ST70 Instrument

User Reference Manual

Document reference: 81284-1
Date: June 2007

Contents

Preface iii
Safety notices iii
WARNING: Product installation & operation iii
WARNING: Electrical safety iii
WARNING: Navigational safety iii
EMC conformance iii
Certified installation iii
Product documents iii
Product disposal iv
Waste Electrical and Electronic (WEEE) Directive iv
Chapter 1:ST70 General Information 1
1.1 ST70 Operating Principles 1
Controls 1
Setup functions 2
First use after installation 2
Instruments requiring commissioning 2
Instruments not requiring commissioning 3
Normal operation 4
Day-to-day setting up 5
1.2 System functionality 5
SeaTalk 5
SeaTalk^2 & SeaTalk^{ng} 5
Power protocol 6
1.3 Commissioning requirement 6
WARNING: Product installation & operation 6
Chapter 2:Commissioning Procedures 7
2.1 Dockside setup 7
WARNING: Product installation & operation 7
Switch on 7
Initial setup 8
Select language 8
Vessel Type 8
Select type 8
Autodetect results 8
Time & Date 8
Setting date format 9
Setting time format 9
Setting local time 10
Leaving date & time setup 10
Data units 10
Leaving units setup 11
Depth offset 11
WARNING: Ensure you use the correct depth offset 12
Requirement 12
Depth offset setup procedure 12
Set water temperature 14
Set ground wind 15
Set magnetic variation 15
Changing response rate 16
Ending dockside setup 17

2.2 Seatrial calibration 17
WARNING: Ensure you have sufficient sea room for calibration 17
Preliminary procedures 18
Wind transducer setup 18
Linearization 18
Alignment 19
Calibrate wind speed 20
Speed calibration 20
Start speed calibration 21
Set to SOG 21
Manual calibration 22
2.3 Return to normal operation 23
2.4 After commissioning 23
EMC Conformance 23
Chapter 3:Setup Procedures 25
3.1 Introduction 25
3.2 Procedures 25
Changing the language or vessel type setting 25
Setting Language 25
Setting Vessel Type 26
CAUTION: Vessel Type setting also affects other parameters ... 26
Leaving Advanced Options 26
Changing the time/date format 26
Setting time format 27
Setting date format 27
Leaving time/date setup 27
Chapter 4:Maintenance & Troubleshooting 29
4.1 Maintenance 29
Servicing and safety 29
Instrument Cleaning 29
Cabling 29
4.2 Troubleshooting 30
First considerations 30
Procedures 30
Using About Display feature 33
Technical support 34
World wide web 34
Telephone help line 35
Help us to help you 35
Specification 37
Glossary 39
Index 41

Preface

Safety notices

WARNING: Product installation & operation

This equipment must be installed, commissioned and operated in accordance with the Raymarine instructions provided. Failure to do so could result in personal injury, damage to your boat and/or poor product performance.

WARNING: Electrical safety

Make sure you have switched off the power supply before you start installing this product.

WARNING: Navigational safety

Although we have designed this product to be accurate and reliable, many factors can affect its performance. Therefore, it should serve only as an aid to navigation and should never replace commonsense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.

EMC conformance

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

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

Certified installation

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

Product documents

The following user documents are available for ST70:

- ST70 Operating Guide. Comprises a series of individual operating cards, which provide day-to-day operating and setting up procedures. Intended for all users.
- ST70 User Reference Manual (this document). Intended for users in general and commissioning personnel in particular. It describes:
  - Commissioning procedures. These describe how to set up an ST70 instrument when first switched on after installation.
  - Setup procedures not included in the Operating Guide

  - Routine maintenance instructions
  - Troubleshooting instructions
- ST70 Installation Guide. Describes how to fit an ST70 instrument and connect it to an operating system. Intended for installers.

Additional information on Raymarine SeaTalk^{ng} systems is given in the *SeaTalk^{ng} Reference Manual*.

To the best of our knowledge, the information in the product documents was correct when they went to press. However, Raymarine cannot accept liability for any inaccuracies or omissions in product documents.

In addition, our policy of continuous product improvement may change specifications without notice. Therefore, Raymarine cannot accept liability for any differences between the product and the accompanying documents.

Product disposal

Waste Electrical and Electronic (WEEE) Directive

The WEEE Directive requires the recycling of waste electrical and electronic equipment.

Whilst the WEEE Directive does not apply to some of Raymarine's products, we support its policy and ask you to be aware of how to dispose of this product.

The crossed out wheelie bin symbol, illustrated above, and found on our products signifies that this product should not be disposed of in general waste or landfill.

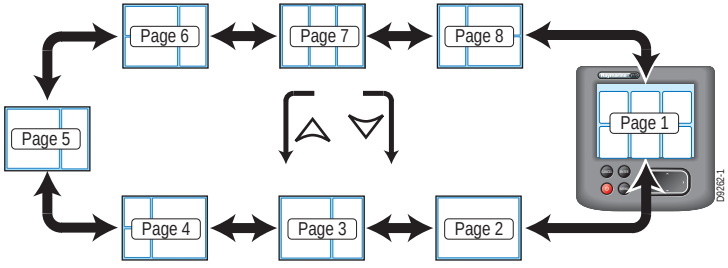
Please contact your local dealer, national distributor or Raymarine Technical Services for information on product disposal.

Chapter 1: ST70 General Information

1.1 ST70 Operating Principles

The ST70 instrument repeats data from Raymarine SeaTalk, SeaTalk^2 and SeaTalk^{ng} systems. The actual information available depends on what information is present on the system, i.e. what transducers are connected.

The ST70 instrument displays information on individual operational pages. Eight pages are available, and you can scroll from page to page by using the ∧ and ∨ buttons.



An operational page can comprise from one to six individual data frames. You can set up the layout of each page by selecting one of sixteen inbuilt page layouts then defining the data content of each frame on the page.

Controls

∧ and ∨ buttons. Used to:

- Scroll to different operating pages.
- Select choices on setup pages

< and > buttons. Used to:

- Scroll to different menu options.
- Set values on setup pages.
- Select choices on setup pages.

MENU button. Gives access to:

- All setup and reset functions.
- Self test routines and diagnostic information.

ENTER button. Used during setup procedures to:

- Confirm a menu selection
- Save a setting and continue

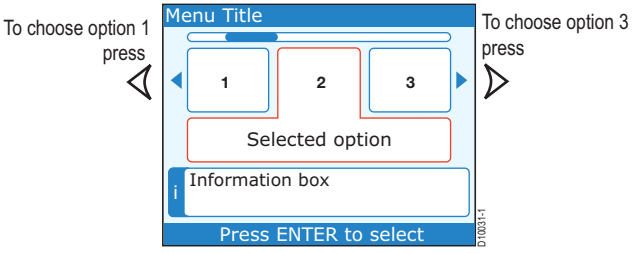
CANCEL button. Used during setup procedures to leave a setup function without making any changes.

Power button ⏻:

- Switches power on and off.
- Provides access to screen brightness control.

Setup functions

In addition to the eight operational pages, setup menus and pages controlled by the front-panel buttons, enable you to access and change the instrument parameters.



Each setup menu provides a number of options. Use the < and > buttons to scroll to the menu item you want, then press ENTER to confirm your selection.

When a menu selection results in a setup page, use the < and > buttons to set the value or make the selection that you want. Press ENTER to confirm your choice.

If at any time during setup, you want to leave a setup function without making any changes, press CANCEL.

First use after installation

When an ST70 instrument is first switched on after installation, what you see is dependent on whether the instrument requires commissioning or not.

Instruments requiring commissioning

If the ST70 instrument is NOT part of a SeaTalk^{ng} system in which at least one other ST70 instrument is already working, an initial setup mode is automatically engaged and at first switch on, a **Language** setup page is displayed (see *Figure 1-1: Initial setup*). This is the first part of the commissioning procedure and enables you to set:

- Language.
- Vessel type.
- Time and date formats.
- Local time value.
- Units.

Details of how to set these values and commission the instrument are given in *Chapter 2: Commissioning Procedures*.

Note: *The values set during initial setup can be changed subsequently via the Main Menu (see Figure 1-2: Normal operation).*

