind, ground wind, XTE, compass, locked heading, waypoint data, pressure, air temperature, sea temperature, local data.

Engine monitor features

Visit www.raymarine.com for a list of compatible engines.

Panel type	5 panels available. Pre-defined (engine, engine and fuel, fuel resources, engine and resources, twin engines or triple engine support) or user-configured.
Data available	Tacho, boost pressure, alternator, oil pressure, coolant temperature, engine hours, fuel level (tanks 1 & 2), fuel rate, total fuel, load.

Video features

Input source type	Composite (PAL/NTSC) and S-Video.
VGA output	For connection to remote PC or flat screen monitors.

Weather features (USA only)

Weather elements	Storm cast, waves, Canadian radar, lightning, wind, sea surface temperature, surface observations stations, city weather, NOWRad, storm tracks, surface pressure.
Animated weather graphics	Weather forecast, weather radar history
Weather reports	Tropical statements, marine warnings, marine zone forecasts, marine watchbox.

Navtex features

Alerts	Incoming message (selectable categories)
Message list	Sorting

AIS features

Target symbols	Sleeping, activated, selected, dangerous and lost.
Target information	AIS vectors, safety critical data and full AIS data.
Collision avoidance	Safe zones and safety messages.
Alarms	Local alarm messages, lost targets

Interfacing

DSM connection	for communication with DSM High Definition Fish Imaging (HDFI)
NMEA 0183 Input	GLL, GGA, GLC, GTD, VTG, BWC, BWR, RMA, RMB, RMC, XTE, VHW, HDG, HDM, HDT, DBT, DPT, APB, VLW, MWV, WPL, RTE, DSC and ZDA. Selectable to 4800, 4800 Navtex, 9600 Navtex or 38,400 AIS
NMEA Output - User selectable	APB, BWC, BWR, DBT, DPT, GGA, GLL, MTW, RMA, RMB, RMC, RSD, TTM, VLW, VHW, VTG, WPL, VHF/DSC and ZDA
SeaTalk Input	Depth,SOG,COG, Position, Waypoint number, range/ bearing, TTG, Boat speed, Time, XTE, Heading, Wind, data, Log/Trip, Pilot status, Temperature, MOB and cursor position
SeaTalk Output	Cursor data, guard zone and navigational data bridged from NMEA
SeaTalk^2 Input	
SeaTalk^2 Output	
Scanners	Two radar scanners can be connected.

Appendix B: List of Abbreviations

Abbrev.	Description	Abbrev.	Description
°C	Degrees Centigrade	kpa	Kilo pascals
°F	Degrees Farenheit	kt	Knots
AIS	Automatic Identification System	ky	Kiloyards
ALR	Alarm	l	Litres
amp	Amperes	Lat	Latitude
Auto	Automatic	Lon	Longitude
CAT	Category	m	Metres
CCFL	Cold Cathode Fluorescent Lamp	Man	Manual
CDI	Course Deviation Indicator	MMSI	Marine Mobile Service Identity
COG	Course over ground	MARPA	Mini automatic radar plotting aid
CPA	Closest point of approach	MOB	Man overboard
C-up	Course up orientation	MPH	Miles per hour
DC	Direct current	nm	Nautical mile
DSC	Digital selective calling	NMEA	National Marine Electronics Association
DSM	Digital sound module	N-up	North up orientation
EBL	Electronic bearing line	OSH	Automatic offshore mode
EMC	Electromagnetic compatibility	PSI	Pounds per square inch
ETA	Estimated time of arrival	RM	Relative motion
fa	Fathoms	RTE	Route
ft	Feet	ROT	Rate of turn
FTC	Fast time constant	s	Seconds
gal	Gallons	SHM	Ship's heading marker
GPS	Global positioning system	sm	Statute miles
HBR	Automatic harbor mode	SOG	Speed over ground
HDFI	High definition fish imaging	SRM	Safety related message
HDG	Heading	STDBY	Standby
H-up	Head up orientation	STN	Station
KHz	Kilohertz	TCPA	Time to closest point of approach
km	Kilometer	TM	True motion
KPH	Kilometers per hour	TTG	Time to go

