

PART 2 - OPERATING INFORMATION

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PART 2 - OPERATING INFORMATION

2.1 FULL FUNCTION DISPLAY (FFD)

The Hydra 2000 System is easily operated using the keys on any one of the NMEA or Standard Full Function Displays (FFD).

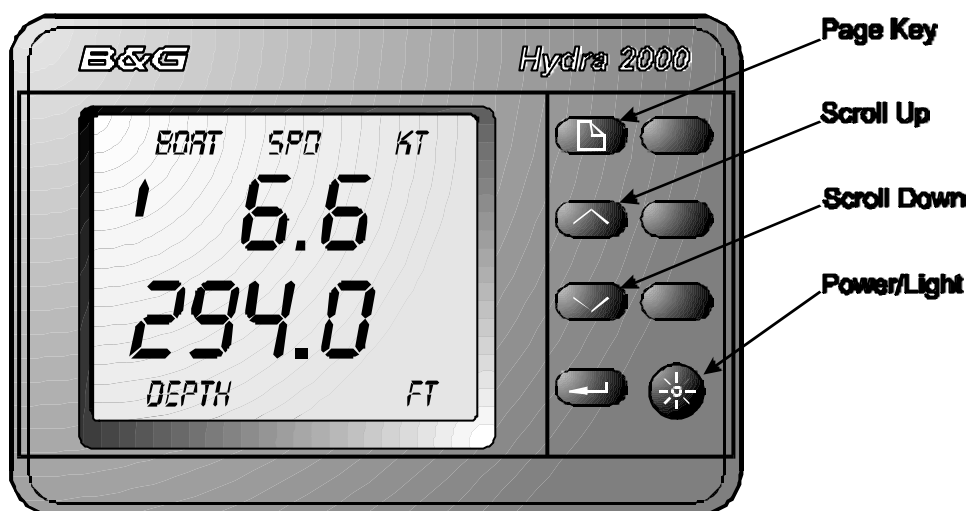


Fig 2.1 - Full Function Display

The information displayed on each FFD consists of a page of information comprising an upper display and a lower display. The FFD has four pages available that may be configured to display any function available in either the upper or lower displays. The user may also select any function for display at any time in either the upper or lower display.

In addition, three factory set pages relating to Wind, Speed/Depth and Navigate functions are incorporated into each FFD. These pages are accessed by pressing the related key on the FFD.

2.1.1 The Keys

All FFDs are provided with the following eight keys:

- Power/Lights Key
- Page Key
- Scroll Up Key
- Scroll Down Key
- Enter/Reset Key
- Speed/Depth Key
- Wind Key
- Navigation Key

2.1.2 Power/Lights Key

This key controls the application of power to the system and the level of illumination at all displays.

One short press of this key applies power to the Hydra System and the display is activated. A second short press of the key provides full background illumination on all system displays. Further short presses of the key decrease the illumination in three stages from full brightness to OFF.

The next press gives full illumination again. This operation on any one FFD within the system, performs the same sequence on all Hydra displays connected to the system. However, display lighting can be localised so that the level can be adjusted for individual displays (see Para 2.9 - LIGHTING CONTROL).

To switch OFF the system, press and hold down the key for three seconds. After this time lapses the message POWER-OFF appears in the upper text, release the key and after a further two seconds the system switches OFF and is now in Standby Mode.

2.1.3 Page Key

This key enables the user to select the User Defined Page (Display) presented on the FFD.

By pressing this key the user is able to choose any one of four user defined pages accessing various functions of the Hydra 2000 System (2 functions per page).

Notes

1. If you become lost in the system, press the **Page** Key and you will immediately return to the top level display without doing any damage.
2. Successive operations of the **Page** Key will bring up each of the user defined pages in rotation.
3. The four initial pages can be reconfigured to meet your specific needs, as described in Para 2.5.2
4. Holding down the **Page** Key for two seconds initiates control of 20/20 displays (see Part 5 - Options).

2.1.4 Scroll Keys

Two scroll keys are provided: **Scroll Up** and **Scroll Down**. The scroll keys have three functions:

1. Select the upper or lower display to change functions.
2. To scroll through (select) the menu choices.
3. To increase or decrease numerical values, such as calibration values.

Immediately after a specific page has been selected, pressing the **Scroll Up** Key will select the upper display. Similarly, operation of the **Scroll Down** Key will select the lower display.

2.1.5 Enter/Reset Key

The principle use of the **Enter** Key, is to make selections chosen from the menu by the scroll keys. As a general guide when any menu choice is flashing, pressing the **Enter** Key will select that choice. It is also used to:

Enter Data. When the value on the display needs changing it is altered by pressing the **Enter** Key. This starts the selected value flashing. Next using the **Scroll Up** or **Scroll Down** Keys, change it to the required value. Press the **Enter** Key again to complete the operation.

Accept and Reset Alarms. When an alarm sounds (if the audible warning is fitted) or flashes at the FFD, two

presses of the **Enter** Key stops the warning and resets the alarm.

Expand Function Displays. When displaying the LOG and TIMER functions the **Enter** Key can be used to expand the display. Normally the Log function displays nautical miles to two decimal places, i.e. 99.99nm (maximum). One press of the **Enter** Key expands the display to 0099nm, giving a maximum available display of 9999nm if required. Similarly the TIMER function normally displays a minutes and seconds reading. Expansion by the **Enter** Key displays hours and minutes instead.

2.1.6 Speed/Depth (SPD/DEP) Key

By pressing the **SPD/DEP** Key the user is able to select any one of three factory set pages accessing the Speed and Depth functions. Successive operation of the **SPD/DEP** Key will display the following information in a fixed order:

- Boat Speed/Depth
- Boat Speed/Speed Over Ground (from NMEA Position Fix)
- Boat Speed/Apparent Wind Angle

2.1.7 Wind Key

By pressing the **Wind** Key the user is able to select any one of three factory set pages accessing the Wind Functions. Successive presses of the **Wind** Key will display the following information in a fixed order:

- Apparent Wind Speed/Apparent Wind Angle
- True Wind Speed/True Wind Direction
- Velocity Made Good/True Wind Angle

2.1.8 Navigation (NAV) Key

By pressing the **NAV** Key the user is able to select any one of three factory set displays accessing the Navigation Functions. Successive presses of the **NAV** Key will display the following information in a fixed order:

- Current Heading/Course Over Ground
- Current Heading/Boat Speed
- Distance to Waypoint/Bearing to Waypoint

Note

The NAV key may be configured to show waypoint information in either Great Circle or Rhumb modes. Refer to section 2.5.3 for further details.

2.1.9 Remote Button Operation

Each FFD may be provided with an optional Remote Button to allow basic control of the associated FFD from a remote position. The Remote Button has two Functions: Page Selection and Fast Reset.

Page Selection is achieved by successive pressing of the Remote Push-Button. When the button is pressed each of the four user defined pages followed by the first page of the factory set Speed/Depth, Navigate and Wind pages are displayed in a fixed order.

