Welcome to Expedition

Expedition is simply the best tactical and navigation software available.

Expedition has been in development since the mid 1990s by veteran Volvo Ocean Race navigator and Whitbread winner, Nick White.

Expedition has been used in multiple Volvo Ocean, America's Cup and Grand Prix events and is the most advanced and usable software available - for racing around the world or your local harbour.

Expedition is continually refined and developed with input from a core group of world-renowned navigators.

Features

For Windows 11, 10 or 8. Windows 11 is recommended.

Microsoft has ceased support for Windows 7, but Expedition may still work on Windows 7.

Charting

Chart-plotter that seamlessly selects, mosaics and rotates charts.

S-57 and S-63 ENCs

BSB (v1-5) RNCs

C-MAP 4D and MAX/NT+ (Expedition 4D requires OpenGL support)

NV-Verlag

Maptech PCX

Softcharts

Visit My Harbour

Advanced weather display and tools

Sophisticated display options

Grib 1 and 2 support

Intelligent merging and display of multiple grib file datasets

Integrated weather reports (ships, buoys and land stations)

Integrated Saildocs, Squid, NOAA, Ocens & MailASail weather services

Integrated NOAA , Proudman, SHOM & Tidetech tides and currents

Simply the best weather routing available

Display multiple optimum routes

Optimal routes for fleet and multiple weather models

Optimal route sensitivity tools

Wave corrections and avoidance

Reverse isochrone function for graphical interpretation of routing

Start display and advanced buoy racing functions

Windward-leeward route support
Sailchart
Time to marks, laylines, next leg etc
Layline bounds
Start line functions
Rate of turn, acceleration and braking
Time to ends & line
Time to burn
Line bias
Hold wind
Display grid
What if? functionality
Simple handicap support

… and much more

Instrument connectivity with all popular instrument systems

AIS, DSC and AIS-SART receivers
B&G
Cosworth
DMK Yacht
Garmin
Koden radar

KVH Quadro

Navico radar

Nexus NX2, FDX and NXR

NKE

NMEA 0183

NMEA 2000 (not yet certified)

Ockam

Racing Bravo

Sailmon

Stowe

Tacktick

VSPARS

Various compasses, lasers and other sensors

Networking support

Also

Stripchart program to graph and analyse any instrument function

Display marks, routes, laylines, track, AIS targets, radar, tracks, race tracking information etc. on the chart

Polar functions to output, analyse and create or modify a yacht's performance polars

Sail chart

Race tracking functions to track and analyse competitors

Logging functions to record race data that can be replayed or analysed later to assist with instrument calibration or polar modifications

GPX file import and export

Number boxes to display any system number

What-if? window

GPS information window

Full screen mode

… and much more!

Licence

LICENCE AGREEMENT

This Licence Agreement (the Agreement) is between you (the User) and Tasman Bay Navigation Systems Ltd. (the Licensor). The product described below is offered to you conditional on your acceptance of the terms and conditions contained in this Agreement. You will be requested at the end of this Agreement to indicate your acceptance of these terms and conditions. By clicking on and selecting the I Agree button below, you will have accepted and agreed to be bound by these. If you do not agree, do not install, copy or use the software.

Description of product

This product may contain one or more software programmes, databases, charts or other data or media. Certain portions of the product may be owned by the Licensor and other portions may be owned by other third parties, including C-MAP s.r.l.

Grant of Licence

Licensor hereby grants User a non-exclusive, non-transferable (except as permitted below) and perpetual right to use Licensor's Expedition suite of computer software, data, associated media and electronic documentation, collectively the Product, in CD-ROM format and electronic format transmitted from Licensor's website. User's licence is subject to the terms and conditions of this Agreement and subject to timely payment of applicable licence fees.
i. User shall only use the Product subject to the

restrictions described in this agreement. Licensor expressly reserves any and all rights which it may have in or to the Product and which are not expressly licensed by Licensor to you under this Agreement.

ii. User may install and use a copy of the Product on one personal computer that is not primarily used aboard a vessel and may install additional copies of the Product on computers that are primarily used aboard a vessel by User.

Restrictions

Except as specifically permitted herein, User may not network, rent, sell, publish, loan, modify, sub-licence or lease the Product to others, reverse engineer, in any manner decode the Product or attempt to discover the source code of the Product except as otherwise permitted by law.

Product Registration

Certain features of the Product, including but not limited to technical support and software updates, require that the Product be registered to you. You may make a one-time permanent transfer of the Product to another user provided that you do not retain any copies of the Product or any of its components.

Termination

You may terminate this Agreement at any time. Licensor may immediately terminate this Agreement if you breach any representation, warranty, agreement or obligation contained or referred to in this Agreement. On termination, you will immediately erase all copies of the Product from your computers.

Proprietary Rights and Confidentiality

The Product is solely owned by Licensor and it is protected by trade secret, copyright and patent laws. You will take all steps necessary to protect Licensor's and its suppliers' proprietary rights in the Product, including, but not limited to, the proper display of copyright, trademark, and other proprietary notices on any versions or copies in any form of the Product, including copies stored on diskettes, hard drives or other media. You will, at your own cost and expense, protect and defend Licensor's ownership of the Product against all claims, liens and legal processes of your creditors and will keep the Product free and clear of all such claims, liens and processes.

Support and Updates

Technical support is available to registered users of the Product at no charge for one year after the date of purchase of the licence to the Product. Updates to the Product will be provided as described on Licensor's web site, currently www.ExpeditionMarine.com. Any updates to the Product shall be deemed to be part of the Product and shall be governed by the terms and conditions of this Agreement. You acknowledge that access to the web site and updates may not be uninterrupted or error free.

Disclaimer of Warranties by Licensor and Warranty from User

The product is provided as is, without warranty of any kind. Licensor further disclaims any implied warranties, including, without limitation, any implied warranties of merchantability, fitness for a particular purpose and non-infringement for the product. Licensor makes no guarantees, representations or warranties about the

suitability or the accuracy of the information contained in the product and other information provided to you by licensor or regarding the use, or the results of use, of the product in terms of correctness, accuracy, reliability or otherwise. User assumes the entire risk as to the results and performance of the product. The information provided by licensor could include technical or other inaccuracies or typographical errors.

You warrant that:

i. All individuals having access to the Product will adhere to all the terms and conditions of this Agreement.
ii. You shall, at your own expense, promptly enforce the restrictions in this Agreement against any person who gains access to the Product in violation of the terms.
iii. You shall immediately notify Licensor in writing of any misuse, misappropriation or unauthorized disclosure, display or copying of the Product that may come to your attention.
iv. The person accepting the terms of this Agreement has actual authority to bind his or her organization and its other users who will gain access to and use of the Product to each and every term, condition and obligation to this Agreement.

International Navigational Requirements and Safety Warnings

User agrees to comply with all laws, regulations, and requirements of the Country in which you are using the Products and acknowledges and agrees that:

i. Nautical navigation is an inherently dangerous act and that this product is only a navigational aid and neither the sole nor primary method of navigation.
ii. No national hydrographic office or official agency of any country has verified the data or information in this product, including but not limited to nautical charts or

other images in digital or physical form and no such office will accept responsibility or liability for the accuracy of any reproduction or any modification made to the data or information produced by the product.

iii. No national hydrographic office or agency warrants that this product satisfies national or international regulations regarding the use of the appropriate products for navigation.

iv. User shall consult official, updated nautical charts which are issued by each country through which you transverse for purposes of navigation.

Indemnification

User agrees to indemnify, defend and hold harmless Licensor and its suppliers from and against any and all claims, costs, liabilities, damages and expense (including, but not limited to reasonable attorneys fees and legal costs), including claims by third parties, which Licensor may incur as result of your breach of any of the terms and conditions of this Agreement and/or use of the Product.

Limitation of Liability

In no event shall Licensor or its suppliers be liable for any indirect, consequential, special or incidental damages whatsoever, including, without limiting the foregoing, damages for loss of business profits, business interruption, loss of business information or other pecuniary loss arising out of the use of or inability to use the product or for any cause of action, including in contract, tort (including negligence) or otherwise, even if licensor has been advised of the possibility of such damages.

The parties to this Agreement have each agreed to the fees and entered into this Agreement in reliance upon the limitations of liability and disclaimers of warranties

and damages set forth in this Agreement, that the same form an essential basis of the bargain between the parties, and that they shall not be removed, even in the event of the failure of an essential purpose of a remedy.

Acknowledgment of Understanding

You acknowledge that you have read this Agreement, understand it and agree to be bound by its terms and conditions. You also agree that this Agreement is the complete and exclusive statement of the agreement between Licensor and you and supersedes all proposals, representations or prior agreements, oral or written, and any other communications between Licensor and you relating to the subject matter of this Agreement. This Agreement may not be amended, except by an agreement in writing which is signed by authorized representatives of Licensor and you.

Governing Law

This Agreement shall be governed by the laws of the New Zealand. You consent to the personal jurisdiction of the courts of such venue.

Installing Expedition

Expedition can be downloaded from the Expedition web site at www.ExpeditionMarine.com

Run the setup .exe file to start the installation process.

It is good practice to keep a copy of the installation file on your computer.

After the installation is complete, you can launch

Expedition by double clicking the Expedition icon installed onto your desktop.

When Expedition launches for this first time, it will ask for a licence key which will be unique for your computer. Email the site code the program provides to Expedition or one of the resellers listed. The authorisation window contains functionality to automatically create this email for you. If you already own or have paid for a licence to use Expedition, a key will be emailed to you. If not, you can arrange for payment or a temporary licence at this time.

Licence keys (licence.xml) should be copied to the Expedition data folder. There are linked to the data folder on the Application button menu and also the licence window.

Installations and updates may be obtained from www.ExpeditionMarine.com. Periodic updates are made available on the web site.
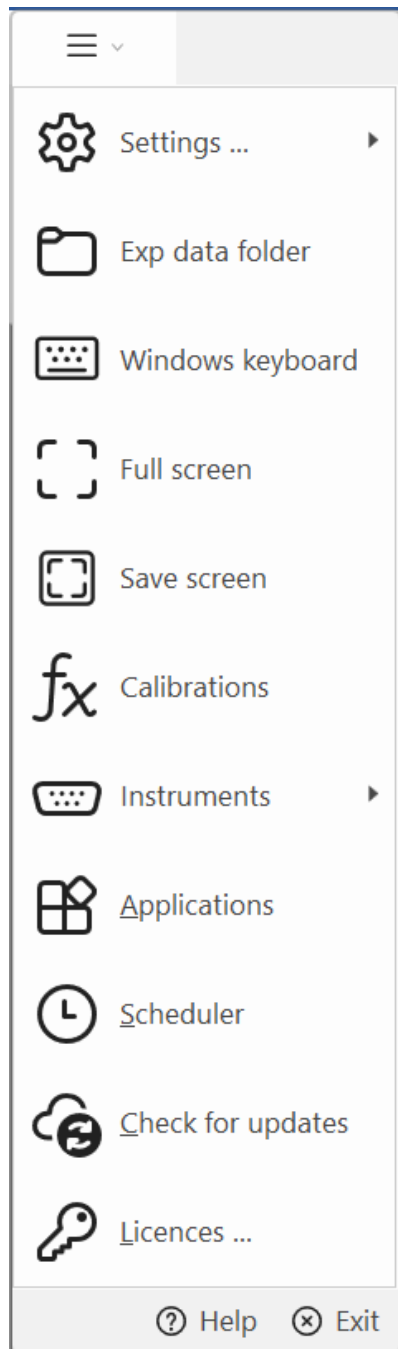
Expedition interface

Expedition uses Microsoft's Office Fluent User Interface which will be familiar to anyone used to products such as Microsoft Office.

Application button and system menu

Some quick, easily accessed functions.

Settings (Ctrl-S)

Accesses Expedition's various settings.

Save settings

Saves various setttings in Exp without the need to exit.

Export settings

Exports all Expedition settings saved in the registry to a file for backup etc purposes. Note that this also exports display states etc.

The data exported is from:

HKEY_CURRENT_USER\SOFTWARE\Expedition

Save user configuration
Load user configuration

These options allow some settings such as boat length, polars, sailchart and advanced optimal routing settings to be saved to an xml file.

This is to ease switching settings if sailing on different boats with the same computer or doing on-shore planning for different boats.

The files are saved in the config_user folder in the Expedition data folder.

Expedition data folder

Opens the App Data folder used to store Expedition data files, such as log, archive and configuration files.

Normally this is c:\programdata\expedition\

Windows keyboard

Launches Windows' on-screen keyboard. This can be useful for touch screen displays.

Also see tablet mode in system settings.

Full screen

Shows a full screen, chart only display.

Save screen

Exports the chart display to a file.

Calibration

Interface to calibration functions used by Expedition. For instrument data, calibration of the instrument system is preferred.

Instruments (Ctrl-I)

Displays the instrument pages.

Also has various menu options:

GPS

Select the GPS source to use.

Reconnect

Reconnects all network connections. This is the same as on the individual connection pages. Useful for dropped wireless connections. Also on the QAT.

Send reconnect

Tells any other computers connected with the Expedition instrument protocol to reconnect their network instrument connections.

Number of network connections

Expedition can have several network connections for receiving instrument data over. Most users will only require 1 (the default value). For practicality, the number is limited to 8.

Marks to instruments

Sends mark and route information to instruments where applicable.

Instrument specific options

Shortcuts to instrument system settings. Depending on the instrument types selected, some of these options may appear.

Start radar

Start radar transmission

Stop radar

Stop radar transmission

Actisense & Garmin (Ctrl-A & Ctrl-G)

AIS

B&G Hercules (Ctrl-B)

Nexus FDX

Racing Bravo

Radar

Ockam

Applications

Stripchart

Garmin2Exp

Cosworth2Exp

Navico radar

Dfw2Exp

Expedition System Restore

Scheduler

User controlled timer for various functions.

Position reports

Monitor folder for Expedition/Volvo/MaxSea position reports

Monitors a selected folder for Expedition, Volvo or MaxSea type position report files.

The first line must be EXPEDITION, POSRELEASE or MAXSEA.

Replaces the old Volvo SatC application, originally designed to detect position reports

received by an Inmarsat C terminal in the Volvo Ocean race

Wx to grib

Creates grib file data from wind data from all boat, weather boat or AIS data.

Check for updates

Checks www.ExpeditionMarine.com to see if there is a later release available.

Also see the system settings.

Licences

Allows a demo or full licence key to be entered.

Help

Opens Expedition's help documentation.

Exit

Closes Expedition.

Quick access toolbar

The Quick access toolbar (QAT) is just to the right of the Application button.

The QAT can be customised to show any button or ribbon pane by clicking on the preset shortcut or 'More commands' on the pop-up menu.

Selecting 'Minimise the ribbon' hides the ribbon. It will appear when selecting a ribbon menu item.
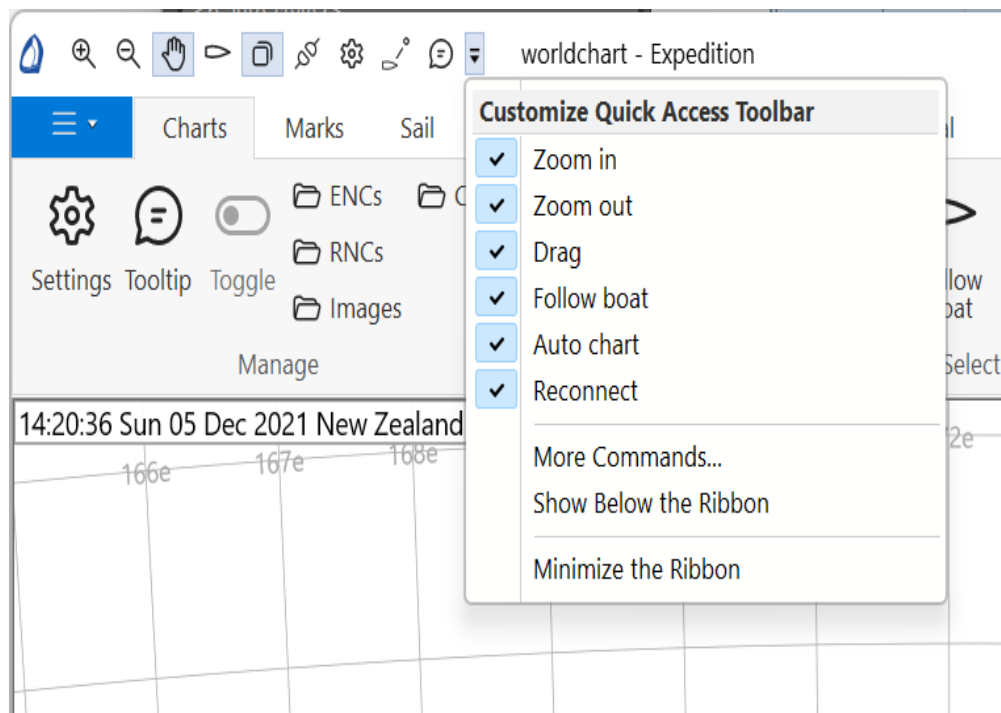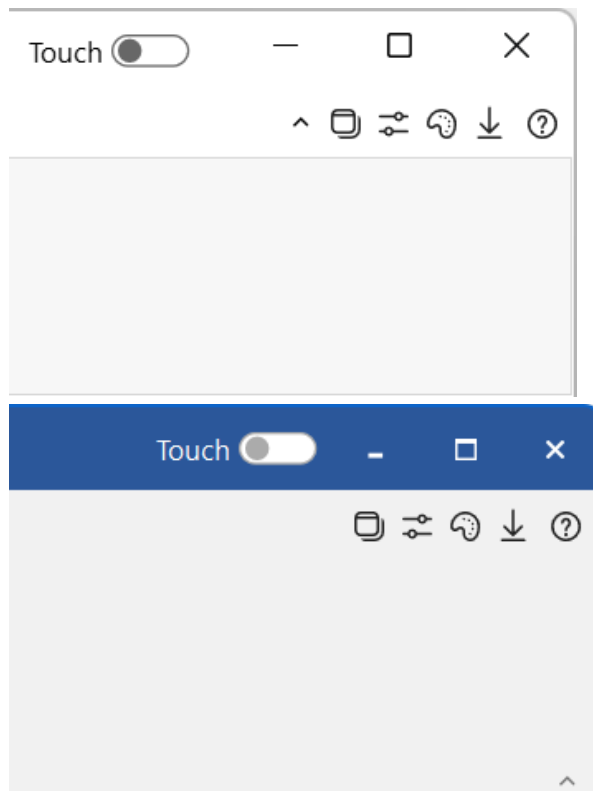
Simple-classic switch

Caret button at the bottom right of the ribbon or just to the left of the custom buttons, depending on the theme.

Toggles the Simple ribbon setting, a simple and small ribbon.

This option is also available in Expedition's System settings.

Download

Toggles the download window.

Windows

These menu items toggle Expedition's windows on and off.

Lock panes

Locks number boxes and most panes.

States

The position of all windows, contents of the number boxes and QAT etc can be saved as 'Display states'. This enables easy switching between configurations. The active display state will be displayed at the top of the main Expedition window.

Display states available

> Default display state
>
> Pre-start display state
>
> Race display state
>
> Inshore display state
>
> Offshore display state
>
> Cruising display state

Save

Saves any changes to the display state currently being used.

Save as …

Allows the current display state to be copied and saved as another.

Delete all

Deletes the saved positions of windows and toolbar configurations.

Theme

The visual appearance of Exp can be modified to suit the user's preferences. This is purely cosmetic and options include:

Colourful

Dark grey

White

Black

Expedition can also modify the display colours for day, dusk or night conditions.

Day

Dusk

Night

Expedition windows

The Expedition interface allows a lot of customisation as different users will have differing requirements that may vary from time to time.

Available from the button near the top-right of Expedition.

Windows available

AIS & DSC

Displays a list of AIS and DSC targets. The data displayed can be selected on the AIS & DSC settings page.

Double-clicking on the target list toggles the toolbar on and off. The AIS toolbar allows the AIS targets on the chart to be toggled on and off and has a direct link to the AIS settings.

The targets can be sorted by any of the columns items in the target list by clicking on the column header.

C-MAP

Shows C-MAP images on selecting Query C-MAP from the pop-up menu.

Route

A list of the legs of the route with wind angle, range, bearing etc data.

GPS

Shows the GPS SV constellation, with GPS mode, satellite signal to noise rations etc.

Number boxes

There are two number box windows available. Clicking the window toggles the toolbar on and off.

Number list

List of numbers, similar to the number box windows. Double-clicking on the list toggles the toolbar on and off.

Radar

Displays radar echoes in a simple PPI display. Double-clicking on the radar window toggles the toolbar on and off.

Sail chart

See the sail chart help. Double-clicking on the sail chart toggles the toolbar on and off.

Sail graphic

A graphical representation of the boat, mark, wind etc. See the sail graphic help.

What-if?

The What-if? window.

Wind

Plots of TWD and TWS.

May be damped. Use the toolbar to set the damping.

Can also display TWD & TWS from the loaded grib file(s). This is for the current position rather than previous boat positions.

Lock panes

From the Window menu. Locks most panes and also number boxes.

Docking

Windows can be dragged around the screen and left floating or docked to each other or the side of the main Expedition window. As a window is dragged, small controls will appear. Just drag the window to these controls to dock the window to an existing window or other windows. These windows can even be docked as tabs over each other.

The configuration of these windows, Quick Access Toolbar and number window contents are saved as display states.

Auto-hide

Expedition windows can be made to auto-hide by clicking on the pin icon on the window header or by right-clicking on the window header and selecting *Auto Hide* from the pop-up menu. In this case, they appear as small tags on the side of the Exp window and only appear when the cursor is moved over the tag.

C:\ProgramData\Expedition\sails\KNDSailChart.xml
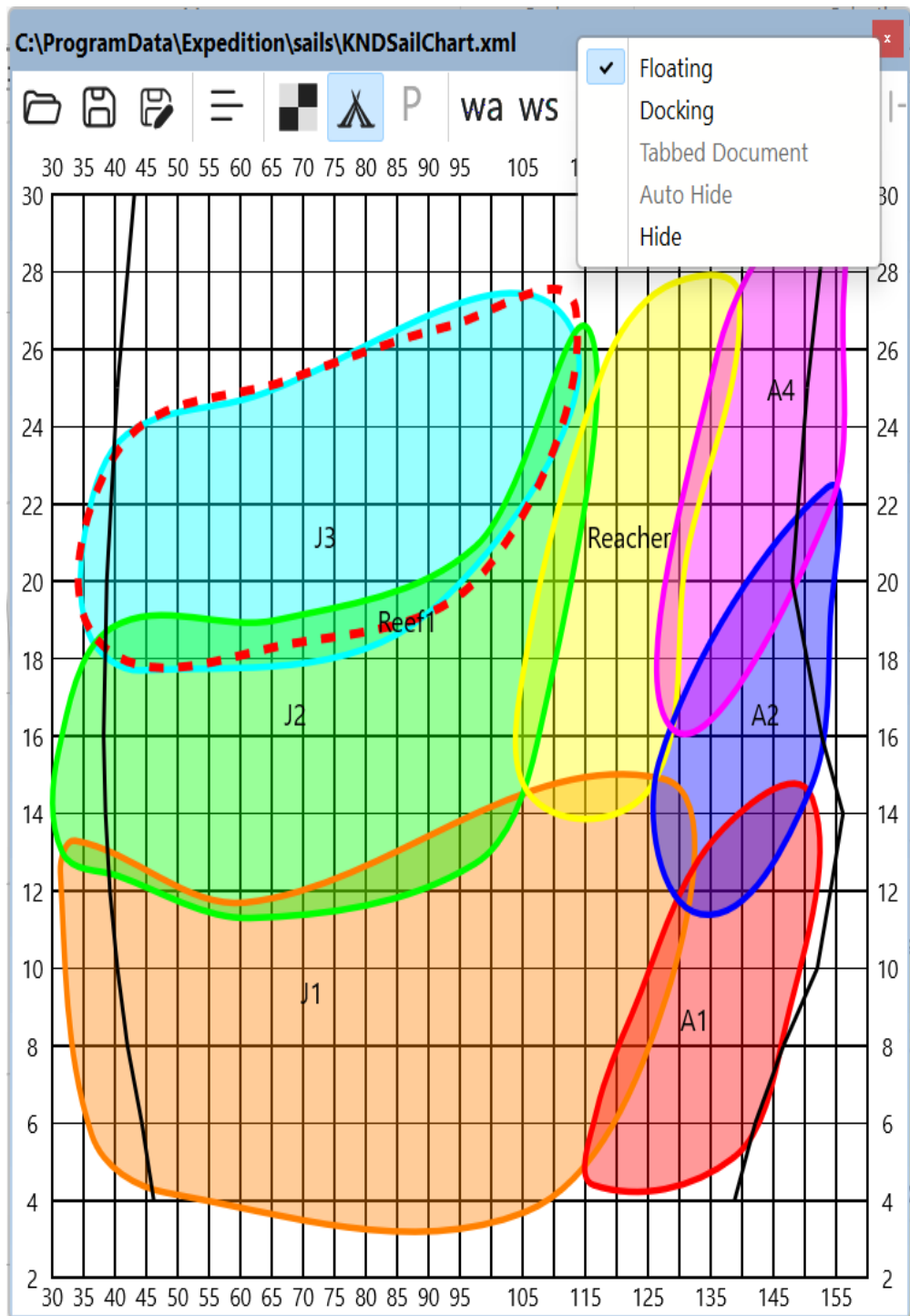
Number boxes

There are three number box windows available in Expedition.

Number box toolbar

To save screen space, the toolbar for the Number-box window is hidden by default. This can be toggled on and off just by clicking anywhere in the number-box window.

The toolbar is toggled on and off in the number list window by double-clicking on the list.

Adding numbers

TWD °M	Depth
337	17.5
TWS	**HDG °M**
4.1	046
BSP	**PolBsp%**
5.24	104.0
SOG	**COG °M**
4.86	064
Tm on P	**Tm on S**
03h 11m	41m 40s
MkBrg °M	**MkRng**
007	12.62
MkTwa	**NxtMkTwa**
-34	-116
Set °M	**Drift**
264	0.1
05-Dec-2021	**Mark Tm**
14:32:45	03h 52m

The contents of these windows can be edited by clicking on the toolbar button in each.

The largest box/window on the right of edit interface contains all the numbers or channels that Expedition can display. Simply left mouse click on the number you want to have displayed in this large centre box. This selected number will immediately appear in the previously empty left hand box with your boat number (i.e. 0: Depth). All numbers displayed in the left hand box will be displayed on the number box or list window being edited.

Some of the numbers are for specialized uses, so not all of these numbers will be available from your particular instrument system. However, the numbers that are coming from your instruments (i.e. Latitude, Longitude, boat speed, depth etc.) will be available for display on your main chart window.

To remove a number from the display list, simply move your mouse to the left hand box (where the data to display is listed), click on the desired number and then click on the Remove button.

Notes

The individual numbers in the number box windows can also be edited by right-clicking on them.

The displayed numbers can be damped or streaming straight from your instrument system.

Up to ten alternating channels (i.e. alternating/flashing two different numbers) to be

displayed and/or exported into the external channels of your instrument system for display on deck.

See Appendix A for a list and explanation of Expedition's numbers.

Boat

This drop down window is in the lower left corner of the page. Expedition has the ability and power to display data from up to sixteen boats. This feature is useful for an America's Cup level weather program or a two (or more) boat testing program. Most users will only have data coming in from their own instruments and therefore should have Boat 0 selected.

Unless you are running a fancy multiple boat system, your boat is Boat 0 and it should always be selected.

Damped check box

If you want the displayed data or number to be damped then check this box before driving the mouse to the central box and left clicking on the number that you want to select for display. In the left hand window you will now see that the number you selected for display will be damped.

A damped function/number will be *italicised*.

The system damped value or a longer period may be selected. The amount of system damping to be applied for particular function/number is set on the User settings tab.

Boat list

As mentioned above, most users will leave this at '0', but if you do have multiple sources of information, first select the desired *boat number* in the drop down window before you select the number or channel you want displayed.

Dragging a number box

Number boxes can be dragged around the number box window by left-clicking on them and dragging.

A number box may be deleted by dragging off the number box window.

Right click to change an individual number box

Any individual number box settings, including background colour, can be changed by right-clicking on it.

Lock

Locks number boxes and most panes.