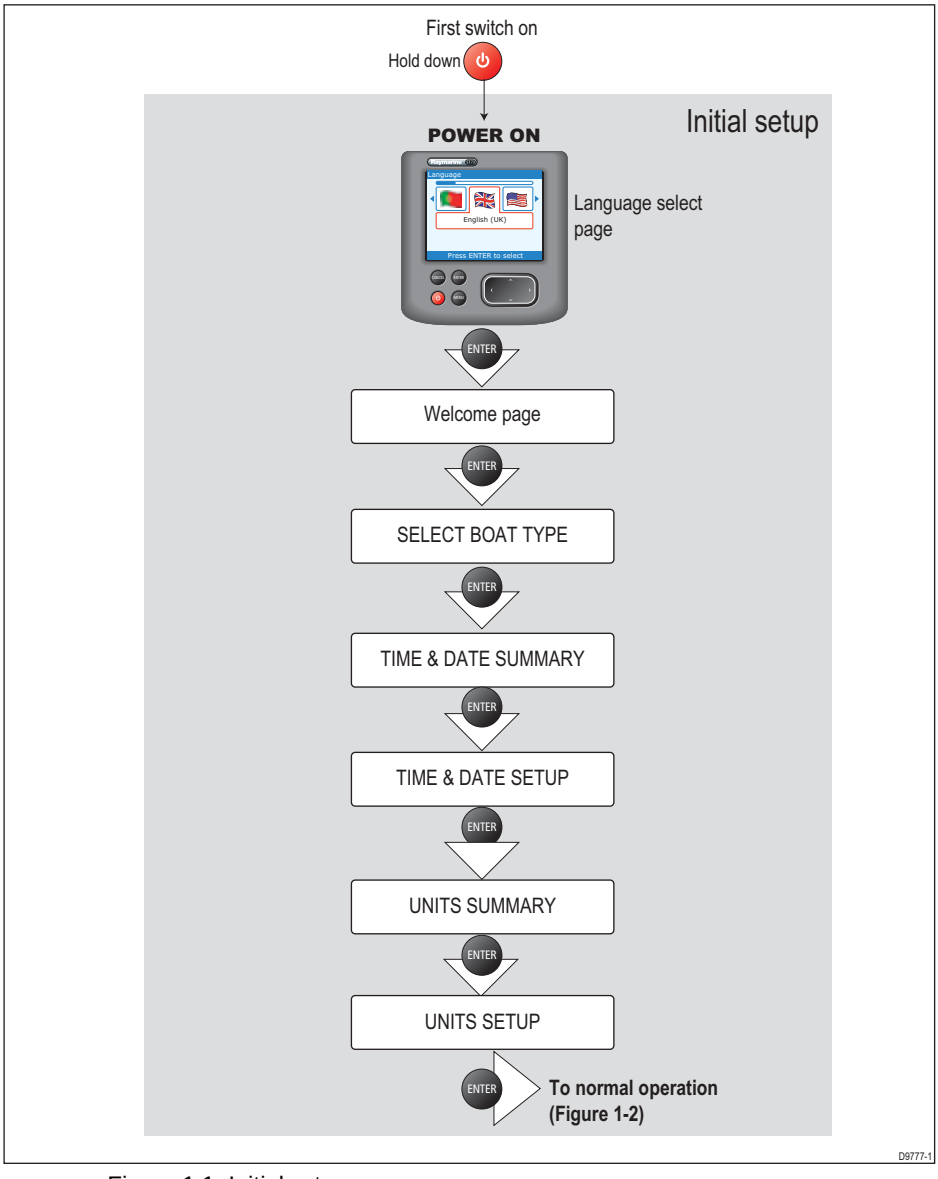


Figure 1-1: Initial setup

Instruments not requiring commissioning

If the ST70 instrument is part of a SeaTalk^{ng} system in which at least one other ST70 instrument is already working, then an operational page is displayed at initial switch on and you can use the instrument immediately. In this case, the new instrument will adopt the settings that already apply in the system.

Normal operation

A summary of the day-to-day operating and setup functions is shown in *Figure 1-2: Normal operation*. Detailed operating instructions are given in the *ST70 Instrument Operating Guide*.

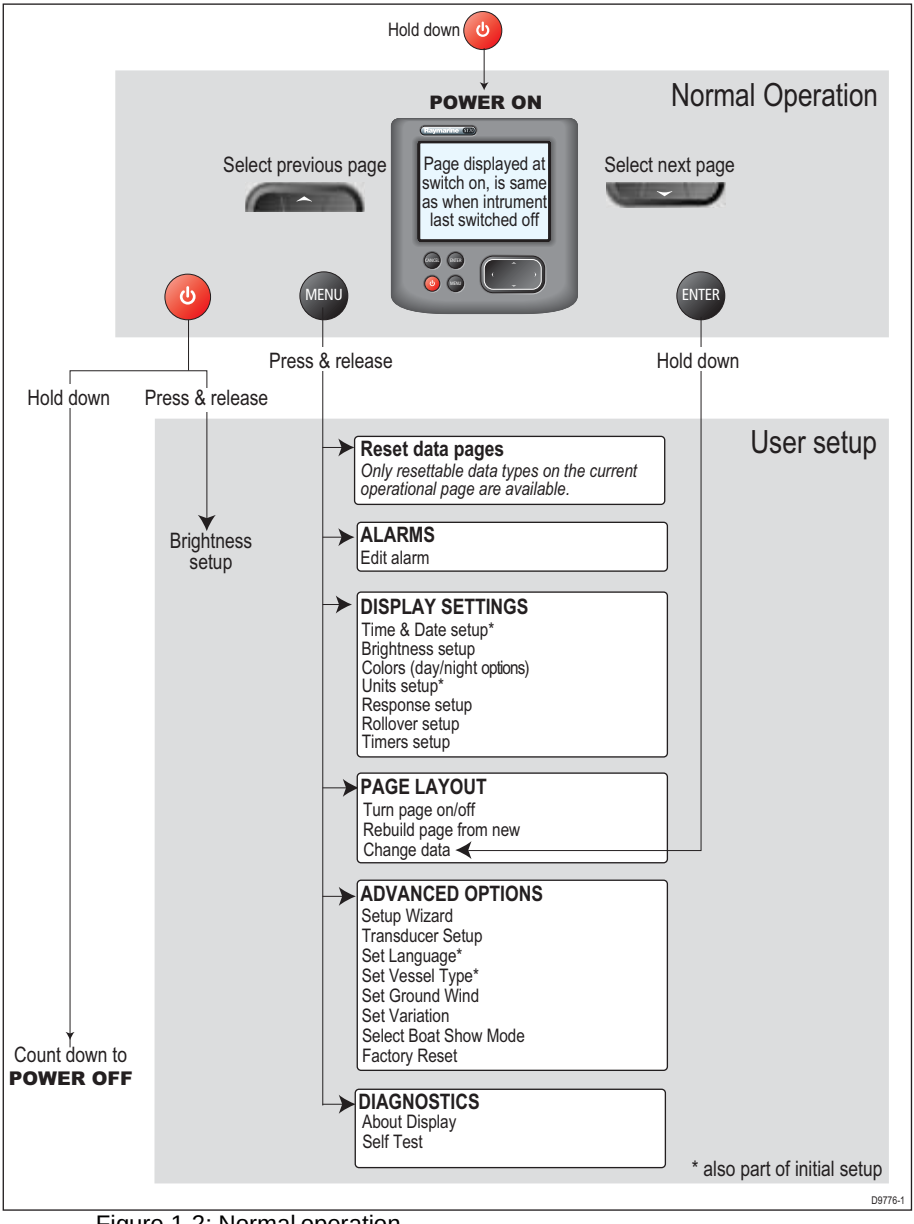


Figure 1-2: Normal operation

Day-to-day setting up

Instructions for setting up many of the ST70 Instrument parameters are given in the *ST70 Instrument Operating Guide* and are not repeated here. Other setup procedures are carried out during Commissioning to set:

- Language.
- Vessel Type.
- Time format.
- Date format.
- Method used for ground wind calculation
- Magnetic variation
- Response rate

If you need to change any of these after the instrument has been commissioned, refer to the appropriate procedure in *Chapter 3: Setup Procedures*.

1.2 System functionality

Your ST70 instrument is fitted with Raymarine SeaTalk^{ng} connectors, but it can be connected to any of the following Raymarine systems, using suitable adaptor cables as necessary:

- SeaTalk
- SeaTalk^{2}
- SeaTalk^{ng}

SeaTalk

When connected to a SeaTalk system, each ST70 instrument repeats the SeaTalk data. You can set the system variation only if it has not been set at another product.

You cannot set the data units or calibrate the system transducers.

SeaTalk^{2} & SeaTalk^{ng}

When connected to a SeaTalk^{2} & SeaTalk^{ng} system, each ST70 instrument repeats the data on the bus. You can set the instrument response as required. You can set the system variation only if it has not been set at another product.

You can also calibrate the system transducers and set the data units you want to apply to the system.

Power protocol

Power to each individual ST70 instrument can be switched on and off using the power button  (as described in the *ST70 Operating Guide*). However, where instruments are part of a system, it may be more convenient to switch power for the entire system from a central circuit breaker.

In this case, when system power is switched ON again:

- ST70 instruments that were switched on when power was last switched off will return to the switched ON state.
- ST70 instruments that were OFF when system power was last switched OFF will remain OFF and will need to be switched ON individually using their power buttons.

1.3 Commissioning requirement

WARNING: Product installation & operation

Each ST70 instrument must be prepared for use in accordance with the Commissioning Procedures, before it is used for operational purposes, unless it is part of a SeaTalk^{ng} system in which at least one other ST70 instrument is already set up and working, it. Failure to comply with this could result in death, personal injury, damage to your boat and/or poor product performance.

After installation, each ST70 instrument that is NOT part of a SeaTalk^{ng} system in which at least one other ST70 instrument is already set up and working must be commissioned in accordance with *Chapter 2: Commissioning Procedures*, before it is used for operational purposes.

Note: *if an instrument is part of a system in which at least one other ST70 instrument is already set up and working, you do not need to commission it.*

Refer to the *ST70 Instrument Operating Guide* for instructions on how to use the ST70 instrument on a day-to-day basis.

Chapter 2: Commissioning Procedures

Before an ST70 instrument is used for the first time, it must be commissioned in accordance with the instructions in this chapter, to carry out:

- *Dockside setup*
  followed by
- *Seatrial calibration*.

2.1 Dockside setup

WARNING: Product installation & operation

Each ST70 instrument must be prepared for use in accordance with the Commissioning Procedures, before it is used for operational purposes, unless it is part of a SeaTalk^{ng} system in which at least one other ST70 instrument is already set up and working, it. Failure to comply with this could result in death, personal injury, damage to your boat and/or poor product performance.

Notes: **(1)** *If your ST70 instrument is connected to an existing SeaTalk^{ng} system that has already been successfully commissioned, you do not need to commission the new instrument.*

(2) *Values set during Dockside setup can be changed subsequently, if necessary.*

Use these *Dockside setup* instructions when an ST70 instrument is first started after installation to:

- Switch on the instrument.
- Carry out the initial setup procedures, to:
  - Select language.
  - Set vessel type.
  - Set date and time format (only if GPS is fitted).
  - Set correct local time (only if GPS is fitted).
  - Set required data units.
- Set the correct depth offset.
- Set the correct magnetic variation.
- Set the required method for calculating ground wind.
- Set the water temperature.
- Set the instrument response.

Switch on

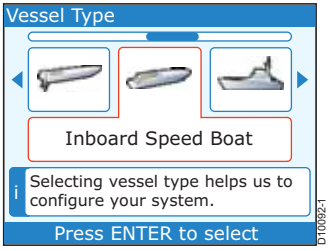
Hold down the power button for 1 second to power up the instrument. When the instrument is first switched on after installation, a select **Language** menu is displayed.

