

USER GUIDE FOR

DATALINE-X™

WAYPOINT+

Stowe Marine Ltd.

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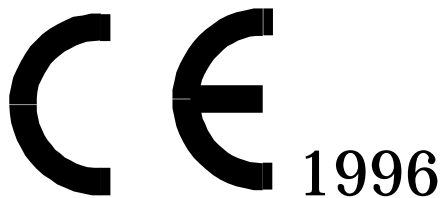
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Dataline-X WAYPOINT+ Manual, Part Number 06047SM, Issue 2, Dec 1995.

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the manual before attempting to operate or work on the equipment.

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1.1 The Dataline-X System

The Dataline-X System, as its name implies, uses a single cable to carry both power and data around the vessel to each instrument. This is done using a NMEA 0183 serial digital communication link, which is an established industry standard. Because of this, instruments from other manufacturers may be interfaced to the Dataline-X System - assuming that they have a NMEA output or input.

This User Guide describes the Navigation System Repeater digital display, known as **Dataline-X WAYPOINT+**, used within the Dataline-X System.

The **Dataline-X WAYPOINT+** provides the user with a sophisticated repeater, able to display the navigational data available from the Shipmate RS5700, 5800 and 5900 GPS and control the Dataline Multi-Chart plotter. It can also be used as a straight forward repeater to a stand-alone GPS/Decca/Loran receiver. In many cases, the **WAYPOINT+** will calculate the data for these displays, even if it is not directly present in the Radio Navigator's output. Man Overboard displays show how to return to the incident position.

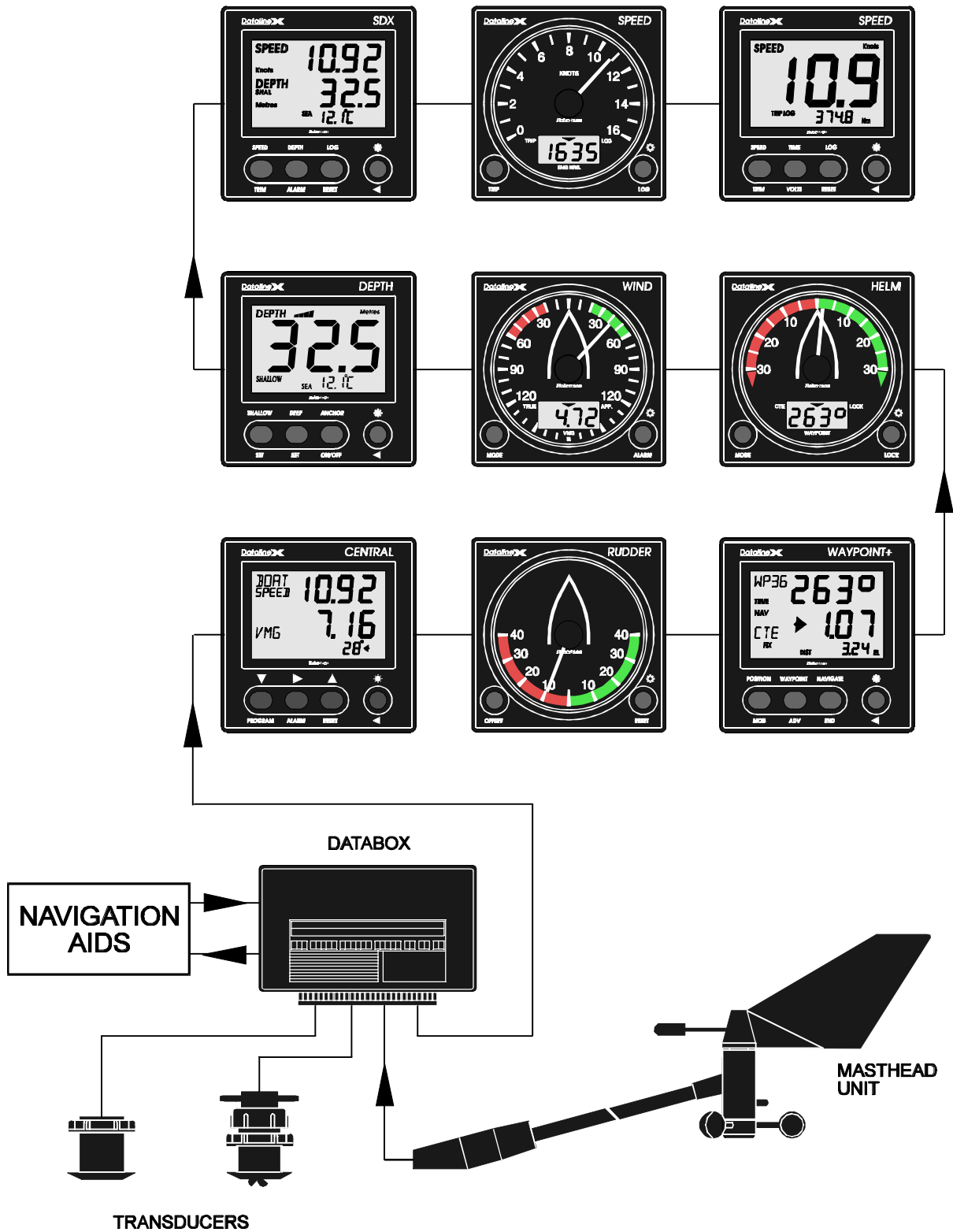


Figure 1.1 - Dataline-X System Diagram

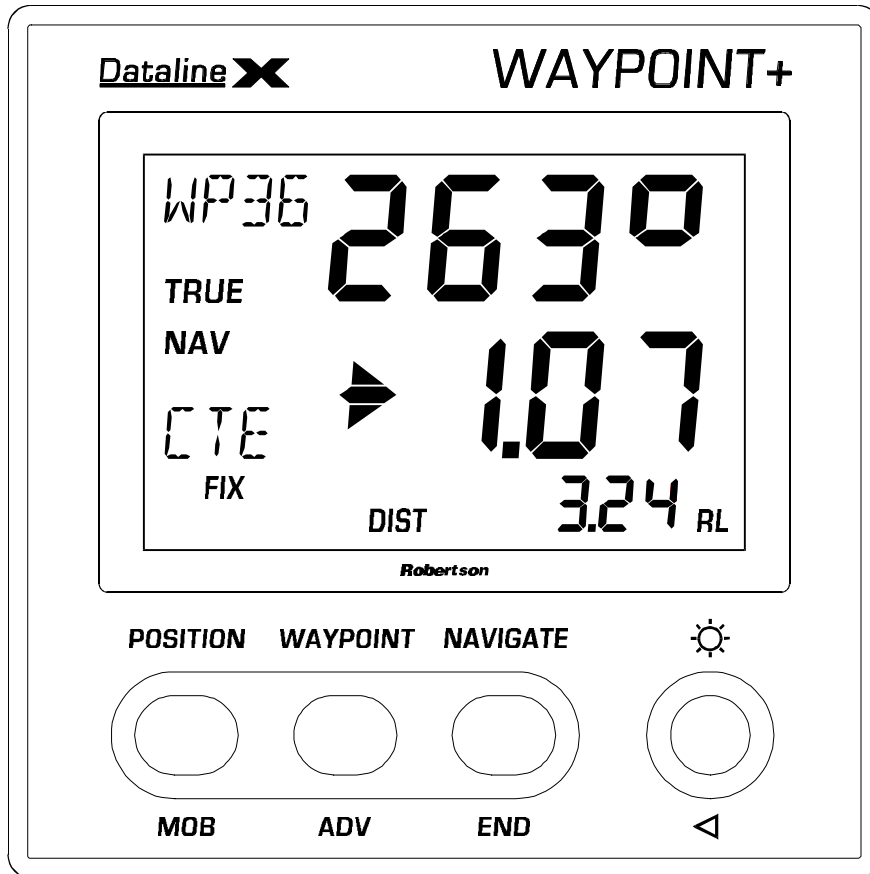


Figure 1.2 - Dataline-X WAYPOINT+ Instrument

1.2 Dataline-X WAYPOINT+ SpecificationPosition Functions

Lat/Long Display	Degrees, Minutes and Hundredths of Minutes
Datum	As received from Navigator
Course Over Ground (COG)	0 to 359°
Speed Over Ground (SOG)	0 to 99.9 Knots
SOG Precision	0.1 Knots
Local Time	24 Hour Clock, Hours and Minutes