When any one of the trip functions is selected at the associated FFD, pressing and holding down the Remote Push-Button for two seconds will change the display to show RESET flashing, or if TIMER is selected START 10 flashing. Pressing the Remote Button again will Reset that function, or in the case of TIMER start the countdown. After a reset the display will revert to normal page set-up automatically.

2.2 20/20 DISPLAY

The 20/20 is a fully programmable, single function display, incorporating large digits, which may be installed virtually anywhere in the yacht.

Control of the 20/20 Display may be achieved via any FFD or from an optional Remote Button, see Part 5 - Options.

2.3 SUPER HALCYON 3 AND HALCYON 2000 COMPASS

The Super Halcyon 3 and Halcyon 2000 Compasses are high performance electronic transmitting compasses which interface with your Hydra 2000 System. Heading and direction information may be selected for display on any of the FFDs or on a Halcyon Display. Additionally, analogue compass card displays may also be added.

Software incorporated within the compass allows the unit to learn the magnetic fields in the vessel that may cause deviation errors. These errors can be reduced to an insignificant level by following the Calibration procedure described in Part 3.

2.4 HALCYON DISPLAY

The Halcyon Display is a dedicated electronic compass display that may be connected to your Hydra 2000 System in the same manner as a regular FFD. It is a large digit display providing a clear and accurate digital indication of compass heading information together with a bar graph indicating port and starboard off-course error.

Control of the Halcyon Display and the associated functions can be achieved from the display, an optional Remote Push-Button or from any FFD, see Part 5 - Options.

2.5 EXAMPLES OF OPERATION

The general principle of operating the Hydra 2000 will be made clear by the following examples of Function, Page Selection and Damping.

2.5.1 Function Selection

Our first example will be to select another function for one of the pages. This new function is Stored Log that we want to place in the lower display.

- (1) Select the lower display by pressing the **Scroll Down** Key. The lower display will start to flash. The upper display is not affected.
- (2) Using the **Scroll Up** and/or **Scroll Down** Keys, scroll through the menu until the required menu (LOG) is shown flashing in the lower display. The upper display is not affected.
- (3) Press the **Enter** Key, the lower text now shows the STD LOG flashing, the upper display is not affected.

Note

If another menu choice is required (i.e. Trip Log) scroll through the menu choices using the **Scroll Up/Scroll Down** Keys until the required choice is displayed in the lower display.

- (4) Press **Enter** again, the lower display now shows Stored Log function, the upper display is not affected.

At this stage we have simply called up this function to view it, if the **Page** Key is pressed then the configured page will return and Stored Log will no longer be on view. If however you wish to keep Stored Log on a page, then you can configure the page.

2.5.2 Page Display Configuration

The **Page** Key allows the user to configure four pages per FFD depending on its required use at that position.

To store the setting in Para 2.5.1 as a permanent new page, proceed as follows:

- (1) Press **Scroll Up** or **Scroll Down** and scroll text until CNFG DSP is shown on Display.

Note

Scroll Up or **Scroll Down** can be used because we are configuring the whole page, both upper and lower displays.

- (2) Press **Enter**, PAGE is shown on the lower display.
- (3) Press **Enter**, the digital display is blanked and the two functions selected are displayed in the upper and lower displays.
- (4) Press **Enter** to accept the new page configuration and restore the digital display.

All page displays are held in the display memory, independent of the power supply.

2.5.3 NAV Key Configuration

Our second example is configuring the NAV key. The NAV key allows the user to select either Rhumb Line or Great Circle navigation information to be displayed. To select the required mode, proceed as follows:

- (1) Press the **Page** Key once.
- (2) Press **Scroll Up** until the upper display shows CNFG DSP flashing.
- (3) Press **Enter**, the upper text now shows PAGE flashing.
- (4) Press **Scroll Up** to select either NAV MODE GC (Great Circle) or NAV MODE RH (Rhumb).
- (5) Press **Enter** to select your desired choice. The display will stop flashing.

2.5.4 Damping Adjustment - Boat Speed

Our third example is the entry of a damping value. To find out if it is possible to damp a function, refer to OPERATING Menu choices, Table 1.2.

- (1) Using the **Scroll Up** or **Scroll Down** Key select the upper or lower display as required.
- (2) If BOAT SPD is in the upper display press and hold **Scroll Down** and scroll to DAMPING which flashes. If BOAT SPD is in the lower display use **Scroll Up**.
- (3) Press **Enter** and the current damping value will be displayed on the upper or lower display as appropriate.
- (4) Press **Enter** and DAMPING value will start to flash.
- (5) Press **Scroll Up** or **Scroll Down** to increase and/or decrease the damping value as required.
- (6) Press **Enter** to accept new value.

- (7) Press **Page** to return to full display.

Damping control for any of the other functions that can be damped is achieved in a similar manner.

2.6 EXAMPLES OF CALIBRATION

The calibration method of your Hydra 2000 System will be made clear by the following examples. The Calibration Process is described in detail in Part 3 - Calibration.

2.6.1 Calibration Adjustment - Boat Speed

- (1) Using the **Scroll Up** or **Scroll Down** Keys select the upper or lower display as required.
- (2) If BOAT SPD (or STD LOG) is shown in the upper display, press and hold the **Scroll Down** Key to select CALIBRATE from the menu. If BOAT SPD (or STD LOG) is in the lower display use **Scroll Up**.
- (3) Press **Enter** and then press **Scroll Down** to select MANL CAL on the Display.
- (4) Press **Enter** and SINGLE is shown on the Display.

Notes

1. SINGLE is the choice required if a single paddlewheel or sonic sensor is fitted.
2. If two paddle-wheels or two sonic sensors are fitted, the **Scroll Up** or **Scroll Down** Keys should be used to select PORT CAL or STBD CAL as required.
 - (5) Press **Enter** to reveal the current calibration value in Hz/knot.
 - (6) To adjust the calibration value, press **Enter** and the value flashes.
 - (7) Using the **Scroll Up** and **Scroll Down** Keys to change the calibration value as required to the new calibration value.
 - (8) Press **Enter** to input the new calibration value into the system.

(9) Press **Page** to return to the normal display.

2.6.2 Calibration Adjustment - Depth

- (1) Using the **Scroll Up** or **Scroll Down** Keys select the upper or lower display as required.
- (2) If DEPTH is shown in the upper display, press and hold the **Scroll Down** Key to select CALBRATE from the menu. If DEPTH is in the lower display use **Scroll Up**.
- (3) Press **Enter** and the display shows DATUM which flashes.
- (4) Press **Enter** again, DATUM stops flashing and the current datum value is displayed.
- (5) Press **Enter** and the DATUM value flashes.
- (6) Use the **Scroll Up** or **Scroll Down** Keys to set the new DATUM value.

Note

If DATUM is referenced to the water line, the value is positive. If DATUM is referenced to the keel line, the value is negative and this is indicated by a minus sign before the left digit.

- (7) Press **Enter** to input the new DATUM value into the system.
- (8) Press **Page** to return to the normal display.