Initial setup

Select language

Use < and > to select the required language, then press ENTER to display the 'Welcome' screen. When you are ready to proceed, press ENTER to display the **Vessel Type** menu.

Vessel Type



The **Vessel Type** menu enables you to automatically apply the optimum instrument settings for your vessel type. The options are:

- Race Sail
- Sail Cruiser
- Catamaran
- Workboat
- RIB
- Outboard Speed Boat
- Inboard Speed Boat
- Power Cruiser 1*
- Power Cruiser 2*
- Power Cruiser 3*
- Sport Fishing
- Pro Fishing

***Power Cruiser settings**. Note that the Power Cruiser settings apply as follows:

- Power Cruiser 1 - capable of speeds up to 12 knots.
- Power Cruiser 2 - capable of speeds up to 30 knots.
- Power Cruiser 3 - capable of speeds greater than 30 knots.

Select type

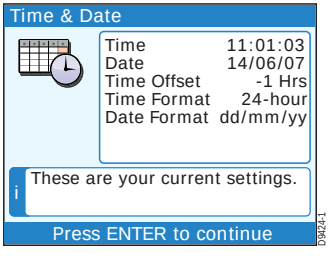
Use < and > to select the vessel type that most closely corresponds to your vessel.

When you have chosen the vessel type, press ENTER to confirm the choice. The Time and Date values and the data Units considered most appropriate for the Language and Vessel Type you chose, are then automatically applied to your ST70 system and an automatic check of system parameters is carried out.

Autodetect results

When the automatic checks are complete, a **Time & Date** summary page is displayed. This shows the current values applied to your ST70 system.

Note: *If your instrument is not receiving GPS information, time and date information are not available.*



Time & Date

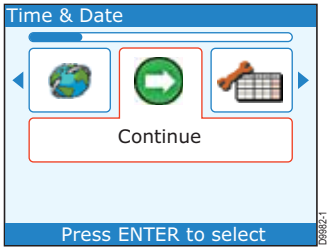
You can either change or accept the **Date Format**, **Time Format** and **Time Offset** settings. You can:

- Select either dd/mm/yy or mm/dd/yy as the date format
- Select either 12-hour (am/pm) or 24-hour as the time format.
- Set the value of the time offset to give the required local time.

With the **Time & Date** summary page displayed, check the information, then press ENTER to display the **Time & Date** setup menu.

If you want to accept the **Time & Date** values:

1. Select the **Continue** option (if necessary use < or >).
2. Press ENTER to proceed to the Units summary page.
3. Proceed from *Data units* (below).

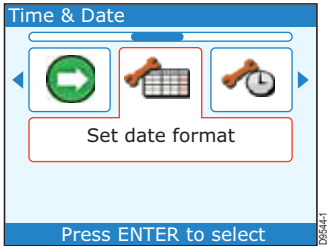


If you want to change any **Time & Date** values, carry out the *Setting date format*, *Setting time format* and/or *Setting local time* procedure below, as appropriate.

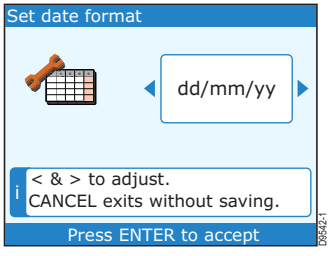
Setting date format

To set the required date format:

1. At the **Time & Date** setup menu, use < and > to select the **Set date format** option, then press ENTER, to display the **Set date format** page.



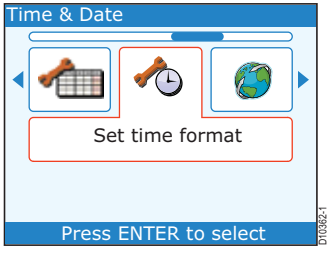
2. Use < and > to select the required Date Format, then press ENTER, to save the format and return to the **Time & Date** summary page.
3. Press ENTER to select the **Time & Date** setup menu.



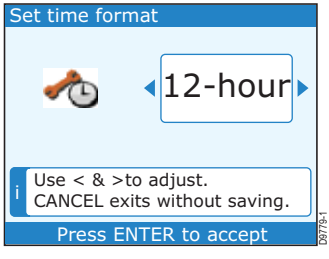
Setting time format

To set the required time format:

1. With the **Time & Date** setup menu displayed, use < and > to select the **Time Format** option, then press ENTER, to display the **Set time format** page.



2. Use < and > to select the required Time Format, then press ENTER, to save the format and return to the **Time & Date** summary page.
3. Press ENTER to select the **Time & Date** setup menu.



Setting local time

To set the instrument time to your local time.

1. At the **Time & Date** setup menu, use < and > to select the **Set time offset** option, then press ENTER, to display the **Set time offset** page.

2. Use < and > to set the correct local time. For example, if your local time is 1 hour after GMT, set **-1**, then press ENTER, to save the setting and return to the **Time & Date** setup menu.
3. Press ENTER to select the **Time & Date** setup menu.

Leaving date & time setup

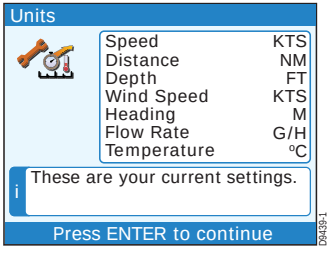
When your date and time formats and values are set as required:

1. Display the **Time & Date** setup menu.
2. Use < and > to select the **Continue** option.
3. Press ENTER, to proceed to the **Units** summary.

Data units

The **Units** summary comprises two pages and shows units currently in use. You can accept all or change any of the data **Units** settings. You can set:

- Speed to either miles per hour, kilometers per hour or knots.
- Distance to either miles, nautical miles or kilometers.
- Depth to either feet, fathoms or meters.
- Wind speed to either knots or meters per second.
- Heading to either magnetic or true.
- Flow rate to either US gallons per hour, UK gallons per hour or liters per hour
- Temperature to degrees Celsius or degrees Fahrenheit.
- Pressure to pound per square inch or kiloPascals.
- Volume to either US gallons, UK gallons or liters
- Number of engines to either 1, 2, 3, 4 or 5.
- Number of batteries to either 1, 2, 3, 4 or 5.
- Number of fuel tanks to either 1, 2, 3, 4 or 5.



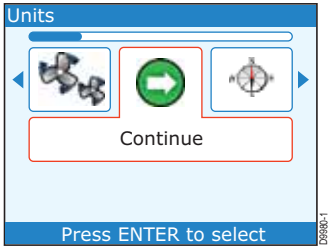
Press ENTER to see the second **Units** summary page, and if you want to return to the first page from the second, press CANCEL.

Check the information on the **Units** summary pages.

With the second **Units** summary page displayed, press ENTER to display the **Units** setup menu.

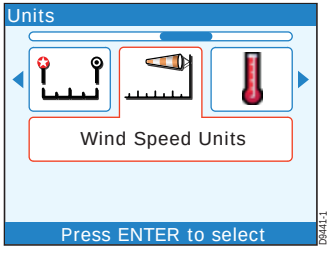
If you want to accept all data **Units** as currently set:

1. Select the **Continue** option (if necessary use < or >).
2. Press ENTER, to leave Initial Setup and proceed to the first operational page.
3. Proceed from *Depth offset* (below).

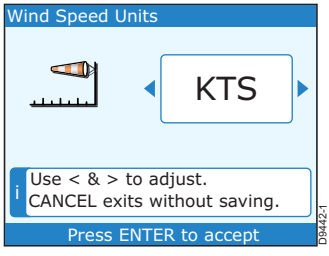


If you want to change any data **Units**:

1. With the **Units** setup menu displayed, use < and > to select the type of data you want to change, i.e. Speed, Depth, Distance etc.



2. Press ENTER, to display the setup page for the units you have selected.
3. Use < and > to select the required units
4. Press ENTER, to save the units setting and return to the first **Units** summary page.
5. Press ENTER twice to display the **Units** setup menu
6. If you want to change any other units, repeat steps 1 to 5 of this procedure.



Leaving units setup

When all units are set to what you want, display the **Units** setup menu, then:

1. Use < and > to select the **Continue** option.
2. Press ENTER, to leave Initial Setup and proceed to the first operational page.

Depth offset

Depths are measured from the Depth transducer to the sea bed, but you can apply an offset value to the depth data, so that the displayed depth reading represents the depth to the sea bed from either the keel or the water line.

If an offset is not applied, the displayed depth readings are from the transducer to the sea bed.

WARNING: Ensure you use the correct depth offset

The use of the correct depth offset is critical to the safety of the vessel. If an incorrect offset value is applied, this could result in misleading depth information being displayed with a consequent risk of running aground. Take great care to ensure you set the correct value.

Requirement

If you want to apply an offset to your depth readings, you MUST set the correct offset value, before relying on Depth data.

Therefore, before attempting to set a waterline or keel offset, find out the vertical separation between the transducer and either the waterline or the bottom of the keel on your vessel, as appropriate. See *Figure 2-1*.