Tidal Functions

Tidal Set	0 to 359°
Tidal Drift	0 to 99.9 Knots
Tidal Drift Precision	0.1 Knots
Tidal Drift Accuracy	Includes vessel leeway due to calculation from COG/SOG and Heading/Boat Speed

WAYPOINT+ Functions

Waypoint Identity	4 Alpha-Numeric characters
Waypoint Bearings	0 to 359° (True or Magnetic)
Waypoint Distance	0 to 9999 Nm
Waypoint Distance Precision	1, 0.1, or 0.01 Nm as appropriate (4 digits)
Velocity Made Good to Wpt (VMG)	0 to 99.9 Knots
VMG Precision	0.1 Knots
Time to Go to Waypoint (TTG)	0 to 99 Hours 59 Minutes
Waypoint Arrival Alarm	('Arr')
Waypoint Passed Alarm	(PASS)

Navigation Functions

Cross Track Error (CTE)	0 to 999 Nm
CTE Precision	1, or 0.1 Nm as appropriate (3 digits)

Direction to Steer	Port or Starboard Arrow (see Note 2)
Heading to Steer to Wpt (HEAD)	0 to 359° (Magnetic)
Cross Track Velocity (SLIP)	0 to 99.9 Knots Port or Starboard
SLIP Precision	0.1 Knots

Man Overboard Functions

MOB Position	(Not corrected for Tide)
MOB Bearing	0 to 359°
MOB Distance	0 to 99 Nm
MOB Distance Precision	0.01 Nm
MOB TTG	0 to 99 Hours 59 Minutes

Additional Functions

System Calibration Facility	
Waypoint Advance	(With suitable Radio Navigator)
Navigation Mode Start/End	(With suitable Radio Navigator)
Display Backlighting Levels	Seven levels plus Off
Display Backlighting Colours	Three colours, (Red, Green, Yellow)
Display Backlighting Control	Two independent lighting banks.

General

Power Requirement	10 to 16V, 14 mA, (50 mA max with lighting)
Size	110 x 110 x 18 mm (above panel)
Mounting Hole Size	50 mm (2 inches)
Total Depth Below Panel Front	32 mm
Weight	210 grams
Environmental Rating	IP65
Temperature Range	0°C to 70°C

Alternative Transducers

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If any of the system transducers are not fitted to the Databox, but there is alternative speed, log, or sea temperature NMEA data being transmitted from another sensor to the Databox, then this alternative data will be used.

Notes:

1. The values and functions given relate to the display, the radio navigator installed will determine the actual values and functions.
2. If the vessel is off course by less than 0.1 Nm, the appropriate off course arrow will still be shown.

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- 2.5 The 'Navigate' Display
 - 2.5.1 Ending Navigate Mode
- 2.6 Man Overboard Mode
- 2.7 To Set The Display Backlighting
- 2.8 Demonstration Mode

2.1 General Description

The LCD display is generally controlled by the three oval buttons. These buttons move up, down, or sideways through the groups of display screens that are available.

2.1.1 The LCD Display

The LCD is divided into three sections, known as sub-screens. The top two sections are the main display, while the smaller, lower, section shows additional data. All data is described by legends located to their left. In addition, there are a number of general information legends.

2.1.2 The Buttons

The word below the button (in white) indicates the main function for that button.

The word below the button (in grey) indicates an additional function which can only be selected when that button is used in conjunction with the round * button. Both must be pressed together.

For some functions, such as setting the display backlighting with the round button, the button must be held for greater than 3 seconds.

When a function has been selected, a BEEP will be heard to confirm correct operation.

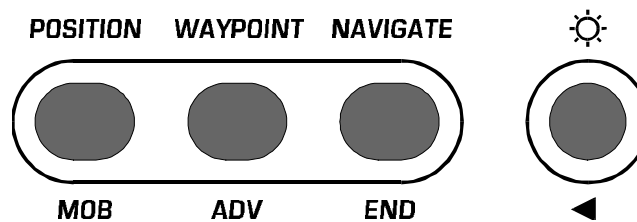


Figure 2.1 - The Buttons

The main navigational displays are arranged in groups under each of the three oval keys - Position, Waypoint and Navigate. The user cycles round each group by repeatedly pressing the key concerned. When moving to a new group, the first display shown will be the last one accessed in that group.

2.2 Powering Up

When powering up the instrument, it will beep, the pointer will move to the top of the display, and will show all the LCD segments for approximately half a second.

The display will then show the current position if it is available. If not, it will display 'NO POS' and the number of GPS satellites being targeted (if appropriate).



Figure 2.2 - The Display on Power Up

2.3 The 'Position' Display

Each successive push of the POSITION button will cause the display to indicate the following:

- Present Position and Time →
- Course and Speed Over Ground and Time →
- Tidal Set and Drift and Time →
- Present Position and Time

Select as required.

Notes:

1. Time is only available if the GPS System is being used. It is corrected from Universal Co-Ordinated Time (UTC) to local time by an offset. (See Part 4 for details).
2. If the Navigator outputs Tidal Set and Drift data, then this is shown. However, it can be calculated from the Course and Speed Over Ground, the Heading, and the Boat Speed, if all this data is available.
3. Bearings are to Magnetic or True North as selected. 'MAG' or 'TRUE' is shown to indicate which. (See Part 4 for selection).

2.4.1 Position Lost Alarm

If a valid position fix is not received by the WAYPOINT+ for 60 seconds, or it receives a 'Lost Fix' message. It will sound an alarm for 10 seconds and display 'POS LOST'. The phrase 'NO POS' will then be shown, instead of the Position display, until a valid position has been received. Any data which can be considered valid without a position fix will still be available.

If the WAYPOINT+ is connected to a GPS, and the NMEA data for the number of satellites that are being tracked is being received, then the number of satellites will also be displayed, as will the time, if this is available. At least three satellites are required for a fix.

2.4 The 'Waypoint+' Displays

Each successive push of the WAYPOINT button will cause the display to indicate the following:

- Wpt ID, Wpt Bearing, Course Over Ground and Wpt Distance →
- Wpt ID, Wpt Bearing, Time to Go and Wpt Distance →
- Wpt ID, Wpt Bearing, VMG to Wpt and Wpt Distance →
- Wpt ID, Wpt Bearing, Course Over Ground and Wpt Distance

Select as required.

Notes:

1. The Waypoint ID will show the first 4 characters at the selected / current destination. e.g. 99 will show 'WP99', or 1000 will show '1000'. NEEDLES will show 'NEED'.
2. Bearings are to Magnetic or True North as selected. 'MAG' or 'TRUE' is shown to indicate which. (See Part 4 for set-up.)
3. The data will be from Rhumb Line or Great Circle calculations as selected. 'RL' or 'GC' is shown to indicate which. (See Part 4 for set-up.)
4. Time To Go is displayed up to 99 hours, 59 minutes. Longer times are shown as '99:59'. If the vessel is moving away from the Waypoint, the display will show (----').
5. If the Navigator outputs Time To Go data, then this is shown. However, it can be calculated from the Speed Over Ground, Course Over Ground, Waypoint Distance and Waypoint Bearing, if required.