2.6.3 Calibration Adjustment - Wind Angle

- (1) Select APP W/A.
- (2) If APP W/A is on lower display press **Scroll Up** and scroll to CALBRATE which flashes. If APP W/A is on upper display, press **Scroll Down** and scroll to CALBRATE.
- (3) Press **Enter** twice and the current alignment value will be shown.
- (4) Press **Enter** and the current offset angle will flash. Use **Scroll Up** or **Scroll Down** to set the new value.
- (5) Press **Enter** to accept the new value.

- (6) Press **Page** to return to the normal display.

2.7 ALARMS

2.7.1 Alarm Control

When a pre-set alarm parameter is reached, e.g. the depth reducing, the system raises an alarm automatically. In an alarm condition, the lower display changes to highlight the cause of the alarm and flashes red and green alternatively until the **Enter** Key is pressed twice. At which point all the FFDs except the one on which **Enter** was pressed, return to normal. The audible alarm, if fitted, is also silenced by this operation. After this, the lower display continues to monitor the alarm condition. The alarm is still active and, if the alarm parameter is again exceeded, the alarm will flash/sound as necessary. The displayed alarm function remains on the lower display until **Page** is pressed.

2.7.2 Alarm Types

The system incorporates the following types of alarm:

HI ALARM - This is initiated if the value of a function exceeds a pre-set level.

LO ALARM - This is generated if the value of a function drops below a pre-set level.

SECTOR ALARM - This is generated when the value of a function leaves the safe sector as shown in Fig 2.2.

Example

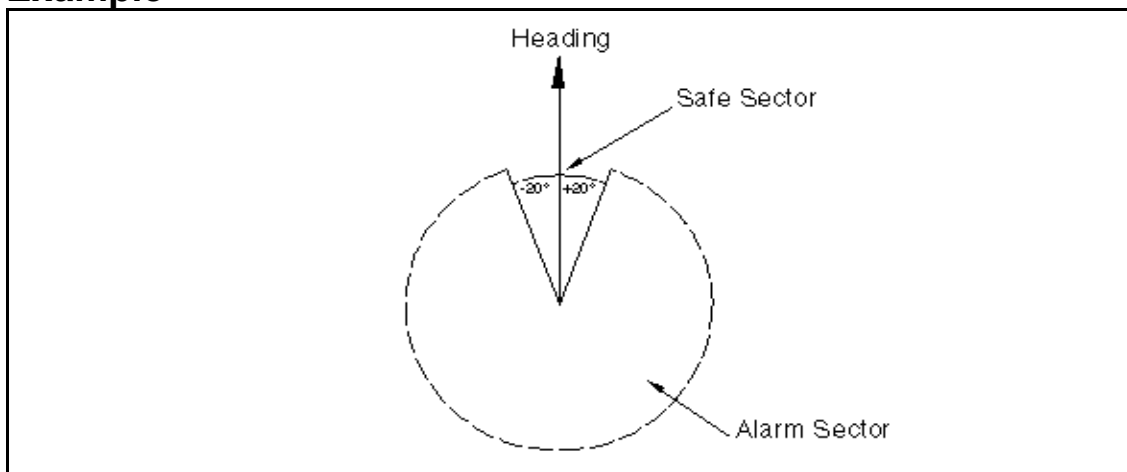


Fig 2.2 - Sector Alarm

For example, when the SECTOR alarm is turned on, the alarm reference heading is the current compass heading. If the SECTOR alarm is set at 40° the sector value is the compass heading +/- 20°. It is therefore important to switch OFF the SECTOR alarm before carrying out a course alteration and switching the alarm on again when settled on the new course heading.

Any alarm can be switched ON and OFF individually, or all alarms can be switched OFF collectively.

2.7.3 Set LO Alarm - Depth

- (1) Select function which requires alarm facility, e.g. DEPTH.
- (2) If the selected function is in the upper display, press **Scroll Down** and scroll the lower display until ALARMS appears, flashing. If the selected function is in the lower display use **Scroll Up**.
- (3) Press **Enter** and the text shows ALL OFF, flashing.
- (4) Using **Scroll Up** or **Scroll Down** as appropriate, scroll through until the text shows LO ALARM flashing.
- (5) Press **Enter** and the display shows the current LO ALARM value.
- (6) To change the LO value, press **Enter**, and the value flashes.
- (7) Press **Scroll Up** or **Scroll Down** to increase or decrease the value as required. Press **Enter** to accept the new value and switch the alarm ON.
- (8) Press **Page** to return to the normal display.

To select the HI alarm, scroll through the text until HI ALARM appears and press **Enter** to reveal current HI ALARM value. To change the value, use the same procedure as used to change the LO ALARM value.

2.7.4 Switch Alarms On/Off

To switch OFF an alarm (HI, LO or SECTOR), scroll through until the required item (e.g. HI OFF) appears in the text and press **Enter**.

To turn ON an alarm, press scroll through until the required item (e.g. LO ON) appears in the upper text and press **Enter**.

2.7.5 Disable Alarms

(1) Select any function with an alarm facility, e.g. DEPTH.

(2) If function is in the top display press **Scroll Down** to scroll to ALARMS, or if function is on the bottom use **Scroll Up** Key. Then press **Enter** and ALL OFF appears flashing.

(3) Press **Enter** again, all alarms are turned OFF and the normal page display will be restored.

WARNING - All alarms in the system will remain OFF until the values are reset or the individual alarms are switched ON again.

2.8 TRIP FUNCTIONS

The Hydra 2000 provides three trip functions - Timer (count up and count down), Trip Log and Dead Reckoning. The functions can be reset and restarted as required, e.g. for keeping a separate log of elapsed time and distance run for a given passage.

When any trip function is started, all other trip functions that have been reset start with it, except when the timer countdown is started. Under this condition, the other functions start again if previously reset, when the countdown reaches zero. This is designed for the start of races, so that you have DR, Resettable

Log and Timer running, without pressing buttons during the moments of the start itself.

When a trip function is displayed, the two right-hand characters show the status of that function.

The letters MS (Minutes/Seconds) and NM (Nautical Miles) mean the function is running.

The letters RE stand for RESET, where the function is zeroed and waiting to be started.

The letters FR stand for FROZEN, where the displayed value is frozen, but the function is still counting in the background.

2.8.1 Fast Reset

The Hydra 2000 System incorporates a Fast Reset feature for all trip functions (Trip Log, Timer and Barometric Pressure Trend). Fast Reset can be initiated either by operation of a Remote Push-Button (see Para 2.1.9) or by operation of the **Enter** Key on any FFD.

Note

If two trip functions are displayed at the same time, the Fast Reset facility will only reset the function shown in the upper display.

2.8.2 Reset Timer

The options for the TIMER function are as follows:

START 0 - for count up
START 5)
START 10) - for countdown from appropriate time.
START 15)

(1) Using the **Scroll Up** or **Scroll Down** Keys select the upper or lower display as required.

- (2) If the upper display is selected use the **Scroll Up** Key to select TIMER in the upper display. If the lower display is selected, use **Scroll Down**.

- (3) Press **Enter** the text now shows START 10 flashing.