Note about true wind angle in Expedition

Please note that True wind angle displayed in Expedition and StripChart includes the effects of leeway wherever possible. Polar data from designers generally present TWA in this manner (TWA to the boat's centreline plus leeway equals TWA track) as do Ockam and modern B&G systems. For systems that do not add in the effect of leeway into TWA, leeway is added to the TWA received from the instrument system wherever possible. There are several benefits to this. For example, calculations of VMG have to include leeway and it makes the optimal routing function easier to use. This is why you may notice that Twa as reported by Expedition may be a few degrees wider than Twa reported by the instruments.

Charts ribbon
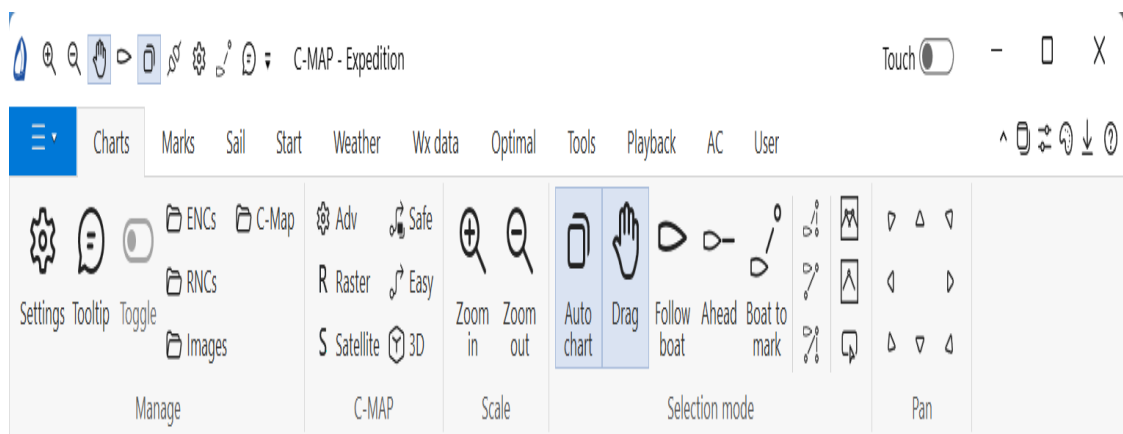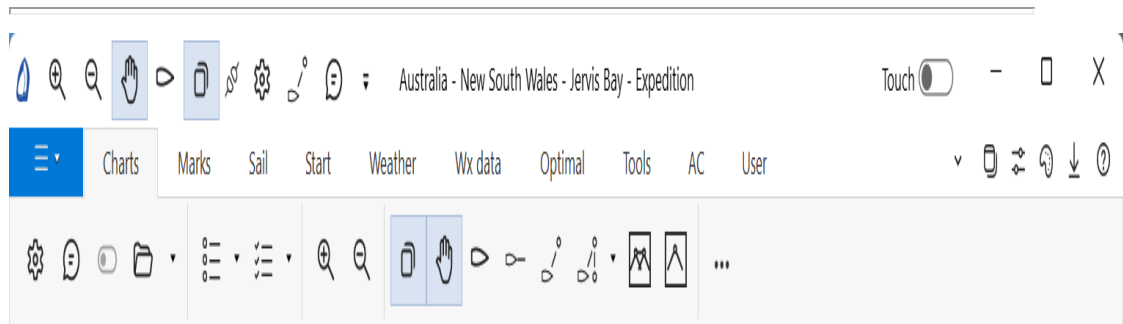
Manage

Settings

Chart settings is used to manage how charts are displayed in Expedition.

Tooltip

ENC and C-Map chart tooltips for point objects.

Toggle

Toggles the display between the active chart and an image.

ENCs

ENC chart management is used to manage and select ENCs.

RNCs

RNC chart management is used to manage and select raster charts such as Maptech, NV-Verlag, Bsb charts.

Images

Image management is used to manage and select raster images such as Squid satellite images and .bmp, .jpeg etc images.

Right-click menu options

On the pop-up menu, use Open best chart to select the best chart available at the cursor position or use Open chart to select any of the available charts at the cursor position.

ENCs

Only shown if using ENCs.

Base
Standard
All

Toggle between levels of chart display information.

Soundings

Adds soundings and depth contours to the Standard ENC display mode, also in ENC settings.

Lights text

Toggles lights text, also in ENC settings.

Light sectors

Toggles light sectors, also in ENC settings.

Info

Shows chart information objects on the chart.

Names

More names etc text.

C-MAP

Only shown if using C-Map charting.

C-MAP

Selects C-MAP charting is not in C-MAP mode.

If in C-MAP mode, shows C-MAP chart areas available and provides access to C-MAP chart management tools. For MAX, this is a shortcut to NT Selector. For 4D, this provides access to My Maps and the C-MAP Web Store.

For C-Map 4D, this will also indicate wether the OpenGL to Expedition mechanism is accelerated.

Advanced settings

More C-MAP options.

Safe route check

See the safe route check help.

C-MAP 4D

Raster charts

Toggles raster chart mode.

Satellite

Toggles satellite image mode.

3D

Toggles 3D mode.

Easy route

See the safe route check help.

Scale

Zoom in or out. If Auto-chart is selected, this will automatically select the next scale chart.

These functions can also be performed using the + and - keyboard keys, the right click drop down menu or the mouse scroll button.

Zooming in can also be accomplished in *Zoom + centre* mode by holding the left mouse button down while dragging the cursor. This zooms in one scale level.

Selection mode

Controls how Expedition selects and centres charts. Note that the chart cannot be manually panned if one of the automatic chart display functions such as 'Follow boat' are selected

Auto chart (also known as Open Best Chart)

This function only applies to zooming in and out and in the *Follow boat and Centre ahead of boat* modes.

With *Auto chart* mode selected, the next higher or lower scale chart will be selected when you zoom in or zoom out. If this mode is not selected, zooming in or out will display the current chart at different scales. See the help on chart enhancement.

This mode also influences C-MAP MAX chart behaviour. With it unselected, you can zoom in and out on the same chart level.

Note: It is recommended that this mode is selected for most use.

Drag

In this mode, click on the chart and drag in the direction to pan. This technique will be more familiar to Google Earth and Photoshop users and can be easier on touch screens.

Follow boat

Automatically centres the chart on the boat.

Ahead

Centres the chart on a point ahead of the boat and may be used in conjunction with *Auto chart* to select the best chart at that location. This can be useful in tricky coastal piloting situations to best view the upcoming hazards and feature. If your computer is

not connected to instruments providing a GPS position, then the *Centre on boat button* will have no effect.

If the chart pans around too much because of frequent changes of heading, de-select this feature.

Boat to mark

Selects the best chart to display the boat and the active mark of the route.

Centre on active leg

Selects the best chart to display the boat and the active leg of the route.

Centre on boat, active mark and next mark

Selects the best chart to display the boat, the active mark and the following mark.

Centre on active route

Selects the best chart to display the boat and the active route.

Zoom + centre

The chart can be re-re-entered by clicking the left mouse button. This option is preferred by some users as it can be more efficient. This mode is can also be used to zoom in.

Start display

Race display

This is an un-cluttered display mode with no charting and scaled to fit the start line or course to the screen.

After the start, it will display the active mark and the boat.

Pan

Pans the chart up, down, left or right.

See also auto-pan.

Marks ribbon

Manage

Man over-board (F2)

See the Man overboard help.

Edit marks (Ctrl-M)

Mark management.

Visual marks

Sets the Visual marks route creation mode. This is a quick and easy way to graphically set a new route.

Route builder

Enables easy creation of a route from marks displayed on the chart as 'always drawn'.

To use, select this mode and then select each mark in turn. Options will include leaving each added mark to port or starboard or to create a new route.

When finished, deselect the Course builder mode.

Undo

Reverses the last mark or route modification.

Redo

Redo a mark or route modification that was undone.

Reset XTE

The Reset XTE option resets the preceeding position for the XTE calculation to the boat position when using a boat position rather than the previous mark for the XTE calculation.

See also the XTE calculated between marks option in System settings.

Lock

Locks all marks in the active route.

Unlock

Unlocks all marks in the active route.

Gate

Toggles between the active mark and a gate mark for calculated numbers (laylines, mark bearings, distances and times etc).

Select mark

Next mark (right key)

Select the next mark as the active mark The right arrow is a keyboard shortcut to previous mark.

Previous mark (left key)

Select the previous mark as the active mark The left arrow is a keyboard shortcut to previous mark.

Left and right keyboard arrows are short cuts to these functions.

Ping

Ping

Set a mark at the current boat position - either at the bow or GPS based on the Set start at bow (else at

GPS) function in Racing settings.

This is helpful if you want to ping a mark and then later right click or use mark management and add it to a route. For example, I often use this function to ping gate marks instead of using the mark gate function.

Ping at

Creates a mark at a given range and bearing from the boat. Option of setting the created mark to be the active mark/route or as an always drawn mark to be added to the route (e.g. with the right click insert mark function).

Ping laser

Creates a mark at the last laser position.

Move

Move to boat

If it isn't locked, moves the active mark to the boat's position - either the bow or GPS based on the Set start at bow (else at GPS) function in Racing settings.

Move

Moves the active mark.

Dividers

Set dividers

The dividers tool allows the user to draw and calculate the range and bearing between points on the main chart window. It is very useful in race planning or coastal navigation. The number of *dividers* (actually a range and bearing between two points) displayed is unlimited and they can be all cleared at once using the *Clear* button or the right-click pop-up menu.

Bearing

Set dividers given range and bearing from the boat. This tool can be used with running bearings on a mark to refine it's position.

A W/L race is a good example of the use of this tool

The windward mark can be set from the range and bearing from the race committee using the Create WL course function. However this is only approximate and once rounded, the mark can be dragged to its correct position.

Before arriving at the mark, its position can be refined using this tool from different places on the race course - the actual mark position is the intersection of the divider lines drawn using this tool.

Reverse

Reverses bearings displayed on dividers.

Clear

Clears all dividers.

Exchange

Instruments

Sends mark and route information to instruments (NMEA 0183, NMEA 2000, Nexus FDX etc).

Note that PGN 129285 and/or 130074 must be enabled to send for NMEA 2000.

Also available from the application menu.

Export

Export marks and routes to various file formats.

GPX

Exports Expedition's mark and route database to a GPs eXchange format (*.gpx) file for use in a range of other mapping and GPS products.

CSV

Exports marks to a CSV (*.csv) file.

The format is

mark name, latitude, longitude, mark group name, range circle, comment

Export

Import marks and routes from various file formats.

GPX

Imports mark and route information from a GPX file.

Expedition

Imports marks from an Expedition marks.dat file.

Dfw

Imports marks from a Deckman marks .d file.

CSV

Imports marks into Expedition from a CSV (*.csv) file.

The expected format is

mark name, latitude, longitude, mark group name, range circle, comment

The mark group name, range circle and comment are optional.

For example:

North Head,50 42.69n,01 35.52w
North Ryde Middle,50 46.61n,01 14.31w
North Sturbridge,50 45.33n,01 08.23w

Paul Jackson,50 44.33n,01 28.19w
Peel Bank,50 45.49n,01 13.34w
Peters & May,50 46.13n,01 22.19w
Prince Consort,50 46.42n,01 17.59w
Quinnell,50 47.07n,01 19.88w

The latitude and longitude could also be in decimal degrees. For example:

My mark,50.1234,-1.0234

Cowes

Imports a race course into Expedition from a text (*.txt) file in the format used by Cowes Weeks SMS course messages.

The format is

IRC 3; Saturday; 8Y(RS); 8S(RS); 44(RP); 31(RP); 3H(RP); FINISH at 80

Class;Day of week; markref(rounding);markref(rounding);… markref(rounding);Finish at markref

First field: name of class
Second field: Day of week
Third to n-1th field: mark of the course
Nth field: finish mark in the format shown

Class and day are usually defined by the organisers.

Each mark is shown with the standard 2 character reference (per the Cowes Week SIs, which include some Cowes Week specific

marks) together with (in brackets) a rounding/passing designator as follows:

The markref must be two characters and the corresponding mark in Exp's database should be the same two characters or start with the same characters and a space. For example

4Y NRYDM

Rounding may be

(RP) - round to port
(RS) - round to starboard
(PP) - pass to port
(PS) - pass to starboard
(GT) - gate mark (sets as sail to mark as we don't know the gate details)

Expedition also supports the 2013 roundings:

(LP) - leave to Port
(LS) - leave to Starboard

The starting line/CV is not defined in the SMS message file but defined manually using the Start Panel.

Sail ribbon
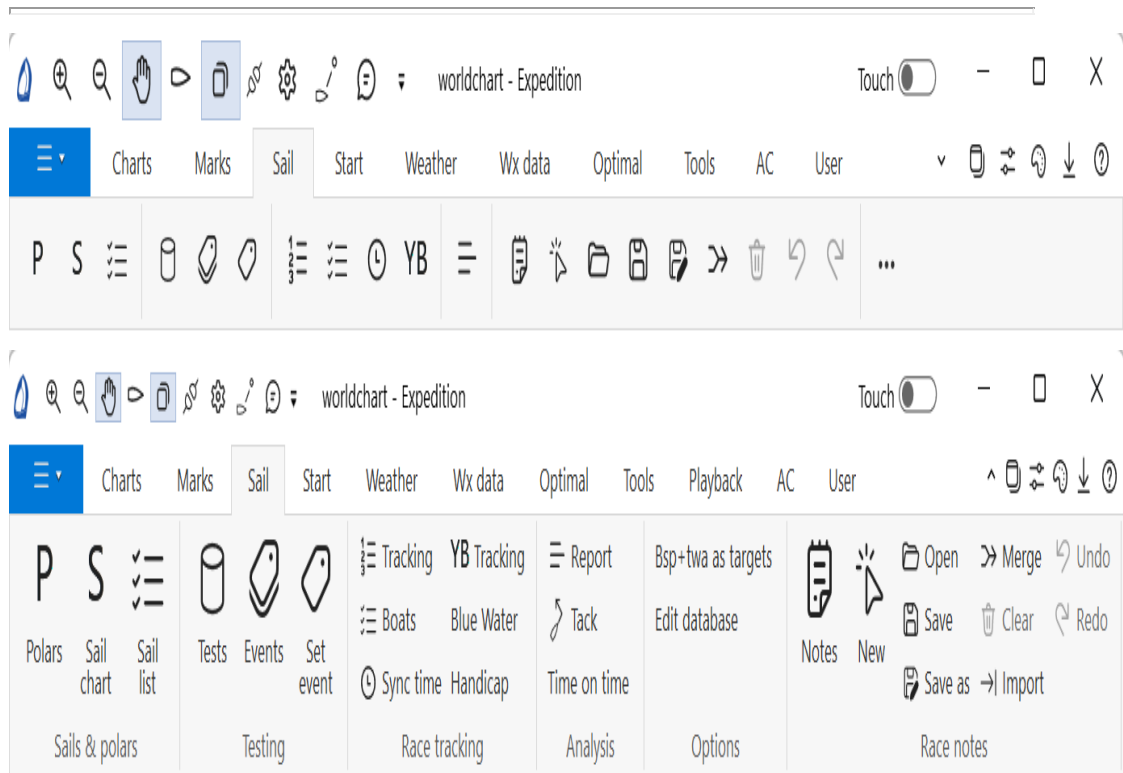
Polars

Polars (Ctrl-P)

See Polars.

Sail chart

Displays the active Sail chart.

Sail list

Allows the Sail list used in Exp to be edited.

Testing

Tests (Ctrl-T)

Displays test data stored in the database for selection to plot or exporting from Expedition.

Also available with the Ctrl-T keyboard short-cut or from a polar edit window.

See the sail test analysis help and *Saving tests* in the Stripchart help.

Event list

Expedition's event database.

Set event (Ctrl-E)

Set an event. Note that only sails selected in Sail settings are displayed in the drop lists.

Racing tracking

Race tracking

Accesses Expedition's race tracking functions.

Yellow Brick

Downloads and imports race positions from YB Tracking.

Blue Water

Downloads and imports race positions from Blue Water Tracks.

Sync time

Sets the display time to the time of the latest position report for the reference boat.

Boats

Edits boats used in race tracking and the handicap calculator.

Handicap

Handicap calculator.

Analysis

Report

Recent sailing performance, implemented for a Volvo project.

Tack analysis

For analysing tack performance / cost. Also populates the 'Tack/gybe loss time' and 'Tack/gybe loss metres' channels.

Options

Bsp + twa as targets

Instructs Exp to use damped instrument values instead of targets to calculate laylines.

Edit database

Race notes

Race notes are annotations on the chart. They can be used for race planning and can be used to set areas to avoid or to reduce speed when using route optimisation.

The right-click pop-up menu can also be used to edit a race note.

There is also a number channel 'GPS time to race note', which is the time to reach the nearest race note area boundary based on Cog and Sog.

Notes

Lists all race notes.

Add

Creates a new race note. Select this, then click on the chart to create a new race note area.

Open

Loads a race notes file.

Merge

Merges data from another race notes file.

Save as

Saves a race notes file.

Clear

Clears all loaded race notes.

Import

Imports race note areas from a csv file. The format is:

Area name 1
lat,lon
lat,lon
lat,lon
lat,lon
Area2
lat,lon
lat,lon
lat,lon
lat,lon
…

Start ribbon
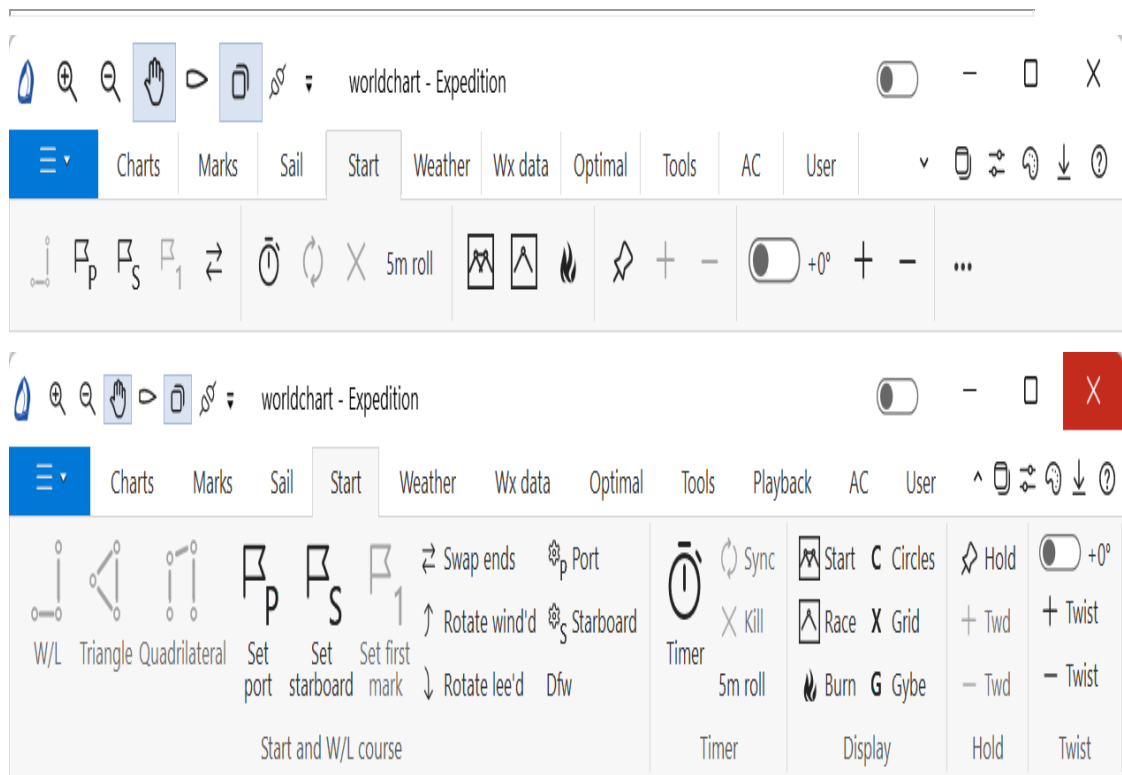
These tools can be useful at the start of any race and for windward/leeward style buoy races.

Start and W/L course

W/L

This is the quickest way to configure a standard windward/leeward course. It easily allows you to configure a course where the leeward mark (or gate) is upwind of the starting line.

Triangle

Olympic triangle course wizard.

Quadrilateral

Quadrilateral course wizard.

Set port

Sets the port end of the starting line to the position of the boat.

Set starboard

Sets the starboard end of the starting line to the position of the boat.

Select whether to set start marks at the bow or the GPS on the user settings page. If pinging the mark at the bow, this requires the distance between the GPS and the bow to also be entered correctly.

The position used will be the last position received when the OK button is clicked.

Set first mark

Adds a mark at a range and bearing from the starboard end of the line to the beginning of the active course.

Swap ends

If you pinged them wrong?

Rotate wind'd

Rotates W/L marks to allow for a course change partway through the race.

Rotate lee'd

Rotates W/L marks to allow for a course change partway through the race.

If the race committee announces a change in the axis of the windward mark when you are rounding the first leeward mark simply press *rotate windward mark* and enter the new axis/heading in the dialogue box that pops open and then click OK to accept your change. Keep in mind that with these course change buttons, the course rotates around the leeward mark (or the windward mark), not the starting line (unless you configured the course so the leeward mark is at the starting line.

Dfw

Gets ends of the Deckman start line from start.d.

Port options
Starboard Options

Provides options for each end.

Laser port

Sets the end of the starting line to the position that most recently *pinged* with the Laser gun.

Nudge upwind

Nudges the end of the start line upwind or downwind in metres or system distance units. Positive values nudge the mark upwind, negative values nudge it downwind.

From starboard

Set the end of the start line given a range & bearing from the starboard end. Range is in metres or system distance units. Bearing is in degrees magnetic or true, depending on the system settings.

From port

Set the end of the start line given a range & bearing from the port end. Range is in metres or system distance units. Bearing is in degrees magnetic or true, depending on the system settings.

Timer

Timer

The start time controls are used to control Expedition's starting line functionality by setting the

time to go before the start. Take note that the pre-start countdown starts when you select OK on the pop-up window that appears.

Start time

Sets the start time to any time.

Time to gun

Sets the time to the gun to any number of minutes and seconds.

Sync start time

Rounds the count-down timer (time to gun) to the nearest minute.

Kill

Kills the start countdown timer.

Roll

Resets the countdown timer at the gun. Defaults to 5 minutes, but may be set in Racing & Start settings.

Display

Start display

Shows the boat and start line.

Race display

This is an un-cluttered display mode with no charting and scaled to fit the start line or course to the screen.

After the start, it will display the active mark and the boat.

See also the chart panel help.

Burn

Switches from time to go to the line, line ends etc to time to burn to the line etc.

Circles

Toggle the start range circles on and off.

Grid

Toggle the start range grid on and off.

Gybe

Shows gybes to the line. See also the start settings.

Time ratios

Displays start times as a ratio of time to gun.

For example, time to line is displayed as $^{time\ to\ gun}/_{time\ to\ line}$.

Hold

Hold wind and/or current. Often, especially in the pre-start, it may be desirable to fix the wind and/or current to set values. The hold button offers a quick way to hold the twd, tws, set or drift to user-defined values rather than from the instruments.

Exp can release these settings at the gun - See *Release hold wind and current* at start in Start settings.

Wind

Twist

Adds TWD for laylines.

Weather ribbon
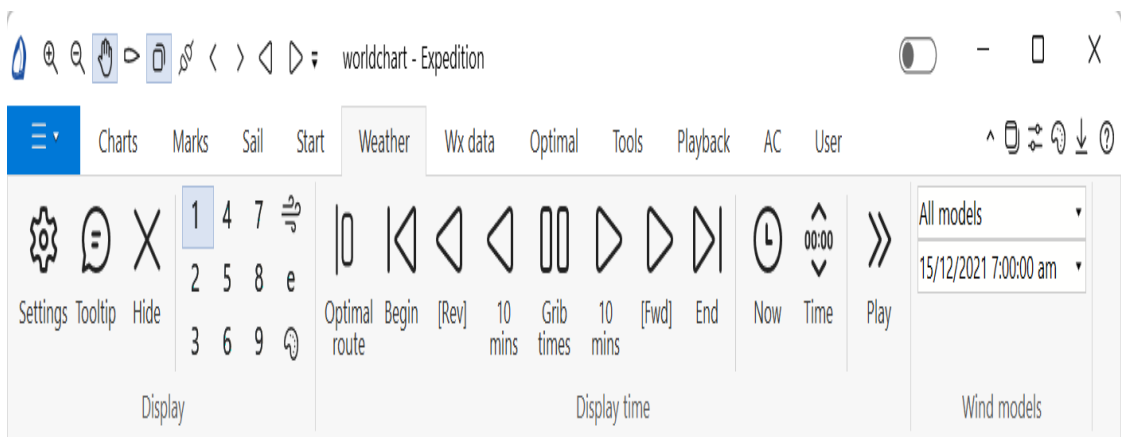
Display

Settings (Ctrl-W)

Shortcut to the weather settings page, also available
from the keyboard as *Ctrl-W*.

Tooltip

Toggles the weather tooltip on and off. The weather
tooltip can be used to examine forecast weather and
tide conditions anywhere on the screen.

See also the weather table from the pop-up menu.

1 2 3 4 5 6 7 8 9

Weather display states. Allows easy switching between different weather display settings.

Wind flow

Animated wind flow. The colour can be set in Weather settings.

e (ensemble display)

Draws all loaded weather models. Ignores shading options to reduce clutter.

Ensemble settings

Set colour for each weather model. Also sets the default colour for ensemble optimal routing.

Hide

A convenient one-click control to globally turn weather display on or off. This is very useful if you want to quickly 'de-clutter' the screen.

Display time

The keyboard up and down arrows are shortcuts to the forward and reverse buttons. The keyboard *space bar*

toggles between stepping by times in the grib file or the user defined interval (See *xx minutes* below).

The time is displayed in the upper left corner of the chart window.

Begin

Sets the display time at the first time in the grib file(s).

Optimal route

Sets the display time to the start of the last route optimisation.

Reverse

Steps the GRIB weather display backward in time. The keyboard down arrow is a shortcut to this function.

xx minutes

Steps the grib display forward or backward in time.

Grib times / xx min

Expedition may interpolate between the steps of the GRIB file or time steps set on the weather settings page, depending on the selection of the Grib/xx min button.

Forward

Steps the GRIB weather display forward in time. The keyboard up arrow is a shortcut to this function.

End

Sets the display time at the last time in the grib file(s).

Now

Synchronizes the weather display time with that of the computer clock. It will always display the weather for now.

Time

Sets the display time to any user-selectable time.

Play

Animates the weather display.

Wind models

Quickly switch the display between models or ensemble runs loaded.

For known models, the name of the model will be displayed.

If the model is not known, the National Centre and codes for the sub-centre and process will be displayed.

Occasionally the weather model will be depicted as a code.

Most private weather modellers do not have a National Centre code, so invariably they use 255.

Expedition shows the code to discern between models.

However several use the same codes, even within their own products. This means ensemble routing and weather may be unpredictable for such products.

For example, the Squid GCWF model will appear as 255 0 96.

Times

Quickly switch between time steps in the grib file(s).

Weather data ribbon
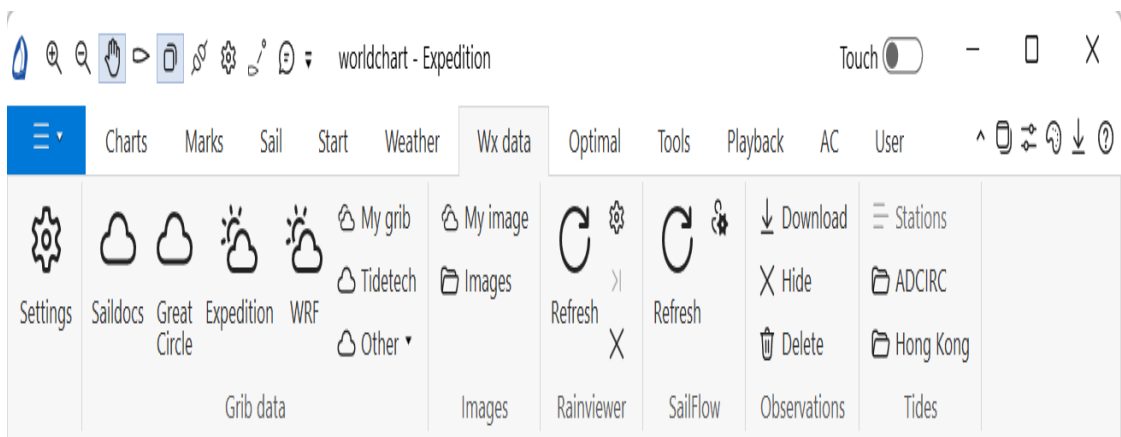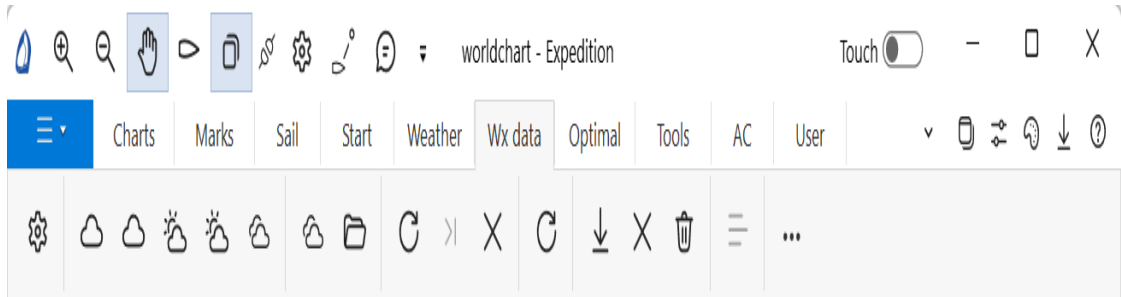
Settings (Ctrl-W)

Shortcut to the weather settings page, also available from the keyboard as *Ctrl-W*.