2.4.1 Waypoint Arrival Alarms

When the vessel approaches the Waypoint, an alarm will sound for 10 seconds.

If the waypoint arrival circle is entered, then 'Arr' is shown, while if the waypoint is passed, then 'PASS' is shown.

Note: If the Navigator does not output a waypoint arrival or pass message, then the WAYPOINT+ will sound a Waypoint Pass alarm when the vessel reaches a point where the Waypoint is at 90° to the past Track.

2.4.2 Destination Waypoint Advance

Press the WAYPOINT and * buttons together. The GPS or Plotter will now advance to the next waypoint in the route, and the WAYPOINT+ will display the bearing to this waypoint.

Notes:

1. This function is only available if the WAYPOINT+ is connected to a compatible Dataline or Shipmate GPS or Chart Plotter.
2. This function will only work if the system is in Navigate mode, and when not already heading towards the final waypoint in the current route.

2.5 The 'Navigate' Displays

Each successive push of the NAVIGATE button will cause the display to indicate the following:

Waypoint ID, Waypoint Bearing, Cross Track Error,
Direction to Steer, and Waypoint Distance →

Velocity Made Good to Waypoint, Slip
(Cross Track Velocity), and Waypoint Distance →

Heading to Steer, Cross Track Error, Direction to Steer,
and Waypoint Distance →

Waypoint ID, Waypoint Bearing, Cross Track Error,
Direction to Steer, and Waypoint Distance

Select as required.

Notes:

1. If the WAYPOINT+ is connected to a compatible Dataline or Shipmate GPS or Chart Plotter, a route is set up and the system is not in Navigate mode, then pressing the NAVIGATE button will cause Navigate mode to be entered, heading for the first waypoint in the route.
2. If the WAYPOINT+ is connected to a compatible Dataline or Shipmate GPS and a route is not set up, then pressing the NAVIGATE button will give a long 'error' beep.
3. Velocity Made Good (VMG) is defined as the speed at which the vessel is approaching the selected Waypoint. If the vessel is actually moving away from the Waypoint, VMG is shown as being negative.

Slip is the rate at which the vessel is moving at 90° to the Velocity Made Good. It is shown as a speed in knots, together with an arrow to indicate the direction of movement, to port or starboard.

4. If the Slip is zero, then the vessel is headed directly towards the Waypoint.
5. The Cross Track Error direction to steer is the direction to steer in order to regain the original track. This may not be the direction to steer directly to the waypoint, but may be important for safety reasons; for instance, if the track passes close to shoals, or a restricted area. This is the opposite direction to the direction of the Cross Track Error eg. if off track to the left, then the direction to steer is to the right.
6. The Heading to Steer shows the Magnetic Heading to Steer directly to the Waypoint, allowing for tide and leeway.
7. As it is a Magnetic Compass steering display the Heading to Steer is **ALWAYS** shown relative to Magnetic north, even when the WAYPOINT+ has been set-up to display True bearings.
8. When the WAYPOINT+ is receiving valid navigation data (Cross Track Error), 'NAV' will be shown on the display to indicate that the system is in Navigate mode.

2.5.1 Ending Navigate Mode

Press the NAVIGATE and * buttons together. The GPS or Plotter will now end Navigate mode.

Notes:

1. This function is only available if the WAYPOINT+ is connected to a compatible Dataline or Shipmate GPS or Chart Plotter.
2. This function will only work if the system is in Navigate mode.

2.6 Man Overboard Mode

The WAYPOINT+ Man Overboard Mode can be used to provide directions back to a position.

Press the POSITION and * buttons together. The WAYPOINT+ will now enter Man Overboard Mode, and show the MOB position. 'MOB' will flash to show the unit is in Man Overboard Mode.

While in Man Overboard Mode, each of the three oval buttons show one set of data, as below:

'Position' Button = Man Overboard Position and present time.

'Waypoint' Button = Bearing to MOB, Course Over Ground, and Distance to MOB.

'Navigate' Button = Bearing to MOB, Estimated Time To Go, and Distance to MOB.

To leave Man Overboard Mode and return to normal operation, press the POSITION and * buttons together.

Notes:

1. Tidal Set and Drift are **NOT** taken into account, and any tide or current will sweep the Man Overboard away from the WAYPOINT+ MOB position.
2. If the WAYPOINT+ is connected to a compatible Dataline or Shipmate GPS or Chart Plotter, then the GPS or Chart Plotter will enter or leave MOB Mode under control of the WAYPOINT+. The WAYPOINT+ will also enter or leave MOB Mode under control of the GPS or Chart Plotter.

2.7 To Set Display Backlighting

1. Press the * button and hold. The display backlighting will change from 0 to level 7, then level 6, then level 5, and so on to level 0. If the button is still held, the level will then increase back to 7 again.
2. At the desired display backlighting, release the * button. This will set the lighting on ALL displays on the Dataline-X system, which are in the same Lighting Bank. The Dataline-X system has two lighting banks, so that the internal lighting on a power boat may be set differently to that on the flybridge, or the cockpit lighting may be set differently to the chart table or mast display lighting on a yacht. All displays are supplied set to bank 1. (See Part 4 for the bank set-up information.).

Note: On some Dataline Systems (not Dataline-X) only lighting levels 0, 3, 5 and 7 are available

2.8 Demonstration Mode

The Demonstration Mode allows the user to familiarize himself/herself with all the functions of the instrument with the device removed from the system. Demonstration software within the instrument produces realistic values for the display.

A +12V power supply will be required to be connected as follows:

0V to the BLACK (far right) terminal.

+12V to the RED (far left) terminal.

To enter the Demonstration Mode, press the * button whilst applying power to the instrument.

To leave the Demonstration Mode, switch off and re-apply power.

Notes:

1. The display will leave demonstration mode if any data is received.
2. The display can be set to automatically enter 'Shop' demonstration mode every time it is powered up. (See Part 4 for further details.)

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- 3.1 General
- 3.2 Installation
- 3.3 Choosing the Cable Routes
- 3.4 Securing the Cable

3.1 General

The instrument head is fully waterproof and can, therefore, be installed on deck or below. The connections should be protected from water penetration and should, if possible, allow rear access to remove the desiccant pack, if required. The position selected should, in the first instance, meet the requirements of the helmsman, or crew.

The selected surface for the instrument head must be flat and even to within 0.5 mm.

Before installation, note the Serial Number of the unit and keep it in a safe place.