(4) When the 10 minute gun sounds, press **Enter**. The display now shows the timer counting down from 10 minutes and the START 5 is flashing. If it is required to correct the timer at the 5 minute gun then this is achieved by pressing **Enter** again at the 5 minute gun. The Timer will count down to zero and then begin to count up giving the time since the start.

(5) Press the **Page** Key to return to the normal display.

2.8.3 Reset Trip Log

(1) Display TRIP LOG in the upper display.

(2) Press **Scroll Down** once and the lower text now shows CONTROL flashing.

(3) Press **Enter** and use the **Scroll Down** key to display RESET flashing.

(4) Press the **Enter** key and the display now shows RUN flashing.

(5) Press the **Enter** key again and the display shows the trip log running.

(6) Press the **Page** key to resume normal operation.

Note

Every time you reset the TRIP LOG the AVERAGE SPEED resets and begins its calculation again. The control facility for the Dead Reckoned functions work in the same way; the bearing and distance are linked, so that they are started simultaneously.

2.9 LIGHTING CONTROL

The level of illumination at system displays is controlled by the Power/Lights Key. Use of this key normally controls all the Hydra displays simultaneously. However, the level of illumination on a single FFD can be controlled individually using the menu choice - LIGHTING - LOCAL.

2.9.1 Select Local Control

- (1) Press and hold **Scroll Up** or **Scroll Down** until LIGHTING appears in the text.
- (2) Press **Enter**, **Scroll Down** until LOCAL appears in the text.
- (3) Press **Enter** again and the original page display appears. Control of the FFD Lighting is now in local mode.

Successive operation of the **Power/Lights** Key now controls the illumination level on that display only. This will enable you to use very low lighting at the chart table whilst keeping a higher intensity display up on deck.

2.9.2 Select System Control

- (1) Press and hold **Scroll Up** or **Scroll Down** until LIGHTING is displayed in the text.
- (2) Press **Enter** and **Scroll Up** or **Scroll Down** to select SYSTEM.
- (3) Press **Enter** again, the original page display appears and the illumination control has returned to System Control.

Note

In order to control the lighting on analogue repeaters, at least one FFD must be set to System Control.

2.10 OPERATING NOTES

Within the preceding paragraphs of this part of the manual the steps necessary to select a specific function and/or setup the system have been described in detail. The remainder of this manual contains some detailed examples; therefore to describe further operations the following shorthand system has been adopted.

Each successive selected menu choice will be in capitals, separated by a → symbol. For instance the example in Para 2.5.1, to manually calibrate the log, would be presented as follows:

SPEED → BOAT SPD, **CALBRATE ® MANL CAL ®
SINGLE**

Menu choices in plain CAPITALS are the selection of the required function. Menu choices in **BOLD** are the selection of the relevant operation and are completed using the other half of the display.

2.11 OPERATING FUNCTIONS

The previous Paragraphs have described how the Hydra System is built up and how to use the keys and basic menu structure. The following Paragraphs describe each of the functions available in more detail and how these features can best be applied on the boat.

2.11.1 Air Temperature

Menu Heading:	TEMP
Function Text:	AIR TEMP
Update Rate:	Once per second
Units:	Centigrade or Fahrenheit

Notes

1. Requires a Temperature Sensor.
2. Audible high/low alarm available.

2.11.2 Apparent Wind Angle

Menu Heading:	WIND
Function Text:	APP W/A
Update Rate:	Twice per second
Units:	Degrees

Notes

1. Alignment calibration.
2. Variable damping 0-99 seconds.
3. Analogue indicator available.
4. Audible sector alarm available

The apparent wind angle is the angle between the boat's bow and the wind blowing across deck (at mast height). It is a basic number, useful in its own right like Boat Speed, Heading and Apparent Wind Speed and provides the starting point for the higher level, calculated functions.

A special analogue indicator, Magnified Wind Indicator, which only shows the 0-50 upwind/downwind sector of Apparent Wind Angle in a magnified form is available. This is described in Part 5 - Options.

2.11.3 Apparent Wind Speed

Menu Heading:	WIND
Function Text:	APP W/S
Update Rate:	Twice per second
Units:	Knots or metres per second

Notes

1. Variable damping 0-99 seconds.
2. Audible, high/low alarm available.
3. Analogue indicator available.

The Apparent Wind Speed is the speed of the wind blowing across the deck at mast height. A basic number from which the calculated functions are derived and important in its own right as a lot of sail choices are judged by the Apparent Wind Speed.

2.11.4 Average Speed

Menu Heading:	SPEED
Function Text:	AVG SPD
Update Rate:	Once per second
Units:	Knots

Average speed is a trip function that averages your speed through the water over the period the trip log has been running, i.e.

Trip Log

Time it has been running

2.11.5 Barometric Pressure

Menu Heading:	MISC
Function Text:	BAROMETER
Update Rate:	Once per second
Units:	Millibars

Notes

1. Requires pressure sensor.
2. Offset calibration available.

This is essential for the Offshore Sailor, giving not only the instantaneous barometric value but also the important trends towards higher or lower pressure. This helps position you in a weather system and so predict the next change.

After installation it is essential that the calibration (CAL VAL1) of the pressure sensor is checked against an accurate barometer and adjusted accordingly. To select CAL VAL1 for calibration proceed as follows:

MISC → BAROMETER, **CALBRATE ® CAL VAL1**

2.11.6 Barometric Pressure Trend

Menu Heading:	MISC
Function Text:	PR TREND
Update Rate:	Once per second
Units:	Millibars

This shows the change in pressure over a period of time that can be set for up to 24 hours. The period can be changed by selecting a control option in the OPERATION Menu using the following sequence:

MISC → PR TREND, **CONTROL ® PERIOD**

A reset facility at the same menu level is also provided. This is selected using the following sequence:

MISC → PR TREND, **CONTROL ® RESET**

This operation resets the data collected to zero.

2.11.7 Battery Voltage

Menu Heading:	MOTOR
Function Text:	VOLTS
Update Rate:	Once per second
Units:	Volts

Notes

1. Audible, high/low alarm available.
2. Calibration.

This function measures the voltage that the batteries supply to the system. This is especially useful for monitoring the supply voltage offshore enabling you to optimise your engine running time.

To calibrate against another voltmeter, measure the voltage, then enter this actual voltage in using the following sequence:

MOTOR → VOLTS, **CALBRATE ® CAL VAL1**

2.11.8 Bearing to Waypoint

Menu Heading:	WAYPOINT
Function Text:	BTW RMB or BTW GC
Update Rate:	Provided by position fixer
Units:	Degrees magnetic, degrees true

Notes

1. Requires interfaced position fixing system.
2. Rhumb, Great Circle, Magnetic or True.

Once the position fixer is connected and sending information, it automatically appears in the menu and becomes available for display.

2.11.9 Bearing Waypoint to Waypoint

Menu Heading:	WAYPOINT
Function Text:	BRG W-W
Update Rate:	Provided by position fixer

Units: Degrees magnetic, degrees
 true

Notes

1. Requires interfaced position fixing system.
2. This is the bearing from a waypoint to the next waypoint in the position fixer's route.