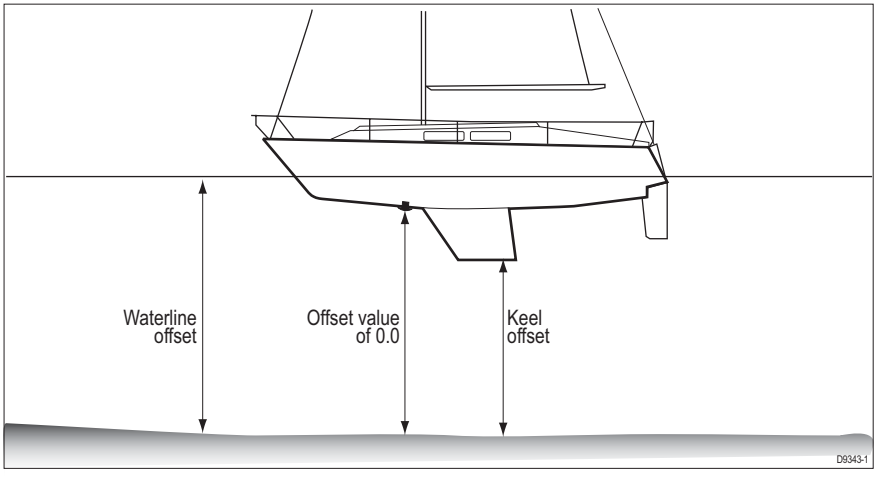
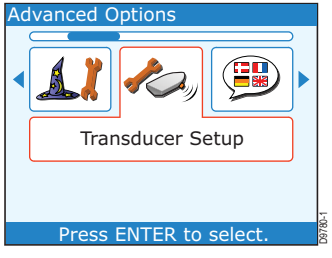


Figure 2-1 Depth offsets

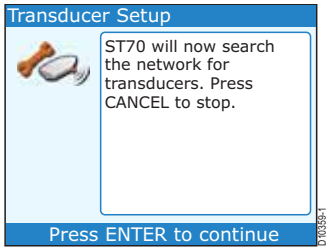
Depth offset setup procedure

To set the correct depth offset:

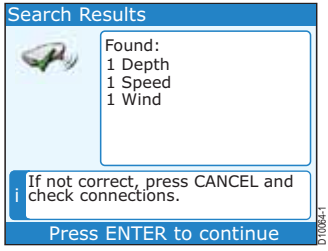
1. With any operational page displayed, press MENU to display the **Main Menu**.
2. Use < or > to scroll to **Advanced Options**, then press ENTER
3. At the **Advanced Options** menu, use < or > to scroll to **Transducer Setup**.



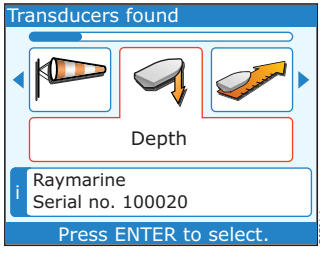
4. Press ENTER to display the **Transducer Setup** start search page.
5. Press ENTER again, to initiate a system search for transducers.



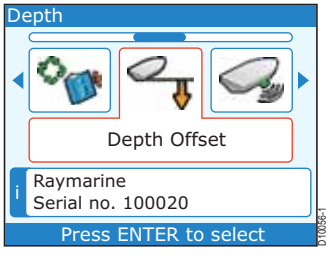
At the end of the search a **Search Results** page is displayed.



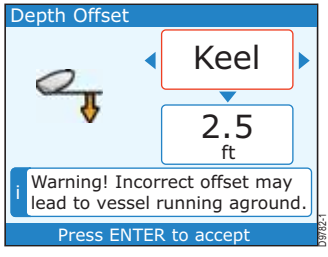
6. With the search results page displayed, press ENTER to display the **Transducers found** menu.
7. Use < or > to scroll to **Depth.**
8. Press ENTER to display the **Depth** transducer menu.



9. With the **Depth** transducer menu displayed, use < or > to scroll to the **Depth Offset** option.



10. Press ENTER, to display the **Depth Offset** setup page.
11. Check the type and value of the offset currently applied:
    - If the offset type is what you require and the value is correct for your boat, press CANCEL to return to the **Depth** transducer menu, then proceed from step *16.*
    - Otherwise proceed from step *12.*



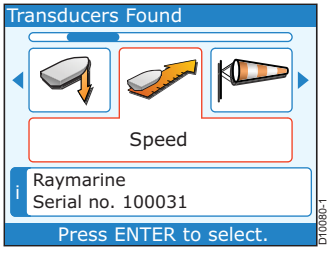
12. Press ∧ to select the upper (offset type) adjust box.
13. Use < or > to scroll to either **Water line**, **Keel** or **Transducer**, as required. If you select **Transducer**, an offset value of zero is automatically applied.
14. If you have selected:
    - Either **Water line** or **Keel,** press ∨ to select the lower (offset value) adjust box then use < or > to set the correct value.
    - **Transducer**, ensure the offset value is zero.
15. Press ENTER to save the offset value return to the **Depth** transducer menu.
16. Press CANCEL to return to the **Transducers found** menu.

Now proceed to *Set water temperature* .

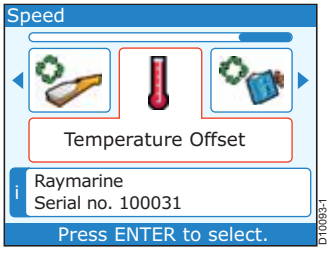
Set water temperature

To set the water temperature to the correct reading:

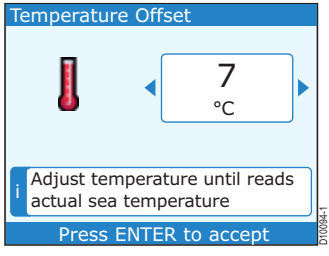
1. With the **Transducers Found** menu displayed, use < or > to scroll to the **Speed** option.



2. Press ENTER to select the **Speed** transducer setup menu.
3. Use < or > to scroll to the **Temperature Offset** option.



4. Press ENTER to display the **Temperature Offset** setup page.
5. Using a suitable thermometer, measure the water temperature, then use < or > to set the correct temperature value at the ST70 instrument.
6. Press ENTER to accept the value and return to the **Speed** transducer menu.
7. Press CANCEL to return to the **Transducers found** menu.



8. Press CANCEL to return to the **Search Results** summary.
9. Press CANCEL to return to the **Transducer Setup** start page.
10. Press CANCEL to return to the **Advanced Options** menu.

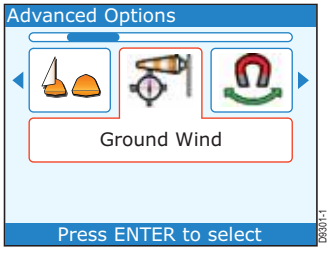
Now proceed to *Set ground wind*

Set ground wind

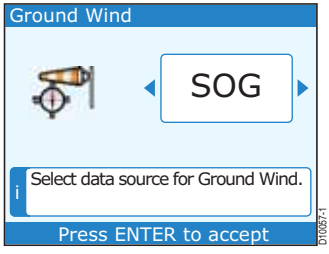
You can choose either Speed Over Ground (SOG) or Speed Through Water (STW) from which to derive the ground wind speed.

To set the required method:

1. With the **Advanced Options** menu displayed, use < or > to select the **Ground Wind** option.



2. Press ENTER, to display the **Ground Wind** setup box.
3. Use < or > to select either **STW** or **SOG**, then press ENTER to return to the **Advanced Options** menu.



Now proceed to *Set magnetic variation* .

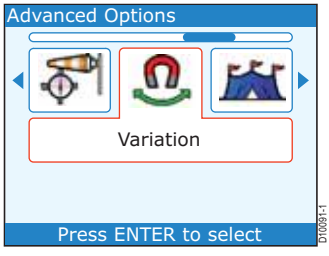
Set magnetic variation

The magnetic variation is the difference in heading between true north and magnetic north. Before setting this, refer to an up-to-date chart of the area in which you intend using your boat, to ascertain the correct value of magnetic variation.

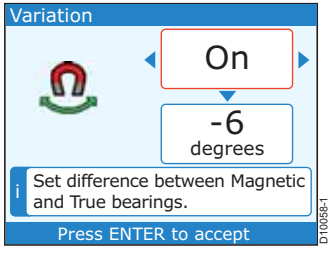
Note: *As the magnetic variation is dependent on your geographical location, you may need to change the magnetic variation value during a long voyage.*

To set the magnetic variation:

1. With the **Advanced Options** menu displayed, use < or > to select the **Variation** option.



2. Press ENTER, to display the **Variation** setup box. This has two adjust boxes, an upper box which shows the variation mode, and a lower box that shows the variation value.
3. Press ∧ to select the upper (mode) adjust box.



4. Use < or > to select the required mode:
   - Select **ON** if you want to set a value for variation. if you choose this mode, the value you set will be applied to the rest of the system.
   - Select **OFF** if you do not want to apply a variation value to the system.
   - If **SLAVE** is displayed in the mode adjust box, the variation has been set at another product in the system, and the value is shown in the lower adjust box. In this mode, you cannot change the variation value.
5. If you selected the **OFF** or **SLAVE** mode, proceed from step 6. If you selected the **ON** mode:
   i. Press **v** to select the lower (value) box.
   ii. Use < or > to set the correct variation value.
6. Press ENTER to save the value and return to the **Advanced Options** menu.
7. Press CANCEL to return to the **Main Menu**.

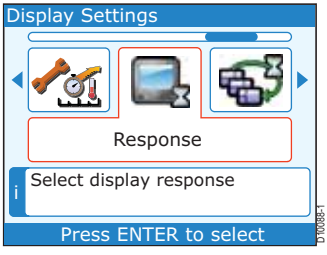
Now proceed to *Changing response rate* .

Changing response rate

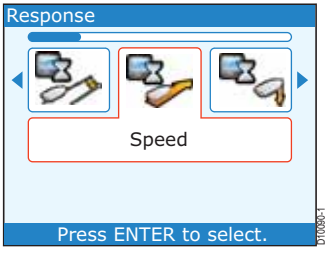
The response setting determines the rate at which data readings update. You can adjust the response at each instrument, to best suit the conditions under which you are operating. You can independently adjust the response at each instrument, for individual data types.

If you want to change the response at any instrument:

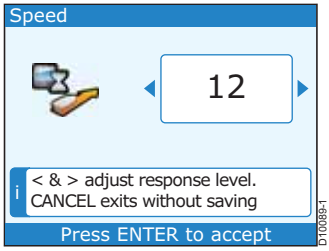
1. With the **Main Menu** displayed, use < or > to scroll to **Display Settings.**
2. Press ENTER to display the **Display Settings** menu.
3. At the **Display Settings** menu, use < or > to scroll to the **Response** option.



4. Press ENTER to display the **Response** menu, then use < or > to scroll to the required data type (**Speed** shown here).