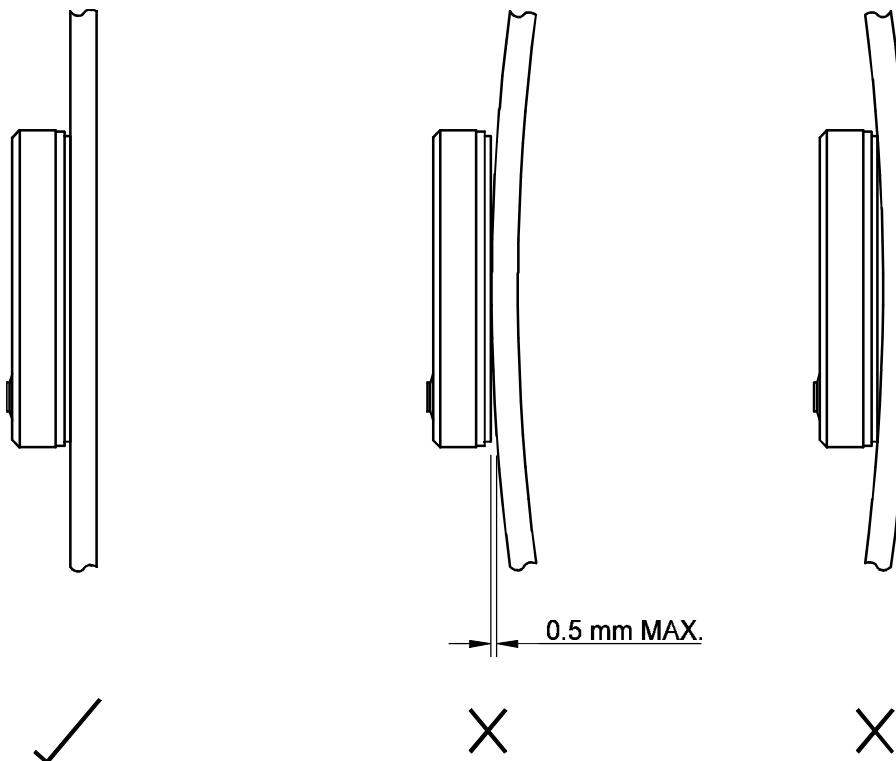


Figure 3.1 - Installation

3.2 Installation

1. Carefully position the self-adhesive template provided on the surface where the instrument is to be mounted.
2. Drill a small pilot hole first, and then check the location on the other side of the panel or bulkhead to confirm suitability.
3. Open out the pilot hole to 50 mm (2 ins.) using a cutter in a hand-held brace, or electric drill.
1. Drill the four fixing holes using a 2.5 mm (3.32 ins.) drill.

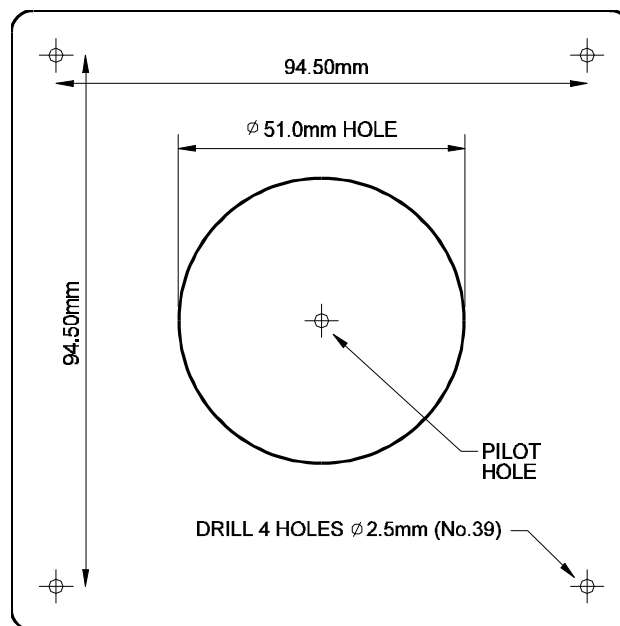


Figure 3.2 - Mounting Details (Not To Scale)

2. The instrument should next be wired into the system. The wiring should be carried out as in the 'Choosing the Cable Routes' and 'Securing the Cable' Sections below.
 - a. If the instrument is being connected to a Dataline-X system, then connect it to the Dataline wire. This can normally be done simply by using the 'Dataplug' connector and cable supplied to connect the display to the Databox or to any adjacent display.

If the cable routing cannot be made with the Dataplug connector attached, then simply disconnect it from the cable. The cable may then be run through holes of down to 6 mm (0.25 ins.) diameter before reconnecting the Dataplug connector, making sure that the colours are correctly wired to the terminals. The correct positions for the different coloured wires are shown on the rear label of the instrument.

- b. If the instrument is being connected directly to a Dataline Chart or Multi-Chart Chart Plotter, then the connections are as below:

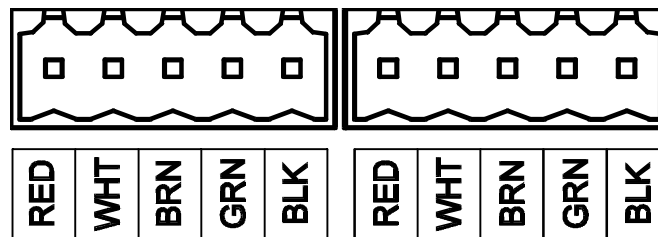
Red = +12V Power In (Fused 1A).

White = Chart I/O Cable Yellow.

Brown = Chart I/O Cable White.

Green = Chart I/O Cable Green AND Grey.

Black = 0V Power In.



- c. If the instrument is being connected to another instrument system then the connections are as below:

Red = +12V Power In (Fused 1A).

White = NMEA Signal In (A / + / Positive).

Brown = Not Connected

Green = NMEA Reference In (B / - / Negative).

Black = 0V Power In.

Figure 3.3 - Electrical Connections

6. Check that the instrument functions correctly.
7. Temporarily disconnect the Dataplug connectors and coat the terminals and wires with silicone grease or petroleum jelly. These products will not harm the instrument.

8. Make sure the 'dovetail' lugs are free from grease and securely located into the rear of the instrument when replacing the Dataplugs.
9. Secure the instrument using the four, No 4 self-tapping screws provided. Ensure that the sealing gasket is correctly located.
10. Replace the front cover, the installation of the instrument is complete.

CAUTIONS

DO NOT OVER-TIGHTEN FIXING SCREWS.

DO NOT USE SEALING COMPOUND ON THE INSTRUMENT BACK.

DO NOT USE WD40 OR ANY SOLVENT ON ANY PART OF THE INSTRUMENT.

3.3 Choosing the Cable Routes

After you have decided on the system and started to mount the components of the Dataline-X System, the next step in the installation process is to route the cables between the various parts of the system and to the power supply. When routing the cables, choose the most direct paths while avoiding the following hazards:

- Sharp bends or kinks in the cable
- Hot surfaces (exhaust manifolds or cooking equipment)
- Rotating or reciprocating equipment
- Sharp or abrasive surfaces
- Door and window jambs
- Corrosive fluids or gases

3.4 Securing the Cable

After the ideal cable routing has been established, use tie-wraps, 'P' - clips or other fixings to secure the cables along the routings.

Notes:

1. Install protection for the cable jackets where the cables pass through bulkheads, or past sharp edges. This will prevent the cables from chafing.
2. Secure the cable near to the terminals for strain relieving.
3. Secure the cable ends with enough slack to allow for easy connection.
4. Cut any spare wire ends to an appropriate length.

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- 4.1 System Calibration
- 4.2 Calibration Mode
- 4.3 Lighting Colour Selection
- 4.4 Lighting Bank Selection
- 4.5 LCD Contrast Setting
- 4.6 Navigation Mode Selection
- 4.7 Bearing Reference Selection
- 4.8 Local Time Offset From UTC
- 4.9 Software Code Version Display
- 4.10 Shop Demo Mode Setting
- 4.11 Leaving Calibration Mode

4.1 System Calibration

After installation, the system may be set up for the desired displays. No calibration or set ups may be made for the Speed, Depth, Wind, or Heading Sensors however. These set-ups need to be done from other instruments.

4.2 Calibration Mode

To enter Calibration Mode:

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LiTE' is shown on the display.
2. For each successive press of the NAVIGATE button, the display will step through the calibration menu. To step through backwards, press the POSITION button.
3. The menu function may be changed immediately by pressing the WAYPOINT button, or this may cause the value to flash, depending on the function.
4. The POSITION and NAVIGATE buttons may be used to decrement or increment values, which are flashing. When the value is correct, press the WAYPOINT button again to save it.
5. Depressing the * button will return the instrument to its normal working mode.

The following calibration functions are available:

- Lighting Colour (select Yellow, Red or Green)
- Lighting Bank (select Bank One or Bank Two)*
- Navigation Mode (select Rhumb Line or Great Circle)
- Bearings Reference (select Magnetic or True North)
- Local Time Offset from UTC/GMT (value entry, \pm 12 hours)
- Software Version Display
- Test Mode entry screen (select, On, Off)
- Shop Demo Mode Selection (select On, Off)

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The options marked with '*' perform no function if the display is not part of a Dataline-X system.