2.11.10 Boat Speed

Menu Heading:	SPEED
Function Text:	BOAT SPD
Update Rate:	Four times per second
Units:	Knots, MPH or KPH

Notes

1. Port, starboard calibration with automatic facility.
2. Variable damping 0-99 seconds.
3. Acceleration, deceleration indicator.
4. Analogue indicators available.
5. Audible, high/low alarm available.

Boat speed is the most fundamental piece of information on the Hydra. It is used in many of the calculations of higher functions; e.g. true wind angle/speed/direction, VMG, the log and trip functions.

The accurate calibration of the paddlewheel or sonic speed sensor is essential. Hydra uses simple procedures for calibrating the speed sensors that are described in Part 4 - Calibration. On boats fitted with two sensors, connected by a gravity switch, Hydra will automatically use the calibration factor for the leeward sensor.

Boat speed is shown on the display with a small bar to the left of the digits that indicates the increase or decrease of speed. The amount of damping that is applied can be adjusted. This can be increased to smooth out the display value in rough conditions or conversely reduced to speed up the response in light conditions.

2.11.11 Course

Menu Heading:	NAVIGATE
Function Text:	COURSE
Update Rate:	Once per second
Units:	Degrees magnetic

Note

Requires heel sensor.

This incorporates leeway (Course Made Good) into heading. Leeway can only be calculated if you have the heel sensor fitted. Course is the better function for most navigational purposes and should be used whenever possible.

2.11.12 Course Over Ground

Menu Heading:	WAYPOINT
Function Text:	CRSE O/G
Update Rate:	Provided by position fixer
Units:	Degrees magnetic, true

Note

Requires interfaced position fixer.

Once the position fixer is connected and sending information, it automatically appears in the menu and becomes available for display. This is your actual track over ground and is invaluable to the navigator for dealing with tidal areas.

2.11.13 Dead Reckoning

Menu Heading:	NAVIGATE
Function Text:	D/R CRSE or D/R DIST
Update Rate:	Once per second
Units:	Degrees magnetic, nautical miles

Notes

1. Course and distance.
2. Corrected for leeway if heel sensor fitted.
3. Resettable as a trip function.

Formerly the mainstay of all offshore navigation, now with such widespread use of electronic position fixing equipment it is more often used as an essential back-up. It can be particularly effective as an indicator of the net course steered on long offshore legs. Both the course as a bearing from the start point, and its distance in nautical miles, can be displayed as separate functions. If the heel angle sensor is fitted then the course calculation will include leeway correction.

In the worst case, a Man Overboard (MOB) situation, immediately resetting the Dead Reckoning (DR) will bring the vessel back to the MOB position. DR is the course over the water and not over the land as would be given by a position fixer.

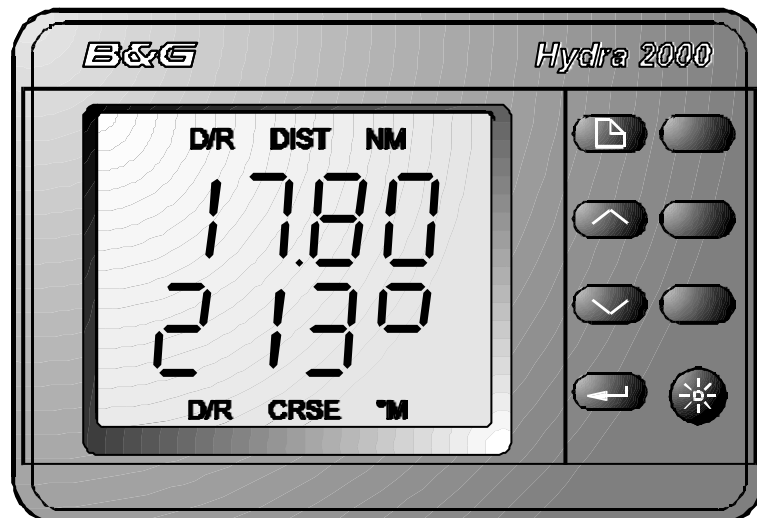
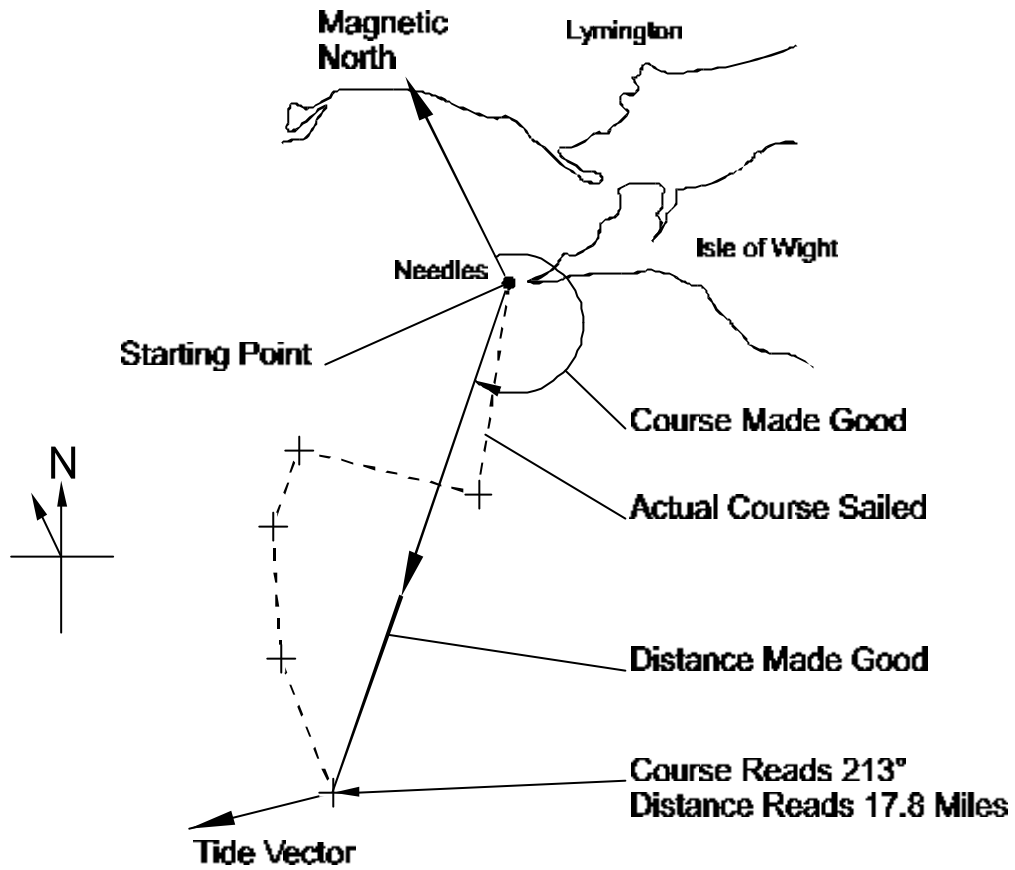


Fig. 2.3 - Dead Reckoning

2.11.14 Depth

Menu Heading:	DEPTH
Function Text:	DEPTH
Update Rate:	Once per second
Units:	Metres, feet and fathoms

Notes

1. Audible, shallow/deep alarm available:

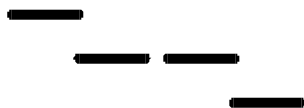
Shallow range 0-99.9m

Deep range unlimited

2. Analogue indicators available.

Depth is one of the most important functions on the boat, being an essential navigational and safety tool. A datum adjustment allows you to move the base point to give either depth under the keel or actual water depth (see Para 2.6.2).