Grib data

Most downloads messages and progress are shown on the weather ribbon.

Downloads may be cancelled at any time by selecting the Cancel button in the Download section of the ribbon.

Saildocs

Interface for the Saildocs grib service. Select this, then left-click on the chart and drag the cursor to select an area.

Great Circle - Squid

Interface to the Great Circle - Squid grib service.

Expedition

Interface to the Expedition GRIB service.

WRF

Expedition WRF models.

WRF model data may also be downloaded by right-clicking on the chart and selecting Expedition WRF from the pop-up menu.

My grib

User defineable grib file downloader. The files are listed in \config\MyGrib.xml in the Exp program files folder.

MyGrib data may also be downloaded by right-clicking on the chart and selecting the MyGrib from the pop-up menu.

It may be better to use a dedicated file downloader over satellite connections, depending on

circumstances.

Tidetech

Opens the Tidetech interface to tidal and ocean current data from Tidetech. Select this, then left-click on the chart and drag the cursor to select an area.

Tidetech data may also be downloaded by right-clicking on the chart and select the Tidetech from the pop-up menu.

NOAA

Download grib data directly from NOAA. Does not always work as well as eGrib or Saildocs.

GMN

Interface for Global Marine Network's grib service.

Ocens

Accesses the Ocens WeatherNet system if installed.

Images

Images

Image management is used to manage and select raster images such as from My Image and Squid satellite.

Also see the Chart ribbon.

My image

Downloads and automatically geo-references images, including satellite images and weather charts, from the web.

Rainviewer

Rainviewer is a very nice service that provides radar imges for many locations.

Downloads may be cancelled at any time by selecting the Cancel button in the Download section of the ribbon.

Rainviewer is a free service, so we encourage people to support them with Patreon.

Refresh

Downloads radar images for the current chart area from Rainviewer.

Settings

Select the radar colour palette to download.

Adjust the transparency of the radar images displayed on the chart.

Select the number of hours to retain data.

Download latest image is selected by default. If deselected, Expedition will download available images.

Fast downloads will download lower resolution data in, resulting in smaller downloads.

Latest

Sets the Expedition display time to the last Rainviewer images at the chart scale/level.

Hide

Toggles Rainviewer imagery on or off.

SailFlow

Downloads may be cancelled at any time by selecting the Cancel button in the Download section of the ribbon.

Refresh

Downloads weather observations for the current chart area from SailFlow.

Settings

The SailFlow username and password.

Observations

See also the Weather Observations options in display settings.

Note that the colour of the observations can be determined by the weather 10m wind settings or the colour specified in display settings.

Download

Downloads observation data from the web from the BOM, NOAA's NDBC web site, ship and buoy observations as well as 3 hourly land synoptic reports.

Hide

Toggles weather observations display.

Delete

Deletes downloaded observation data to the recycle bin.

Tides

Stations

Access a list of tidal stations currently loaded into Exp. Select any individual station and clicking the *Predictions* button will display a window showing tide heights (or stream) information for that station.

If you don't find a desired location in the Tides section, look in the Secondary Tides section.

ADCIRC

Imports ADCIRC current model output in fort.64 format. Requires the associated .grd mesh grid file and a user input model run time.

Hong Kong

Imports Hong Kong Hydrographic Office current model predictions.

The format is

> Date,Time,Knots,Degree,Latitude(WGS84),Longitude(WGS84)
>
> 2016-07-19,00:00,0.10,59,22.4618675408,114.3535103735

Times are local (Hong Kong), so select this when prompted.

Downloader

Shows progress and error messages for Grib, Rainviewer and SailFlow downloads.

Also allows the downloads to be cancelled.

Optimal ribbon
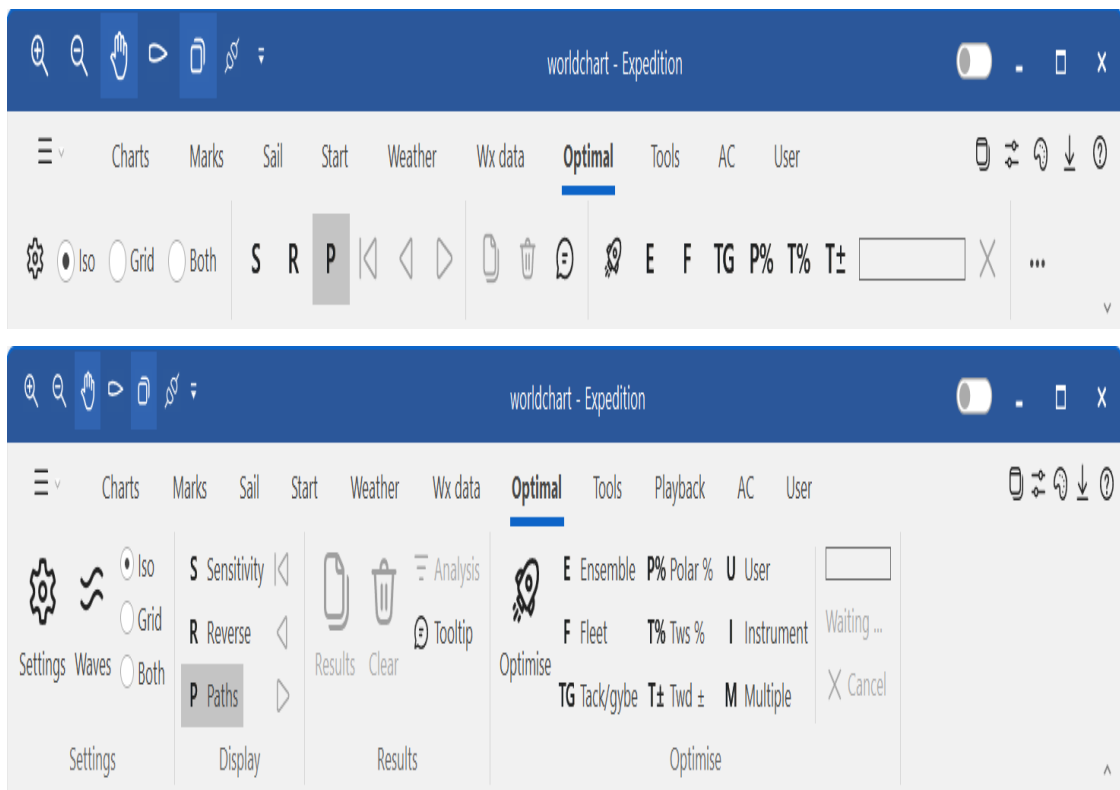
Settings

Settings

This is a shortcut to the optimal settings page

Waves

Correction factors (percentages) for waves. Wave heights are in metres. Angles are to the boat. See the optimal routing settings help.

Isochronal or grid based routing

Expedition has two route optimisation algorithms.

The isochronal algorithm should yield a slightly 'better' result as it is a better way of performing the simulation.

The grid algorithm was originally developed for routing studies where it was important to compare similar simulations.

They should yield very similar results, but a user may prefer one or the other or use both for comparison of results.

See the optimal routing topic and optimal routing settings help.

Display

Sensitivity

Toggles sensitivity display.

Reverse isochrones

Toggles reverse isochrones display.

Paths

Toggles paths display.

Begin

Sets the display time to the start of the optimal routing. Also on the weather display ribbon.

Previous

Sets the display time to the previous step in the optimal routing. Also Ctrl-Dn.

Next

Sets the display time to the next step in the optimal routing. Also Ctrl-Up.

Results

Results

Displays tables or meteograms of the optimised routes.

Clear

Clears all optimised routing.

Optimise

Produces a summary of the optimal routes. This may be exported to a .csv file that may be opened by Microsoft Excel.

Tooltip

Enables a tooltip to show time, speed and weather data over the analysed area. This is for the most

recent solution and should be coloured as for the optimised solution.

DNM% is the distance from the next mark as a percentage of the closest point to the mark on an isochrone.

Optimise

Optimise

Computes a single optimal route. This processing is performed in the background. The results will be displayed on the chart when complete.

Ensemble

Automatically performs route optimisation for each model or ensemble run loaded.

Colours are set by the definitions for the various weather models.

Fleet

Performs route optimisation for boats in the fleet that are drawn on the chart at the last race tracking time for the reference boat.

Each boat needs to have a polar specified on the Boats interface.

Note that All optimal paths needs to be selected to draw the other boats on the chart.

Tack / gybe

Performs route optimisation with the 'Prefer tacks and gybes at routing steps' option off and on.

May be useful for sensitivity decisions.

Polar %

Runs a series of route optimisations at 90, 95, 100, 105 and 110% of the navigation polar.

Tws %

Runs a series of route optimisations at 90, 95, 100, 105, 110, 115 and 120% of the grib wind speeds.

Twd +/-

Runs a series of route optimisations at -10, -5, 0, +5 and +10 TWD offsets.

User wind

Perform a route optimisation with a user defined wind. Useful for exploring current effects.

Instrument

Optimise route with instrument wind.

Multiple

Compute multiple optimal routes with staggered start times.

Tools ribbon

Track

Load

Loads saved boat positions (track) and currents from a log file. See the help on the display page for more information.

Load GPX

Loads track data from a GPX file.

Clear

Clears the boat track.

Misc

Set clock from GPS

Updates the computer clock to the time from the GPS.

This may not be successful if you do not have the required privileges on your computer. Expedition must have the SE_SYSTEMTIME_NAME privilege. This privilege is disabled by default.

One easy solution is to run Exp as administrator - right click Expedition.exe and select Run as administrator from the pop-up menu.

Reset logs

Resets Log Bsp and Log Sog to zero.

User flag

Toggles the ExSysBoolUserFlag system channel for third party use. May be retrieved or cleared with ExpDLL. See GetSysBool() in ExpDll.h.

Log files

Extract log data

Extract selected data from a log file. Options include the Expedition format, CSV, CSV Euro and Pi Toolbox format.

The Euro option replaces decimal points with commas and commas with semi-colons.

Data may also be restricted to the times between Stripchart wands, which may also be set from the right-click pop-up menu. This is useful if you just want to look at a section of a race.

Export KML/GPX

Exports any selected log file to a file in KML for GPX formats. The KML output can be read by Google Earth.

24 hour run

Finds the maximum 24 hour run from a series of log files.

As each log file covers 24 hours, at least 2 consecutive files are needed.

Convert

Converts Yacht Devices Recorder and NKE or NMEA 0183 format log file to Exp log file.

The Yacht Devices NMEA 2000 recorder requires PGNs 126992 or 129029 for this conversion.

Analysis

Analyse log file

Automatically extracts test style data means from a log file.

Log files to grib

Create grib files of sea temperature, depth or current set and drift from your log files.

Analyse sail tests

See the sail test analysis help.

Polars

Table to polar

Can create an Expedition format from a regular polar table. This an be useful to estimate the targets.

The format is a (normally) tab delimited text file with twa increasing across and tws increasing down.

Example

	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
4	2.51	3.56	4.37	4.91	5.24	5.38	5.34	5.12	5.04	4.97	4.62	4.10	3.65	3.19	2.73	2.27
6	3.77	5.15	6.11	6.68	6.99	7.11	7.07	6.98	7.09	6.98	6.56	5.92	5.20	4.58	4.01	3.43
8	4.73	6.27	7.17	7.62	7.85	7.94	7.92	8.03	8.13	8.06	7.77	7.27	6.60	5.90	5.24	4.57
10	5.38	6.84	7.58	8.01	8.33	8.50	8.52	8.43	8.60	8.71	8.52	8.12	7.60	6.96	6.32	5.67
12	5.73	7.11	7.78	8.22	8.57	8.87	9.02	8.96	8.96	9.16	9.18	8.83	8.29	7.71	7.16	6.67
14	5.92	7.24	7.92	8.38	8.76	9.10	9.43	9.52	9.31	9.59	9.84	9.50	8.89	8.35	7.85	7.50
16	5.99	7.32	8.01	8.50	8.91	9.31	9.71	10.02	9.91	10.0	10.49	10.20	9.63	8.96	8.45	8.14
20	5.88	7.38	8.12	8.66	9.15	9.66	10.18	10.78	11.25	10.89	11.67	11.91	11.65	10.62	9.86	9.29
25	5.33	7.27	8.13	8.75	9.34	9.96	10.70	11.57	12.49	13.15	13.32	14.23	14.92	13.59	12.32	11.05
30	3.95	6.75	8.01	8.72	9.39	10.13	11.08	12.20	13.49	14.98	15.18	16.83	18.39	17.32	15.39	13.46

Grib

Extract grib data

Extracts an area from currently loaded grib data and saves to a file.

Save currents

Saves edited currents as a grib file.

Import currents

Allows a test file containing current data to be imported. For example, this allows the use of AOML analysis data.

Expedition will also ask for a file name to save the grib data to and a validity time.

The accepted format is:

Latitude Longitude Zonal meridional current speeds

57.77 -34.79 5.2 11.7

Current speeds are in cm/s.

Create currents

Create mode

Sets Expedition into a mode for manually entering currents for current grib file creation.

Set drift rate

Sets the drift rate in knots to enter in *Create currents mode*.

Clear

Clear all currents created in grib file creation

Save grib

Create a grib file of the manually entered current. See grib file creation.

Playback ribbon
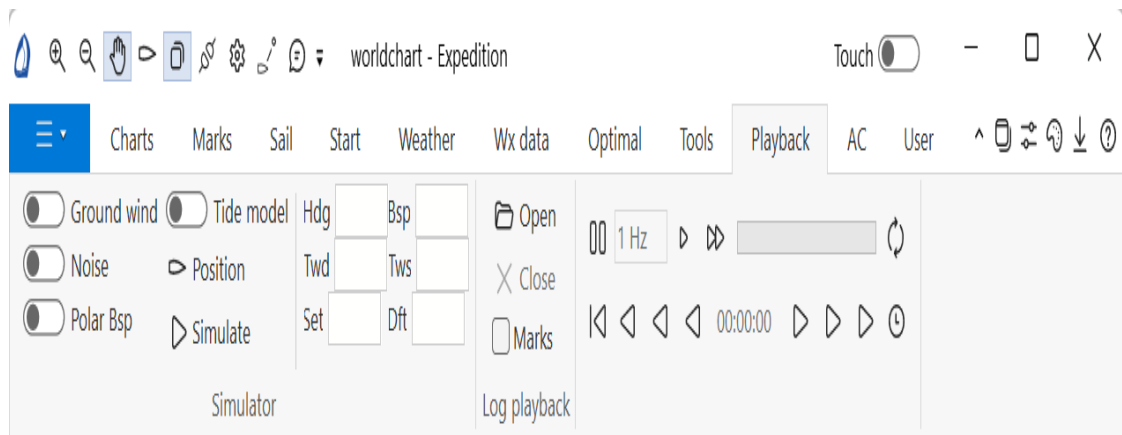
This panel replaces the old Simulator and LogPlayer applications.

Simulator

Simulate

Starts or stops the simulator.

Position

Manually set the boat position.

Noise

Applies pseudo-random noise to the simulated vars.

Polar Bsp

Uses polar bsp as bsp from the simulator TWA and TWS.

TWD, TWS, HDG & BSP

User defined vars for the simulator. Bsp is ignored if Polar Bsp is selected.

Log Playback

Open

Opens a log file.

Close

Closes all open log files.

Marks

If selected, Playback will use active and start mark information from the log file. It is recommended there is no active mark enabled.

Sync

Scynchronises the display time wieth the time in the log file.

There are two groups of controls for managing the playback:

Speed

Pause,
Playback at 1Hz,
Playback at 2, 3, 4 -10Hz.

Position in log file

Rewind to beginning,
Step back,
Step forward,
Go to a user selected time in the log file.

Port ribbon
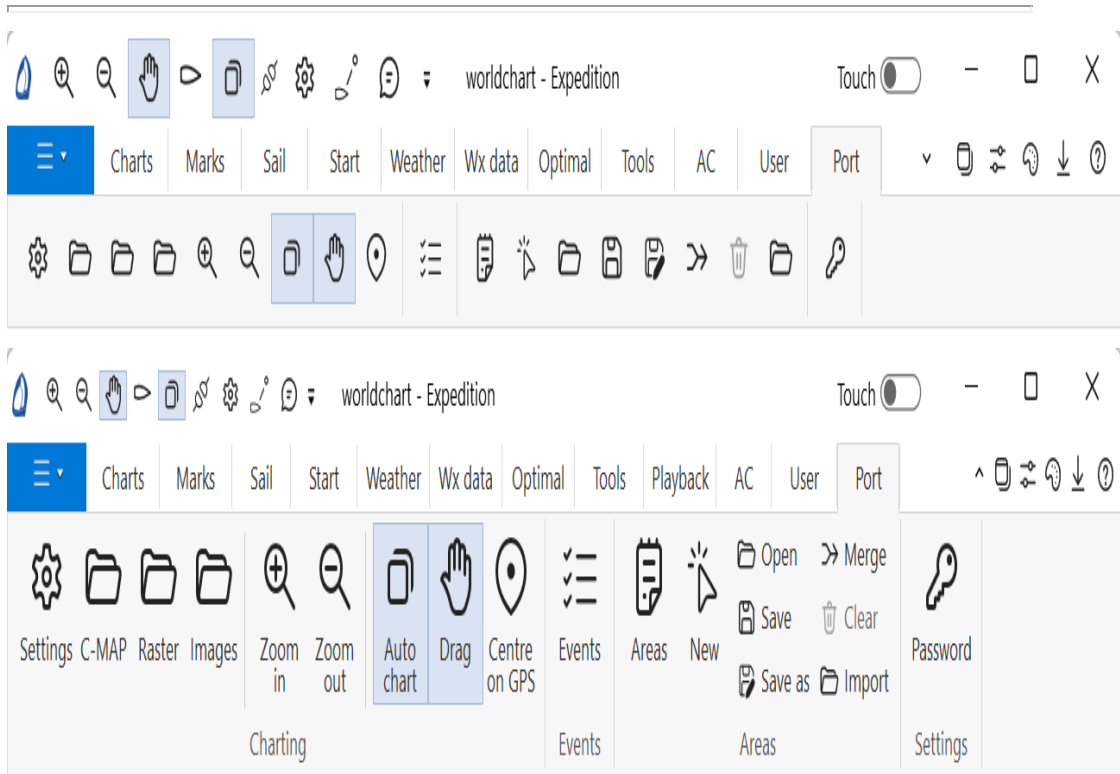
Expedition's Port mode shows the Port panel and hides many features not used in this configuration.

Charting

Settings

Chart settings is used to manage how charts are displayed in Expedition.

C-MAP

Shows C-MAP chart areas available, selects C-MAP charting mode and provides access to C-MAP chart

management tools.

There may be a pop-up menu on the bottom of the C-MAP button for further functionality.

Raster

Chart management is used to manage and select raster charts such as Maptech, NV-Verlag, Bsb charts.

Zoom in and out

Zoom in or out. If Auto-chart is selected, this will automatically select the next scale chart.

These functions can also be performed using the + and - keyboard keys, the right click drop down menu or the mouse scroll button.

Auto chart

This function only applies to the Centre on GPS mode and zooming in and out.

With *Auto chart* selected button selected, the next higher or lower scale chart will be selected when you zoom in or zoom out. If you have this button de-selected, zooming in or out will display the current chart at different scales.

Note: It is recommended that this button is selected for most use.

Drag

In this mode, click on the chart and drag in the direction to pan. This technique will be more familiar to Google Earth and Photoshop users and can be easier on touch screens.

Centre on GPS

Automatically centres the chart on the boat.

Events

Event list

Expedition's event database.

Areas

Areas are annotations on the chart.

The right-click pop-up menu can also be used to edit, delete or add points to a race note.

Notes

Lists all race notes.

Add

Creates a new race note. Select this, then click on the chart to create a new race note area.

Open

Loads a race notes file.

Merge

Merges data from another race notes file.

Save as

Saves a race notes file.

Clear

Clears all loaded race notes.

Settings

Configuration

Manages the Vesper AIS connection. See also AIS help. The instrument connection may also be accessed from the Application button.

⛵ Pop-up menu

Right mouse-clicking anywhere on the screen will display the pop-up menu, which may have any of the following menu items. You will notice that the cursor changes when near a mark - when the cursor is near enough a mark, many of the following functions will be available from the pop-up menu, else they are hidden.

Open chart

Allows any available chart at the cursor position to be opened. Hovering the cursor over this menu item causes a sub-menu to be displayed (normally to the right) with all the available charts for the cursor latitude/longitude. The C-MAP charting system will be at the top of the list. Below C-MAP will be a list of charts sorted by increasing scale.

If you wish to exclusively use C-MAP charts, open the C-MAP charting system (either using this method, by selecting the check box under chart management or by zooming in or out to a C-MAP chart, then de-select the Auto-chart button.

Open image

Allow any available image at the cursor position to be opened.

Open best chart

Opens best chart at the selected location.

Update image time

Set the validity time for the displayed image.

Query C-MAP object

Displays C-MAP objects information.

C-MAP mark: *xxxx (e.g.. Lighthouse)*

Creates an *always drawn* mark based on the selected C-MAP object.

Astro

Sun rise and set etc.

Add *mark*

Allows the selected mark to be inserted at any point in the active route. Hovering the cursor over this menu item causes a sub-menu to be displayed

(normally to the right). Use this sub-menu to insert the selected mark at the beginning of the active route or after any desired mark in the route.

Add *mark* as gate to

Set active mark and route

Creates a new route and sets a new mark at the pointer.

Ping mark

Pings a mark, not part of the active route.

Insert mark

Insert a mark in the active route. The inserted mark will always be placed in the nearest great circle leg of the route to the pointer. See right click to build a route.

Add new first mark

Adds a mark to the beginning of the active route.

Add new end mark

Adds a mark to the end of the active route.

Add mark at range and bearing

Adds a mark at a specified range and bearing from the selected mark.

Edit *mark*

Displays a dialog to edit the selected mark.

Remove *mark* from *route*

Removes the selected mark from the active route without deleting it.

Lock *mark*

Locks the selected mark.

Unlock *mark*

Unlocks the selected mark.

Delete *mark*

Deletes the selected mark.

Delete divider

Deletes the selected divider.

Set *mark* as port end

Sets the selected mark to be the port end of the start line.

Set *mark* as starboard end

Sets the selected mark to be the starboard end of the start line.

Port start

Sets the port end of the start line at the pointer.

Starboard start

Sets the starboard end of the start line at the pointer.

Route to cursor

Computes an optimal route from the boat to the cursor.

Route via cursor

View optimal route

Displays details for selected optimised route.

Meteogram

Displays graphs or a table of weather data from the grib file or files loaded valid for the location selected.

Most colours and line widths are controlled as for weather display settings.

SkewT

Draws a SkewT diagram at the selected location. See the weather settings help.

Edit current

Edit the current from a loaded grib file. Any edited currents may be saved using the *Save currents* button from the Tools panel.

Tides

Displays tidal information for the tide station selected.

MyGrib

Opens the MyGrib interface to download weather and oceanographic data.

MyImage

Opens the MyImage interface to download weather and oceanographic data.

Misc

There may be other weather options presented, depending on availability and licensing.

Insert point into race note area

Inserts a point into a race note polygon.

New race note area

Creates a new race note area with the first point at this location.

Edit race note

Edit the race note attributes - colour, transparency, text.

Note that if editing the notes (as shown in the tooltip), text can be shown on a new line by using the Ctrl+Enter keys. This can make the tooltips much more readable.

Delete race note point

Deletes the nearest race note polygon point.

Chart details

Displays various details about the chart such as type, manufacturer, datum, projection.

Open best chart

Opens the best chart at the pointer.

Stripchart wand

If displaying a track, creates a wand on Stripchart at the time corresponding to the point on the track selected.

Query AIS target

Shows AIS target details.

Map AIS target to boat

Map a target to an Expedition boat (1 to 7). This can be useful if tracking a competitor. The cog, sog, range and bearing can then be displayed in number boxes, sent to instrument displays etc.

Status Bar

The status bar has no controls and is purely for information. Most of the displayed numbers relate to the cursor or chart.

Use the Display settings page to select which of the items listed below to display on the status bar.

From left to right:

Chart scale and zoom factor

The published scale of the chart. In most cases, you will be using charts at real size, but you may wish to over-zoom or under zoom them. In which case, the zoom factor will be displayed to the left of the colon.

Cursor position

Latitude and longitude.

Magnetic variation

The magnetic variation at the cursor.

Cursor range and bearing

Range and bearing to the cursor.

Time to cursor

The time to the cursor position at the present GPS cog and sog. The polar time is also given in parentheses. These will not be displayed if you have no position information.

Polar time to cursor

Based on polars.

Chart datum

The published datum of the chart. If the datum of the chart cannot be determined or allowed for, UNKNOWN DATUM will be displayed. In this case, exercise extra prudence when navigating with the chart.

Position fix warning

If no position information is available, NO POSITION FIX will be displayed.

Log warning

This will only be displayed if you not logging data.

Active mark

The active mark name.

Chart depth units

The chart depth units for raster images. For vector charts, the depth units selected under [system](#) settings.

Navigation and yacht racing

With advances in technology, more tools are becoming available to the modern navigator every year. New instruments are being developed, existing instruments are being enhanced and analysis of all the information available is becoming increasingly sophisticated.

This section will provide a basic introduction to the role of information in navigation and tactics.

Targets and polars

Calibration

Inside the instrument system

Instruments

On deck displays

The most common Expedition configuration, on a race boat at least, is a dedicated computer in the nav station and a roaming tablet that is linked to this computer.

While it is possible to run Expedition on a tablet, there are several advantages to having a fixed computer in the navstation, with everything displayed on the main computer being reflected on the on-deck display.

- A physical connection to the instruments, so lessens the risk of lost connections

- There is no chance of dropping it over-board or otherwise damaging it

- A permanent power supply

Note that a good, fast wireless connection is essential.

Tablets

Various options , see
www.expeditionmarine.com/support/tablets

Tip

Turning off unnecessary animations in Windows can help performance. To do this, go to Windows'

Control panel, then 'Ease of access', then 'Make the computer easier to see' and select 'Turn off all unnecessary animations (when possible)'.

Software

There are several solutions to use a remote tablet with the navigation computer.

Remote desktop is generally faster than VNC. This is because the remote desktop system sends instructions on how to draw the screen, whereas VNC systems generally send a picture of the desktop from the server.

Microsoft Remote Desktop

Included with Windows and also freely available for Android and iPad.

Remote desktop tends to be faster and more secure than VNC.

VNC

VNC tends to be slow and less secure than remote desktop, but can be used by more users.

There are several options.

RealVNCAndroid, Apple and Windows Client Software are free, but server

software is not.

Splashtop

Splashtop. Easy interface, but not as good as it once was.

IP Code

The IP code rates the degree of protection against dust, water etc.

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects.

> 5 - Dust protected, mostly dust protected
> 6 - Dust tight, no ingress of dust

The second digit indicates the level of protection that the enclosure provides against harmful ingress of water.

> 4 - Splashing of water
> 5 - Water jets
> 6 - Powerful water jets
> 7 - Immersion up to 1m for 30 minutes
> 8 - Immersion below 1m for indefinite period

Targets and polars

Your polars are an extremely valuable input into the navigation process - for tactics and performance analysis. At their simplest, polars are a table of boat-speed for varying true wind speed and angles as seen in the table of the right of the picture below. This performance data is normally referred to as *polars* because it is often presented graphically in a polar form - as seen on the left of the picture.