4.3 Lighting Colour Selection

This function enables the colour of the backlighting on the display to be set to Yellow, Red, or Green. This is independent of all other displays.

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LItE' is shown on the display.
2. The display should indicate the current lighting colour and light to show this.
3. Press the WAYPOINT button to change to the desired colour, 'rEd' (Red), 'Grn' (Green) or 'YEL' (Yellow).
4. Return to the main display by pressing the * button.

4.4 Lighting Bank Selection

The Dataline-X instrument system can have two separate banks of instruments. Setting the lighting level on one display will set all the other displays in that bank to the same level, but will not effect any displays in the other bank. For instance, the lighting level can be independently controlled for:

1. The cockpit and chart table displays of a yacht.
2. The cockpit and mast displays on a yacht.
3. The cabin and flybridge of a motor yacht.

This is independent of the display colour, so that displays in the same bank may have different colours if desired.

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LItE' is shown on the display.
2. Press the NAVIGATE button once until the LCD indicates 'bank LItE-1-' (or 'bank LItE-2-').
3. Select the required lighting bank, either 1 or 2, by pressing the WAYPOINT button.
4. Return to the main display by pressing the * button.

4.5 LCD Contrast Setting

The LCD contrast level on this Dataline-X instrument can not be adjusted.

4.6 Navigation Mode Selection

Displayed navigation data may be set to either Rhumb Line or Great Circle.

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'Lite' is shown on the display.
2. Press the NAVIGATE button twice until the LCD indicates 'NAV Set'.
3. Select required navigation mode by pressing the WAYPOINT button. For Rhumb Line , 'RL' is shown, and for great Circle, 'GC' is shown.

Note: When the WAYPOINT+ is used as a Repeater for a stand-alone navigation receiver, the user is advised to select Rhumb Line or Great Circle to be in agreement with the selection made on the receiver. However, if the receiver is set up for Great Circle Calculations, the WAYPOINT+ is able to compute Rhumb Line data.

4.7 Bearing Reference Selection

The displayed bearings may be set to reference either Magnetic or True North.

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LiTE' is shown on the display.
2. Press the NAVIGATE buttons 3 times until the LCD shows 'BRNG Set'.
3. Select the required Bearings by pressing the WAYPOINT button. For Magnetic Bearings 'MAG' is shown and for True Bearings 'TRUE' is shown.
4. Return to the main display by pressing the * button.

Note: When the WAYPOINT+ is used as a Repeater for a stand-alone navigation receiver, the user is advised to select Magnetic or True to be in agreement with the selection made on the receiver. However, if the Navigator outputs the variation, the WAYPOINT+ is able to compute either True or Magnetic from the other.

4.8 Local Time Offset from UTC

The display will show the local time if the time is received from an attached GPS. The GPS system works on 'Universal Co-Ordinated Time' (UTC), which is the same as 'Greenwich Mean Time' (or 'GMT'). So, to correct the time display, enter in the local time offset from GMT. For instance, the offset for British Summer Time is +1 hours.

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LiTE' is shown on the display.
2. Press the POSITION button twice, until the LCD indicates 'TIME 0 Hour' (or similar).
3. Press the WAYPOINT button to start to set the Local Time Offset, the value will start to flash.
4. Increase the Local Time Offset using the NAVIGATE button.
5. Decrease the local time offset using the POSITION button.
6. Return to the calibration menu by pressing the WAYPOINT button, and return to the main display by pressing the * button.

4.9 Software Version Display

The WAYPOINT+ Software Version may be checked as below:

1. Press the POSITION and NAVIGATE buttons together, and hold for more than 3 seconds, until 'LiTE' is shown on the display.
2. Press the POSITION button once until the LCD indicates 'COdE 3.00' (or similar). The number shown is the software version, in this case, 3.00.
3. Return to the main display by pressing * button.

4.10 Shop Demo Mode Setting

The instrument can be set to always power up in demonstration mode by setting 'Shop Demo' Mode On (this function is for use by dealers only).

1. Press POSITION and NAVIGATION buttons together, and hold for more than 3 seconds, until 'LiTE' is shown on the display.
2. Press POSITION once so that the display shows 'SHOP OFF' (or ON).
3. Press the WAYPOINT button to set Shop Demo Mode ON or OFF as desired.
4. Return to main display by pressing the * button.

Note: After power up, the instrument will always return from Shop Demo Mode to showing data if any data is received.

4.11 Leaving Calibration Mode

To return to the main display from Calibration Mode the Calibration Mode End Screen has to be selected.

1. From any Calibration Mode menu screen press either the MODE or the ALARM button repeatedly until the LCD shows 'End?'. This is the Calibration Mode End Screen.
2. Return to the main display by pressing both buttons together.

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CONTENTS

- 5.1 General
- 5.2 Fault Finding Chart

5.1 General

This instrument has been tested before shipment. However, installation conditions and procedures are outside the control of the manufacturer and can sometimes produce faults. The following check list is provided to assist the user in diagnosing such faults and suggests remedial action to be taken. For additional assistance, call your local dealer.

5.2 Fault Finding Chart

This chart assumes that the instrument is part of a Dataline-X instrument system. If it is connected to another instrument system then perform the equivalent checks on that system.

General Display and Communications Faults

<u>Condition</u>	<u>Probable Cause</u>	<u>Action</u>
<p>All instruments have blank displays.</p>	<p>No 12V Power Supply.</p>	<p>Check that the ships instrument system fuse(s) or circuit breaker(s) are not blown / tripped.</p> <p>Check the power supply wiring to the Databox.</p> <p>Check the 2.5A fuse inside the Databox. (This is the leftmost of the two fuses inside the Databox when it is viewed with the connectors at the lower edge, with the top cover removed. In order to remove the top cover to the Databox first remove the four screws in its corners.)</p> <p>Check the power supply wiring from the Databox to the instruments (the Red and Black 'Dataline' wires).</p> <p>Check for the Dataline-X instruments powering up, if not connected to the Databox, but directly to the power supply.</p> <p>Contact your dealer.</p>
<p>One or more, but not all, instruments have blank displays.</p>	<p>There is no 12V power supply to the affected instrument (s).</p>	<p>Check the power supply wiring to the affected instrument(s) (the Red and Black 'Dataline' wires). This is almost certainly the problem if more than one instrument is not functioning.</p> <p>Contact your dealer.</p>

<u>Condition</u>	<u>Probable Cause</u>	<u>Action</u>
<p>All instruments always show '----', with the pointers of analogue instruments at their zero positions.</p>	<p>No data is reaching any of the instruments.</p>	<p>Check that the battery voltage at the Databox Power Input terminals is greater than 10V.</p> <p>Check the signal wiring from the Databox to the instruments (the White and Green 'Dataline' wires). (If the lighting on any instrument can be controlled from another instrument then this is not the problem.)</p> <p>Contact your dealer.</p>
<p>One or more, but not all, instruments always show '----', with the pointers of analogue instruments at their zero positions.</p>	<p>No data is reaching the affected instrument(s).</p>	<p>Check the signal wiring to the affected instrument(s) (the White and Green 'Dataline' wires). This is almost certainly the problem if more than one instrument is affected. (If the lighting on any affected instrument can be controlled from another instrument then this is not the problem.)</p> <p>Contact your dealer.</p>
<p>All instruments show question marks on their display after they are used to set the lighting level, and the lighting level soon returns to Off, but other data is correct.</p> <p>Or:</p> <p>All instruments show question marks after setting any other data values.</p>	<p>The lighting level or other data is not reaching the Databox.</p>	<p>Check the return signal wiring to the Databox (the Brown 'Dataline' wire).</p> <p>Contact your dealer.</p>
<p>One or more instruments show question marks on their display after they are used to set the lighting level, and the lighting level soon returns to the previous level, but other data is correct, and other instruments can set the lighting level correctly.</p> <p>Or:</p> <p>One or more instruments show question marks after setting any other data values.</p>	<p>The lighting level or other data is not reaching the Databox from the affected instrument(s).</p>	<p>Check the return signal wiring from the affected instruments to the Databox (the Brown 'Dataline' wire).</p> <p>Contact your dealer.</p>