Depth sounder performance is dependent on many factors: transducer type and installation, boat speed, electrical noise, sea state, sea bed conditions, air and plankton in the water. But however good the equipment, there will always be times when a reliable measurement of depth is not possible. In these cases, such as following in the wake of another boat, the display shows:



to indicate a signal problem.

The accuracy of the measurement is dependent on the velocity of sound and the amount the sound penetrates the sea bottom. Changes in the velocity of sound are not normally significant, however, errors up to one foot can result from sound penetration into very soft mud.

2.11.15 Distance to Waypoint

Menu Heading:	WAYPOINT
Function Text:	DTW RMB or DTW GC
Update Rate:	Provided by the position fixer
Units:	Nautical miles

Note

Rhumb or Great Circle.

Once the position fixer is connected and transmitting NMEA data, it automatically appears in the menu and is available for display.

2.11.16 Fore/Aft Trim

Menu Heading:	PERFORM
Function Text:	TRIM
Update Rate:	Once per second
Units:	Degrees

Notes

1. Adjustable for horizontal sensor alignment.
2. Requires clinometer mounted fore and aft.
3. Variable damping 0 - 99 seconds.

Fore and Aft trim is an often ignored factor in Boat Speed, but it is as important to trim the boat in this plane and to have a record of the trim angles for various conditions.

2.11.17 Heading

Menu Heading:	NAVIGATE
Function Text:	HEADING
Update Rate:	Twice per second
Units:	Degrees magnetic

Notes

1. Adjustable damping, 0-99 sec.
2. Sector alarm available.
3. Sensor alignment calibration.
4. Moving card analogue meter available.
5. Halcyon display available.

This is the compass heading, derived directly from the electronic Fluxgate Compass. This input for the system allows calculation of True Wind Direction, dead reckoning and other course related navigation functions.

An available option is the Halcyon Display which permanently shows heading in digital form and has a segmented bar graph display to show off course.

The Halcyon 2000 Compass automatically corrects for deviation due to the vessel's magnetic fields.

2.11.18 Heading on Opposite Tack

Menu Heading:	PERFORM
Function Text:	OPP TACK
Update Rate:	Once per second
Units:	Degrees magnetic

This gives the heading the vessel would be sailing when on the opposite tack with the same wind angle, and can be used in conjunction with a hand bearing compass to tell you when you are on the layline. It is calculated from Heading and True Wind angle.

2.11.19 Head Lift Trend

Menu Heading:	WIND
Function Text:	LIFT/HDR
Update Rate:	Once per second
Units:	Degrees

Notes

1. Requires Halcyon Display.
2. Analogue indicator available.

This function is particularly useful to racing yachtsmen when sailing up wind. Port and starboard reference courses are entered into the Halcyon Display and used to calculate whether the boat is being lifted or headed. It is resettable from the FFD using the following sequence:

WIND → LIFT/HDR, **CONTROL @ RESET**

2.11.20 Heel Angle

Menu Heading:	PERFORM
Function Text:	HEEL
Update Rate:	Once per second
Units:	Degrees

Notes

1. Adjustable for horizontal sensor alignment.
2. Requires clinometer.
3. Variable damping 0 - 99 seconds.

Heel Angle is a useful option that improves the accuracy of some of the calculated functions. Heel can be used to give some idea of the wind pressure when abnormal shear or gradient is affecting the True Wind Speed. It can also be checked when going upwind to ensure that the boat is not sailed over its optimum heel angle.

2.11.21 Leeway

Menu Heading:	NAVIGATE
Function Text:	LEEWAY
Update Rate:	Once per second
Units:	Degrees

Note

Requires clinometer for heel.

Leeway is the angle between the boats heading and its course through the water. The difference is caused by the sideways slip that the boat has when going upwind. For the Hydra to be able to measure this it needs to know the heel angle, and hence a clinometer must be fitted. Leeway is of great importance in the calculation of Dead Reckoning, since leeway can considerably affect the dead reckoned position.

2.11.22 Layline Distance

Menu Heading:	PERFORM
Function Text:	LAYLINE
Update Rate:	Provided by position fixer
Units:	Nautical miles

Note

Requires NMEA 0183 interfaced position fixing system transmitting the ZDL sentence.

If tacking upwind or downwind to a waypoint, this function displays the distance of both left and right-hand laylines by alternating the display between the two. An L or an R is shown in the right-hand digits to signify Left or Right laylines respectively. This function is useful when nearing a waypoint. When the value reaches zero, it is

time to tack or gybe for the mark. The calculation should be corrected for any tidal offset.

2.11.23 Local Time of Day

Menu Heading:	TIME
Function Text:	LOC TIME HR
Update Rate:	Provided by position fixer
Units:	Hours, minutes, seconds

Notes

1. Requires NMEA 0183 interfaced position fixing system transmitting the ZLZ sentence.
2. Check that the Local Time Offset is entered into the position fixer correctly.

The function normally shows the Local Time of Day in hours and minutes as given by the position fixer. To reveal minutes and seconds press the **Enter** Key once. A further press of the **Enter** Key returns the display to hours and minutes.

2.11.24 Mast Angle

Menu Heading:	PERFORM
Function Text:	MAST ANG
Update Rate:	Once per second
Units:	Degrees

Notes

1. Requires mast rotation sensor.
2. Offset calibration available.

Required for yachts with rotating masts, such as multi-hulls, that have the mast rotation sensor fitted. It measures the angle between the mast and the centreline of the yacht, i.e. the angle it is twisted off the centreline.

2.11.25 Next Waypoint Distance

Menu Heading:	WAYPOINT
Function Text:	NEXT WPT NM
Update Rate:	Provided by position fixer
Units:	Nautical miles

Note

Requires NMEA 0183 interfaced position fixing system transmitting the WDC sentence.

This is the distance in nautical miles from the current selected waypoint on your position fixer to the next waypoint on route.

2.11.26 Off Course

Menu Heading:	NAVIGATE
Function Text:	OFF CRSE
Update Rate:	Once per second
Units:	Degrees magnetic

Notes

1. Requires Halcyon Display.
2. Analogue Indicator available.

This function is available when a Halcyon Display is connected to the system. The amount off course is indicated on the Halcyon bar graph and shown numerically on other Hydra displays.

A dedicated analogue indicator is also available. For further information see Part 5 - Options.

It is resettable using the following sequence:

NAVIGATE → OFFCRSE, **CONTROL ® RESET**

2.11.27 Rig Tension

Menu Heading:	MISC
Function Text:	LINEAR 1
Update Rate:	Once per second
Units:	Linear scale 0-1000

Note

Requires forestay loadcell.