	Twa0	Bs...	Twa1	Bs...	Twa2	Bs...	Twa3	Bs...	Twa4	Bs...	Twa5	Bsp5	Twa
4	30	2.51	46.2	4.1	50	4.37	60	4.91	70	5.24	80	5.38	90
6	30	3.77	44.3	5.63	50	6.11	60	6.68	70	6.99	80	7.11	90
8	30	4.73	42	6.51	50	7.17	60	7.62	70	7.85	80	7.94	90
10	30	5.38	40.4	6.88	50	7.58	60	8.01	70	8.33	80	8.5	90
12	30	5.73	39.2	7.05	50	7.78	60	8.22	70	8.57	80	8.87	90
14	30	5.92	38.5	7.14	50	7.92	60	8.38	70	8.76	80	9.1	90
16	30	5.99	38.2	7.2	50	8.01	60	8.5	70	8.91	80	9.31	90
20	30	5.88	38.7	7.28	50	8.12	60	8.66	70	9.15	80	9.66	90
25	30	5.33	40.4	7.33	50	8.13	60	8.75	70	9.34	80	9.96	90
30	30	3.95	43.1	7.33	50	8.01	60	8.72	70	9.39	80	10.13	90
35	30	4.42	46.6	7.31	50	7.73	60	8.59	70	9.33	80	10.17	90

100 %

100 % night

C:\ProgramData\Expedition\Polars\Farr 40mh.txt

Polars may be obtained from many sources - your boat designer, class association, your IMS certificate or US Sailing to name just a few. Expedition has some powerful tools to edit and manipulate polars.

Targets

Since a yacht can't sail directly upwind or downwind, but has to sail at an angle to the wind, we aren't making ground to weather at the boat-speed. Rather, progress to weather is at *Velocity made good (Vmg)* - that is, the component of speed either upwind or downwind.

Targets are the *true wind angle* and *true wind speed* at which the boat should be sailed to maximise VMG either upwind or downwind. These are indicated by the blue radial lines on the left of the picture above. So, in an ideal world, you will sail best upwind or downwind sailing at your target angle and speed.

Polar performance

If the boat isn't sailing upwind or downwind, but is reaching, then the target numbers aren't a lot of use. In this case, we use the predicted speed from the polar to tell us how well we are doing. Expedition has numbers such as polar bsp and polar bsp %. For example if the polar bsp% is 96%, then the boat is only doing 96% of the speed the polar suggests it should be able to do. Obviously, the use of polars is a very powerful means of monitoring how well you are sailing and is a very important input into any tactical decision.

Obviously, your polar numbers will vary slightly from day to day with changes in shear and air density. 96% of polar speed might be all that is possible some days. For this reason, Expedition uses a concept of wind weight. If the air feels heavier, you may want to use a wind weight of 1.1 for example.

Calibration

The data received from the various sensors by the instrument system will be of varying quality and accuracy. Obviously, if you have inaccurate data, then any calculations made by the instrument system and any decisions based on them will reflect those errors. So, we need to calibrate the instruments, bearing in mind that updating these calibrations is an ongoing task.

The basic calibrations are performed first. Most of these will also be available on lower end instrument systems.

Speed

The basic instrument calibration done in all systems is to calibrate the speed. This will be explained in the manual.

Compass

Calibrating a compass involves two steps. The first is to swing it. This involves motoring the boat through several steady circles so the compass can learn about any magnetic effects in it or the boat and correct for them. The compass can also be corrected to line up with the boat - normally just linear addition or subtraction from the heading so

when the boat is point due north, the compass reads 0°.

Apparent wind

The apparent wind speed is normally calibrated by the factory and isn't changed by the user. However, the apparent wind angle will need to be calibrated as the wind sensor may not be aligned with the boat. Your instrument manual will explain how to do this.

Generally, all the other sensors (depth, temperature etc) can also be calibrated.

Unfortunately, this is only the first step in the calibration process. There are other influences on the wind sensors that can (and do) vary from day to day such as upwash, heel and wind shear. So, the next step is to calibrate the outputs. The ability to do this is what differentiates the various instrument systems available. To correct for all the errors in Awa and Aws would be impossible if we tried to correct them all individually, but we can make some very easy approximations and correct the outputs for all the combined sources of error. Experience has shown this approach works very well.

Speed

Paddle-wheels are notoriously non-linear, especially as the boundary layer breaks down with increasing

speed. Because of this, sonic speed sensors are replacing paddle-wheels in many installations. Higher end systems often use a table of calibration values, effectively giving different calibration values at different speeds.

True wind angle

As the air flows around and over the sails, it is distorted. We call this upwash. What this means is that the apparent wind angle and speed measured at the mast-head will vary with wind speed, angle to the wind, the wind shear and even the sails being used.

Furthermore, as the boat heels, the wind angle measured by the wind sensor will vary and there are also effects due to twist in the mast.

Finally, wind speed and direction will vary at different heights about the water. Generally the wind speed will be more higher up and twisted, but by how much will vary from day to day.

The easiest way of calibrating the true wind angle this is to compare true wind direction when sailing at the same angle on port and starboard. Twa is treated as negative by the instruments internally, so if the wind direction is higher when on port tack than starboard, we add half the difference between the

wind directions to the true wind angle. Conversely, if the wind direction is higher on starboard, we subtract half the difference from the true wind angle.

In this way, we build up a TWA calibration table based on TWA and TWS that collectively corrects for upwash and twist.

True wind speed

In general, the wind sensor will read more wind downwind than upwind because of upwash - the wind accelerates over the sails. This effect is more pronounced downwind. B&G instruments have a simple, but effective solution in which the difference is entered in a calibration table and subtracted downwind. Less is subtracted as TWA decreases. Expedition and Ockam T1 systems can take this one step further and offer different calibration values at different wind angles as well as wind speeds.

Apparent wind angle and speed

Effectively what the instrument system or Expedition is doing here is correcting the true wind values for errors in the apparent wind inputs. Expedition then takes this one step further and re-calculates the apparent wind sped and angle. You can think of these as calibrated or corrected apparent winds.

Inside the instrument system

Obviously, the raw information from the instruments is of limited use for many navigation problems. Fortunately, the instrument system (and computer) can make use of the raw data to provide a range of very useful information.

True wind angle and speed

At a basic level, the instrument system receives apparent wind angle and speed and speed.

Using some basic mathematics, it then calculates *true wind speed* and *true wind angle*. Tws is the speed of the wind over the water (remember aws is the speed of the wind over the boat) and Twa is the angle of the wind to the boat's heading if the boat wasn't moving. These are some of the most useful numbers you can get from the instrument system. Your sail chart and boat polars will be in terms of these two numbers.

Leeway

As the boat sails through the water, it also slides sideways a little. If the boat has a heel sensor, then an approximate leeway can be calculated. Expedition, B&G and Ockam systems all do this in a bid to increase the accuracy of the wind triangle calculations.

The commonly used equation is $\text{Leeway} = -1 \cdot k \cdot \text{heel} / \text{bsp}^2$

So, leeway increases as you heel more, but decreases as you go faster.

Note that heel should be -ve on port, yielding a +ve leeway value.

Expedition and some instrument systems include leeway in Twa (so twa is relative to the boat's track through the water instead of its heading). This has important consequences for calculating laylines and is generally preferable.

True wind direction

If the boat has a compass, the instrument system can then add heading into the calculations and calculate the *true wind direction*. Twd is the direction, from north, the wind is coming from over the water.

Current set and drift

The GPS gives the boat's route over the ground (Cog) and speed over the ground (Sog). Since boat speed is relative to the water and we know the heading of the boat from the compass, then the instrument system can calculate the speed and direction of the water. The is the current *set* and *drift*. For obscure reasons, the current set is the direction the current is going to - this is the opposite sense to the way the true wind direction is described.

Laylines

In combination with your targets and polars, Expedition and high end instrument systems can use all this information to calculate laylines, polar speeds, time to laylines and many other numbers.

These calculations can be significantly enhanced by calibrating both the sensors and the derived numbers.

Instruments

The last couple of decades have seen the most profound changes to navigation paradigms in centuries with the advent of satellite navigation systems - the latest of these being the US GPS system.

Prior to this, navigation primarily involved position fixing - a time consuming and, by today's standards, relatively inexact art. With the advent of GPS, position information is available to anyone possessing the barest of skills and experience with astounding accuracy and timeliness.

This and the increasing array on instrumentation have changed the role of the racing navigator from being a pure navigator to a tactician and manager of information.

The GPS, instrument system and boat computer are often connected using the RS232 and NMEA electrical standard, although there are several proprietary communication protocols.

Instrument systems

The instrument system supplies the much of the information available to the navigator. Systems by Ockam and B&G are the main ones chosen by racing navigators, but there are other manufacturers of instrumentation.

The five fundamental sensors connected to a yacht system are wind, depth, compass, speed and GPS. There are many other sensors available that provide extra information and/or add to the accuracy of the information from these main inputs. For example, barometer, heel, trim, sea temperature and load cells.

GPS

The GPS provides position (latitude and longitude), route and speed over the ground (Cog and Sog) as well as being an accurate time source.

Wind

The raw information received from the wind sensor are the apparent wind angle (awa) and apparent wind speed (aws). These are obviously relative to the boat, so will vary depending on boat speed and heading.

Speed

This is historically measured by a paddlewheel, but in high-end applications is slowly being replaced by sonic-speed devices, which provide better linearity and repeatability.

Heading

This is the direction your boat is heading and is often measured by a fluxgate or gyro compass.

Depth

The depth sensor is a fundamental safety and navigation instrument, but is an input that can be treated as separate from the rest of the system as far as the racing navigator is concerned.

Heel

A heel sensor (inclinometer) measures the heel of the boat to port or starboard. It can be a useful measure of how powered up the boat is and is often used in calculations of leeway.

Trim

A trim sensor (inclinometer) measures the fore and aft trim of the boat.

Load cell

These measure loads, for example forestay load/tension and can be useful tuning aids.

Sea temperature

The sea temperature sensor (an electronic thermometer) is often packaged with the speed sensor. It can be very useful to know the sea temperature when racing through the Gulf Stream for example.

Barometer and air temperature

These can be useful for monitoring the weather.

Expedition charting

Expedition features a highly efficient and class leading charting system that seamlessly rotates, mosaics and moves between charts. Expedition supports a range of chart formats from different manufacturers.

Electronic charts are available in several formats. Expedition can use ENCs, RNCs, C-Map vector and other raster charts.

See the Expedition charts web page for chart sources.

Unlike RNCs, objects on ENC and C-MAP charts can be interrogated using the right-click pop-up menu.

ENCs

S-57 and S-63 ENCs

Vector charts are databases of all objects in a chart and their attributes - you can think of them as an intelligent chart. Vector charts are normally more efficient, require less storage and often allow better clarity. However, their main advantage is that the user or software can choose to display objects on the chart or not.

ENC charts use the WGS-84 datum and are displayed on a Mercator projection.

Some countries supply these free of charge, for example the USA. Others charge for them - Canada, Hong Kong and the South China etc. Official S-63 ENCs are also available through global providers, such as ChartWorld and the Admiralty Vector Chart Service (AVCS).

RNCs and raster charts

RNCs and raster charts are often scans of paper charts that contain the geo-referencing information necessary to convert between pixels in the image and latitude/longitudes. Most raster charts also contain other information such as the date of update, datum and depth datum. Many navigators prefer raster charts over vector charts because they are more familiar. Raster charts are mostly available as varieties of the BSB format.

RNC and other raster charts do not always use the WGS-84 datum and a Mercator projection. This is most common in the US. Where possible, all raster charts are corrected to WGS84.

RNCs from various manufacturers have near global coverage.

Note that not all raster charts are official charts and may be sold or supplied as an 'Aid to Navigation'.

Some countries supply these free of charge. Examples are Argentina, Brazil, New Zealand and the USA. Others charge for them.

C-Map

C-MAP MAX and 4D have near global coverage. The 4D option is newer than MAX, but can have performance issues, especially on older computers. Depending on personal preference, one possible advantage of 4D charting is it can contain raster information.

C-MAP charts are similar to ENCs in appearance and are based on ENC data, but are not official charts and are sold as an 'Aid to Navigation'.

C-Map charts use the WGS-84 datum and are displayed on a Mercator projection.

Chart settings

Accessed from the Chart tab on the settings sheet, see the chart panel. Ctrl+C.

Important warning

Most charts are referenced to the WGS84 datum. Non WGS84 charts are automatically corrected by Expedition to the WGS84 datum where possible. This is to make everything consistent within the system and with the position provided by your GPS. Most charts contain enough information to facilitate this, but if the words *unknown datum* or *unknown ellipsoid* appear in the status bar at the bottom of Expedition's main chart window, then no conversion is possible. In this case, extra care should be exercised if using Expedition as an aid to navigation.

There are small errors involved in datum conversions, potentially up to tens of metres. Some projections (for example ED50 around the Mediterranean) may have errors larger than this for various reasons.

A chart's datum can also be viewed in the chart management dialog or using the right-click pop-up menu. There are inherent errors in any datum conversion, so the user should be especially careful

with non WGS84 charts. For optimum accuracy on a given chart, the user may want to apply an offset to the GPS position. Most GPSs have a protocol to enter a user determined correction to be applied to the position. This sort of correction should only be done if you are confident of its accuracy and you must remember to remove/change it if you switch to a different chart. Luckily this sort of manipulation is rarely necessary.

Because of this, it is normally recommended that your GPS is configured to output position based on the WGS84 datum unless you are an expert user and your chart datum is unknown to Expedition.

General

Expedition has no printing features due to licensing restrictions with the chart manufacturers.

Chart orientation

Expedition can rotate raster charts to suit individual needs, but most navigators accustomed to paper charts will prefer the chart up display setting.

The chart up mode is faster when displaying raster (e.g. Bsb) images.

Chart up

The default and most common setting. Display charts oriented as they are drawn (most charts are drawn with true north up).

True north up

Display charts so that true north is always to the top of the screen.

Course up

Useful for windward/leeward courses where tactical viewing is more desirable than navigational viewing.

Heading up

Orients the chart to the current heading.

Start up

Like *Course up*, this setting displays charts with the starting line oriented horizontally across the screen.

Projection

Expedition can use different projections for the simple world vector chart. Currently the options are Mercator or orthographic.

Mercator

The standard map projection for nautical navigation as rhumb lines or loxodromes are straight lines that preserve angles with the meridians.

The latitude scale is distorted towards the poles, thus distorting areas.

ENCs, RNCs, C-Map charting and most paper charts use a Mercator projection.

Orthographic

Preserves neither area nor angles, but great circles near the centre latitude and longitude will appear nearly straight.

Use ENCs and/or RNCs

Restrict Expedition to automtically using the selected chart types.

This could be useful if using ENCs, but want to temporarily use or refer to an RNC.

Palette

By default, Expedition displays uses a standard S-52 colour palette. However, a grey scale colour scheme may also be used.

ENCs

Shallow, Safety and Deep depths

Adjusts colours of depth areas, soundings and the safety contour.

Safety depth

This is an important setting.

Affects the bold displayed safety contour and colour of soundings.

The safety depth will also affect some symbols - for example wrecks and other obstructions.

Display class

Also selectable from the Chart ribbon panel.

See IMO Resolution A.817(19), appendix 2.

If in any doubt, use the All display option.

Display base

Not intended to be sufficient for safe navigation. Permanently retained on the ECDIS display, consisting of:

1.   Coastline (high water),

2. Own ship's safety contour, to be selected by the mariner,

3. Indication of isolated underwater dangers of depths less than the safety contour which lie within the safe waters defined by the safety contour,

4. Indication of isolated dangers which lie within the safe water defined by the safety contour such as bridges, overhead wires, etc., and including buoys and beacons whether or not these are being used as aids to navigation,

5. Traffic routing systems,

6. Scale, range, orientation and display-mode,

7. Units of depth and height.

Standard display

To be displayed when the chart is first displayed by ECDIS. Note this does not include soundings and depth contours, which are shown in the All display option or can be selected in Standard by Exp.

1. Display base,

2. Drying line,

3. Indication of fixed and floating aids to navigation,

4. Boundaries of fairways, channels, etc,

5. Visual and radar conspicuous features,

6. Prohibited and restricted areas,

7. Chart scale boundaries,

8. Indication of cautionary notes.

All

Standard display and additional information.

1. Spot soundings,

2. Submarine cables and pipelines,

3. Ferry routes,

4. Details of all isolated dangers,

5. Details of aids to navigation,

6. Contents of cautionary notes,

7. ENC edition date,

8. Geodetic datum,

9. Magnetic variation,

10. Graticule,

11. Place names.

Chart display settings

General

Chart bounds

Chart boundaries.

It is recommended this setting is enabled as it provides important visual indications of smaller scales charts.

Lat/lon Grid

Display or hide the latitude/longitude grid on ENCs and the simple world chart.

Image bounds

As for chart bounds, but for images.

Quilt charts

Will attempt to fill in areas of the screen where the active chart has no coverage. Will try to use the next scale out chart.

For very slow computers, it could be useful to disable quilting.

Fill world chart land
Fill world chart sea

Default is to not shade the sea on the simple word chart to improve clarity.

ENCs

Soundings and depth contours

These are not displayed in the Standard display. This causes them to be shown in Standard display mode.

Anti-clutter

Hides chart data depending on the display scale.

Land features

Not implemented.

Two colour depth shading

Else uses 4 colours for depth shading based on Shallow, Safety and Deep depth settings.

Simplified boundaries

Draws boundaries with simplified
symbology. Default on.

Simplified symbols

Draws symbols with simplified symbology.
Default is off for paper symbols.

Information objects

Information about the chart, quality etc. -
M_NSYS, M_QUAL, CATZOC etc.

ENC Lights

Light sectors

Displays light sectors. Default is on.

The light sectors will be replaced by a
simple flare symbol.

This is a non-standard option for small
screens where the user may want to
reduce clutter during daylight hours.

Lights text

Light descriptions.

Full light sector lines

Draw radial lines depicting light sector bounds to the nominal range of the light.

If deselected to reduce screen clutter, will draw shorter radial lines.

Small light sectors

ENCs are normally drawn with light sectors at 20 or 25mm radius.

This is often too large for users and may clutter the chart. Use this option to reduce the size of the drawn light sectors.

ENC Text

Large text

Draws soundings and other text with a larger font.

Important text

Important text, including bridge, cable and pipeline clearancaes, recommended tracks etc.

Lights

Lights.

All other

Any other text.

Other

Tooltips

Shows object information in a tooltip, similar to the right click Query chart data.

 Also toggled with the Tooltip button on the chart panel.

C-MAP settings

Accessed from the C-MAP tab on the settings sheet, see the chart panel.

Important warning

C-MAP charts, are referenced to the WGS84 datum.

Because of this, it is normally recommended that your GPS is configured to output position based on the WGS84 datum.

Palette

By default, Expedition displays C-MAP charts using the NOAA colour palette. However, C-MAP MAX, Admiralty or grey scale colour schemes may be used.

Language

Lists available C-MAP languages.

Raster mode
Raster Opacity

See the 4D help.

Colour schemes

Reference depth colouring

Colours depth areas less than the value specified in Reference depth (m).

This over-rides and disables Colour sea areas, Dynamic depth colouring and Invert depth colouring.

Dynamic depth colouring

Dynamic depth colouring.

This also colours the simple world vector chart used as a land mask by the route optimisation.

Invert depth colouring

Inverts dynamic depth colouring.

Chart settings

Set various chart display settings.

Base data only

Hides most items on the chart. Only useful if using the C-MAP chart solely as a weather backdrop etc.

Enhanced anti-clutter

Uses the C-MAP enhanced de-clutter algorithm for cleaner charts. MAX charts only.

Enhanced coastal land colouring

Low lying areas can be hard to see on some chart plotters. This accentuates them. MAX charts only.

Lane features

Can be used to declutter land areas.

Large text
Large icons

Draws the chart with larger icons and/or text for improved readability.

Perspective view
Satellite Maps

Tides & currents

Tide-ways, water turbulence and tide height. In the case of C-MAP MAX charting, also displays tidal streams.

Continuous animation with C-MAP tides and currents showing can be slow.

C-MAP tidal streams are for display purposes only. See the tide settings help for Expedition's tides and tidal streams.

VAD (value added data) bounds

Great Barrier Reef, photos etc. Also tide stations in C-MAP MAX.

Multimedia

ENC charts

ENCs

ENCs are available in S-57 and S-63 encrypted formats.

Expedition mosty follows the IHO S-52 Presentation Library edition 4.0, with some customisations to suit the needs of sailing navigators. For example, the options to make light sectors smaller or shown as flares to reduce clutter.

David Burch's 'Introduction to Electronic Chart Navigation' is recommended reading on ENCs. It is available from www.starpath.com.

Management

ENC chart management is accessed from the ENC button on the chart panel.

Also see the chart panel and chart settings help.

Performance note

ENCs are slower to load and render than RNCs. A fast computer helps. If desired, deselecting quiting in chart display settings will improve performance.

Open

Opens the selected chart cell in the main chart window.

Clear DB

Clears the chart cell list. Does not delete cells from your system.

Find chart

Type any part of a chart name and the Exp will filter the chart list only show charts with names containing that text.

Search

This will search your computer for charts and build a database of all the ENCs in the selected folder. Expedition will ask you where to search - you can search the whole computer or just update specific folders in your chart database to save time. After the search is complete, you will be able to see and access your updated chart list.

Selecting any chart in the list will display its attributes right of the dialog.

The active chart's details (chart name, datum, etc) may be queried by right mouse clicking anywhere on the chart and selecting Chart details from the popup menu.

Once selected, a chart will remain displayed in the main chart window until you either Zoom in, Zoom out, re-centre or pan the chart window off the present chart.

S-63 ENCs

Many ENCs are supplied in an encrypted form for licensing reasons. S-63 is the encrypted distribution format for S-57 ENCs.

The cell licences are for use on a single system and are valid for a set period. This ensures the charts cells are kept up to date. Expired cells may still be displayed if not updated, but Expedition will display a warning.

The encrypted ENC management functions are accessed from the ENC Permits button on the ENC management window.
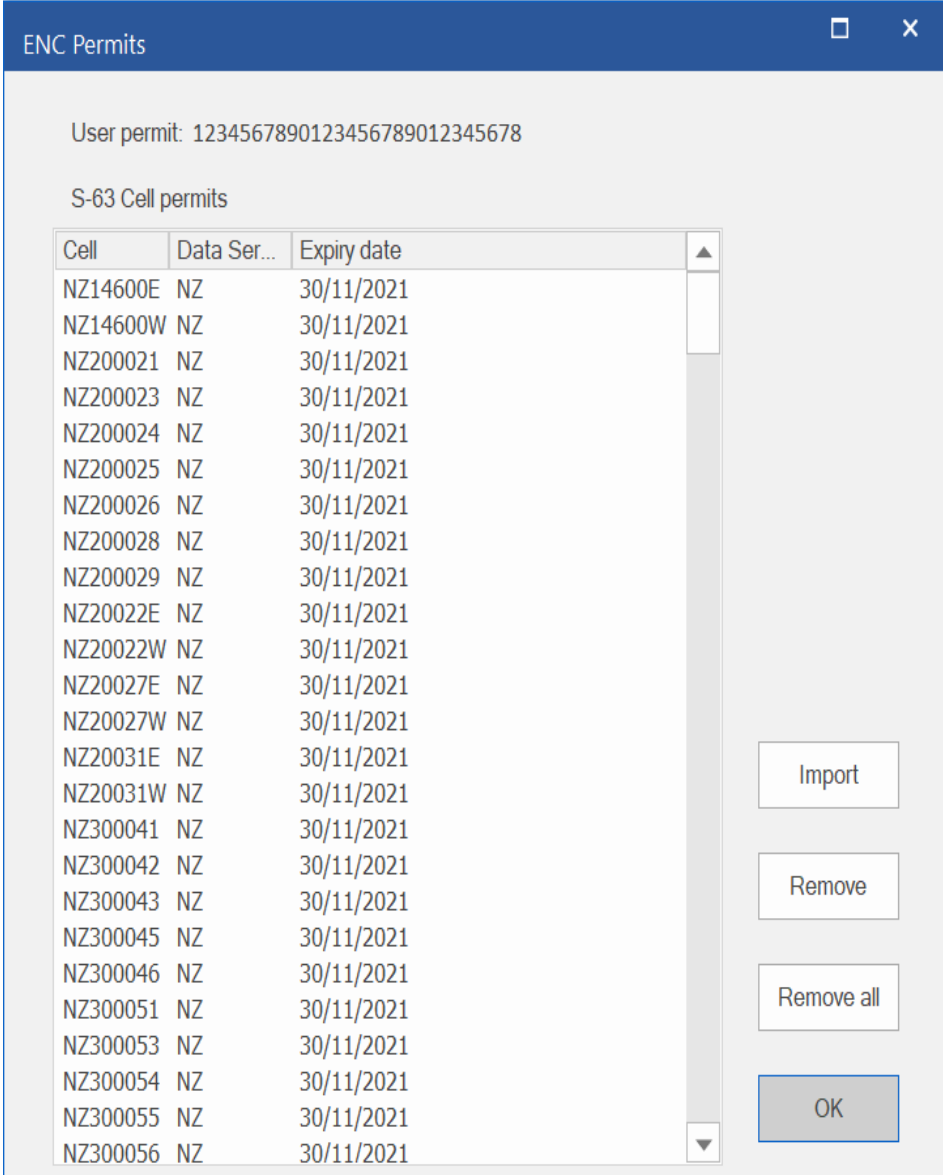
User Permit

We supply User Permits with the Expedition on request.

The User Permit will also be displayed on the ENC Permits window.

Please keep a copy of the User Permit for your records and for obtaining ENCs from ENC providers.

User Permits supplied for Expedition are unique to the Expedition licence and will not work with other systems.

Purchasing ENC licences

Your ENC provider will need the 28 character User Permit when purchasing ENC licences.

The provider will supply a Permi and the ENC data, commonly online.

Installing ENCs

ENC data

Copy the supplied ENC data to your computer. The directory structure must be exactly as supplied.

A typical location would be

C:\ProgramData\Expedition\S63\

It is good practice to keep different chart sets separate. For example, AusENCs could be stored in the folders

C:\ProgramData\Expedition\S63\AusENC\enc-base\
C:\ProgramData\Expedition\S63\AusENC\enc-update\

Certificates

Expedition is distributed with the default IHO.PUB certificate. Some servers may use and distribute different certificates.

In this case, copy the certificate (eg UKHO.PUB) to the Expedition S63 data folder, normally

C:\ProgramData\Expedition\S63\

Cell permits

The ENC distributor will supply permits to use the ENC cells.

To install the permits, click the Import Permits button on the ENC Permits window and search for the supplied PERMIT.TXT file.

Old or unwanted permits may be removed by selecting them from the list and clicking the Remove Permits or Remove All buttons.

Please keep back-up copies of the Cell permit files.

Install charts

After importing the cell permits, click the Search button from the main ENC chart management window (see above) and select the base data folder the ENC data was copied to.

Then repeat the procedure for any update data folders.

SSE-21 Decryption failed, no valid cell permit found warning

Expedition may give this warning if cells have been updated in a subsequent update. This error will be resolved on importing the update(s).

The base and update data will have the same directory structure, similar to:

[ENC_ROOT]
[EXTRAS]
[INFO]
IHO.CRT
SERIAL.ENC

ENC Updates

Periodically, or as advised by your supplier, copy the chart updates and permits to your computer.

Both the permits and chart updates need to be imported into Exp. The permits must be imported first.

1.   Import the updated PERMITS.TXT file supplied as above.

2.   Update the ENC database by selecting the search button.

AusENC

At 01 October 2017, AusENC data is available at

http://www.hydro.gov.au/software/products/products.jsp

See AusENC Fact sheets and

Guide to AusENC Permits and Certificates

Guide to AusENC Update Services and Subscription Renewals

Guide to Installing your AusENC Service

Using AusENC with Expedition requires

1. AusENC Base data

2. AusENC Update data

3. AusENC cell permits

The Base data is released on a six monthly basis in January and July. The update data is released every two weeks thereafter.

The updates are available as a cumulative file or as fortnightly updates. Applying the cumulative file data is simpler and recommended to reduce the risk of missing updated cell data.

At 01 October 2017, the Base data file is 185MB and the cumulative update file 24MB. This is one reason for not re-issuing the complete data set every two weeks.

The zip download options are easier for most users than the iso downloads.