For Standalone Displays

<u>Condition</u>	<u>Probable Cause</u>	<u>Action</u>
Instrument display blank	No 14V power supply	Check fuse(s) or circuit breaker(s). Check power supply wiring.
Position screen always shows 'NO POS', all other screens show '----', even though the radio navigator is working.	No information from radio navigator	Check radio navigator has a position fix. Check radio navigator output set-up. Check radio navigator output specifications against WAYPOINT+ input spec' (Appendix A). Check signal wiring from radio navigator to WAYPOINT+. Check that the radio navigator is driving other remote displays correctly. Contact dealer.
Some data is not shown.	Data not available from radio navigator.	Check radio navigator NMEA output set-up. Check radio navigator NMEA output specifications, against the WAYPOINT+ input specification (Appendix A). NOTE: Without an electronic heading sensor and log, neither Set and Drift, nor Heading to Steer, can be shown.
Rhumb Line/Great Circle selection changes independently.	Information of the required format is not being transmitted by the Navigation Receiver.	Check that the Navigation Receiver is set to the same navigation mode, and is set up to transmit the correct navigation information.

Navigation Display Faults

<u>Condition</u>	<u>Probable Cause</u>	<u>Action</u>
Rhumb Line/Great Circle selection changes independently.	Information of the required format is not being transmitted by the Navigation Receiver.	Check that the Navigation Receiver is set to the same navigation mode, and is set up to transmit the correct navigation format.
All WAYPOINT+ Instruments always show 'NO POS' on the Position screen, and '----' on all other screens, even though the radio navigator is working. All other Instruments are correct.	No information from radio navigator.	<p>Check radio navigator has a position fix.</p> <p>Check radio navigator NMEA output set-up.</p> <p>Check radio navigator NMEA output specification against the WAYPOINT+ input specification (Appendix A).</p> <p>Check signal wiring from radio navigator to Databox.</p> <p>Check Dataline signal wiring to the defective WAYPOINT+(s) (White and Green wires). This is not the problem if Instruments "further down" the Dataline are working.</p> <p>Check that the lighting can be set on the defective WAYPOINT+(s) from another Instrument.</p> <p>Contact dealer.</p>
The Cross Track Error screen shows '----'.	Radio navigator not transmitting Cross Track Error.	<p>Check the radio navigator is in 'Navigate' mode.</p> <p>See table above for other conditions where the screen displays '----'.</p>
WAYPOINT+ shows question mark after setting the lighting level, but other data is correct.	Information is not reaching Databox.	<p>If only the WAYPOINT+ cannot set lights, then check the brown wire to the WAYPOINT+.</p> <p>If all Instruments cannot set lighting level, then check the brown Dataline wire to the Databox.</p> <p>Contact dealer.</p>

Other Faults

<u>Condition</u>	<u>Probable Cause</u>	<u>Action</u>
The external alarm does not sound.	<p>The alarm is not turned on, or the values are not as desired.</p> <p>The external alarm sounder is not connected to the Databox properly.</p> <p>The external alarm sounder is not suitable.</p> <p>The external alarm sounder is not working.</p>	<p>Check that the desired alarm is turned on and has the correct value.</p> <p>Check the alarms' connections to the Databox.</p> <p>Check that the alarm sounder does not require more current or a higher voltage than is available.</p> <p>Check with the alarm sounder driven directly from a suitable power supply.</p> <p>Contact your dealer.</p>
There are missing Engine Hour or Battery Voltage displays, or the Engine Hour counts don't work, or these displays always show '----'.	<p>The engine hour / sat nav set ups are incorrect.</p> <p>The engine hour / battery voltage inputs are not connected to the Databox properly.</p>	<p>Check the set up, and correct if necessary. (Using another instrument.)</p> <p>Check the connections to the Databox, and correct if necessary.</p> <p>Check that the engine inputs are active when the engines are turned on.</p> <p>Contact your dealer.</p>
Condensation forms inside the instrument.	Slight internal moisture.	Turn the lights to Level 7 and leave on until cleared.

CONTENTS

- 6.1 General Maintenance
- 6.2 Annual Maintenance
- 6.3 Removal of Instrument
- 6.4 Return for Service

6.1 General Maintenance

The instrument head will require no maintenance apart from occasional cleaning. Do this using fresh water and a mild soap solution (not a detergent).

CAUTION

DO NOT USE ANY ABRASIVES, CHEMICAL CLEANERS, PETROL OR DIESEL TO CLEAN THIS UNIT.

6.2 Annual Maintenance

1. Check all connections to the instrument and, if necessary, cover with silicone grease or petroleum jelly.

6.3 Removal of Instrument

1. If rear access is possible unplug the Dataplug connectors from the rear of the instrument. If the connection needs to be made up then the two wires may be joined using one of the connectors as a terminal block.
2. Remove the outer cover. This can be done by squeezing the instrument sides between finger and thumb and applying an upward pressure. At the same time, place a flat-bladed screwdriver between the bulkhead (or panel) and the cover, and carefully rotate.
3. Remove the cover and the four corner fixing screws.
4. Pull the instrument free from the surface, being careful not to strain the wiring if the connectors have not yet been removed.

5. If they are not yet removed, unplug the Dataplug connectors from the rear of the case, and make up the cable if necessary.

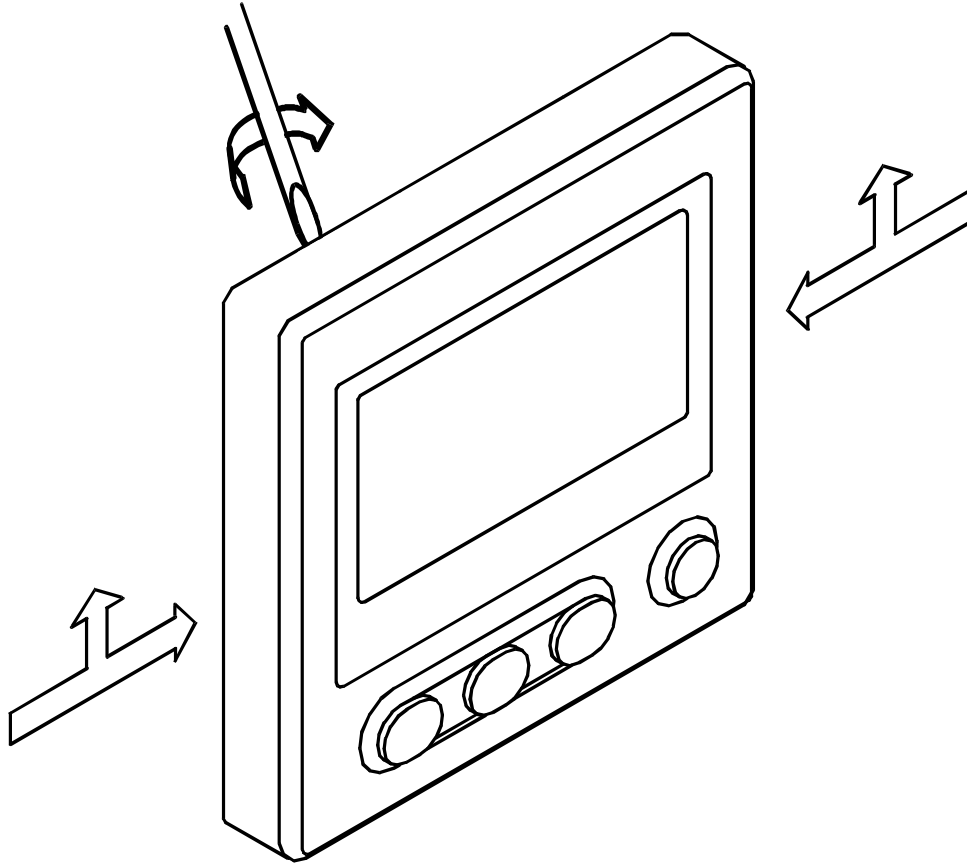


Figure 6.1 - Removal of Instrument

6.4 Return for Service

Please ensure that an instrument that is believed to be faulty is correctly installed, the wiring is in good condition and correct, that all connections are secure, and that a 12V supply is present at its power input terminals.