This is useful on racing yachts that require the Genoa Trimmer to repeat their sail trim much more quickly and consistently than by eye particularly just after a tack.

2.11.28 Rudder Angle

Menu Heading:	MISC
Function Text:	RUDDER
Update Rate:	Once per second
Units:	Degrees

Notes

1. Requires rudder angle sensor.
2. Offset calibration available.

This function is used to indicate to the Trimmers how well the boat is balanced.

2.11.29 Sea Temperature

Menu Heading:	TEMP
Function Text:	SEA TEMP
Update Rate:	Once per second
Units:	Degrees Centigrade/Fahrenheit

Notes

1. Requires temperature sensor.
2. Audible high/low alarm available.

Useful on long distance sailing when ocean currents are discerned by changes in water temperature. It can be useful in other ways too. Often the water flowing out of rivers differs in temperature quite markedly to the sea, and this may help you pick up the favourable current.

2.11.30 Speed Over Ground

Menu Heading:	WAYPOINT
Function Text:	SPD O/G
Update Rate:	Provided by position fixer
Units:	Knots

Note

Requires interfaced position fixing system.

This also comes straight from the position fixing system, and is available, provided it is sent, when the position fixer is connected. Comparing the speed over ground to the speed you are doing through the water is a key tactical tool. This is particularly so in strong tidal waters and at night, when the only indication that the tide has changed and you are no longer making progress is the speed over ground.

2.11.31 Stored Log

Menu Heading:	LOG
Function Text:	STD LOG
Update Rate:	Once per second
Units:	Nautical miles

The stored log runs continually, and is always available as an accumulative total of the boat's miles. It is not resettable, the trip log is used for this purpose.

Normally the Log function displays nautical miles to two decimal places, i.e. 99.99nm (maximum). One press of the **Enter** Key expands the display to 0099nm giving a maximum available display of 9999nm if required.

2.11.32 Tidal Set and Drift

Menu Heading:	NAVIGATE
Function Text:	TIDE SET or TIDE RTE
Update Rate:	Once per second
Units:	Degrees magnetic, knots

Notes

1. Damping 0-99 minutes.
2. Calibration: Magnetic variation.
3. Some position fixers output the current local magnetic variation on the NMEA 0183 port using either HVD, HVM, RMA or RMC sentences. As a result, CAL VAL 1 on the TIDE SET function will automatically set to the correct variation.

Your position fixer will either supply a true or magnetic bearing to the Hydra 2000. If it supplies true bearing then you must enter the

magnetic variation into the Hydra 2000. It is found in the menu under:

NAVIGATE → TIDE SET, **CALBRATE ® CAL VAL 1 (MAG
VAR)**

Note

If your position fixer sends magnetic bearing, check that the variation is correctly entered into it.

The calculation involves comparing the course and speed over the ground, from the position fixer, to the course and speed of the boat through the water, from dead reckoning. Any differences are due to the tidal set and drift and can be displayed as such. To make this accurate the dead reckoning really requires Leeway input and this in turn requires a heel angle sensor to measure heel angle.

The damping on this function is adjustable and this can be important. In rapidly changing tidal situations you need to lower the damping right down to be able to see changes quickly. Conversely in a steady tide or current the longer time the calculation is averaged over, the more accurate the results will be. The lag in the position fixer's ability to adjust to rapid changes in direction, such as tacks, should also be considered when using the results of this function. When making numerous tacks, readings should be treated with caution.

2.11.33 Timer

Menu Heading:	TIME
Function Text:	TIMER
Update Rate:	Once per second
Units:	Hours, minutes and seconds

Note

Individually resettable.

Used to time the start and to record elapsed time during a handicap race. The timer will act as either a stopwatch or countdown from 5, 10 or 15 minutes.

Pressing the **Enter** Key will toggle the display between min/secs and hrs/mins as indicated on the display.

2.11.34 Time to Layline

Menu Heading:	TIME
---------------	------

Function Text:
Update Rate:
Units:

TIME L/L
Provided by the position fixer
Hours, minutes, seconds

Note

Requires NMEA 0183 interfaced position fixing system transmitting the ZDL sentence.

This function is linked to layline distance. The information displayed shows the time to go before reaching the appropriate layline. A value of zero indicates time to tack or gybe.

2.11.35 Time to Waypoint

Menu Heading:	WAYPOINT
Function Text:	ETA WPT
Update Rate:	Provided by position fixer
Units:	Hours, minutes

Notes

1. Also gives ETA.
2. Requires interfaced position fixing system. Calculated directly by the position fixer, based on an assumed constant speed over the ground towards the mark.

2.11.36 Trip Log

Menu Heading:	LOG
Function Text:	TRIP LOG
Update Rate:	Once per second
Units:	Nautical miles

Note

Individually resettable.

This is the resettable log for recording trip distance and reads from the moment it is started, in nautical miles. It must be remembered that this is the distance sailed through the water, not over the ground. It also forms part of the calculation for Average Speed. A useful feature is that if it is reset prior to the start of a race, then when the Timer counts down to zero, the trip log (and any other trip functions that have been reset) start automatically.

The trip log display can be expanded to display a maximum of 9999 nautical miles by pressing the **Enter** Key.

2.11.37 True Wind Angle

Menu Heading:	WIND
Function Text:	TRUE W/A
Update Rate:	Once per second
Units:	Degrees

Notes

1. Relative to the boat's heading.
2. Corrected for masthead and other errors via the Look-up Table (see Part 3 - Calibration).
3. Variable damping 0-99 seconds.

The true wind is calculated from the vector triangle shown in Fig. 2.4. This uses the apparent wind speed, apparent wind angle and the Boat Speed in the calculation. The results are then corrected by the true wind correction tables, which are detailed in Part 3 - Calibration.

Note

The true wind is the wind relative to the water, and is not the same as the ground wind, unless there is zero tide or current. The true wind angle is the angle between the boat's heading and the true wind.