Installing AusENCs

1. Unzip and copy the AusENC Base data to the desired location, such as
   C:\ProgramData\Expedition\S63\AusENC\enc-base\

2. Unzip and copy the Cumulative AusENC to the desired folder.
   C:\ProgramData\Expedition\S63\AusENC\enc-update\

3. Install the permits (PERMITS.TXT) as above.

4. Tell Expedition to import the base data, then the update data, see search above.

Updating AusENCs

If significant time has elapsed between the expiry of your old AusENC service and the start of the new service, we recommend that you remove all previous data and corresponding permits from Expedition prior to installing the new service.

1.   Unzip and copy the Cumulative AusENC to the folder used to store the ENC update data as above.

2.   Install the permits (PERMITS.TXT) as above.

3.   Tell Expedition to re-import the chart cells again after the update, see search above.

RNC charts

Raster chart management is accessed from the RNC button on the chart panel.

Also see the chart panel and chart settings help.

Open

Opens the selected chart in the main chart window.

Clear DB

Clears the RNC chart list. Does not delete charts from your system.

Find chart

Type any part of a chart name and the Exp will filter the chart list only show charts with names containing that text.

Search

This will search your computer for charts and build a database of all the raster charts in the selected folder. Expedition will ask you where to search - you can search the whole computer or just update

specific folders in your chart database to save time. After the search is complete, you will be able to see and access your updated chart list.

Selecting any chart in the list will display its attributes right of the dialog.

The active chart's details (chart name, datum, etc) may be queried by right mouse clicking anywhere on the chart and selecting Chart details from the popup menu.

Once selected, a chart will remain displayed in the main chart window until you either Zoom in, Zoom out, re-centre or pan the chart window off the present chart.

 Note that Expedition does not support notice to mariner updates.

Custom images

Accessed from the images button on the chart panel.

This opens the raster image management window. This is very similar to the raster chart management window.

Also see My Image on the weather data panel.

The custom image support is DEFINITELY not for navigation.

Set display time

Set's Expedition weather display time to the validity time of the image. This can be set from the right-click pop-up menu or when the image is geo-referenced.

Squid

Quick import of Squid satellite images.

Open

Opens the selected image in the main chart window.

Clear DB

Clears the image list. Does not delete images from your system.

Find chart

Type any part of a chart name and the Exp will filter the chart list only show charts with names containing that text.

Search

This will search your computer for charts and build a database of all the raster images in the selected folder. Expedition will ask you where to search - you can search the whole computer or just update specific folders in your image database to save time. After the search is complete, you will be able to see your updated image list and access them as described below.

After running search and building the data base, your images are arranged alphabetically in a tree arrangement based on their format.

On selecting any image in the image management window its attributes will appear on the right of the dialog.

You can import individual images using the Import button (see below) or import several images at once using the Search function.

You can also examine the present image's details (name, etc) by right mouse clicking anywhere on the chart and selecting Image details from the popup menu.

Once selected, an image will remain displayed in the main chart window until you either Zoom in, Zoom out or re-centre (pan) the chart window off the present image.

Import

Allows import of individual images (saves a full search) in BMP, GIF, JPEG, PNG or TIFF formats. The image to be imported has to be north up, a mercator or equidistant lat/lon projection. As part of the import process, the image needs to be geo-referenced.

Expedition requires at least two geo-referencing points that should be as far apart as possible on the chart for best results - for example in the top left and bottom right or top right and bottom left corners.

It also allows the import of Squid .sat satellite images, which already contain the georeferencing.

For example, you can import images of weather faxes, sea temperature charts, satellite images, 'QuikScat' wind satellite charts and ocean current charts to plot your position on, overlay grib weather on or create grib fields of ocean current.

Note: Do not use these custom images files for navigation. The ability to display these is only provided as an aid to strategy and decision making.

C-MAP MAX

C-MAP MAX/PC is most common source of C-MAP charts.

Also see the chart panel and C-MAP settings help.

Reference guides

C-MAP provides two quick reference charts that can be downloaded from the Expedition or C-MAP web sites:

C-MAP chart legend: A visual reference and description of objects on C-MAP NT+ electronic charts.

C-MAP NT Cartography Reference Guide: Detailed information about C-MAP charts, the different formats and features.

C-MAP NT/MAX PC Selector

MAX charting requires C-Map's NT/MAX PC Selector for installation and licence management.

C-MAP MAX charts are normally distributed on DVD, resellers can make them available online or copy to (eg) USB sticks.

Please see the help below.

C-Map MAX and Expedition

See the chart panel help.

Open Best chart

With *Auto chart* mode selected, the next higher or lower scale chart will be selected when you zoom in or zoom out. If

this mode is not selected, zooming in or out will display the current chart at different scales.

This mode also influences C-MAP MAX chart behaviour. With it unselected, you can zoom in and out on the same chart level.

C-MAP MAX zooms between levels that contain chart data for different scales as displayed in the status bar and may be over-zoomed as you zoom in.

For example, Level B/0 means level B data that will contain data between 1:500,000 and 1:1,500,000. LevelB/1 is level B data zoomed in one step. The display scale is also shown in the status bar.

Expedition should step over any levels that are empty as the display is zoomed in and out.

These are represented below.

```
LEVEL_W   26,400,000
LEVEL_X   13,200,000
LEVEL_Y   8,800,000
LEVEL_Z   6,600,000

LEVEL_A   1,500,000 - 5,000,000
LEVEL_B   500,000 - 1,500,000
LEVEL_C   150,000 - 500,000
LEVEL_D   50,000 - 150,000
LEVEL_E   15,000 - 50,000
LEVEL_F   5,000 - 15,000
LEVEL_G   1,500 - 5,000
```

See the chart panel help.

Palettes

By default, Expedition displays C-MAP charts using the default C-MAP colour palette. However, NOAA, Admiralty or grey scale palettes may be used. See the C-MAP chart settings help.

Display settings

You can turn various C-MAP features and display attributes on or off. See the C-MAP chart settings help.

Colour shallow depths

This can be used to shade areas where the depth is less than a set amount.

Always in metres,

Requires *Reference depth colouring* to be enabled in C-MAP chart settings.

C-MAP objects

Use the Query C-MAP object menu item on the right-click pop-up menu to interrogate any C-MAP object.

Select any item in the tree control on the left of the C-MAP object window to display its attributes in the right hand window.

In the case of a tide station, times of high and low tides as well as sunrise and sunset will be displayed.

In the case of a C-MAP image, a picture will be displayed. Note that to suit smaller screens, expanding the dialog will show more detail in the displayed window.

Advanced settings

See the advanced settings button on the chart panel.

Perspective view pitch

Chart Expansion factor

It is possible to display chart levels always under-zoomed.

The default value is 1. Using a value of 4 will show the charts 4x underzoomed.

This setting is only for advanced users. Chart expansion should normally be left at a factor of 1.

C-MAP NT/MAX PC Selector

MAX charting requires C-Map's NT/MAX PC Selector for installation and licence management.

Please see the help included with NT/MAX Selector for detailed information.

NT/MAX PC Selector acts as an electronic chart catalog to choose the charts needed. It generates licence code requests and manages chart licences and installation.

NT/MAX PC Selector can be launched from the C-Map button on the charts panel.

When using NT/MAX PC Selector to request a chart licence, make sure NT Selector shows Expedition as the client as illustrated below. If you have run Expedition before, it should be shown. If not, start Expedition and then start NT Selector.

If using a Eutron or Sentinal dongle, make sure the Eutron or Sentinal dongle is shown in the status-bar. If using a dongle and the status-bar shows C-MAP HID (as below), the dongle drivers probably need to be installed.
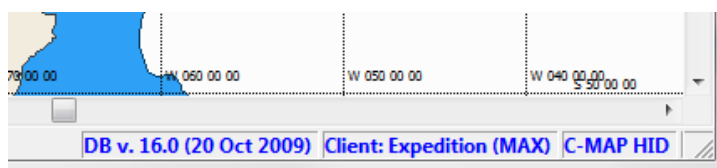
The user has two options when purchasing and loading these charts - they can be linked to the PC or to a security key (dongle). The advantage of the dongle is that the chart can be used on any computer the dongle is connected to. The C-MAP NT/MAX PC Selector programme is included with C-MAP's NT/MAX PC CDROM.

Generally the dongle security key solution is recommended as it makes it easier to migrate C-MAP charts to a new computer.

Important notes on C-MAP MAX NT Selector

The C-MAP destination folder must not be in c:\program files\ or c:\program files (x86). This is mainly a problem with old releases.

A common location is C:\ProgramData\C-MAP NT PC Selector\Charts\

If there are problems with the charts not being recognised, also check the folder security settings (right-click on the folder, select Properties etc). These should be set for Full control, Modify and Read & Execute.

Using the NT/MAX backup and restore procedures are highly recommended. See the NT Selector help.

Legacy C-Map chart sources

Expedition can also utilise C-MAP NT+ charts from the following legacy sources:

C-Card

Requires a C-Card Reader. The required drivers should be provided with the cartridge reader, but may be downloaded from the Expedition or C-MAP web sites, and should be installed according to the on screen instructions when you first connecting the USB lead from the reader to your computer.

PCMCIA

The required drivers should be provided with the card, but may be downloaded from the Expedition or C-MAP web sites, and should be installed according to the on screen instructions when you first install the card in your computer.

C-Map 4D

Expedition4D uses the C-MAP 4D charting system.

Also see the chart panel and C-MAP settings help.

Features

C-MAP 4D gives access to coastal, inter-coastal and waterway maps, detailed oceanic and enhanced GPS maritime navigation, precise fishing bathymetry and digital raster maps.

As well as the base data, C-MAP 4D data is are available in two variants:

- MAX - Charts, nav aids, photographs, tides and currents. features etc.
- 4D - All the Max data plus 4D charting, satellite and raster chart overlays as well as VAD data.

Free charts

C-MAP 4D has 'WWD303 - More Free Base Maps' available, freely available for download with My Maps, see below.

Limitations

Please confirm Exp4D works with your computer's graphics before purchasing C-MAP 4D charts.

C-MAP 4D may not work with GeForce graphics processors.

C-MAP 4D is limited to 2732x2048 pixels, but higher DPI displays will work with 4D in Expedition.

System requirements

Web browser

Map mangement and purchases are managed through a web browser interface.

There are two interface options - using the default web browser or the built in web interface.

Generally the default web browser option is preferred. The built in interface is legacy support and requires at least Internet Explorer 10.

If there are any issues, especially with purchases, make sure the default web browser is up to date.

Maps Manager

Expedition4D requires Maps Manager to be installed. It may be downloaded from the Expedition web site.

OpenGL

C-MAP 4D uses OpenGL to render the charts. OpenGL enables hardware acceleration of 3D graphics.

In addition, using the data in Exp can be accelerated. This is indicated in the first line of the C-MAP chart summary, available from the C-MAP Charts button on Chart ribbon panel. This will indicate wether the OpenGL to Expedition transfer is accelerated.

Drivers

Support is required from the graphics drivers for optimum performance. Graphics drivers that come with Microsoft Windows or that are downloaded from Windows Update often do not support OpenGL.

Especially with a bare install of Windows, additional OpenGL drivers may need to be installed. Common graphics drivers are:

Intel

Intel Graphics drivers Intel Graphics drivers FAQ
Intel Graphics drivers support

NVidia

NVidia OpenGL driver support
GeForce drivers

AMD

AMD Driver autodetect
AMD Graphics Driver and Software

C-MAP Chart Management

The C-Map Web store and My Maps chart management functions are accessed by clicking the C-Map button on the Charts panel.

Chart purchase is managed by the Web Store. Users who want to buy charts from the Web Store need to create an account to become a C-MAP customer first.

The Web Store allows charts to be purchased online. The charts may be purchased in as either MAX or full 4D.

My Maps controls downloading of purchased charts.

C-MAP Web Store

This will open the Web Store, see image below. To buy a chart

1. Click on Maps Catalogue

2. Select the cartridge price class type - Local or Wide

3. Select the desired chart by using the map on the right, the search box or list of chart areas.
   The paper charts in the selected electronic chart area will be listed at the bottom of the page.

4. Click Show HOs and Show VADs to show lists of Hydrographic Offices and available value Added Data.

5. Select the cartridge type

   ○ 4D MAX (contains only vector chart data)

   ○ Full 4D (contains all data - vector chart, satellite, 3D, raster chart etc)

6. Click the Buy button

7. In some countries (currently EMEA areas), it may be possible to purchase charts using a special SD Card, called a Transport Card. This allows you to use the charts without downloading them from the Internet. Once you have received the Transport Card, insert it into your PC. The Maps Manager recognises the inserted SD Card and uploads the SD content into the PC. The Transport Card is a special SD Card which is used ONLY for downloading charts - Expedition cannot read charts directly from the Transport Card.

8. My Maps can be used to download and update chart areas.
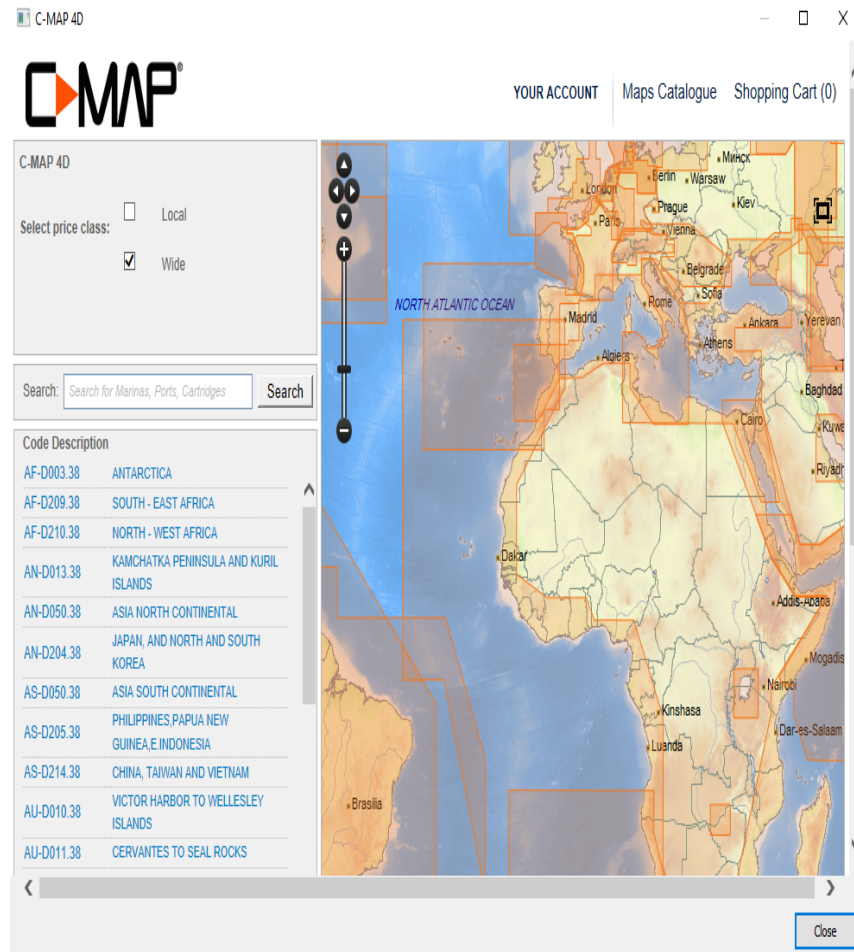
My Maps

Once the chart has been purchased, it is linked with the C-MAP account registered on the computer and has to be downloaded

Click My Maps in Expedition as shown above. A table of charts associated with the current registered account will be shown.

These will be either:

1. On the Cloud - puchased, but not yet downloaded,

2. On the device - downloaded and available for Expedition.

To download a chart listed as On the Cloud, just click the Download button. Download progress can also be monitored here.

Be aware some of these chart files are large (several GB), so allow sufficient time for download.

The charts may also be disabled or removed using Your Maps. Note that if removed, they must be downloaded again. This can be a problem if a chart that was purchased some years previously is no longer available for download.

Display settings

You can turn various C-MAP features and display attributes on or off. Some of these (eg. chart bounds) also apply to raster charts. See the C-MAP chart settings help.

Other display settings

Orientation

Palettes

By default, Expedition displays C-MAP charts using the default C-MAP colour palette. However, NOAA, classic, sun and night palettes may be used. See the chart settings help.

Language

Raster mode

Select raster charts and/or satellite images. See also the **R** and **S** buttons on the chart panel.

The opacity (or transparency) of the raster charts can also be specified.

Advanced settings

See the 4D advanced settings button on the chart panel.

This controls the 3D exaggeration and pitch.

Grid offset. This should rarely be used as C-MAP data is compiled using the WS84 datum.

Also VAD object settings.

C-MAP objects

Use the Query C-MAP object menu item on the right-click pop-up menu to interrogate any C-MAP object.

Select any item in the tree control on the left of the C-MAP object window to display its attributes in the right hand window.

In the case of a tide station, times of high and low tides as well as sunrise and sunset will be displayed.

In the case of a C-MAP image, a picture will be displayed. Note that to suit smaller screens, expanding the dialog will show more detail in the displayed window. This will also be retained in the dockign C-MAP pane.

C-MAP Safe Route Check, Easy Routing & Guardian Alarm

The Guardian Alarm provides another level of safety for mariners, and alerts while navigating of possible obstacles on the chart. This function continuously scans the chart area in front of the vessel to detect rocks and shallows that could pose a threat if the vessel continues along its current course. It looks ahead of the vessel's heading to see if a potential danger exists. When the Guardian Alarm is enabled, a triangle in front of the vessel is displayed on the chart page showing the area that is being searched.

Important disclaimer

The accuracy of Safe Route, Easy Routing and the Guardian alarm is limited by the availability of electronic charts loaded on your navigation system and the accuracy of original source material used in producing such charts. Always remember that you should navigate with the most detailed and up-to-date chart data available from C-MAP and that new information from National Hydrographic Offices may render your charts obsolete at any time.

Safe Route check

Safe route check will check an area around the active route for hazards based on the defined safe depth.

Route width

Width of the route to check in metres.

Safe depth

The water depth in the route width area so the unit can check and confirm underwater threats. It checks if some objects with a depth attribute such as Shallow Water, Dredged Areas, Diffusers, Obstructions, Pingos, Production Installation and Wrecks.

Safe height (4D)

C-MAP 4D charting setting. Minimum vertical clearance for a safe sail which is used in conjunction with bridge vertical clearance.

Accuracy (MAX)

C-MAP MAX charting setting. A resolution for the search. Smaller resolutions may take longer.

1000m	Minimum
500m	Low
200m	Medium
100m	High
50m	Maximum

Easy routing

C-MAP 4D charting only.

The Easy Routing function calculates the shortest and safest route between two chosen points on the chart avoiding:

- Obstacles (rocks, wrecks, obstructions, land etc)

- Shallow waters

- Dangerous areas

- Restricted areas

The user must always review the route calculated by the Easy Routing before any use of it.

Guardian alarm

C-MAP 4D charting only.

The Guardian Alarm provides another level of safety for mariners and alerts while navigating of possible obstacles on the chart. This function continuously scans (approximately every 10 seconds) the chart area in front of the vessel to detect rocks and shallows that could pose a threat if the vessel continues along its current course. It looks ahead of the vessel's heading to see if a potential danger exists. When the Guardian Alarm is enabled, a triangle in front of the vessel is displayed on the chart page showing the area that is being searched.

The Guardian alarm may notceably affect performance, so it may be best to disable it if not needed.

Display

- If any dangerous points are found in the detected area, they are marked with RED points to identify them at first sight , while the sector is colored in GREY.
- If dangerous area is found, the whole sector is colored in RED.

- If dangerous points and area are both found, the whole sector with the points are shown in RED.

- If no dangerous sector and points are found the sector is colored in GREY.

Guardian alarm settings

Before using the Guardian Alarm function, it is necessary to setup the search parameters.

Radius

Sets the Distance of the length of the sector to be detected.

Angle

Sets the angle to search in front of the vessel.

Safe depth

The water depth in the route width area so the unit can check and confirm underwater threats. It checks if some objects with a depth attribute such as Shallow Water, Dredged Areas, Diffusers, Obstructions, Pingos, Production Installation and Wrecks.

Safe height

C-MAP 4D charting only. Minimum vertical clearance for a safe sail which is used in conjunction with bridge vertical clearance.

Enable Guardian Alarm

Turns the Guardian Alarm On or Off.

Show warnings

Displays a warning of the dangerous objects currently detected.

Marks and routes

Man overboard button

Visual marks

Right click to build a route

Mark management

⛵ Man overboard

The man overboard button on the marks panel sets a locked mark called MOB at the current boat position.

Also available from the and by using the F-2 keyboard shortcut.

The MOB attribute for a mark may also be set by the Ventus smart-phone app or an Exp MOB button for example.

Important note

> Computers can be less reliable than a purpose built GPS, so always use your boat's GPS system as your primary MOB position fix system. Use Expedition as a backup - displaying the track on the screen is a very good way visual of seeing your way back. Expedition not designed or intended as a primary life safety control.

Visual marks

Also known as easy or quick marks. Accessed from the Marks panel.

This is a quick and easy way to graphically set a new route. As per its name, this is often the easiest way to set up a new route.

First, zoom out to a chart scale where you can see your entire route area. Now select Visual marks. A window will pop up where you can name the route or simply accept the name Easy by clicking OK. Now you can move the cursor onto the main chart window. Wherever you left click, a mark will be laid and a route will be created following these marks in the order in which they were created.

Remember to deselect Visual marks when you're finished creating the route or else you will create an additional mark every time you use the left click button.

Marks can be easily added by using the insert mark item on the pop-up menu while you are creating a visual route.

Loop

If a route is set to be able to *loop*, moving to the next mark from the last mark sets the first mark as the active mark. Similarly, moving to the previous mark from the first mark selects the last mark as the first mark.

Fine tuning the position of a mark

After setting up an Quick Route you can then Zoom in to a particular mark and fine tune it.

Drag

You can drag a mark to a desired location by left mouse clicking it (an arrow will appear on the mark when it is drag-able) and whilst keeping the left click button depressed, move the mark where you want it.

Edit on chart

By right mouse clicking a mark in the main chart window you open a drop down window. If you select Edit mark, a Mark properties window will open where you can enter a precise latitude and longitude and perform a number of other functions including locking the mark so that it is not drag-able.

Edit in Mark management

You can get to the same Mark properties window by highlighting/selecting (with a left mouse click) any mark in the Mark management window and clicking the Edit button.

The ability to drag a mark is highly useful in buoy racing where the race committee does not always place the marks exactly where intended.

Mark Management and Visual Marks

If you accepted the name Easy when creating the Visual route your new marks are stored in the Easy folder in Mark management. They will be overwritten next time you use Visual marks. You could rename the mark and route folders using mark management, but it is easier to choose a unique route name when you first click this button.

Right mouse click to build a route

You can build a route by right clicking a point and selecting Set Active Mark and Route from the pop-up menu. Subsequent marks in the route can be added by right clicking and selecting Insert Mark for example. The pop-up menu can also be used to add marks at the start and end of a route or to insert an already existing mark into any point of the route. See the pop-up menu help for further assistance.

As with Easy Marks the marks you create in this manner can be found in the marks section of mark management.

The pop-up menu tools can be very helpful when fine tuning or refining a route. The inserted mark will always be placed in the nearest great circle leg of the route to the pointer.

Mark management

Accessed from the marks panel.

The the mark management window can be used to modify existing routes and create new routes from existing marks that are in your mark folders.

To build a new route, first create an empty route by clicking the New button to the left of the the routes section. The new route can be renamed by clicking the selected route.

Marks can be added to the selected route by selecting a mark and clicking the button. If the route is selected, the mark will be added to the end of the route. If a mark in the route is selected, the mark will be added after that mark.

To remove a mark from a route folder simply highlight it and click the right mark button.

Set a route to be the active route by selecting the it and then clicking Select.

Tips

Marks can be dragged between mark folders.

Mark and route names and their attributes may be edited by selecting the label in the tree control.

Right-clicking in the marks tree control also allows some operations.

Marks

New

Creates a new mark or mark folder

Edit

Edits a selected mark

Delete

Deletes a selected mark or mark folder

Lock

Locks a mark or all marks in a folder

Unlock

Unlocks a mark or all marks in a folder

MOB

The Man Over Board attribute for the mark. This may be set by the Ventus smart-phone app or an Exp MOB button for example.

Always draw

Sets a mark or all marks in a folder to be *always drawn*.

Don't draw

Sets a mark or all marks in a folder to be not always *drawn*.

Port end

Sets the currently selected mark to be the port end of the start line.

Starboard end

Sets the currently selected mark to be the starboard end of the start line.

GPX

Exports the selected mark folder to GPX.

Table

Create a .csv format table of ranges and bearings between the marks in the selected mark group.

Routes

Leave to port, Leave to starboard or Sail to mark

It is also used when computing laylines - Exp adds or subtracts half a boat width when leaving a mark to port or starboard.

Loop

Toggles the route loop attribute on and off.

New

Creates a new route

Delete

Deletes a route if selected or removes a mark from a route if selected.

Move up

Moves the selected mark of the route up one.

Move down

Moves the selected mark of the route down one.

Set active

Sets the selected route as the active route.

Clear active

Clears any selected, active route.

Details

Displays details about the currently selected/active route.

Can also edit a route's *loop* property. If a route is set to be able to *loop*, moving to the next mark from the last mark sets the first mark as the active mark. Similarly, moving to the previous mark from the first mark selects the last mark as the first mark.

Reverse

Reverses the order of marks in the selected route.

Reverse

Creates a copy of the selected route.

GPX

Exports the selected route to GPX.

Weather and tides

GRIB files

A Grib file is a digital weather or current file. These are available from a variety of sources - see www.ExpeditionMarine.com for examples.

Expedition can seamlessly merge and use multiple Grib files, automatically using the best available data in the selected Grib files for its calculations.

There is some variation in the types of Grib files that are available, but Expedition can read the most common types.

See the weather settings help for further help on using grib files.

NetCDF files

Expedition supports some NetCDF data. This can be expanded as support for new datasets is requested.

Tides and currents

See the tide settings, also Tidetech, Proudman and SHOM help.

Saildocs

Available from the Saildocs button on the Weather data panel.

Saildocs has an email or direct web delivery service for the delivery of grib weather data.

For more information, send email to the auto-respond addresses info@saildocs.com and gribnews@saildocs.com.

Requesting smaller areas with less fields, times and resolution will result in smaller grib files. This can be important with a slow or expensive email connection, especially at sea.

To use, click on the Saildocs button, then select an area of the chart to obtain weather for.

Check VT

Allows a check on the analysis time of the grib file to be downloaded. Useful to check if the grib file has been updated.

Get Grib

Obtains a grib file directly from the web, rather than via email, and automatically load the received grib

file into Expedition.

Clear grib file list

Automatically removes previous grib files from the file list. If not selected, it is advisable to remove any unnecessary grib files from the list.

Email request

Creates a Saildocs email query.

Expedition automates the creation of the email message required to receive a Saildocs grib file, but you can edit the Expedition-created email before sending.

Days

Number of days to subscribe for.

Subscribe

Selecting subscribe will change the email to request grib files for desired number of days.

Resolution

Select the desired resolution of your grib file. Higher resolution grib files will contain more detail, but a 1°

grib file may be close to 4 times as large as a 2° grib file.

Note that higher resolution options may not be available for all models. For example, COAMPS data is available at 0.2°, RTOFS is available at 0.05° and GFS is available at 0.5° resolutions.

Model

Various models and data sources are available from Saildocs.

GFS

The default global model from NOAA/NCEP. Data is generally available at 0.25° resolution grid every 3 hours to 180 hours, then at 0.5° resolution to 384 hours (16 days).

Available parameters include MSLP, WIND, GUST, RAIN, APCP, REFC, AIRTEMP, SEATMP, RH, CLOUDS, CAPE, LFTX, ABSV, HGT500, TMP500, WIND500 and WAVES.

Selecting WAVES will include the WW3 significant wave data in the grib file.

Updated every 6 hours and is generally available by 5 hours after the main synoptic hours.

GRIB

Uses GFS as above, but will use older model data if the most recent isn't available for any particular time.

HRRR

NOAA's High-Resolution Rapid Refresh model for the US.

Available parameters include PRMSL, WIND, GUST, RAIN, SFCTMP, LFTX, CAPE, APCP and REFC.

NDFD

The National Digital Forecast Database is a US National Weather Service (NWS) project to make forecaster-generated weather forecast data available in gridded format for the NWS areas of responsibility. These data files are prepared along with the forecast charts (radiofax charts) and text bulletins.

NDFD is a developing project and available data will be expanded. NDFD is still in "experimental" status which means that the data may not be available or correct.