Should the unit have to be returned to your dealer, adequate packing must be used. Please ensure that your name, telephone number, return address, a clear fault description, and if possible a copy of the receipt of purchase are included with any returned equipment. Simrad Ltd. and their representatives are not responsible for any equipment lost in transit.

Please quote the instrument's serial number in all correspondence. This may be found on the rear of the instrument.

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The NMEA 0183 messages that are received by the WAYPOINT+ display are as below:

GLL
GGA = Current Position
RMA

RMC

GLL
GGA = Fix Quality
RMA

GGA = Number of GPS Satellites in use

GGA
RMC = Time (Universal Co-Ordinated Time)
BWC
BWR

VTG
RMA = Speed Over Ground
RMC

VTG
RMA = Course Over Ground
RMC

VDR = Tidal Set and Drift
VHW = Boat Speed
VHW = Heading

APA
APB = Destination Waypoint Name/Number
RMB
BOD

APB		
RMB	=	Waypoint Bearing
BWC		
BWR		
RMB		
BWC	=	Waypoint Distance
BWR		
AAM		
APA	=	Waypoint Arrival/Pass Alarms
APB		
RMB		
ZTG	=	Estimated Time To Go
RMB	=	VMG to Waypoint
WCV		
APA		
APB	=	Cross Track Error
RMB		
XTE		
APB	=	Heading to Steer
RMC	=	Magnetic Variation
WPL	=	Waypoint Position

The WAYPOINT+ calculates some data and will calculate others, if sufficient information is available. The following are calculated internally if they are not present in the received NMEA messages:

- Bearing to Waypoint
- Distance to Waypoint
- Velocity Made Good
- Time To Go to Waypoint

Note: The Velocity Made Good and Time To Go are calculated from the present position directly to the Waypoint and not from a fixed Track. Therefore, the Waypoint pass line (used as a definition of arrival at a Waypoint) is a line through the Waypoint at 90° to the present Bearing to the Waypoint, and not 90° to the defined Track. The VMG and Time To Go are, therefore, slightly different from those displayed on the CHART, Dataline GPS or any stand-alone navigation receiver.

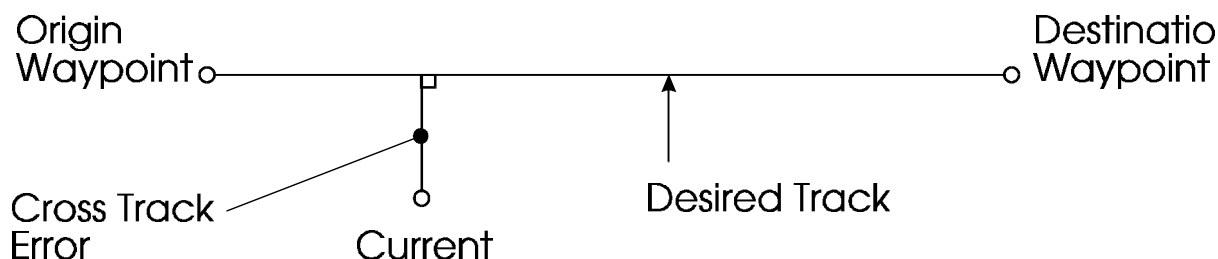
The following are calculated internally, provided that the relevant data is being received.

- Set
- Drift
- Heading To Steer
- Slip

The Cross Track Error, and Origin Waypoints

The Cross Track Error is the distance that the vessel is off the Track defined as the straight line drawn between the Origin Waypoint and the destination Waypoint. The Origin Waypoint is the previous Waypoint in a 'LIST' or 'PLAN' being used. Note, however, that when entering the Navigate mode, the vessel's present position is taken as the starting point and that, therefore, this position is effectively the Origin.

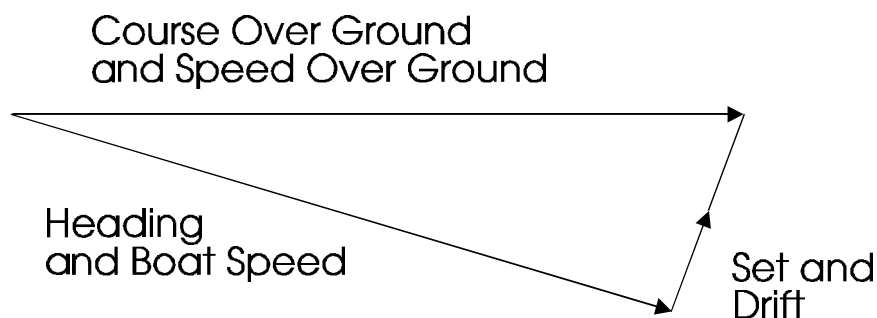
The Cross Track Error MUST, obviously, be zero at the moment that the Navigate mode is selected.



Heading and Boat Speed, Set and Drift, COG and SOG

The Heading and Boat Speed are rarely the same as the Speed and Course Over the Ground. The difference between these two vectors is displayed as Set and Drift and, therefore, includes Leeway and tidal stream. The WAYPOINT+ calculates that data using a vector triangle, exactly as the user would construct by hand on a chart.

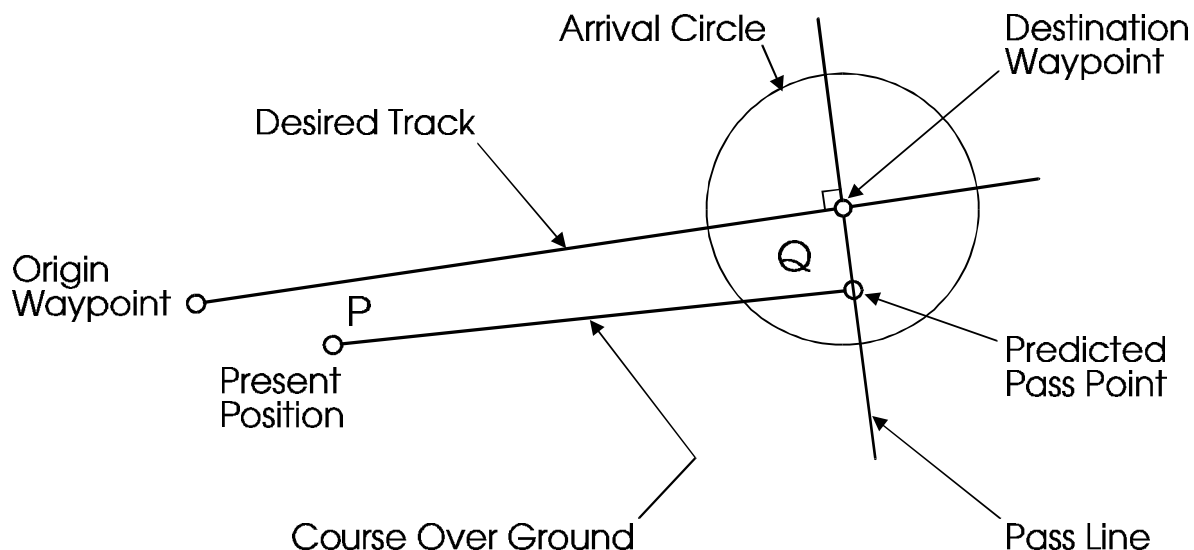
Note: The WAYPOINT+ Set and Drift is NOT the same as the tidal Set and Drift because, as explained above, it includes the effect of Leeway due to wind speed/direction and its influence on the vessel. It is not possible to separate the tidal Set and Drift from Leeway unless additional information is made available.