5. Press ENTER to display the response adjust box for the data you have selected.
6. Use < or > to set the response rate. A higher value gives a quicker response rate and vice versa.
7. Press ENTER to save the value and return to the **Response** menu.
8. If you want to change the response for other data types, use < or > to scroll to the required data type, then repeat steps 5 to 8.



9. To leave response setup, ensure the **Response** menu is displayed, then:
   i. Press CANCEL to return to the **Display Settings** menu.
   ii. Press CANCEL to return to the **Main Menu**.
   iii. Press CANCEL to return to the operational page.

Ending dockside setup

Dockside setup is complete when you have satisfactorily carried out the initial setup procedures and correctly set the:

- Depth offset.
- Water temperature.
- Magnetic variation.
- Ground wind calculation method.
- Response rate.

When Dockside setup is complete, return to the operational page, then carry out a Seatrial calibration.

2.2 Seatrial calibration

WARNING: Ensure you have sufficient sea room for calibration

The seatrial calibration maneuvers require a sufficiently clear area of water. Ensure you are not likely to collide with any vessel or obstruction during calibration.

When the dockside calibration procedures are complete, navigate to a place where you have plenty of sea room then carry out the seatrial calibration procedures. These set the ST70 instrument so it gives an optimum performance with the system transducers. The seatrial calibration comprises:

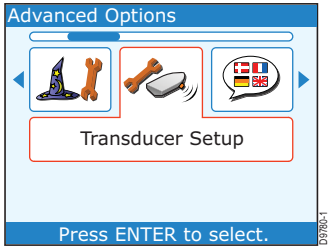
- Wind calibration & alignment.
- Speed calibration.

When you have completed the appropriate seatrial procedures, proceed to *Return to normal operation*.

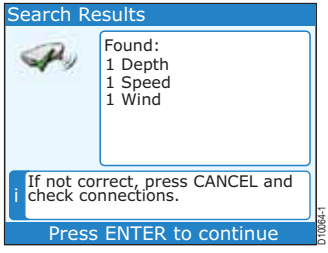
Preliminary procedures

To carry out any seatrial calibration procedure, switch on the instrument, then when an operational page is displayed:

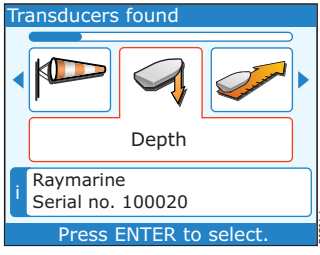
1. Press MENU to select the **Main Menu**.
2. Use < or > to select **Advanced Options.**
3. Press ENTER to display the **Advanced Options** menu
4. Use < or > to select the **Transducer Setup** option, then press ENTER, to display the **Transducer Setup** screen showing a search initiation message.



5. Press ENTER again, to initiate a search for transducers connected to the system.
   When the search is complete, a **Search Results** page is displayed.



6. Press ENTER to display the **Transdusers found** menu.
7. If you have:
   - A Wind transducer, carry out the *Wind transducer setup* procedure below.
   - A Speed transducer, carry out the *Speed calibration* on *page 20*.



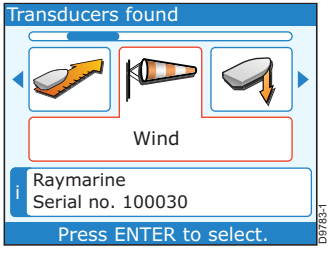
Wind transducer setup

The wind transducer setup procedures are used to:

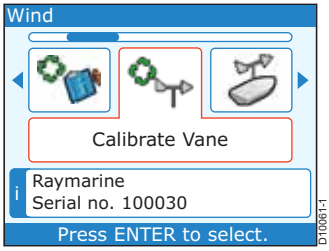
- Linearize the vane.
- Align the vane.
- Calibrate the wind speed.

Linearization

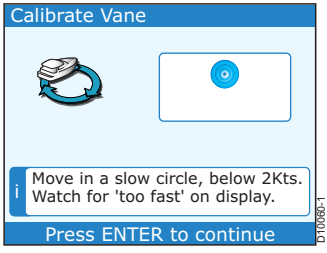
1. To linearize the wind vane:.
1. With the **Transducers found** menu displayed (see *Preliminary procedures* on *page 18*), use < or > to scroll to the **Wind** option
2. Press ENTER to select the **Wind** transducer setup menu.



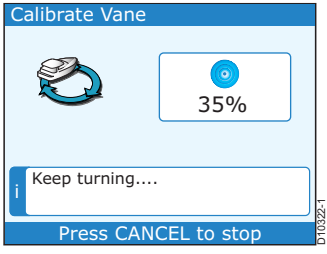
3. Use < or > to scroll to the **Calibrate Vane** option.



4. Press ENTER to select the **Calibrate Vane** start screen.
5. Keeping the boat speed below 2 knots and observing the screen, turn the boat in circles, then press ENTER to start the calibration.



6. Observe the **Calibrate Vane** run screen and continue turning the boat.
   If the boat speed is too high during calibration, the instrument displays a **Slow down** message. If this happens, reduce your speed. Calibration completes automatically.
7. When calibration is complete, the **Wind** transducer setup menu is displayed.

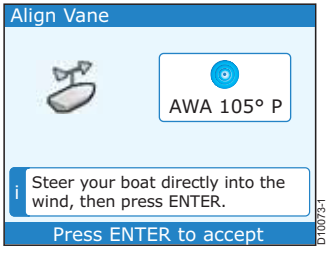


Alignment

To carry out the wind vane alignment:

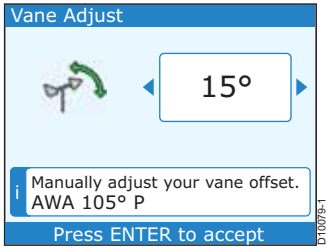
1. With the **Wind** transducer setup menu displayed, use < or > to scroll to **Align Vane**, then press ENTER to display the **Align Vane** screen
2. Sail the boat directly into the wind, then press ENTER to accept the alignment and return to the **Wind** transducer setup menu.

Note: *On a calm day, motor fast enough to create 'your own wind'.*



If there is any inaccuracy after you have completed the Align Vane procedure, then:

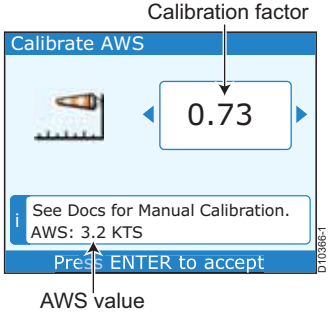
1. At the **Wind** transducer setup menu, select **Vane Adjust**, to display the **Vane Adjust** screen.
2. Sail the boat directly into the wind, then use < and > to manually set the wind reading to zero.
3. Press ENTER to accept the value and return to the **Wind** transducer setup menu.
4. Press CANCEL to return to the **Transducers found** menu.



Calibrate wind speed

To set the correct apparent wind speed reading:

1. With the **Wind** transducer setup menu displayed, use < or > to scroll to **Calibrate AWS**, then press ENTER to display the **Calibrate AWS** screen.
2. Use < or > to adjust the Calibration Factor so that the AWS value in the information box is set to the correct value.
3. Press ENTER to accept the value and return to the **Wind** transducer setup menu.
4. Press CANCEL to return to the **Transducers found** menu.



Speed calibration

The object of speed calibration is to ensure that the speed readings at the ST70 instruments are true indications of the boat speed, ideally over the speed range of the vessel, i.e. from stationary to top speed.

In order to take into account the changes in water-flow characteristics across the hull, for different speeds, it is advisable carry out speed calibration at as many speeds as possible, up to the maximum of five, provided by ST70. **This is particularly important for planing vessels**.

The correct calibration at each speed is achieved by applying a calibration factor to the indicated speed reading. The correct value for the calibration factor is obtained by one of two methods:

- If SOG information is available, you can use this as a reference, to enable you to set the correct calibration factor.
- If SOG information is not available, you need to manually calculate and apply the correct calibration factor.

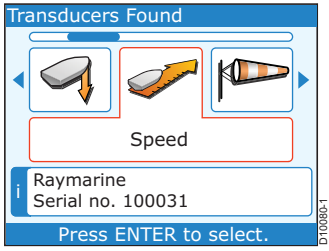
In order to achieve accurate results, speed calibration must be carried out in conditions of **zero tide and zero current**.

Carry out the *Start speed calibration* procedure (*page 21*) followed by the *Set to SOG* or *Manual calibration* procedure, as required.

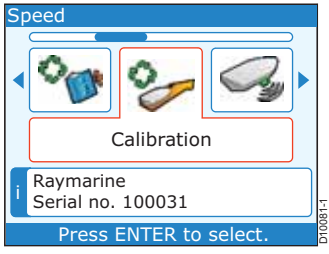
Start speed calibration

To calibrate the Speed transducer:

1. With the **Transducers Found** menu displayed (see *Preliminary procedures* on *page 18*), use < or > to scroll to the **Speed** option.

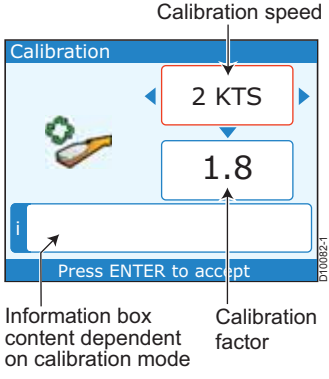


2. Press ENTER to select the **Speed** transducer setup menu.
3. Use < or > to scroll to the **Calibration** option.



4. Press **ENTER** to select the Speed **Calibration** screen

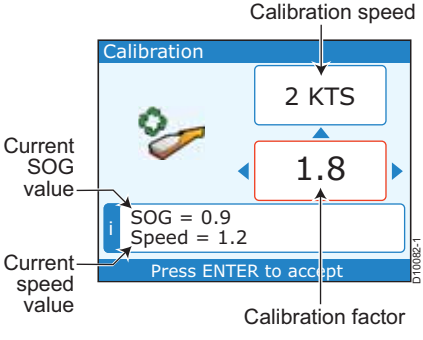
5. Press ∧ to highlight the calibration speed field.
6. Use < or > to select the lowest calibration speed.
7. Apply the appropriate calibration factor, using one of the following:
   - If SOG information is available, use the *Set to SOG* procedure.
   - If SOG information is not available, use the *Manual calibration* procedure.