Abbrev.	Description	Abbrev.	Description
TVG	Time variable gain	VRM	Variable made good
TX	Transmit	WPT	Waypoint
UTC	Universal time constant'	XTE	Cross track error
VMG	Velocity made good		

Appendix C: List of cursor labels

Label	Feature	Application
A/B	Ruler line	Chart
AIS	AIS target	Chart and Radar
COG	Course Over Ground vector	Chart
CTR	Centre of radar	Radar
FLT	Floating EBL/VRM	Radar
GRD	Guard zone	Radar
HDG	Heading vector	Chart
MARPA	MARPA target	Radar
MOB	Man Over Board marker	Chart and Radar
POS	Vessel's position	Chart
RTE	Route leg	Chart
SHM	Ship's Heading Marker	Radar
TIDE	Tide indicator	Chart
VRM/EBL	VRM and EBL, 1 or 2	Radar
WIND	Wind indicator	Chart
WPT	Waypoint	Chart and radar

Appendix D:Glossary of weather terms

Note: *For types of warnings, watches and advisories, please refer to the NOAA website at www.nws.noaa.gov/glossary.*

Term	Definition
Cold front	The boundary between two different air masses where cold air pushes warm air out of the way and brings colder weather.
Cyclone	A large area of low atmospheric pressure, characterized by inward-spiralling winds. A "low" - also called a "depression". Also the name used for a hurricane in the Indian Ocean and Western Pacific.
Depression	An area of low pressure. Also called a cyclone.
Dry line	A region where there is a strong gradient in dew point temperatures. It is often found in a region where strong thunderstorms develop.
Forecast	Something that tells us what the weather is probably going to be like.
Front	The boundary between two masses of air with different temperatures (i.e.: a mass of cold air and a mass of warm air).
High	Also known as an 'anticyclone' - an area of high air pressure with a system of winds rotating outwards. This usually means dry weather. It is the opposite of a 'low'.
High Pressure	A mass of air that presses down strongly on the surface of the Earth because it is being cooled and is therefore more dense.
Hurricane	A violent, spiralling storm that forms over the Atlantic Ocean, with winds over 120 kph. Such storms usually have a lifespan of several days. Also known as a typhoon or tropical cyclone. There are 5 levels of hurricane: **Category 1** Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.

Term	Definition
	Category 2 Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane centre Small craft in unprotected anchorages break moorings. **Category 3** Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the centre of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required. **Category 4** Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the centre of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).

Term	Definition
	Category 5 Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the centre of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.
Isobar	A line on a weather map linking areas with equal air pressure.
Lightning	Discharge of static electricity in the atmosphere, usually between the ground and a storm cloud.
Low	Also called a 'depression' - this region of low pressure can mean wet weather - it is the opposite of 'high' pressure or 'anticyclone'.
Low Pressure	A mass of air that presses down only weakly on the surface of the Earth because it is being warmed and it therefore less dense.
Millibar	A unit used to measure atmospheric pressure.
Occluded Front	An area where warm air is pushed upwards as a cold front overtakes a warm front and pushes underneath it.
Precipitation	Moisture that is released from the atmosphere as rain, drizzle, hail, sleet or snow, as well as dew and fog.
Pressure Centre	A region of high or low pressure.
Squall line	A non-frontal band, or line, of thunderstorms.
Super typhoon	A typhoon that reaches maximum sustained 1-minute surface winds of at least 65 m/s (130 kt, 150 mph). This is the equivalent of a strong category 4 or 5 hurricane in the Atlantic basin or a category 5 severe tropical cyclone in the Australian basin.
Tornado	A funnel-shaped whirlwind which extends to the ground from storm clouds.

Term	Definition
Tropical cyclone	A low pressure system that generally forms in the tropics. The cyclone is accompanied by thunderstorms and, in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface.
Tropical depression	An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 kt) or less.
Tropical storm	An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 39-73 mph (34-63 kt).
Tropics	An area on the Earth's surface that lies between 30° north and 30° south of the equator.
Trough	An elongated area of relatively low atmospheric pressure, usually extending from the centre of a low pressure region.
Typhoon	The name for a tropical storm originating in the Pacific Ocean, usually the China Sea. They are basically the same as the hurricanes of the Atlantic Ocean and the cyclones of the Bay of Bengal.
Wave cyclone	A storm or low-pressure centre that moves along a front.

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