For more info about NDFD see:

http://www.opc.ncep.noaa.gov/opc_gridded_marine.php

WW3

NOAA's WW3 wave model is available at 1 x 1.25° resolution (lat x lon) every 3 hours out to 180

Available parameters include WIND, WAVES, HTSGW, WVHGT, WVPER, WVDIR, PERPW, DIRPW, PERSW and DIRSW.

WAVES, HTSGW, WIND, WVPER and WVDIR.

Updated every 6 hours and is generally available by 5 hours after the main synoptic hours.

NAVGEM

A US Navy model. Data is available at 1° resolution every 3 hours out to 24, then every 6 hours to 96, then every 12 hours to 144.

Available parameters are PRMSL,WIND and HGT.

Updated every 6 hours and is generally available by 6 hours after the main synoptic hours.

COAMPS

A higher resolution regional model provided by the US Navy. Data is available at 0.2° resolution at 6 hourly intervals out to 72 hours.

Available parameters are PRMSL and WIND.

Available regions are

> East Pacific
>
>> 29n - 60n, 160w - 114w
>
> West Atlantic
>
>> 20n - 55n, 093w - 055w
>
> East Atlantic and Europe
>
>> 29n - 66n, 15w - 45e
>
> Central America and Caribbean
>
>> 00n - 32n, 120w - 060w
>
> Continental US
>
>> 24n - 50n, 126w - 066w

RTOFS (Real Time Ocean Forecast System)

An ocean current forecast model from NOAA's RTOFS system.

Current, water temperature, sea level deviation and salinity may be requested (CUR, WTMP, DSL_M & SALTY)

It consists of two different models and three overlapping areas:

RTOFS

> Saildocs selects whichever dataset best covers your request.

RTOFS-GS (Gulf stream)

25N-48N, 083W-052W.
Higher resolution at 0.05x0.06° resolution
at 24 hourly intervals out to 144 hours.
Updated daily at around 15:00z.

RTOFS-ATL (Atlantic Ocean)

26S to 75N, North America to
Africa/Europe.
Available at 0.26° resolution at 6 hourly
intervals out to 144 hours.

RTOFS-GLOBAL

Available at 0.5° resolution at 24 hourly
intervals out to 192 hours.

OSCAR (Ocean Surface Current Analysis-Realtime)

An ocean current analysis based on satellite
observations (scatterometer and altitude) over a
5-day period and updated every 5 days.

Resolution is 0.33°, global data is provided but
the focus is on the tropical Pacific.

The only parameter available is surface current.

QSCAT

Quickscat wind data is obtained from satellite
observations. Data is updated hourly, but only

once or twice a day for any particular area.

This is no longer available.

Forecast times

Select the forecast times to request.

Clear

Clears all selected times.

Default

Selects default times to request.

Parameters

Select desired fields. Defaults are PRMSL and WIND.

Note that the parameters selection has no effect if no forecast times are selected.

Great Circle - Squid

Available from the Squid button on the Weather data panel.

Web

www.squid-sailing.com

To use, click on the Squid button, then select an area of the chart to obtain weather for.

Models/areas

Grib data available for the area selected

Parameters

Select desired fields. If none of these are selected, the default is 10u, 10v and prmsl.

Note that to download wind, both u and v components (eg 10u & 10v) must be selected.

Forecast days & time-step

Select the forecast times to request.

Clear old grib files

Automatically removes previous grib files from the file list. If not selected, it is advisable to remove any unnecessary grib files from the list.

JPEG Compression

JPEG compression results in much smaller GRIB files, with faster download. They will be slower to load into Expedition though.

Update models list

Refreshes the list of available products available for the user's subscription.

Email

Sends a grib email request to Squid.

Download

Obtains a grib file directly from Squid.

Squid X app

Great Circle also provides an app that can be used to download grib and satellite data.

This also allows Iridium Go.

It can be a good idea to set the GRIB Export directory to the Expedition Grib data folder, nomally C:\ProgramData\Expedition\grib.

Expedition GRIB server

Available from the Expedition and button on the Weather data panel

Data from other sources, provided to complement Saildocs and Great Circle - Squid.

To use, click on the Expedition grib button, then select an area of the chart.

Notes on resolution

From experience, 0.25° is a good compromise for global model data.

0.5° is usually too coarse, but is an option for slow connections.

1/8°-1/10° data may be more useful, but file sizes will be larger. Doubling the resolution will increase file size by about a factor of 4.

One reason for using 0.5° data is if you are extremely band-width limited. In this case, 1/2° GFS data is available from Saildocs or Great Circle. In this case just the GFS is a good option.

The GFS, UM, ICON and GDPS models are also available from Expedition at higher resolution.

NBM	0.09° (about, is on a 10,000m

	Mercator projection)
GFS	0.11° and 0.25°
UM-Global	0.1°
ICON	0.125° and 0.25°
GDPS	0.15°

The higher resolution datasets can be significantly larger, GFS 1/9°, ICON 1/8°, UMG 1/10° and GDPS 0.15° at 5 to 2.5 x the size of the 1/4° data, and may take longer for the server to extract and package.

Depending on the area and number of time steps selected, it may be worth downloading fewer time steps or over-riding the standard internet time-outs in Expedition's system settings.

Times

Select the forecast times to request.

Clear

Clears selected times.

All

Selects all displayed times.

Defaults

Selects default times to request.

Model

Various models and data sources are available from Expedition.

NBM

National Blend of Models, see National Blend of Models (NBM).

GFS

The default global model from NOAA/NCEP.

Available at 1/9° and 0.25° resolution.

Data is currently available to 384 hours.

Available parameters are MSLP, wind and rain, significant wave height and primary wave direction.

Updated every 6 hours and normally from about 4:30 hours after the main synoptic hours, although longer range forecasts will take longer.

Notes on the 0.11° data

File sizes will be about 5 times larger than the 0.25° data.

MSLP is replaced by surface pressure, which may not be as useful over land.

UM-Global

The UK Met Office global model.

Data is available at about 0.1° or 0.2° to 168 hours for the 00 & 12z runs and to 60 hours for the 06 & 18z runs

Available parameters are MSLP, wind and rain.

Updated every 6 hours and normally available by about 5 hours after the main synoptic hours.

ICON

DWD's global model.

Data is generally available at 0.125° and 0.25° resolution to 180 hours for the 00 & 12z runs and to 120 hours for the 06 and 18z runs.

Available parameters are MSLP, wind, rain and 2m temperature.

Updated every 6 hours and is normally from about 3:30 hours after the main synoptic hours. Longer range data will be a little later.

Note that the 0.125° file size will be about 4 times larger than for the 0.25° data.

GDPS

The Canadian Weather Centre's global model.

Data is available at 0.15° 3 hourly to 168 or 240 hours.

Available parameters are MSLP, wind and rain.

Updated every 12 hours and is normally available from about 4:30 hours after the main synoptic hours. Longer range data weill be a little later.

Clear old grib files

If this is selected, previous Expedition grib files loaded will be removed from the file list.

JPEG Compression

Downloads more highly compressed grib files. This results in about a 5-10% file size reduction.

It is mainly intended as an option for very slow internet connections or where bandwidth is an issue.

It is also slower for the server to create and a little slower to load in Expedition, so unless file size is an issue, performance will be better if disabled.

Run time

Shows the analysis time and last forecast time of the grib data available.

This is useful to check if the data has been updated.

Note that for most models, the data will gradually become available and the forecast time and hours is the last currently available.

GFS025 ✕

Analysis: 19-Jul-2021 00:00 UTC

Forecast: 29-Jul-2021 00:00 UTC

Hours: 240

OK
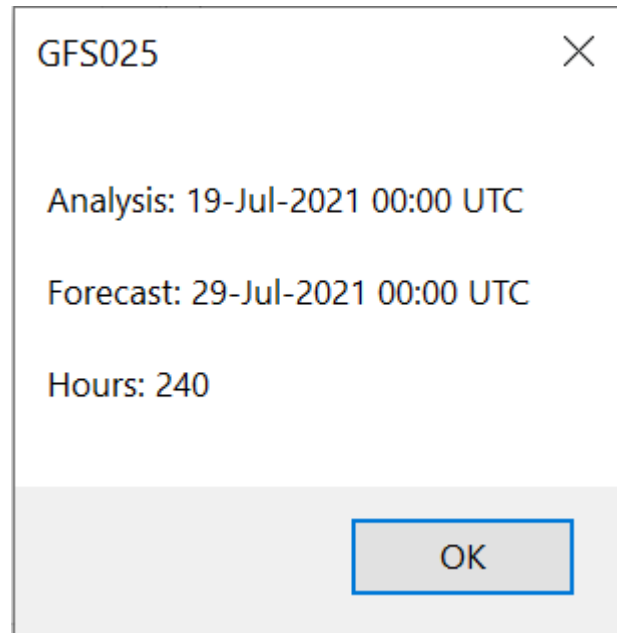
Download

Downloads the grib file.

Expedition WRF server

Available from the WRF button on the Weather data panel or from the right-click pop-up menu.

Expedition WRF

Expedition high resolution WRF models, mostly at 1/12°, 1/36° and 1/108° resolutions. Most areas are updated 6 hourly, but some may be updated every 3 hours.

Selecting the WRF button on the Weather data panel will show all grib files available.

Selecting Expedition WRF from the right-click pop-up menu will show only grib files for that location.

Clear old grib files

If this is selected, previous Expedition WRF grib files loaded will be removed from the file list.

File info

Shows the file size, analysis time and creation time of the grib file to be downloaded.

Useful to check if the grib file has been updated.

Data options

There are 3 data options

All data - currently MSLP, rain, 10m wind and gusts, 20m wind, 2m temperature, CAPE and total cloud cover.

Base data - 10m wind, MSLP and rain

Wind data - 10m wind only

Download

Downloads the grib file.

MyGrib

A collection of third party Grib and NetCDF files available on the internet.

Available from the MyGrib button on the Weather data panel or from the right-click pop-up menu.

The MyGrib button on the Weather data panel will show all grib files.

Selecting MyGrib from the right-click pop-up menu will only show grib files for that location.

Clear old grib files

If this is selected, previous MyGrib files loaded will be removed from the Expedition file list.

File info

Shows the analysis time, issue time and size of the grib file to be downloaded. Analysis time is not available for some data.

Useful to check if the grib file has been updated.

Download

Downloads the grib file.

SailFlow

Available from the SailFlow Refresh button on the Weather data panel.

Expedition can display weather observations from Sailflow. A SailFlow Plus, Pro and Gold membership is required.

Web

www.sailflow.com

Use

Click on the SailFlow Refresh button. The latest weather observations for the chart area will be downloaded.

The SailFlow user-name and password can be entered on the Weather data panel.

See also the Weather observation options in Display Settings.

Tidetech

Expedition integrates Tidetech sea temperature, ocean and tidal currents. A subscription to Tidetech is required for this functionality.

Select Tidetech from Weather data ribbon and then select an area of the chart.

Enter your Tidetech API-Key, available from your Tidetech web dashboard.

The Update list button updates the list of products associated with your subscription.

Note that the list of products are only those available at the location selected. Areas available can be drawn on the chart, see display settings.

To download a Tidetech grib file, just select the item in the list and then the download button.

Proudman tidal currents

Expedition supports the UK's National Oceanography Centre tidal stream models, which are licensed separately as a value-added product. Once licensed, these extensive currents may be displayed on the chart, used in routing, laylines etc.

Please direct licensing inquiries to Expedition or your dealer.

Several areas are available:

Arabian Gulf model

Details

1/12° resolution.

Area: 24° 00'N to 30° 25'N, 47° 45'E to 57° 20'E

Mediterranean model

Details

1/12° resolution.

Area: 45° 50'N to 30° 25'N; 5° 35'W to 3610'E

The tidal currents are divided into 3 areas, only one area may be selected at any one time.

> 6°W to 10°E
> 8°E to 23°E
> 21°E to 37°E

CS3 NW European Continental Shelf model

Details

The standard model supplied with Expedition covering the UK and surrounding waters with a resolution of 1/9° latitude by 1/6°

longitude (approximately 12km) .

Area covered: 48° 07'N to 62° 53' N, 11° 50'W to 12° 50'E

The tidal currents are divided into 9 areas. Only one area may be selected at any time.

Western Approaches and English Channel
Eastern English Channel, Dover Straits and southern North Sea
Ireland and Bristol channel
Central North Sea
Kattegat
Western Scotland
Northern North Sea
Faroe Islands
Norway and Shetlands
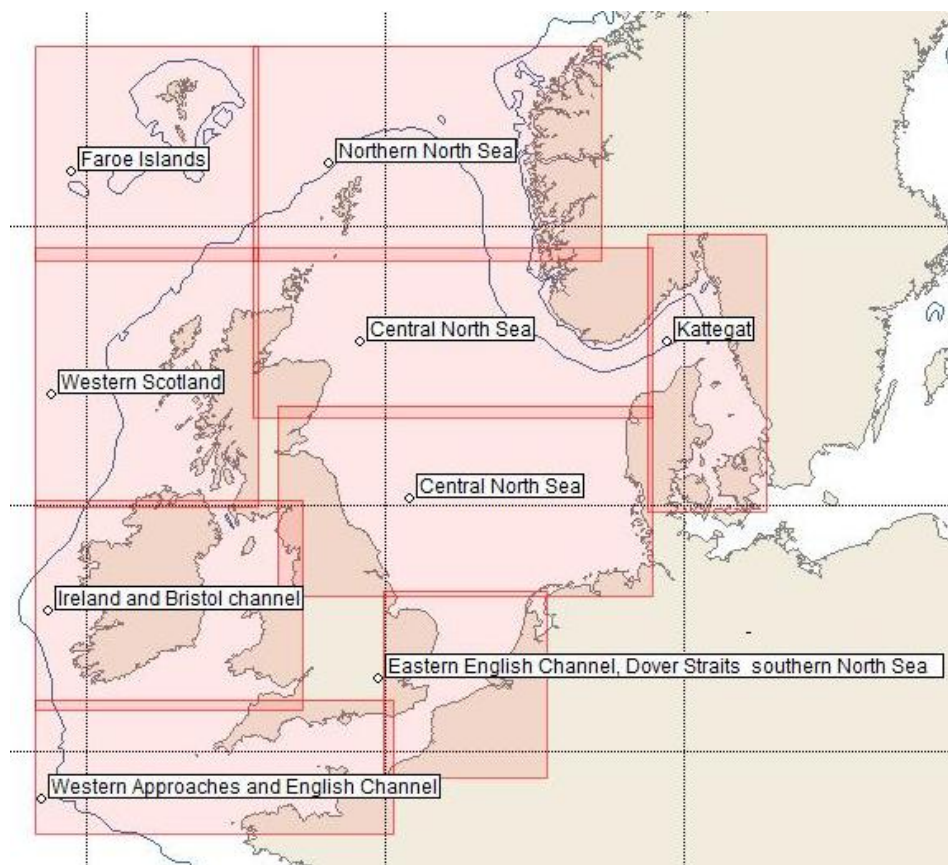
CS20 High resolution NW European Continental Shelf model

A higher resolution Eurpean a resolution of 1/60° latitude by 1/40° longitude (approximately 1.8km) .

Available as a separate download.

Area covered: 48°N-63°N; 12°W-13°E

The tidal currents are divided into 10 areas. Only one area may be selected at any time.

1. West Coast of Scotland / North of Ireland
2. East Coast of Scotland / Orkneys / Shetlands
3. Norway / Northern North Sea
4. Eastern North Sea / Denmark
5. East Coast (Aberdeen to Lowestoft)
6. East Anglia (to Eastbourne in E. Channel)
7. English Channel
8. Celtic Sea
9. Irish Sea / St. Georges Channel / Bristol Channel
10. Ireland
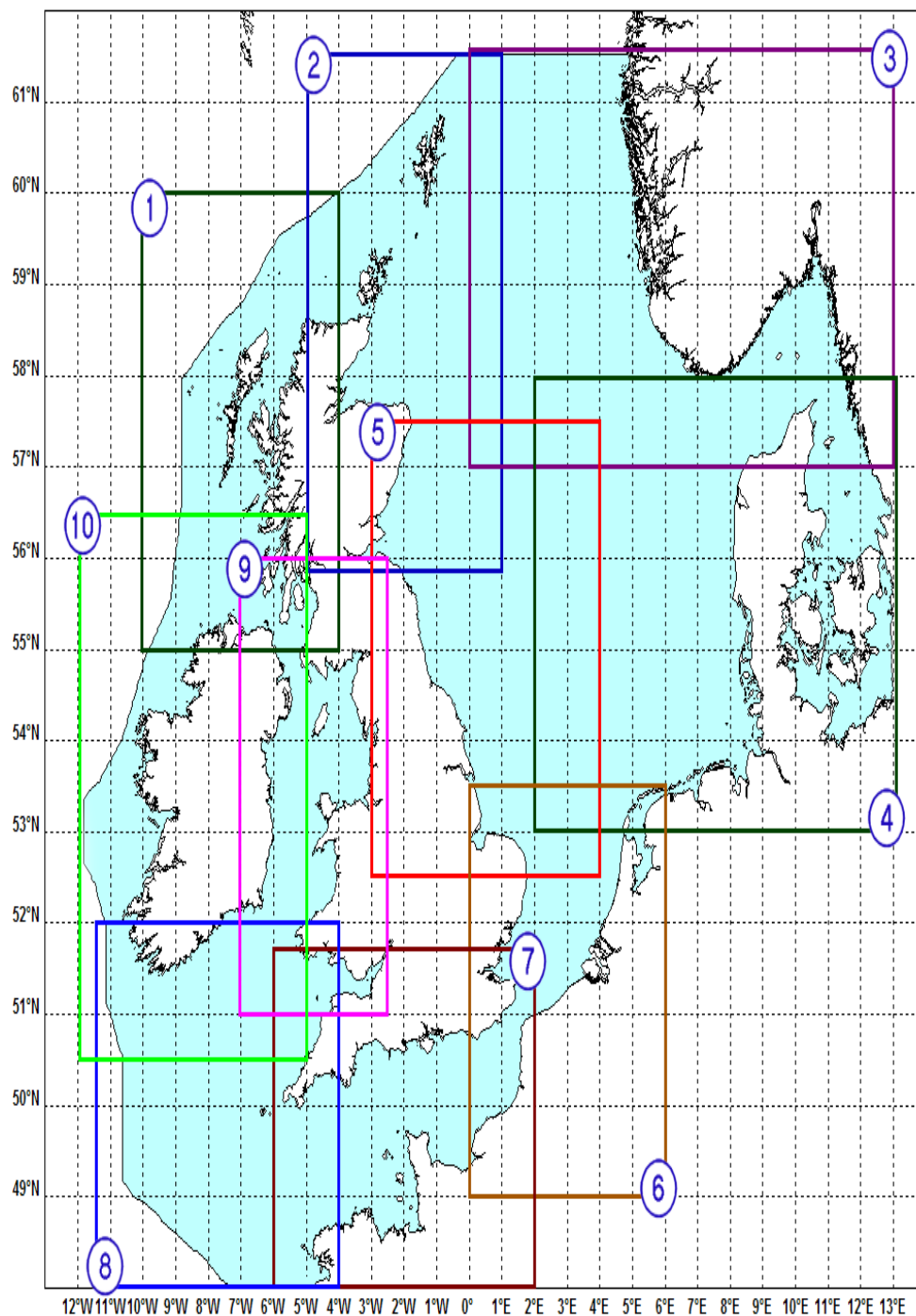
SHOM Tidal currents

Expedition supports the SHOM tidal current models, which are licensed separately as value-added products. Once licensed, these extensive currents may be displayed on the chart, used in routing, laylines etc.

Please direct licensing inquiries to Expedition or your dealer.

The tidal currents are divided into two areas, broadly northern and western French coasts for licensing purposes.

Northern France from Ouessant to Dunkerque

557, Courants de maree dans le Pas de Calais,

561, Courants de maree de la Baie de Seine, de Cherbourg a Fecamp,

562, Courants de maree du Golfe Normand-Breton,

563, Courants de maree Bretagne-Nord, des Heaux-de-Brehat a la Pointe de Pontusval,

564, Courants de maree de la Manche de Dunkerque a Brest.

Atlantic coast from Royan to Ouessant

558, Courants de maree de la Cote Sud de Bretagne, d' 'Audierne au Croisic,

559, Courants de maree de la Cote ouest de France, de Saint-Nazaire a Royan,

560, Courants de maree de la Cote ouest de Bretagne, de Goulven a Penmarc'h,

565, Courants de maree dans le Golfe de Gascogne

Racing tools

Windward-leeward course creation

Boat editing

Calibration

Grib file creation

Handicap calculator

Optimal routing

Polars

Sail chart and list

Sail test analysis

Race tracking

What if?

Start

      Settings

      Setting the line

      Start numbers

Create a WL course

Available from the Create W/L course button on the Start panel.

This function orients your race course around an existing starting line or committee boat.

Unless in the chart-less start display mode, select the start line checkbox on the display settings page to show the start line.

For any derived start numbers such as Time to line, you need to have a start polar loaded.

Note that if you have already set the ends of the start line, they won't be reset by this operation.

After setting up and loading a windward leeward course you can fine tune the position of the ends of the line with the Set port or Set starboard buttons. Fine tuning the starting line in this manner (after you have set up a course) will have no effect on the position of the other marks.

Use the Set dividers given range and bearing tool for tips on fine-tuning the position of the top mark.

Start to windward mark

The distance in nautical miles to the top mark from the start line.

Start to leeward mark

The distance in nautical miles between the start line and the leeward mark. You could then sail up to the gate/leeward mark and drag this buoy to its exact position.

To place the leeward mark below the start line, enter a negative number.

Course axis

Allows the course axis to be manually set in degrees magnetic. If the race committee has done a good job this will be aligned with the True Wind Direction. The Twd button updates the course axis with the current damped true wind direction from Exp.

Leave marks to port

Sets all created marks to be left to port.

Rate of turn can also be used to more accurately calculate time and distance to laylines.

Gate at leeward mark

Select whether or not to have a gate to the left (looking upwind) of the leeward mark and its width. When the leeward mark is the active mark, laylines will also be drawn from this mark.

Finish

Can set a finish mark different from the pin end.

Leeward mark

Sets the position of the leeward mark above either the committee boat, the middle of the line or above the pin end.

Boat editor

The database used by Exp can contain a list of all or some boats in any race.

These are used by race tracking and the handicap calculator.

Options

Plot

Use this boat on the chart etc.

Boat name

Colour

Colour to plot boat and track on the chart

Reference

Is it the reference boat? Normally this is you.

Handicap

Handicap value.

Start time

Note that the handicap calculator has an option to use the time from the start of the race if the start timer is being used.

Polar

Boat polar used for fleet route optimisation.

Draw	Cla...	Colour	Refere...	Handic...	Start time	Pol %	Polar	
☑ 2 UNLIMITED				1.0000		100		
☑ ABBOTTS VAMP				1.0000		100		
☑ ABOUT TIME				1.0000		100		
☑ ABRACADABRA				1.0000		100		
☑ ACTIVE AGAIN				1.0000		100		
☑ ADMIRAL				1.0000		100		
☑ AIRSTREAM				1.0000		100		
☑ ALIVE				1.0000		100		
☑ ALLEGRO				1.0000		100		
☑ ANGER MANAGEMENT FLG				1.0000		100		
☑ ANOTHER PAINKILLER				1.0000		100		
☑ ARCADIA				1.0000		100		
☑ ARCH RIVAL				1.0000		100		
☑ AUDACIOUS				1.0000		100		
☑ AUDERE				1.0000		100		
☑ Activator				1.0000		100		
☑ Am Meer				1.0000		100		
☑ Anarchy				1.0000		100		
☑ Arbitare				1.0000		100		
☑ Atamai				1.0000		100		

Boat editor

Buttons:
- Set all start times to gun
- Colour selected
- Auto colour
- New
- Delete
- Delete all
- Plot all
- Plot selected
- Plot none
- Cancel
- OK

Grib file creation

As well as being able to use grib file data from third party sources, Expedition also has functions enabling the creation of your own grib files. This functionality was developed primarily to allow the creation of ocean current data to enhance route optimisation for races such as the Newport-Bermuda race where ocean current charts of the Gulf-stream are both important and readily available.

There are two ways you can create grib files, both accessed from the tools panel.

1. Create current graphically

If you have an image of ocean temperatures or currents (for example, a Gulf-stream analysis chart), you can use Expedition to create a grib file based on the information in the image.

1. Import and geo-reference an image.

2. Select *Create currents mode* from the Tools panel. This will direct Expedition to create a current vector wherever you click on the chart with the left mouse button. It will ask for a value of

current drift. This should be entered in knots.

Move the cursor around a line of constant current drift, clicking regularly or at important points. The current drift will be in the direction you are moving the cursor, so start upstream.

You can't immediately click elsewhere on the chart to start another line of current points as the first and last points will have unintended sets. So, click *Set drift rate* on the tools panel and enter the drift rate of the next series of points you intend to enter (they could be the same) and then click on the chart as before.

When all creation of current points is complete, click on *Create mode* on the Tools panel to exit the current entry mode. Then, select *Save grib*.

You will then be asked for the bounds and resolution of the grib file you wish to create. The suggested bounds north, south, east and west bounds will be based on the data you entered earlier. The default resolution is 0.5°, but it could be 0.1 or 1.0° for example.

Also, choose whether to give the current field a validity time (it could be

a forecast for example) or make it a climatologically mean current.

Finally, select a file name and location for the new grib file and click on OK.

You can now clear the manually entered currents by clicking on *Clear created currents* on the Tools panel and load the new grib file (see the help on the weather settings page.

It can also be a good idea to enter zero knot currents along coastlines.

2. Log file analysis

As you use Expedition, you can collect your instrument data in log files. This data can be played back by LogPlayer or loaded into Stripchart, but you can also use it to create grib files of sea temperature, currents and/or depth.

Handicap calculator

The handicap calculator window is used to compare mark rounding and finish times with other boats using time correction factor (TCF) handicaps.

The elapsed, corrected and delta times are based on the time from each boat's gun time and the event.

Delta is just the differences in the corrected times.

The Owed column is just a running time owed since the gun. Negative numbers mean you owe time, positive numbers mean you are owed time.

Refresh

Refreshes the time owed column.

To set a boat event

Just click on the boat name in the list. For example at mark roundings or the finish.

Set all start times to gun
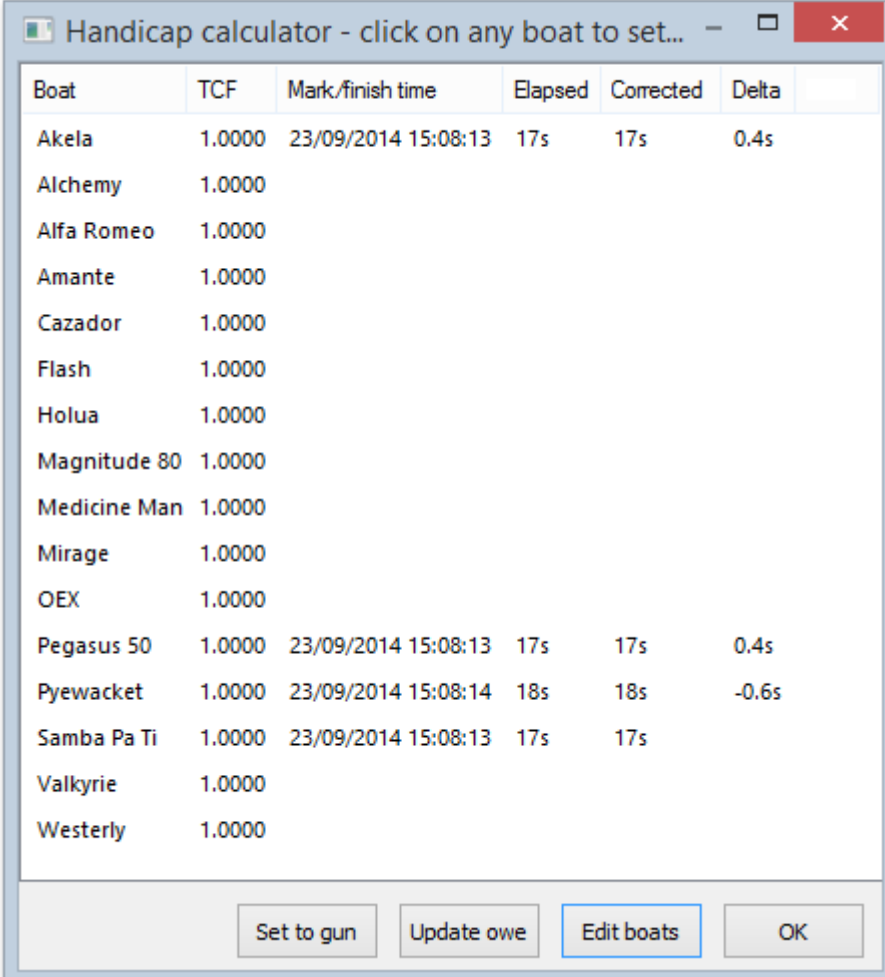
Sets the start time for all boats to the start gun time. On races with staggered starts, it may be necessary to set the start time in the edit boats window.