Set to SOG

To use SOG to set the correct speed:

1. Carry out the *Start calibration* procedure (above).
2. Press ∨ to highlight the calibration factor field.
3. In conditions of zero tide and zero current, run your vessel at approximately the selected calibration speed, using the SOG reading as a guide.
4. Use < or > to adjust the calibration factor, so the current speed value changes to be the same as SOG
5. Press ∧ to highlight the calibration speed field.

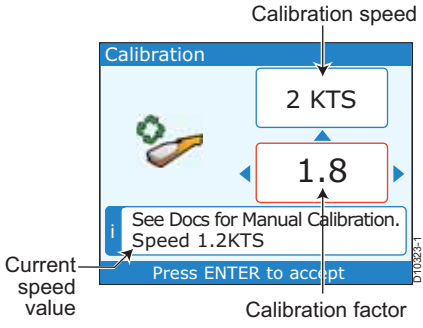


6. Use < or > to select the next calibration speed.
7. Repeat *Set to SOG* steps 2 to 6, until calibration factor values have been set for all calibration speeds.
8. Press ENTER to save the values and return to the **Speed** transducer setup menu.
9. Press CANCEL to return to the Transducers found menu.

Manual calibration

To manually set the correct speed:.

1. Carry out the *Start calibration* procedure (above)
2. In conditions of zero tide and zero current, run your vessel at a steady speed approximately that of the selected calibration speed, over a measured distance.When you do this, make a note of:
   - The current speed value.
   - The time it takes to cover the measured distance.



3. Calculate the actual speed over the measured distance (distance/time).
4. If the calculated speed is:
   - The same as the current speed value noted during the calibration run, then the calibration is correct at this speed, so proceed from *Manual calibration* step 6.
   - Not the same as the indicated speed:
     i. Calculate a new, corrected calibration factor, as follows

$$\textit{new calibration factor} = \frac{\textit{actual speed x old calibration factor}}{\textit{indicated speed}}$$

     ii. Press ∨ to highlight the calibration factor value field.
     iii. Use < or > to set the displayed calibration factor to the new calculated value.
5. Repeat *Manual calibration* steps 2 to 4, until the current speed value displayed during the calibration run is the same as the calculated speed.
6. Press ∧ to highlight the calibration speed field.
7. Use < or > to select the next calibration speed.
8. Repeat *Manual calibration* steps 2 to 7, until the calibration factor values are correct at all calibration speeds.
9. Press ENTER to save the values and return to the **Speed** transducer setup menu.
10. Press CANCEL to return to the Transducers found menu.

2.3 Return to normal operation

When you have completed all the appropriate dockside setup and seatrial calibration procedures, return to normal operation as follows:

1. With the Transducers found menu displayed, press CANCEL to select the **Search Results** screen.
2. Press CANCEL to select the **Transducer Setup** screen showing the search initiation message.
3. Press CANCEL to select the **Advanced options** menu.
4. Press CANCEL to select the **Main Menu**.
5. Press CANCEL to return to normal operation.

2.4 After commissioning

When the dockside setup and seatrial calibration have been completed, and you have returned to normal operation, your ST70 instrument is ready for use. Refer to the *ST70 Operating Guide* for instructions on how to use it on a day-to-day basis.

EMC Conformance

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

Chapter 3: Setup Procedures

3.1 Introduction

Many operating parameters are set during commissioning and may not need to be changed again. However, if any of these parameters are not as you want them, you can change

- The method of ground wind calculation. Refer to *Chapter 2: Commissioning Procedures*.
- The magnetic variation. Refer to *Chapter 2: Commissioning Procedures*.
- The response rate of an instrument. Refer to *Chapter 2: Commissioning Procedures*.
- The language or vessel type. See below.
- The time/date format. See below.
- The local time. See below.

Other setup procedures likely to be useful on a day-to-day basis are given in your *ST70 Instrument Operating Guide*. These procedures include:

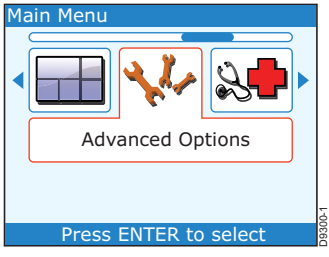
- Changing the screen brightness level.
- Changing the screen colors.
- Changing data units.
- Switching off pages on and off, and/or changing page layout and content.
- Setting local time.
- Using the alarm clock.

3.2 Procedures

Changing the language or vessel type setting

If you need to change the language or vessel type, use the following procedure:

1. Press MENU to display the **Main Menu** then use < or > to scroll to **Advanced Options**.
2. Press ENTER to display the **Advanced Options** menu.
3. Follow the *Setting Language* or *Setting Vessel Type* procedure (below), as appropriate.



Setting Language

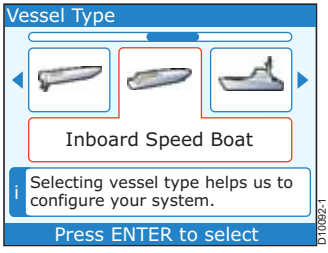
1. At the **Advanced Options** menu, use < and > to select **Language**, then press ENTER to display the **Language** menu.
2. Use < and > to select the language you want, then press ENTER to save and exit the menu.
3. Use the *Leaving Advanced Options* procedure below, to return to the operational page.

Setting Vessel Type

CAUTION: Vessel Type setting also affects other parameters

If you change the Vessel Type, you must then ensure all other parameters are set as you require before using the boat, as some other parameters change when the Vessel Type changes.

1. At the **Advanced Options** menu, use < and > to select **Vessel Type**, then press ENTER to display the **Vessel Type** menu.
2. Use < and > to select the required Vessel Type, then press ENTER to save and exit the menu.
3. Use the *Leaving Advanced Options* procedure below, to return to the operational page.



Leaving Advanced Options

To leave the **Advanced Options** menu:

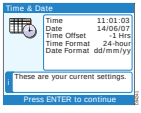
1. Press CANCEL to return to the **Main Menu**.
2. Press CANCEL to return to the operational page.

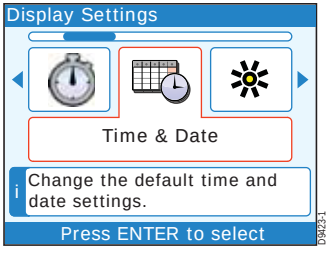
Changing the time/date format

Note: *Date and time information is available only if the ST70 instrument is receiving GPS data.*

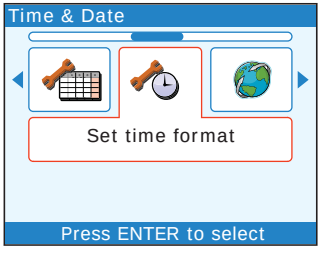
To change the format of either the time or date display:

1. Press MENU to display the **Main Menu** then use < or > to scroll to **Display Settings**.
2. Press ENTER to show the **Display Settings** menu.
3. Use < or > to scroll to the **Time & Date** option.
4. Press ENTER. A summary of the time and date information is then displayed.





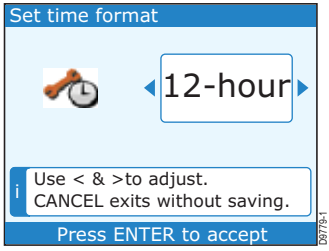
5. **P**ress ENTER again, to display the **Time & Date** menu.
6. Follow the *Setting time format* or *Setting date format* procedure (below), as appropriate.



Setting time format

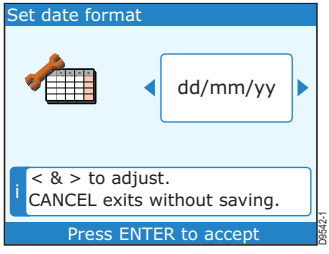
1. At the **Time & Date** menu, use < or > to scroll to the **Set time format** option.
2. Press ENTER to display the **Set time format** box, then use < or > to select either 12 hour or 24 hour format, as required.
3. Press ENTER to save the setting and return to the **Time & Date** summary page.
4. Use the *Leaving time/date setup* procedure below, to return to your operational page.

Note: *If you want to set the correct local time, refer to the ST70 Instrument Operation Guide.*



Setting date format

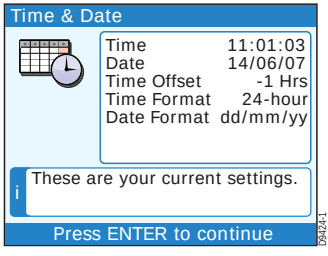
1. At the **Time & Date** menu, use < or > to scroll to the **Set date format** option.
2. Press ENTER to display the **Set date format** box, then use < or > to select either dd/mm/yy or mm/dd/yy format, as required.
3. Press ENTER to save the setting and display the **Time & Date** summary page.
4. Use the *Leaving time/date setup* procedure below, to return to your operational page.



Leaving time/date setup

With the **Time & Date** summary page displayed:

1. Press CANCEL to return to the **Display Settings** menu.
2. Press CANCEL to return to the **Main Menu**.
3. Press CANCEL to return to your operational page.



Chapter 4: Maintenance & Troubleshooting

4.1 Maintenance

Servicing and safety

Unless specific instructions are given to the contrary, Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and replacement parts used will not affect performance.

Some products generate high voltages, so never handle the cables/connectors when power is being supplied to the equipment.

When powered up, all electrical equipment produces electromagnetic fields. These can cause nearby electrical equipment to interact, with a possible adverse effect on operation. To minimize these effects and enable best possible performance from your Raymarine equipment, guidelines are given in the installation instructions.

Always report any EMC-related problem to your nearest Raymarine dealer. We use such information to improve our quality standards.

In some installations, it may not be possible to prevent the equipment from being affected by external influences. In general this will not damage the equipment but it can lead to spurious resetting action, or momentarily may result in faulty operation.