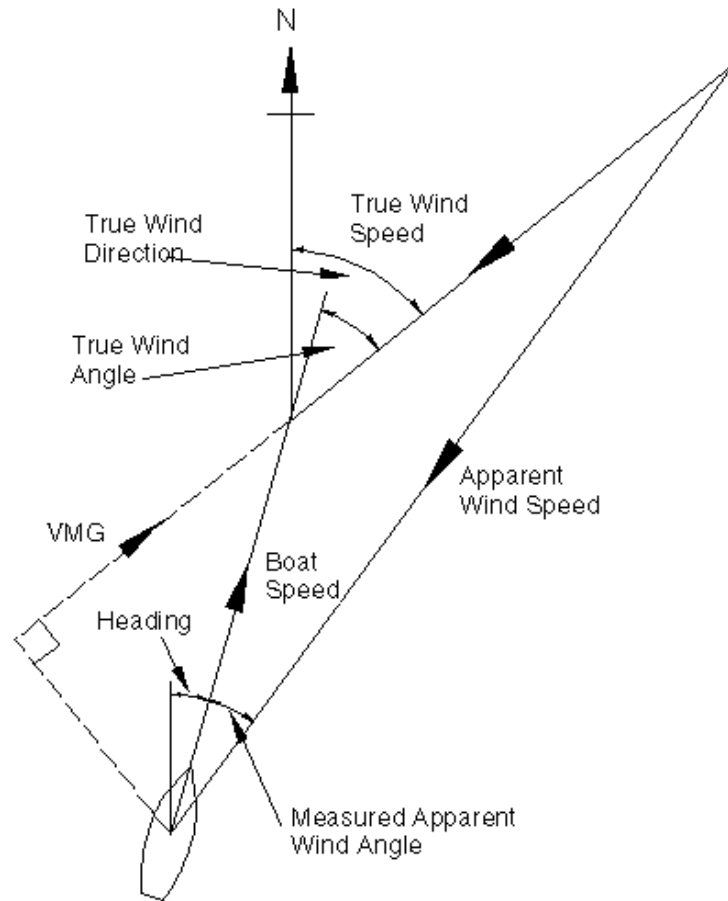


Fig 2.4 - Wind Angle

2.11.38 True Wind Direction

Menu Heading:	WIND
Function Text:	TRUE DIR
Update Rate:	Once per second
Units:	Degrees magnetic

Notes

1. Wind angle relative to magnetic compass point.
2. Corrected for masthead and other errors via a Look-Up Table (see Part 3 - Calibration).
3. Damping control via true wind speed.

This is the tactician's greatest ally in the search for the right wind shifts. It shows the compass direction of the wind regardless of the boat's heading or speed. True wind direction is calculated from the true wind angle and heading, and is corrected for

calibration errors by the true wind look-up table. A full explanation is given in Part 3 - Calibration.

2.11.39 True Wind Speed

Menu Heading:	WIND
Function Text:	TRUE W/S
Update Rate:	Once per second
Units:	Knots, metres per second

Notes

1. Corrected for masthead and other errors via a Look-Up Table (see Part 3 - Calibration).
2. Variable damping 0-99 seconds.

True wind speed is required by the Trimmers for decisions on sails, and to check their trim as the wind changes.

When the boat is sailing downwind, the air passing over the mast is accelerated and tends to make the true wind speed over-read downwind. The Hydra has a calibration to correct for this which is explained in Part 3 - Calibration.

2.11.40 Velocity Made Good (VMG)

Menu Heading:	SPEED
Function Text:	VMG
Update Rate:	Once per second
Units:	Knots

Note

Upwind and Downwind.

Velocity Made Good (VMG) is calculated from the true wind angle and the Boat Speed as shown in Fig 2.5. VMG is a measure of your performance upwind and downwind and is more important than Boat Speed, since it takes into account how close you are sailing to the wind. However, it is not possible for the helmsman to sail to it directly because of the momentum of the boat.

As you sail closer to the wind the VMG will initially rise, because the boat will hold its speed due to its momentum. So VMG

increases and the helmsman, seeing this, would be encouraged to sail even higher to increase the VMG even more. Of course if you carry on like this you will eventually end up head to wind, the boat will stop dead and the VMG will plummet.

Whilst VMG is an important measure of performance it is best if it is watched by someone other than the helmsman. This person should develop a feel for the Boat Speed when the greatest VMG is attained and then communicate these to the helmsman.

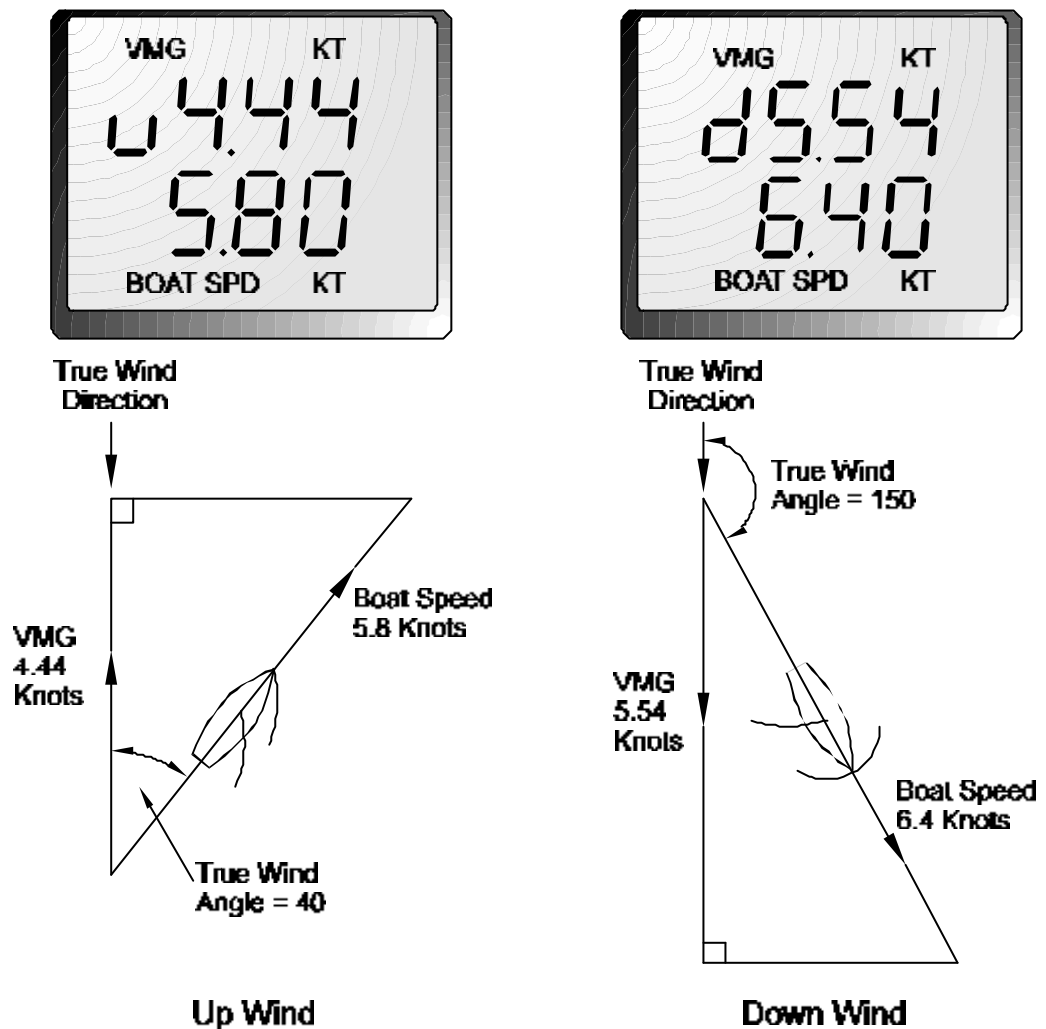


Fig 2.5 - Calculation of VMG

2.11.41 Wind Angle to the Mast

Menu Heading:	PERFORM
Function Text:	W/A MAST
Update Rate:	Once per second
Units:	Degrees

Note

Requires mast rotation sensor if a rotating mast is installed.

When the mast rotation sensor is fitted, this measures the apparent wind angle to the mast's centreline, thus giving the actual angle of attack of the sail.