Set all boats

Sets the event time for all boats to the current time.

Edit boats

Edit individual boat handicaps and start times in the boats window. Also select boats to plot and display in the handicap and race tracking windows.

Optimal routing

Available on the Optimal routing ribbon. See also the Optimal routing settings help.

This is one of Expedition's most powerful and refined features.

Expedition easily routes over complex routes with multiple GRIB fields containing both wind and current information.

Expedition has features such as reverse isochrones and sensitivity shading that help the illustrate the sensitivity of the calculated optimal routing solution. It has features designed to help both the shore side study of an upcoming race (or a race underway that you are watching) and also the navigator/tactician in the middle of the race.

As in any solution involving a computer program, be aware that the final result is only as good as the information/data provided to the program - garbage in = garbage out! So it pays to work hard to make the polars reflect reality and get the very best and latest GRIB files. However, even with the most refined polars and fine mesh weather GRIB files, the prudent navigator will study the solution carefully and make adjustments based upon practical experience or intuition.

Before using this tool, make sure you understand the Expedition's optimal routing settings, marks and routes and weather.

Isochronal and grid based routing algorithms

Expedition has two route optimisation algorithms that were designed for different purposes. They should yield similar results, but a user may prefer one or the other or use both for comparison of results.

The isochronal algorithm pushes an isochrone out from the start point, whereas the grid based algorithm divides the route area into a grid.

The isochronal algorithm should generally be the default choice. The grid algorithm is useful for routing studies and as a comparison.

Note that fewer marks in a course generally yield better results.

Note also that the Draw paths option can be useful for visualising the route optimisation search area.

Isochronal

The isochronal algorithm is generally a slightly superior methodology, especially in areas of light wind, where the current has a significant effect or around obstructions such as land or race notes.

Note that for multi-leg routing, leaving marks to port or starboard is not currently enabled for isochronal routing.

To an extent, the isochronal algorithm is allowed to sail around corners.

Grid

The grid algorithm was originally developed for routing studies where it was important to compare similar simulations.

The route along the great circle route option is only available for the grid based algorithm.

Note that the grid algorithm is not designed to route around corners. One solution is to use multiple marks for this.

Avoiding land

Use the Avoid land settings option. It may make the route optimisation slower, so may not be needed offshore or for routing studies.

Race note areas

Race notes can also be used to mark custom areas to avoid, such as shipping channels and ice exclusion zones.

Race notes can also be used to reduce the boat speed. An example would be due to Sargasso weed.

Before performing a route optimisation

Make sure all your settings in optimal routing settings are correctly configured.

You have a wind GRIB file loaded that covers the area and time span needed to sail the route. You can check the extend last wind field box on the optimal routing tab if your GRIB doesn't quite cover the time frame needed to sail the route.

You have a polar loaded into Expedition. See the polars help.

You have a route set up and selected as active. See mark management.

If using the route to cursor function, an active route is not required, but Exp does need a GPS position.

It is also important that the correct destination mark is selected as active.

The optimal route is calculated by Expedition with a click on the Optimise button on the Optimal panel. A progress bar and cancel button are displayed while Expedition is computing the optimised route. To speed up the calculation you can make the resolution value larger and/or deselecting the avoid land options in optimal routing settings. The

optimisation may be cancelled at any point by clicking on the cancel button.

After the calculation complete, the optimal path and other features such as isochrones that you selected for display on the optimal routing tab will be displayed on the chart.

Notes

You can also save the details (route, wind, heading, finish time) of a particular optimal route by using the View results button on the optimal panel after running an optimal route. You can then save this information in a simple text file by clicking the Export button. Before a big race, you might want to run a daily optimal route calculation and email the graphic image of that route (see: To print out the chart window screen) and the text file of the Optimal route table to your crew.

When you have an intermediate turning mark in your route, there are times that the best or fastest routing solution is for the boat to pass the buoy at some distance not close aboard. Expedition's router has the power to allow for this situation if you configure all the marks in your active route correctly. They can be configured to be left to port, starboard or force the optimal route to go to the mark. Expedition's router will accurately follow the instructions for each waypoint/mark. This feature can also be used to

avoid optimal routing scenarios that route over land by placing some interim waypoints in your route.

Reverse Isochrones

When selected, reverse isochrones are also drawn. This is a very useful tool for studying the sensitivity of a calculated optimal route. Reverse Isochrones use fancy math to work the optimal route backwards through the GRIB fields from finish to start. When displayed concurrently with forward isochrones you can more easily see the moments in a race when a particular side of the route is especially good or bad.

Reverse isochrones are lines of points equidistant in time from the finish whereas isochrones are lines of points equidistant in time from the start. So, if another boat is on the same reverse isochrone as you, they should finish at the same time. Thus, the reverse isochrones can be used as a way of seeing who is ahead.

However, their main use is in analysing the optimal route. The problem with the computer, is that (for example) when going upwind, it will reward a half degree right shift with an optimal route that goes all the way to the right hand side of the, when in fact it doesn't really matter where you go (and a prudent tactician might be more inclined to play the shifts going up the middle of the route).

To get an idea of how critical the optimal route is, have a look at how parallel the forward and reverse isochrones are. You will see that there is a reverse isochrone that animates as well. When you step forward along the optimal path using the forward or reverse buttons on the weather display panel, the forward and reverse isochrones for the display time will be highlighted. If they are close together and parallel over a large distance along their length, then the optimal route isn't very critical, but if they are only close together over a small distance (i.e. have convex or nose shapes pointing at each other), then the optimal route is much more critical. In this instance a prudent navigator would need to have good reason to deviate much from this critical point. Another example is where the forward and reverse isochrones come close together in two different places, but in one you are 10 seconds ahead. The computer is going to suggest a track through the area that puts you 10 seconds ahead, whereas both routes are probably relevant. And you might have good reason to want to take the 10 second slower option if the slightly faster one passes closer to a high pressure ridge with big swells.

The optimal route table

Available from the Optimal panel.

Displays a summary or meteogram of each route optimisation.

This table displays many details about each step of the optimised route. The number of entries (rows) in this table is a function of the length of the route and the resolution that you configured in the [optimal routing settings](#) tab.

The table can be used when studying predicted wind speeds and angles in order to plan sail selection.

The optimal route can be exported to a .gpx or .csv files. It can also be exported to Expedition's mark database.

Important note

If any TWA value is in parentheses, for example (-12), then Exp has tacked or gybed for that part of the optimal route.
Sometimes this might be one tack or gybe, but in other cases it might mean staying in a lane of stronger wind for example.

These will also be displayed as dashed lines on the chart.

Common errors

GRIB problem

The GRIB file does not cover the correct time span or geographic range. Check by displaying

'Wind' in the GRIB file and animate it to confirm its time span and geographic range (See the help on weather for more information).

Route problem

Something is wrong with your route. Maybe the wrong route is selected or the wrong destination mark is selected as active.

Polar problem

Something is wrong with your polar file or you have no polar file loaded. See the help on polars for more information.

Optimal Routing setup problem

Something is wrong in your configuration of the optimal routing settings tab. The most common errors are:

Incorrect Start Time entered (make sure you know the time zone Expedition is using). The start time and finish time should fall within the time span covered by the GRIB.

The resolution is set too low, resulting in the route optimisation taking too long.

Polars

Available from the sail panel or the Ctrl+P keyboard shortcut.

There is support for performance, navigation, start and heel polars in Expedition and each has a dedicated tab.

For details on the file format, see the bottom of this page.

In addition to the pre-defined polars listed below, there are several custom polars. These can be used for parameters such as keel angle. In this case, they would generate polar keel and and polar keel angle %.

Performance polar

Expedition uses the Performance polar when calculating performance numbers - such and Polar Bsp and Polar Bsp%.

Navigation polar

This is the main polar used by Expedition. The Nav polar is used in optimal routing and all navigation calculations.

Being able to modify just the navigation polar to suit different conditions means the performance polar

can be left to provide the same reference from day to day.

Of course, you may just wish to use the same polar file for the navigation and performance numbers.

Start polar

The start polar drives Expedition's starting line program (which features such valuable tools as *time to burn*) so if you plan on using that feature, you will want to enter a starting polar. If you are always doing upwind starts, then you can simply use the same text file as the performance polar. If you are doing downwind starts, you might want to modify this file and slow down the polar points at the angles where the polar assumes you have a spinnaker set.

Heel polar

If entered, it allows you to use Expedition's *Target heel* number which has proved quite useful

Port polar
Starboard polar

Can be used in optimal routing with the Use port and starboard asymmetric polars option selected.

Database tab

Use the Database page to add, delete or edit items in the database, which is selected from the user settings page. These items are used to identify your boat's configuration (i.e. helmsman etc.) when a test is saved in Strip Chart. The boats list used in race tracking may also be edited here, but is more easily edited from the Boats item on the sail panel.

You can also edit Expedition's database (*.mdb) by opening it in a database program like Microsoft Access.

Sails tab

Edit the sails database attributes

Whether on-board. This is to reduce the number of sail options displayed when setting *events* or *tests*,

Name,

Colour (as plotted in the edit polars window described above),

Sail type,

Any notes or comments.

Polar file details

When Expedition was installed it added some sample polars in the Expedition *polars* folder.

Expedition polars are just text files, so can also be edited in any text editor such as Microsoft Notepad. Users often manipulate the data using Microsoft Excel - just make sure you save them in a *.txt file format. Take note of the format of these polars as any new ones that you create for your boat must be in a similar format.

The Expedition polar format is very versatile. It does however have a few restrictions:

> The first column always contains the Tws values,
>
> Other columns are in pairs of Twa and Bsp (or heel etc),
>
> Twa must increase across a row,
>
> Tws must increase downwards,

Normally we set the last column at 180 twa,

For performance, navigation and start polars, Exp automatically determines which point is the target (maximum upwind or downwind vmg),

Comments may be used in the polar file by adding a '!' character at the start of each comment line. Note that these comments aren't saved by Exp, so are only useful if you only edit your polars manually.

There is no limit to the number of rows (True Wind Speed) or columns (True Wind Angle) that you can have in your polar, but you may find it easier to work witha simple polar like the sample ones.

Polar percentage (%)

This allows the polar to be scaled by any value. The default value is 100.

Polar percentage night (%)

This allows the polar to be scaled by any value between civil dusk and dawn. The default value is 100.

This could be useful for route optimisation if the performance is expected to be slower at night.

Load

This allows you to load a polar file (in *.txt format) from anywhere on your computer.

Save and Save As

These buttons allow you to save changes/edits that you have made to a polar file. It is highly recommended that you use *Save As* so you do not overwrite a valuable polar file.

Comments may be used in the polar file by adding a '!' character at the start of each comment line. Note that these comments aren't saved by Exp, so are only useful if you only edit your polars manually.

Converting from 10m to masthead height

Many boat designer's polars are given for 10m winds, so the polars may need scaling. See *Scale winds* in the weather settings help for a formula to assist with this.

Edit button

Displays an edit polar dialog, which allows the polar to be graphically edited by simply dragging polar points.

Important note:

Targets are defined as the point on a polar curve with the maximum VMG upwind or downwind. Editing a target point can cause it to have a lower VMG value than an adjacent point, which would then become the new target and be the displayed in the up-wind and down-wind curves (below).

For this reason, not having polar points too close to the targets can make editing a lot easier.

For example, if the target angle is 46, consider using TWA values of 0, 46, 60 … instead of 0, 46, 50, 60, …

Editing polars

Different views of the polar and target data are available:

Polar

Display polar curves on the familiar polar diagram. Select a polar curve for any wind-speed using the wind-speed drop-list on the top right. The polar curves at wind speeds above and below the selected polar curve will also be displayed to aid with editing.

Tws drop-list

This box is only accessible when you are displaying the individual polar curves. Select the wind speed for the polar curve to be displayed.

Upwind

Display upwind target bsp, twa and vmg. Select whether to plot tests against bsp, twa or vmg from the drop-list.

Downwind

Display downwind target bsp, twa and vmg. Select whether to plot tests

against bsp, twa or vmg from the drop-list.

Log file

Extracts data from a log file to over-lay on the polar, similarly to tests.

Tests

Displays test data stored in the database for selection to plot on the polar edit window or exporting from Expedition. Tests to be displayed on the polar can be selected.

To edit the target upwind/downwind polar points, select the upwind or downwind buttons for display. To edit reaching polar points, select the polar button. If you select the latter, then the drop down window on the upper right shows which wind speed polar curve is being displayed and allows you to move through the wind speed matrix to get to the curve or curves you want to edit.

For Upwind, Downwind and Polar radial editing, the Black line is boat speed, the Blue line is TWA, and the Grey line is the calculated VMG.

Tests saved from Stripchart will be displayed here.Using this feature you can drag a polar point to the middle of a cluster of tests and have a high degree of confidence that you have improved your polar. There are several controls to modify how these tests are displays:

Normalised

The tests displayed will not be for exactly the wind speed selected in most cases. This attempts to scale the test bsp for to the selected tws.

Colour tests by sail

By default, tests are displayed in red if the test tws less than that of the polar curve being edited and in blue if greater. Selecting this option colours the tests by the colour associated with the sail entered for that test.

If editing upwind or downwind targets, tests are displayed in green if on starboard (twa > 0) or in red if on port (twa < 0). If the Vmg of the test is less than that of the polar curve, the test point will be hollow, else it will be drawn as a solid point.

Race tracking

Available from the *Race tracking* button on the Sail panel.

Race tracking was initially designed for and used very successfully in the 2001-2 Volvo race. It enables you to track longer races that have some sort of position reporting on a regular basis.

See also System files settings.

Interpreting Race Tracking

Once you have entered two position reports, the power of Expedition's race tracking tool becomes more apparent. When you have the race tracking dialog open (race tracking from the Sail panel, you are presented with a lot of information about the race.

Most of the column headings should be obvious.

DMG is distance made good towards the next (selected) mark.

Cor DMG is the distance made good on a corrected time basis. This is a very valuable piece of information, as it may highlight some important corrected time information (e.g. Some smaller/slower boats are making big corrected

time gains on a certain part of the route). As mentioned above some functions like Gain, Brg (bearing) and Rng (range) will be calculated relative to the reference boat.

COG & SOG are derived from successive positions, whereas iCOGand SOG are instrument values if supplied.

DFS is distance from the previous mark.

It is important that the correct route and waypoint are selected as *active* for the *Distance to Finish* and other calculations to be correct.

Scheduler

Expedition can automatically monitor a folder for new position report files in Expedition, Volvo or MaxSea format.

See the scheduler help.

Displaying the track of other boats on the main chart window

There are check boxes to draw Race tracking boat positions and tracks on the display settings tab. If selected, the tracks and/or positions of the fleet will be drawn on the chart. The tracks can also be drawn in bold. The boat positions will be drawn for the current display time (upper left of main chart window). There are 7 different pen colours available.

So if, for example, you have 8 boats with position report entries, boat 17 will be drawn in the same colour and style as boat 1. However, by the time you have 7 boats drawn, your screen may be too cluttered anyway so consider only selecting the important boats (class leaders, your division etc) to plot.

If no boat is designated as the reference boat, position reports will not be plotted on the chart.

Tracking window

Race tracking item on the Sail panel.

After setting up the fleet, use this tool to enter position reports and/or operate Expedition's race tracking features.

Boats

See the Boats help.

Use this to add or boat names, handicaps or start times and whether to plot in the database.

One boat, typically your boat, should be selected as the reference boat. Positions, based on distance to the finish (active mark), as well as ranges and bearings to the other boats are relative to the position of the reference boat. Each boat can have a handicap rating (either a

time correction factor (TCF) or a time on distance factor).

Sync time

Sets Expedition's screen display time to the latest race tracking time.

Schedule time (local) window

Displays the time (in local, computer Windows time zone) of the most recent position report. You can display old position reports/tracking using the drop down box in this window.

Export

Exports tracking to a text file. This is useful for printing out and taking on deck.

Manual

Manual entry of position reports. Select the boat, position and time of the report.

For entering positions, use a format as follows: 12 34.5n 123.4w (you can use as many decimal places as you like). Notice the space between Degrees and Minutes and also between the Latitude and Longitude.

Delete

Deletes any selected/highlighted schedule report - good if you make an error.

View all

Displays all position report entries. This is good for finding an erroneous entry.

Clear all

Clears all position reports.

Import

Import positions from a file. Several formats are supported, selected from the drop-list.

Any position report file can also be imported by dragging it onto the race tracking window.

Expedition

This format has been designed as a generic race position report that is efficient to receive at sea. It requires two files - one for the boat names and one for the actual position reports. Using the boat name file means the boat names don't need to be downloaded with every race position

report. For example, it could be downloaded before a race.

The Expedition format is used by YB Tracking for example.

BoatId.csv

This file contains all the boat names possible in a position report. It can be edited with Microsoft Excel or a text editor and the format is:

id,name[,class,handicap]

1,Samba Pa Ti
2,Morning Light
3,Pendragon
4,…

Scheds_*yymmddhhmm*.csv

This file contains the actual position report. The file can have any name, but if it is in the *Scheds_yymmddhhmm*.csv format, then the time of the position reports need not entered for every boat in the file. This is also useful for differentiating position report files.

Times are in UTC.

The minutes part of the file name is optional. For example, a position report for 1200UTC on the 15th of March 2008 would be.

Scheds_0803151200.csv

or

Scheds_08031512.csv

If used with the scheduler, the first line should be

EXPEDITION

Each line of the position report file represents a position report for an individual boat and can contain various parameters. The format is:

id,latitude,longtitude[,YYMMDDhhmm[ss],cog,sog,twd,tws]

At the very minimum, each line needs to contain a boat id, latitude and longitude. In this case, it is assumed the time will be obtained from the file time.

1,-10.1000,-125.9667
2,-10.1500,-124.2500
3,-10.6833,-124.9333,0803151230,2

Adding a UTC time field after longitude over-rides any time value obtained

from the file name. The time field could be used for all reports or as it the example above, for boat 3 (Pendragon) who has reported 30 minutes later. The seconds part of the time field is optional.

Basic

Imports from a basic text file. The format for the text file required is:

Boat name,UTC date and time, LL LL.LL N,LLL LL.LL W

A degree symbol may be used after the degrees value.

The data & time should be in the format used by your computer.

For example, any of the following work:

Boat,26/11/2007 07:02:00,29 58.40 N,021 26.24 W

Boat,26/11/2007 07:02:00,29 58.40°N,021°26.24 W

Boat,26/11/2007 07:02:00 UTC,29 58.40 N,021 26.24 W

Volvo Ocean Race

If used with the scheduler, the first line should be

POSRELEASE

Imports position reports from a text file in the format used in Volvo Ocean races since 2001/2. The format for the text file required is:

Rank;Boat Name;Latitude;Longitude;DateTimeGroup;WindDirection;WindSpeed
1;TYCO;49,16.74S;017,30.72E;0600;05Aug01;170;18
2;NEWS;49,16.74S;017,30.72E;0600;05Aug01;170;18
3;ILLB;49,16.74S;017,30.72E;0600;05Aug01;170;18

Times in this file should be in UTC.

GPX

Imports GPX <trk> and <trkpt> tracks.

YB Tracking XML

Imports YB Tracking xml data.

MaxSea

If used with the scheduler, the first line should be

POSMAXSEA

Imports position reports from MaxSea text files. The format for the text file required is:

```
rank;boat id;lat;lon;date
time;dtf;log;dmg;point-to-point
1;1;48.2967N;5.0785W;11/28/04
08:10:44;23967.3;0;0;0
2;2;48.1660N;5.2808W;11/28/04
09:06:00;23949.3;18.8;18.8;0.0
3;3;48.1076N;5.3560W;11/28/04
09:28:00;23941.8;26.5;26.5;0.0
4;6;47.5552N;5.5308W;11/28/04
10:18:00;23922.9;45.7;45.7;0.0
5;5;47.3576N;6.2252W;11/28/04
11:40:00;23896.4;73.7;73.7;0.0
6;4;47.1724N;6.4916W;11/28/04
13:10:00;23872.1;99.5;99.5;0.0
```

All information to the right of time is ignored.

Positions are degrees and decimal minutes- dd.mmmm.

Times in this file should be in UTC.

In addition, a file called identifiant.txt (or Id_Maxsea.txt) is required in the same folder as the file(s) to be imported. Its format is:

identifiant	nom
1	VM MATERIAUX
2	VIRBAC-PAPREC
3	AKENA VERANDAS
4	ECOVER
6	HELLOMOTO

◭ Sail chart

See the Sail panel help.

Sail charts

Basic sail chart
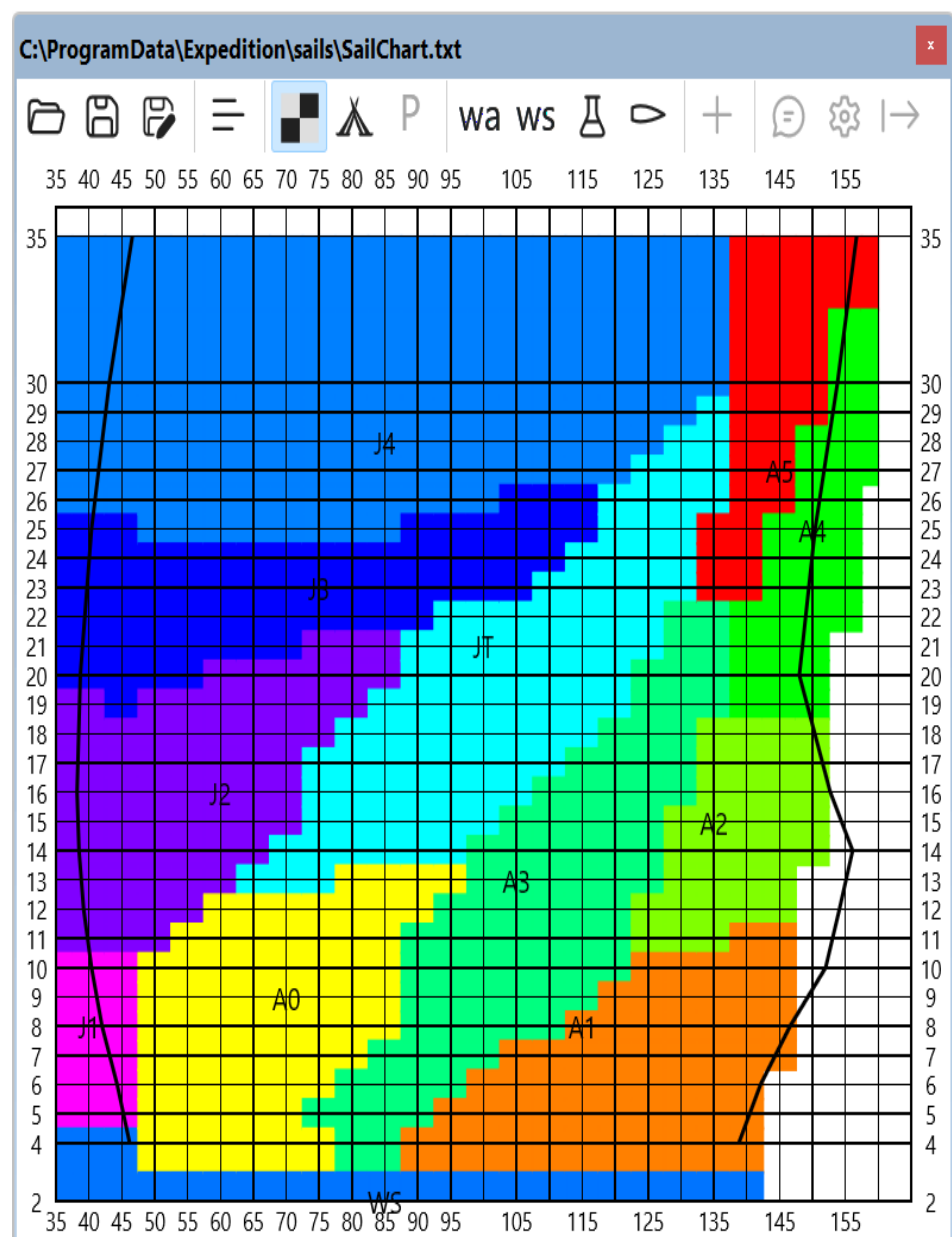
The basic sail chart loaded into Exp can be used for planning

The Route pane will show the sail indicated by the sail chart for each leg of the route.

The optimal routing summary will list the sail indicated by the sail chart for each section of the optimised route.

The current TWA/TWS point is drawn on the sail chart as a circle. Also, TWA to the active mark and next leg are drawn on the sail chart as 'M' and 'N'.

Editing

The format of the sail chart file is a simple text table, with TWA across, TWS down and the name of each sail separated by tabs. See the sample file included with Expedition. The file is also easily editable in Excel. Use the Load and save buttons to select different sail charts.

To edit the sail chart, simply right-click on any cell in the chart window and select the new sail from the pop-up menu.

Sail colours can be changed by clicking on the Sails button or editing the sail list (as above).

Sailing Performance sail chart

Note that this window should be visible for the sails to be used by route optimisation, the route pane and to populate the sail, mark sail and next mark sail channels.

C:\ProgramData\Expedition\sails\KNDSailChart.xml
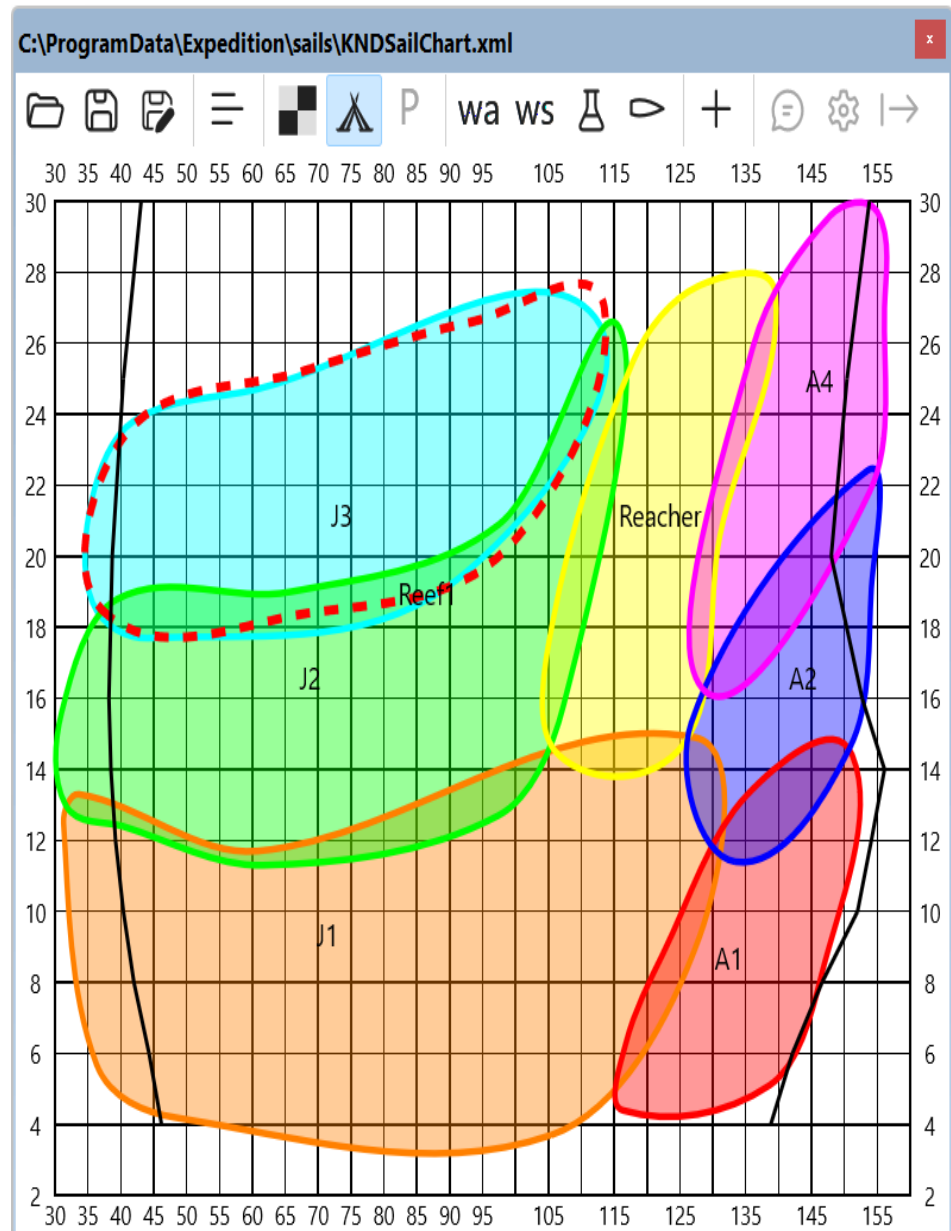
Editing

Limited editing of the sail chart is possible by right-clicking on any sail in the chart window and selecting the appropriate option.