Estimated Time to Go, Pass Lines and Waypoint Arrival Circles

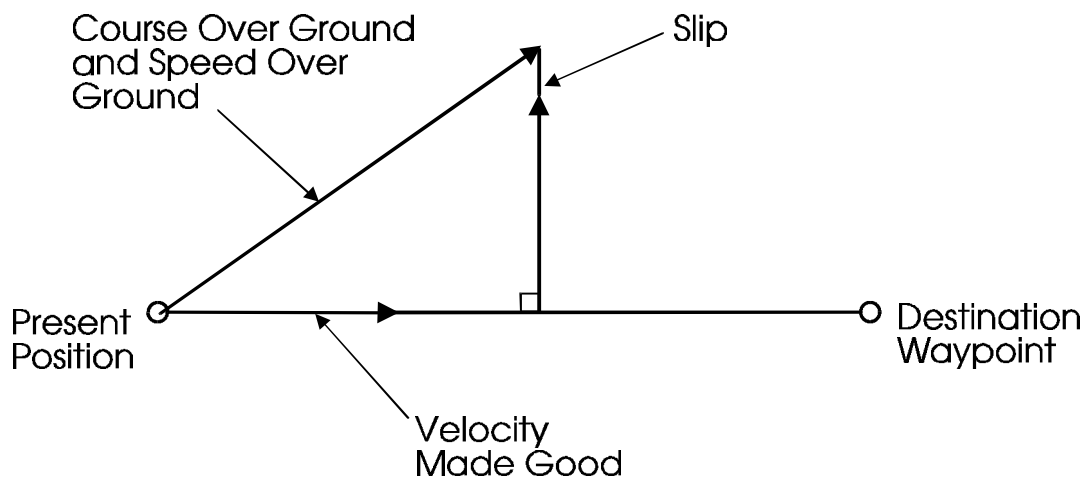
The WAYPOINT+ calculates the Time To Go to the Next Waypoint by extending the Course Over the Ground until it crosses the Pass Line for that Waypoint. It calculates the time to cover that distance at the present Speed Over the Ground.

The Pass line is defined as the line that passes through the Waypoint position at 90° to the Track from the vessel's position to the Waypoint concerned. Thus the Arrival Alarm will sound before the Time To Go has elapsed, assuming that the user has set up a Waypoint Alarm radius.



Velocity Made Good and Slip

The WAYPOINT+ calculates the Velocity Made Good to the Waypoint and slip using a set of vectors. The Velocity Made Good is defined as the component of the Speed Over the Ground, which is in the direction of the destination Waypoint Bearing.

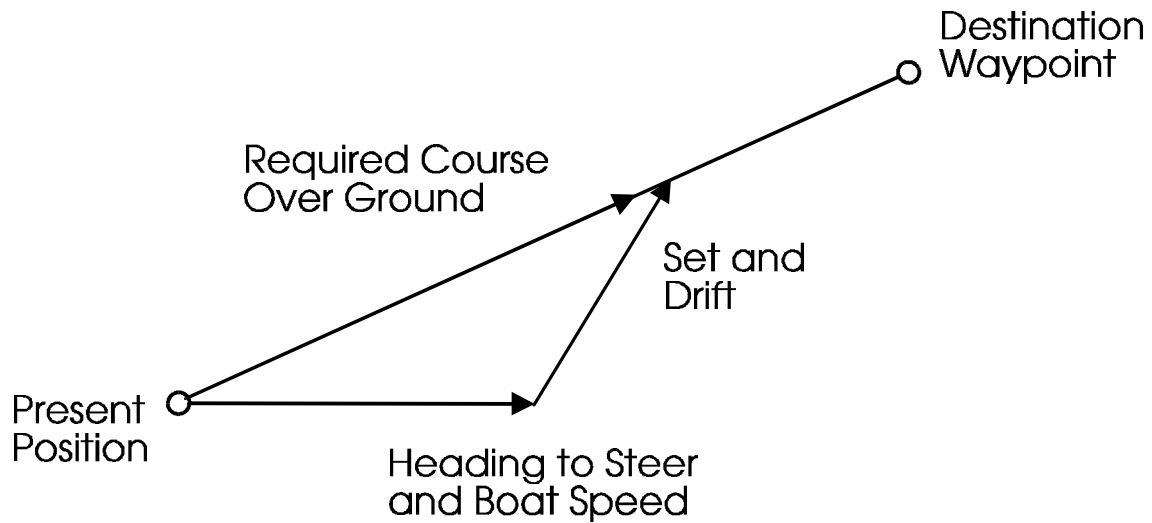


Slip is the component of Speed Over the Ground at 90° to the straight line drawn from the present position to the destination Waypoint. Slip is, therefore, the Cross Track Velocity or the rate at which the vessel is slipping off the Track.

Heading to Steer

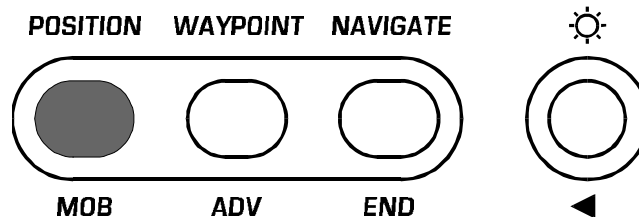
The WAYPOINT+ uses the Speed and Course Over the Ground, Heading and Boat Speed to calculate the correct Heading to take the vessel directly to the next destination Waypoint, and, therefore, takes into account both tidal Set/Drift and Leeway.

Note: Large course changes will change the Heading To Steer as will changes in the tide or leeway, caused by re-trimming the boat or changes in wind strength/direction. Therefore, the displayed Heading To Steer should be viewed regularly.

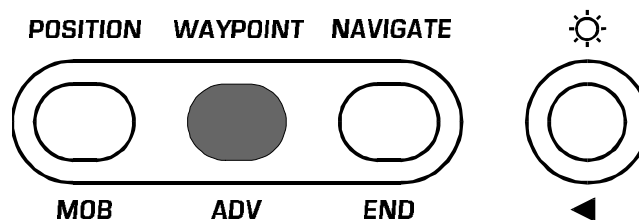


MAN OVERBOARD

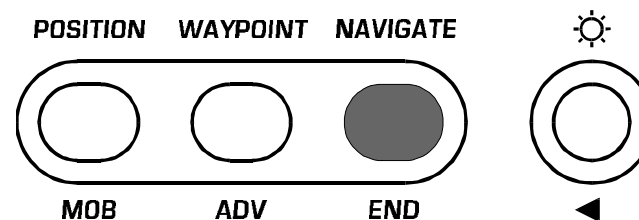
To display the Man Overboard position and the current time press:



To display the bearing to the MOB position and the bearing Course Over the Ground together with the Distance to the MOB press:



To display the bearing to the MOB position, together with the estimated Time To Go and the Distance to the MOB press:



Note: Set and Drift are not taken into account and any time or current MUST be allowed for in returning to that position.