Instrument Cleaning

Periodically clean your ST70 Instrument with a soft damp cloth.

Do NOT use chemical or abrasive materials to clean your instrument.

Do NOT wipe the instrument with a dry cloth as this could cause scratches.

Cabling

Periodically examine all cables for chafing or other damage to the outer shield, and where necessary, replace and re-secure

4.2 Troubleshooting

In the unlikely event that you encounter problems using your ST70 instrument, use this section to resolve the situation.

First considerations

If your ST70 is not performing as you think it should, be sure you are operating correctly as described in the ST70 Operating Guide, supplied with the instrument.

Then:

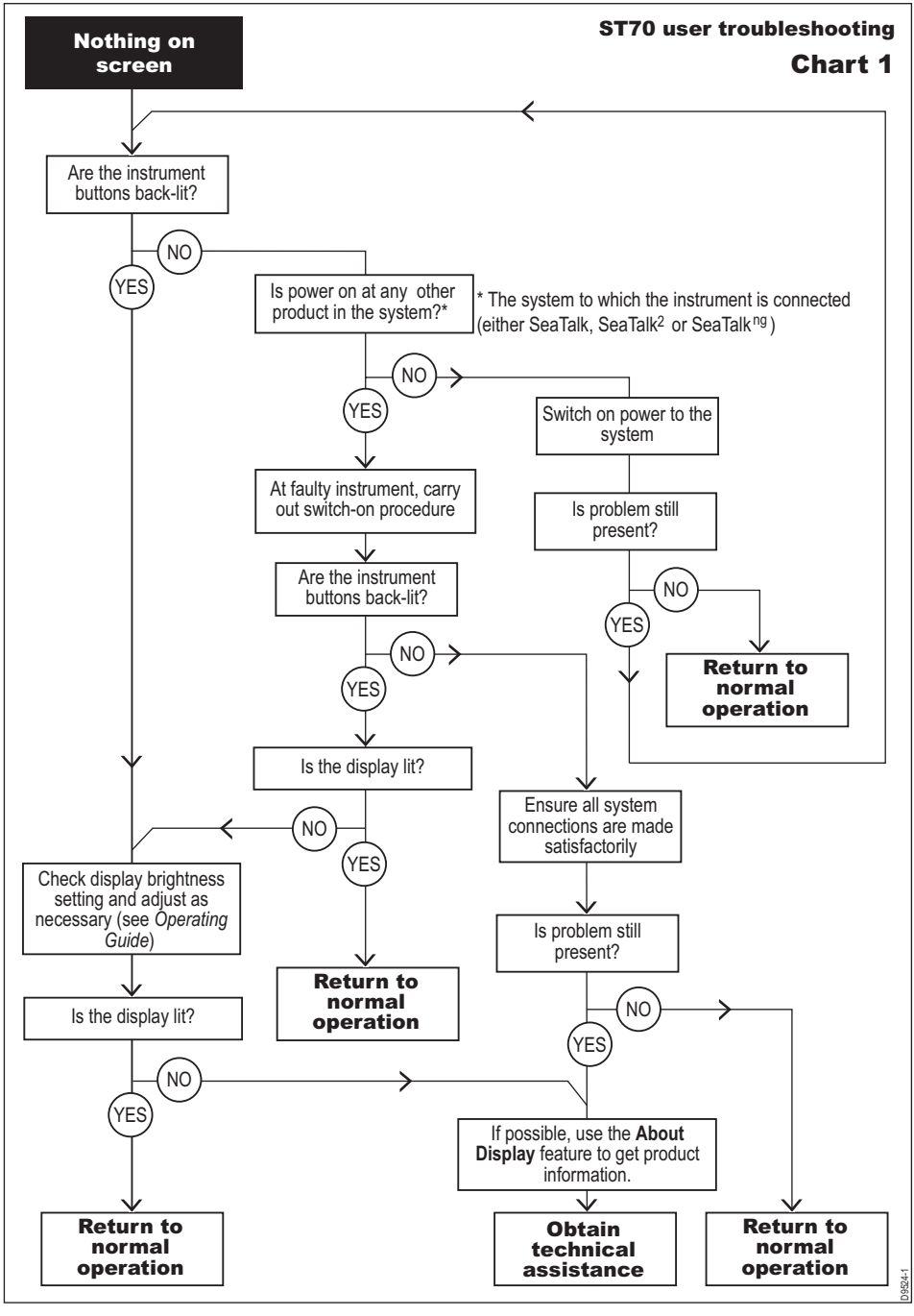
- Ensure that any data you think may be missing, is available on your boat. For example, if you do not have a wind transducer, then there will be no wind data or wind-related data.
- Take into account any changes that may have been made to the electrical system aboard your boat. Such changes could affect the performance of your ST70 instrument.
- Be aware that radio signals transmitted nearby (for example from another boat or shore station) could affect the performance of your ST70 instrument.

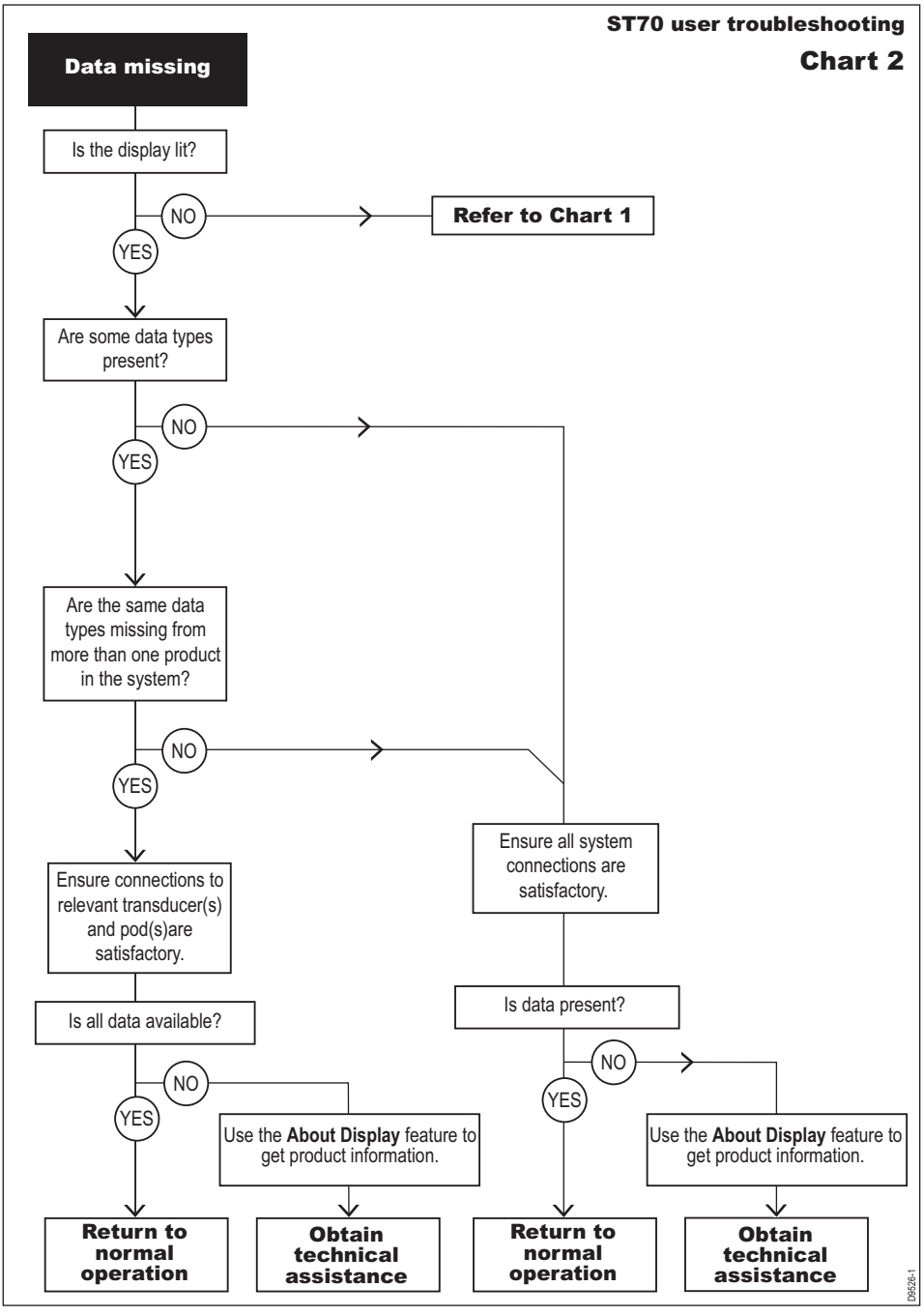
If you are satisfied that the problem is not due to any of the above, use the procedures in this section to isolate the cause of the problem.

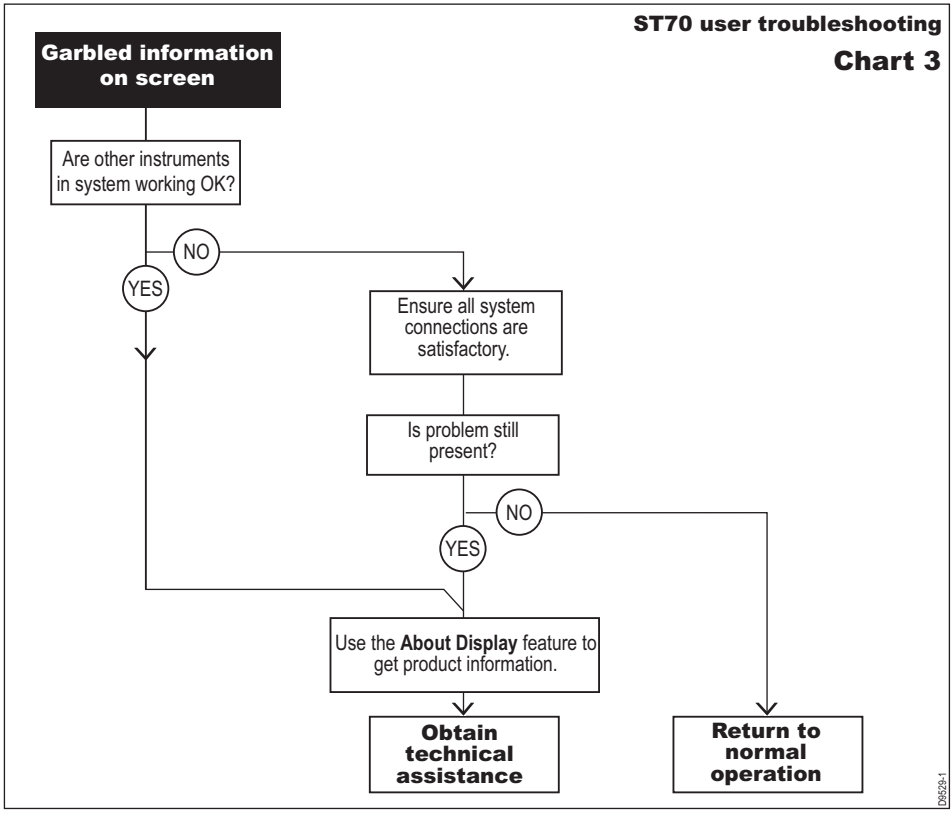
Procedures

If it appears that an ST70 instrument is not operating satisfactorily, check the symptoms below to determine how to resolve the problem:

- Nothing on the instrument screen - refer to Chart 1.
- Data missing from the instrument screen - refer to Chart 2.
- Data on the instrument screen is garbled- refer to Chart 3.
- Specific data types are missing or incorrect:
  - Check the relevant Transducer and Pod, including the connections between them and to the system.
  - If speed readings are missing or obviously wrong, the speed transducer paddle wheel could be fouled and need cleaning.


ST70 user troubleshooting
Chart 1
Nothing on screen
Are the instrument buttons back-lit?
NO
YES
Is power on at any other product in the system?*
* The system to which the instrument is connected (either SeaTalk, SeaTalk2 or SeaTalkng)
NO
YES
Switch on power to the system
At faulty instrument, carry out switch-on procedure
Is problem still present?
Are the instrument buttons back-lit?
NO
YES
NO
YES
Return to normal operation
Is the display lit?
Ensure all system connections are made satisfactorily
NO
YES
Check display brightness setting and adjust as necessary (see Operating Guide)
Is problem still present?
Return to normal operation
Is the display lit?
NO
YES
NO
YES
If possible, use the About Display feature to get product information.
Return to normal operation
Obtain technical assistance
Return to normal operation
D5924-1


ST70 user troubleshooting
Chart 2
Data missing
Is the display lit?
NO
Refer to Chart 1
YES
Are some data types present?
NO
YES
Are the same data types missing from more than one product in the system?
NO
YES
Ensure connections to relevant transducer(s) and pod(s)are satisfactory.
Is all data available?
NO
YES
Use the About Display feature to get product information.
Return to normal operation
Obtain technical assistance
Ensure all system connections are satisfactory.
Is data present?
NO
YES
Use the About Display feature to get product information.
Return to normal operation
Obtain technical assistance
D6526-1



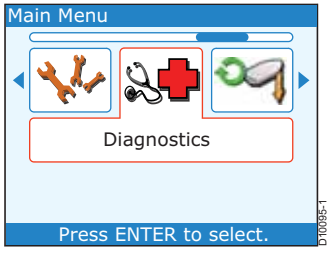
Using About Display feature

The About Display function provides information about the instrument on which it is run. Before seeking technical assistance, please use the About Display function whenever possible to find out the relevant:

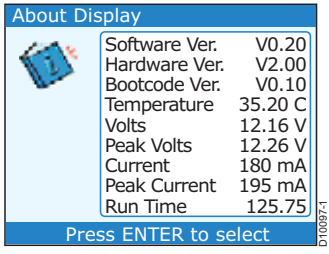
- Software Version Number
- Hardware Version Number
- Bootloader Version Number
- Temperature
- Voltage
- Peak voltage
- Current
- Peak current
- Total hours run

To run the About Display function:

1. With the instrument switched on, press MENU to display the Main Menu, then use < or > to select the **Diagnostics** option.
2. Press ENTER to display the **Diagnostics** menu.



3. With the **Diagnostics** menu displayed, use < or > to select the **About display** option, then press ENTER. Note that the:.
   - **Temperature** should be in the range -30°C to +70°C
   - **Volts** should be in the range 9 V to 16 V
   - **Peak Volts** should be in the range 9 V to 16 V
   - **Current** and **Peak Current** should be not greater than 220 mA



4. Make a note of any data you need then press ENTER:
   - If you have seen all the available data the display shows the **Diagnostics** menu.
   - If there is more data to be displayed, the next page of About Display data is displayed. Repeat step 4 until the display shows the **Diagnostics** menu.

Technical support

Raymarine provides a comprehensive customer support service, on the world wide web and by telephone help line. Please use either of these facilities if you are unable to rectify a problem.

If you intend seeking technical assistance, please first use the About Display and About System functions whenever possible, and make a note of the information available there.

Note: *If it is not possible to use the About Display function on a faulty instrument, remember you may still be able to get system information by running About System at another instrument.*

World wide web

Please visit the Customer Support area of our web site at:

www.raymarine.com

As well as providing a comprehensive Frequently Asked Questions section and servicing information, the web site gives e-mail access to the Raymarine Technical Support Department and a details of the locations of Raymarine agents, worldwide.

Telephone help line

If you do not have access to the world wide web, please call the Raymarine help line.

In the USA, call:

- +1 800 539 5539, extension 2444 or
- +1 603 881 5200 extension 2444

In the UK, Europe the Middle East or the Far East, call:

- +44 (0) 23 9271 4713 (voice)
- +44 (0) 23 9266 1228 (fax)

Help us to help you

When requesting service, please have the following product information to hand:

- Equipment type.
- Model number.
- Serial number.
- Software version.
- Hardware version.

You can find out this information by running the About Display diagnostic feature.

Specification

Supply voltage:	Nominal Maximum Minimum Absolute	12 V dc 16 V dc 9 V dc maximum: 18 V dc
Current:	Nominal Maximum	dependent on screen brightness Not more than 220 mA
Dimensions (excluding studs)	4.33 in W x 4.53 in H x 1.28 in D (110 mm x 115 mm x 32.5 mm)	
Connections	Two SeaTalk^{ng}	
Operating temperature	-20º to +70ºC	
Illumination	Sliding scale	
Compliances	RoHS EMC EN60945 Revision 4	
Buzzer	Monotone buzzer	

Glossary

Abbreviation	Description
AWA	Apparent Wind Angle
AWS	Apparent Wind Speed
COG	Course Over Ground
EMC	Electromagnetic Compatibility
GPS	Global Positioning System
HDOP	Horizontal Dilution Of Position
HMI	Human Machine Interface (see MMI)
MFD	Multi-Function Display
MMI	Man Machine Interface (see HMI)
MOB	Man Overboard
NGCC	New Generation Course Computer
SOG	Speed Over Ground
STW	Speed Through Water
TWA	True Wind Angle
TWS	True Wind Speed
VMG	Velocity Made Good
WEEE	Waste Electrical and Electronic Equipment
XTE	Cross Track Error

Index

A

About Display function, 33

C

Cable checking, 29

Certified installation, iii

Cleaning, 29

Commissioning
- dockside setup
  - data units, 10
  - date format, 9
  - depth offset, 11
  - ground wind calculation, 15
  - initial switch on, 7
  - language, 8
  - local time, 10
  - magnetic variation, 15
  - response rate, 16
  - time format, 9
  - vessel type, 8
  - water temperature, 14
- requirement, 2, 6, 7
- seatrial calibration
  - speed transducer, 20
    - manual calibration, 22
    - set to SOG, 21
  - wind transducer, 18

Controls, 1

D

Data units, 10

Date format, 9, 26

Depth offset, 11
- setting, 12

Disposing of the product, iv

Dockside setup
- data units, 10
- date format, 9
- depth offset, 11
- ground wind calculation, 15
- initial switch on, 7
- language, 8
- local time, 10
- magnetic variation, 15
- response rate, 16
- time format, 9
- vessel type, 8
- water temperature, 14

Documentation, iii

E

EMC conformance, 23

EMC information, iii

Enhanced warranty, iii

G

Glossary, 39

Ground wind calculation, 15

H

Help lines, 35

I

Initial setup, 2, 8

L

Language, 8, 25

Local time, 10

M

Magnetic variation, 15

Menus, 2

O

Operating summary, 4

Operational page selection, 1

P

Page selection, 1

Power
- switch on, 7
- switch on/off, 6

power protocol, 6

Product disposal, iv

R

Response rate, 16

S

Safety, 29
- depth offset, 11
- electrical, iii
- general, iii
- navigation, iii

Seatrial calibration
- getting started, 17
- speed transducer, 20
  - manual calibration, 22
  - set to SOG, 21
- wind transducer, 18, 19

Servicing, 29
Setup
  data units, 10
  date format, 9, 26
  depth offset, 11, 12
  ground wind calculation, 15
  initial, 2, 8
  local time, 10
  magnetic variation, 15
  procedures in Operating Guide, 25
  requirements, 2
  response rate, 16
  select language, 8, 25
  select vessel type, 26
  time format, 9, 26
  vessel type, 8
  water temperature, 14
  wind vane alignment, 19
Speed transducer
  calibration, 20
    manual calibration, 22
    set to SOG, 21
    start, 21
Switch on
  day-to-day, 2
  initial, 2, 7
System operation, 5, 6

T

Technical support, 34
Time format, 9, 26
Troubleshooting, 30
  charts, 30
  symptoms, 30
    data missing from screen, 31
    garbled information, 32
    nothing on screen, 30
  Technical support, 34
  using About Display, 33

V

Vessel type, 8, 26

W

Water temperature, 14
Wind transducer alignment, 19
Wind transducer calibration, 18