Sail polars

Not currently rendered. For advanced users, also see the sail test analysis help.

Toolbar

Open

Selects a basic or Sailing Performance sail chart to display.

Save & Save As

Saves changes in the basic sail chart.

Sail list

Edit the sail list database

Use

Whether on-board. This is to reduce the number of sail options displayed when editing the sail chart or setting events or tests,

Name,

Colour

Sail type

Select "Other" to not include in the optimal routing filter summary.

Any notes or comments

Basic

Displays the basic sail chart.

Sailing Performance

Displays the Sailing Performance sail chart.

Sail polars

wa & ws

Draw apparent wind curves.

Trails

Draws mark trails on the sail chart This can be useful for confidence.

Tooltip

Sail polars tooltip.

Sail polars settings and export

For advanced users.

Sail graphic

A graphical representation of the boat, sails, mark, wind etc.

See the Expedition windows help.

Sail tests

Saving sail tests

Tests (periods of good, consistent data) are saved using the Stripchart program. Note that saving sail changes as Events in Expedition or Stripchart can make post race creation of tests a lot easier.

Saving tests with Stripchart

See also *Saving tests* and *Events* in the Stripchart help.

Once you have set the wands at desired points in time, you can save the averages of the time span in Expedition's test database. A typical time span for a test would be in the 2 to 5 minute range.

Simply use the Save test to database button to save the averages within the *wanded* time span as a discrete test. A window will open where you can enter or change other test details such as sails or sea state as well as comments before finally saving.

Items such as sails available in the test database can be added to the test (see polars).

Once a test has been saved, that section of time will be shaded grey in Stripchart so you know not to save another test during that time span.

These saved tests are then available for viewing in the tests list and analysis. The tests will also appear as data points in the polar edit window and can be displayed on the sail chart.

Events

Events can be useful to record sail changes or items of interest and can be used to automatically populate sail tests.

There are several ways of saving an event:

- Set event on Expedition's sail ribbon panel
- The Event button on the Stripchart toolbar
- Right-click at a point in time in the Stripchart and select *Set event* from the right click pop-up menu.

Editing the polar

The test points will be displayed on the polar edit window. Note that log file data can also be drawn on the edit polar window, which can be an easier option than manually saving tests.

Editing the sail chart

The sails for each sail chart can be displayed on the sail chart.

Analyse sail tests

With time, the number of tests stored in the database can become very large (hundreds or even thousands of tests) and impossible to manually draw conclusions from. Also, test data varies from day-to-day with changing conditions.

So, Exp has automated functions to automatically draw some statistical conclusions as to what the polar and sail chart should look like based on the saved tests.

These functions perform better with more test data available.

The first tab page in *Sail and speed test analysis* allows test data to be analysed for individual or subsets of sails. For example, all sails A2-1, A2-2 and A2-3 can be selected an the test data for these analysed. For example:

It is a good idea to give the output file a short, descriptive name such as *A2* in the example above as this name will be used in the final sail chart.

Also, this function requires the boat's performance polar to be loaded in Exp.

To actually perform the analysis, just click on the *Process* button. The output is a polar patch file for the sail or sails selected, which will be saved in the *Tests* folder in Expedition's data folder. There is a shortcut to the data folder on the Application button menu.

Repeat the analysis process for all sail types to end up with a collection of polars for each sail type.

On the test page accessed from the *Tests* item on the Sail panel, individual or all tests can be selected to be drawn on the edit polars window. Checking *Only use selected tests* directs Expedition to only use these selected tests in the analysis.

Build polar and sail chart

The second tab page in *Sail and speed test analysis* allows selected analysis files from *Analyse sail tests* to be combined to give a sail chart and polar. Select sail analyses to be used by clicking on *Add analysis files*. Enter an output file name, then click on the *Process* button as in the example below.

In this case, the output files will be labelled with the date. Selecting *Update performance polar when process* directs Expedition to update the performance polar with the analysed polar speeds.

In this example, the output files will be

25 June 2007_polar.txt   *- the analysed polar file*

25 June 2007_Sails.txt   *- the analysed sail chart*

These will be saved in the *Tests* folder in Expedition's data folder. There is a shortcut to the data folder on the Application button.

Note that in most cases, the test data will not be complete for every twa and tws value, so the output polar and sail chart files will probably have missing data. As more tests are included, the output will become more complete.

Sail test analysis

Available from the *Analyse sail tests* item on the Tools panel.
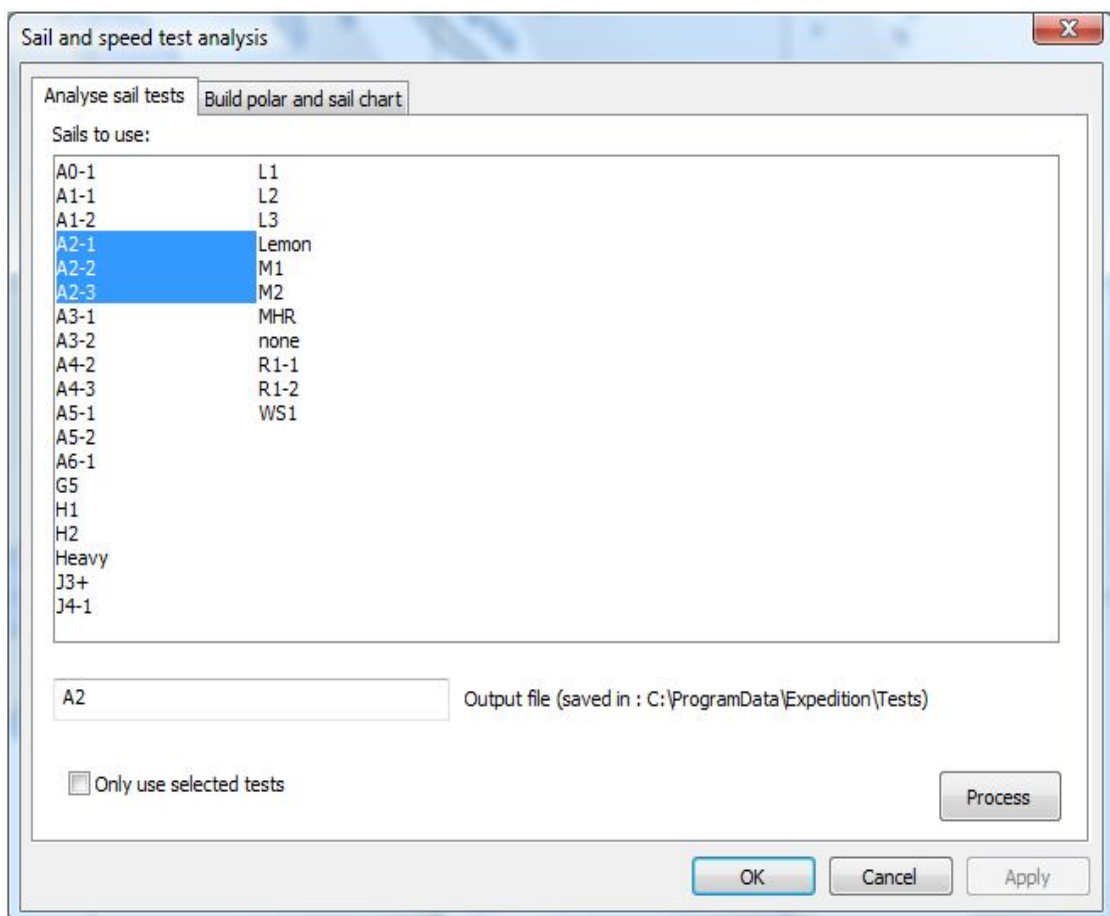
Tests

With time, the number of tests stored in the database can become very large (hundreds or even thousands of tests) and may be hard to manually draw conclusions from. Also, test data varies from day-to-day with changing conditions.

So, Exp has automated functions to automatically draw some statistical conclusions as to what the polar and sail chart should look like based on the saved tests.

This is a very powerful feature, but does require a lot of work to get the most of it and is really only suitable to expert users with large test databases.

Analyse sail tests

The first tab page in *Sail and speed test analysis* allows test data to be analysed for individual or subsets of sails. For example, all sails A2-1, A2-2 and A2-3 can be selected an the test data for these analysed. For example:

It is a good idea to give the output file a short, descriptive name such as *A2* in the example above as this name will be used in the final sail chart.

Also, this function requires the boat's performance polar to be loaded in Exp.
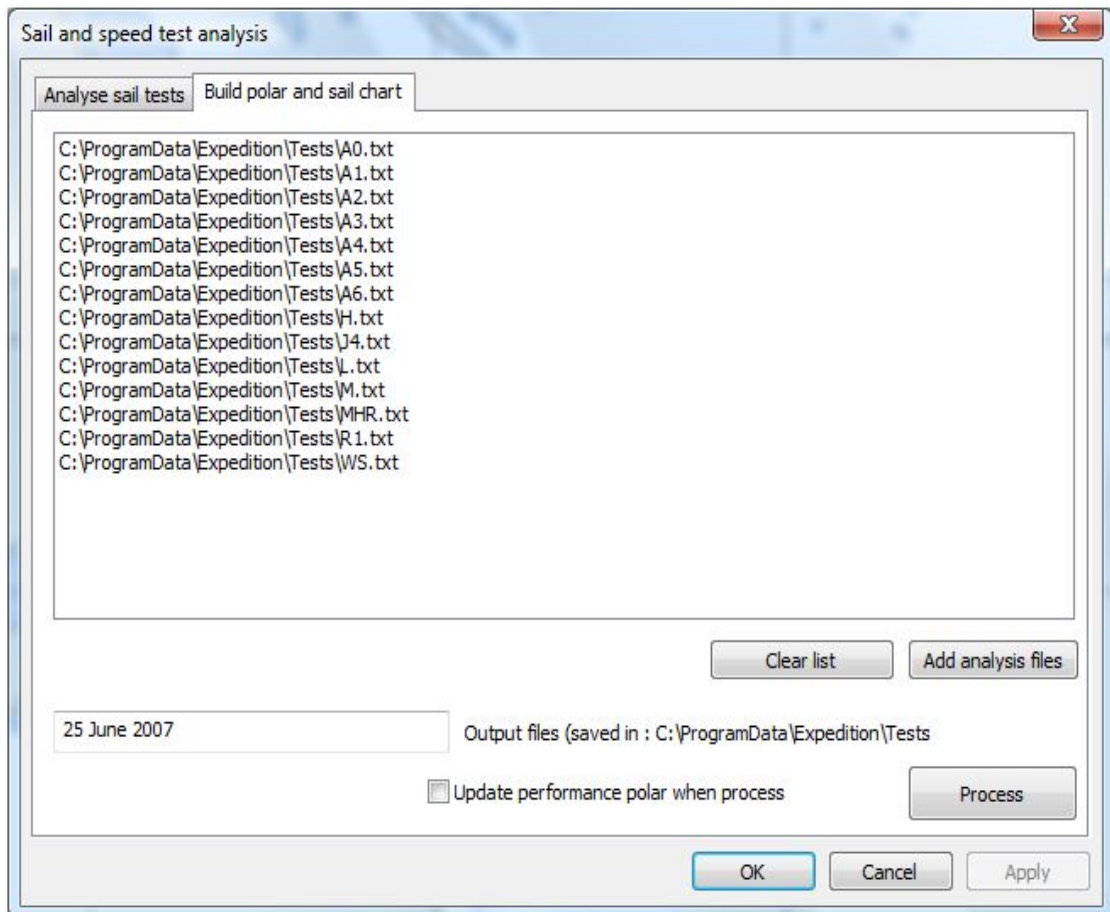
To actually perform the analysis, just click on the *Process* button. The output is a polar patch file for the sail or sails selected, which will be saved in the *Tests* folder in Expedition's data folder. There is a shortcut to the data folder on the Application button menu.

Repeat the analysis process for all sail types to end up with a collection of polars for each sail type.

On the test page accessed from the *Tests* item on the Sail panel, individual or all tests can be selected to be drawn on the edit polars window. Checking *Only use selected*

tests directs Expedition to only use these selected tests in the analysis.

Build polar and sail chart

The second tab page in *Sail and speed test analysis* allows selected analysis files from *Analyse sail tests* to be combined to give a sail chart and polar. Select sail analyses to be used by clicking on *Add analysis files*. Enter an output file name, then click on the *Process* button as in the example below.

In this case, the output files will be labelled with the date. Selecting *Update performance polar when process* directs Expedition to update the performance polar with the analysed polar speeds.

In this example, the output files will be

     25 June 2007_polar.txt   *- the analysed polar file*

     25 June 2007_Sails.txt   *- the analysed sail chart*

These will be saved in the *Tests* folder in Expedition's data folder. There is a shortcut to the data folder on the Application button.

Note that in most cases, the test data will not be complete for every twa and tws value, so the output polar and sail chart files will probably have missing data. As more tests are included, the output will become more complete.

YB Tracking

Available from the YB Tracking button on the Sail panel.

Web

www.ybtracking.com

About

YB Tracking is the global standard in fleet tracking for yacht races.

YB Tracking provides position reports as small text for download at sea. This makes tracking your competition easy with Expedition's race tracking feature.

For each race, the organisers may publish a link to the position report files. As an example, for the 2014 Rolex Middle Sea race, the link is

http://yb.tl/links/rmsr2014

Integrated download and import

The YB Tracking button on the sail panel will download the positions, import them into Exp's database and update the display with one click.

Race name

You must enter the supplied the race name. For example, this is rmsr2014 for the 2014 Rolex Middle Sea race. The race id is listed on the file links web page, in this case http://yb.tl/links/rmsr2014.

Update BoatIds

Downloads the boatids.txt file. This may only need to be downloaded once for each race and is normally not downloaded to save data.

Update display time

Sets the Expedition display time to the time in the downloaded position report.

Archive position file

Saves a copy of the position file.

API for multiple positions

Used to download a user-defined number of past positions. This is a much larger download, but also includes GPS SOG and COG.

Two options are provided JSON and XML. The JSON format replaces the XML format. The XML format can have issues with non utf-8 boat names.

Airmail

Instructs Airmail to request position report files.

Saildocs

Creates an email request to Saildocs in the default email client.

Manual download and import

Downloaded files may be manually imported with Expedition's race tracking import interface.

The YB Tracking web page example above provides links to positions in various formats. To manually import YB Tracking data, you need the two files:

http://yb.tl/rmsr2014-expedition.txt http://yb.tl/rmsr2014-boatids.txt

What if?

Can be toggled on and off from the Window menu.

What-if? is a user definable wind and current value for use in certain calculations. This is a powerful tool for tacticians and navigators.

For example, a navigator might be expecting a 10° wind shift to the left (from 270 instead of 280) and want to see where the laylines would be with the new wind direction in order to avoid sailing extra distance.

If the What-if? true wind speed is zero, Exp will use the instrument tws value.

Note that What-if? is slightly different in Exp than in Deckman, which uses ground wind as an input whereas Exp uses true wind direction and speed.

Start

Expedition has some very powerful start functions and displays, but these do require some advanced user input to use them to their full potential.

Race display

This is an un-cluttered display mode with no charting and scaled to fit the start line or course to the screen.

After the start, it will display the active mark and the boat. See the start and chart panels help.

Both ends of the line as well as boat position are required for the start screen to be displayed.

See race settings for more options, including the option to specify the display state used before and after the start.

Events

Events are automatically set in the database when pinging start marks and at the gun.

In the prestart

The start line is displayed with the port end to the left of the screen and the starboard end to the right.

The current heading is drawn as a thin blue line.

The GPS derived course of the ground is drawn as a solid blue line.

The boat track will be drawn if selected on the display settings page. This can be very useful to reposition start marks if you sail around them.

Laylines are drawn from each end of the line.

The time to each end is drawn at that end and at the top corner. The to burn to the corner is immediately below it.

A bias line is drawn above the start line, indicating the favoured end. In the example below, the starboard end is favoured. The bias angle, length and line square wind are also displayed at the bottom right.

If wind or current is held, they will be displayed at the bottom of the screen. See the start panel help.

Turns to beat (or run) to the line are drawn as thin black lines. Note that some turns aren't drawn in order to keep the display uncluttered.

Many of these items stop being displayed 1 minute after the start to reduce screen clutter. At this point, only part of the line may be drawn.

Expedition draws numbers on the start line for times to the ends, the line etc. Clicking on the *time to burn* button on the start panel makes these numbers *time to burn* numbers instead of actual times.

Selecting the *Display times* button on the start panel can reduce the number of these on screen numbers.

Time to gun, time to burn and distance below the line are displayed at the top centre of the screen. After the gun, the distance above or below the line will also be displayed.

The bar on the left is a graphic indicator that shows time to burn.

The dot and time shown below is the time to burn after sailing to and turning onto the starboard end layline. The time below the start mark is defined on the race settings page.
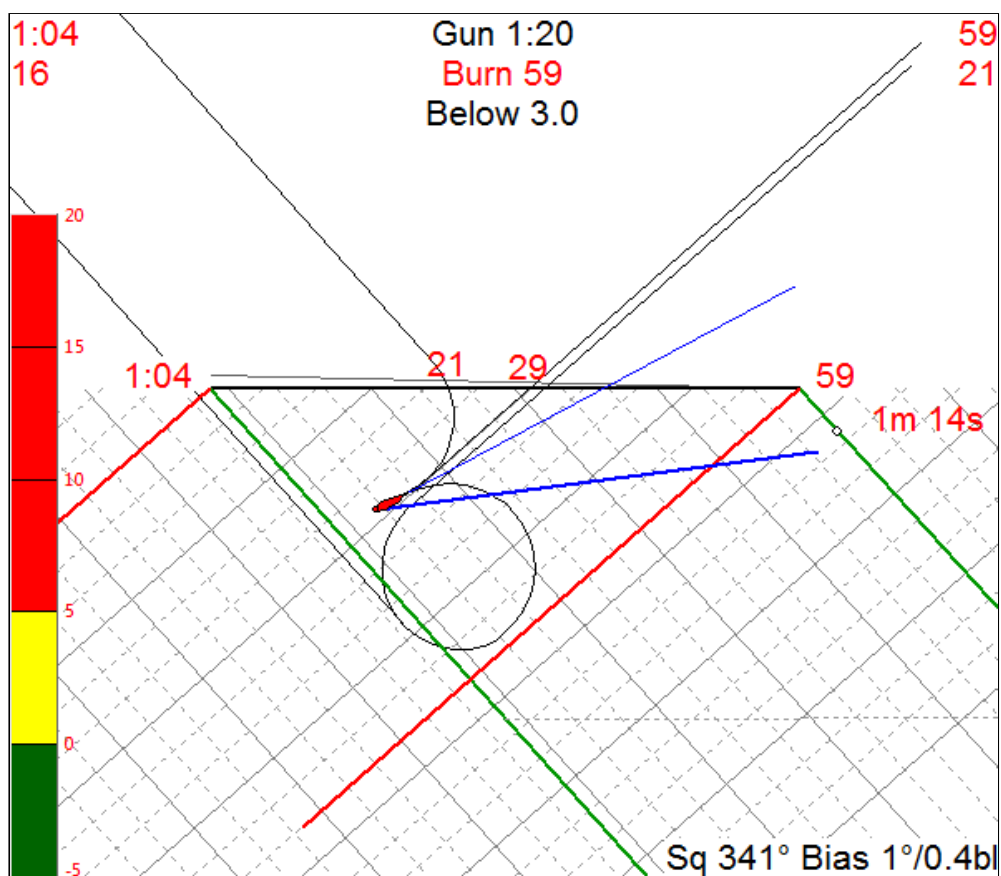
Race and Start settings

Race options

Options used when racing (eg to a mark).

Use rate of turn in laylines

If this option is selected, Exp will include the time and distance to turn to the opposite tack or gybe when calculating laylines. This is based on the rate of turn calibration table.

Time and distance to each layline will be to the start of the tack or gybe.

Countdown past laylines

Exp can display negative numbers when past the layline. This can be useful to see how far past the layline the boat is. If unchecked, the times are set to zero when past the layline.

Race and start options

Options used in both the start and racing to a mark.

Ping marks at bow (else GPS)

The default option when pinging a start (or other) mark is to set the mark at the bow. This assumes the distance between the GPS and the bow is entered correctly as below. If this is de-selected, the mark is assumed to be at the GPS.

Start display

Options to determine items displayed on the start screen.

Grid

Draws a grid with increments of the boat length on the start display.

Boat length circles

Draws range circles in increments of the boat length on the start display.

Track

For clarity, there is an option to not draw the track in the start display.

Time to burn graphic

See the start help.

Starboard layline time to burn offset

Time down the starboard layline to the starboard end for time to burn to this point. See above and the start help.

Magnify line

If close to one end of the line, will magnify the start line to show the boat and that end of the line.

Show gybe

Shows more circle options in the start.

Predictor lines

Display heading, course and cog predictor lines.

Start settings

Mode options.

Switch to race state and chart at gun + 10s

Instructs Expedition to switch to the race display state and the last chart display at 10s after the gun.

Switch to race state and display at gun + 10s

Instructs Expedition to switch to the race display state and race chart at 10s after the gun.

Release held wind and current at gun

Deselects held wind and current values.

Switch to start display when set timer

…

Start time to line options

Select which numbers to use for time to the line and thus time to burn.

Expedition will use the minimum of the selected time values to determine the time to the line.

In a windward/leeward racing scenario, possibly just the starboard layline times to the line are desired. Add port layline approaches, reaching times, times to the ends as needed.

Time to line ends

Include times to port and starboard ends of the line.

GPS time to line

Include time to the line based on GPS COG and SOG.

Reaching time to line

Include the reaching time to the line.

Port layline times

Starboard layline times

Include times on upwind or downwind laylines to the line, including any tacks or gybes required.

Boat

To obtain maximum benefit from Expedition's starting tools, there are several things that are needed to describe the boat.

Boat length

The overall length (in metres) of your boat for proper scaling ofExpedition's distance measurements.

Expedition uses the boat length to present various numbers in boat lengths. The desired units are selected on the user settings page. Note that if you have nautical miles as the default units, most start distances will still be displayed in *boat lengths*.

Bow to GPS

The distance (in metres) from the bow to the GPS antenna. The distance from the GPS to the bow is required for precise calculation of time and distance to the line. This will fine tune the distance and time to start line calculations.

Boat width

Boat width in metres.

GPS offset

For multi-hulls, not actually used anywhere in Exp.

Start

Roll

Start timer roll. Defaults to 5 minutes. See the start panel.

Twa & tws damping
Set & drift damping

Allows longer system damping of these instrument inputs during the prestart. Expedition will use the larger of these vaues or the normal system damping values.

Reverts to the normal system damping values at the gun.

Starboard layline time to burn offset

Time down the starboard layline to the starboard end for time to burn to this point. See below and the start help.

Start calibration values

Shortcut to calibration values used by Expedition.

Also available from the Application menu.

Rate of turn and acceleration are always on, else the time to the line functions can not work.

Rate of turn

Set in the calibration section. Units are degrees per second and are a function of boat speed.

Acceleration

Set in the calibration section. Units are knots per minute and are a function of true wind speed and true wind angle. If you only have one wind angle in the cal file, then it will just be a function of tws.

Often the boat's speed will be less than target speed at any point in the pre-start. Expedition allows for acceleration when calculating time and distance to the line.

Braking

Set in the calibration section. Units are seconds to stop as a function of rate of turn.

This is optional and the default is off.

Setting the start line

There are several ways to create and modify a start line.

See the help on the Start panel.

See the help on the right-click pop-up menu.

Start marks are just like any other mark. They can drag them with the pointer after clicking on them (if they are unlocked). They can be manually edited. See the marks help for more information.

The right-click pop-up menu can be used to create start marks or to select an existing mark as a start mark. Note that to select an existing mark, it must be displayed on the screen - it must be part of the *active route* or be set to *always drawn*.

Start numbers

See Appendix A.

Note that start distance units are set on the system settings page.

Calibration

Expedition's calibration functions are accessed from the Application menu or the relevant instrument page.

In most cases, the calibration functions will not be used. The common exceptions to this are the rate of turn and acceleration values that are necessary for start calculations. In higher end systems (for example B&G, Bravo, Cosworth and Ockam), the instrument system will perform calibration functions.

Calibrations types can either be single value or tables of calibration values. See below for details for each calibration parameter.

Load and save calibration data using the *Load* and *Save* buttons to as text files in Expedition's config folder (in the data folder). The calibration values can either be edited from this dialog window or the calibration file may be edited directly, using any text editor.

Note that Expedition will store raw instrument values of Bsp, Twa and Tws in their own channels, which are logged and can be useful for later analysis.

Calibrations

The checkboxes with each value control whether that value will be calibrated by Expedition.

Some of these calibration tables are single values, others can be tables of numbers.

Interpolation of values uses a smooth spline technique by default. Linear interpolation is also an option.

Start calibrations

Used in start calculations to fine tune the time to the starting line.

Rate of turn and acceleration are always on, else the time to the line functions can not work.

Rate of turn

Table of values. Bsp across the table. Units are degrees per second.

One trick I do is adjust the cal values so the circles on the start display are about the same size as circles on the track.

Rate of turn can also be used to more accurately calculate time and distance to laylines.

The Rate of Turn calibration is the most important calibration for starting numbers.

Acceleration

Table of values. Tws across and twa down the table. Units are knots per minute.

Only one row is needed - most users will just have one row in the table and ignore any TWA dependence.

Expedition has sample values, but it is easy to measure values using Stripchart. Slow to half speed or stop the boat, sheet on and measure how long it takes to accelerate to full speed and calculate this real acceleration value in knots per minute.

Once the boat reaches its polar speed (say 7.5 knots), Expedition will not assume further acceleration.

Braking

Table of values of time to stop in seconds. Rate of turn across.

Models the braking effect of turning, but is mostly not necessary.

The default setting is off.

Data calibrations

Heel (roll)

Table of added value corrections, heel across the table. Roll is positive to starboard (sailing on port).

Trim (pitch)

Table of added value corrections, trim across the table. Bow up pitch is positive.

Mast angle

Table of added value corrections, mast angle across the table.

Rudder angle

Table of added value corrections, rudder angle across the table.

Bsp

Table of added values. Bsp across and heel down the table.

Most users will just have one row in the table and ignore any heel dependence.

Aws

Table of added value corrections to correct for aws errors. Awa across and aws down the table.

For advanced users only.

The AWS cal is added to aws (aws = cal + aws_{raw}).

Twa

Table of added value corrections. Twa across and tws down the table.

Twa and Tws calibration tables are different from other calibration tables in that the default format is similar to the Expedition polar format.

Tws

Table of added value corrections. Twa across and tws down the table. Generally negative numbers as want to subtract from tws.

Heading

Normally a single calibration value to correct for compass installation errors, but could be a table dependent on heading.

Leeway

Often a single calibration value, but could be a table dependent on Twa across and tws down the table.

Expedition uses the same equation as used by systems such as Ockam and B&G to estimate leeway. The calibration values are leeway coefficient(s), k, such that

$$\text{Leeway} = k \cdot {}^{heel} / {}_{bsp^2}$$

The hard part is estimating the value of the coefficient, k. In practice we bias k to upwind sailing as the leeway is larger and more important upwind. For many purposes a value of 10 to 12 will suffice.

Because the ideal value of k varies at different angles, Expedition also allows the use of a table of leeway calibration values. These are just the coefficients at different wind angles and speeds.

So, given a VPP from the yacht designer with bsp, heel and leeway, it is relatively easy to generate a corresponding mean value or table of leeway coefficients.

Note that heel and leeway should be +ve on port, see calculations.

Wind weight

Multiplier for polars, default 1.0.

Calibration and your instruments

Depending on the instrument system being used, Expedition may be able to exchange calibration values with it. In these cases, there will be an extra calibration page available dedicated to exchanging information with the instrument system.

Instruments

Available from the Instruments button on the
Applications menu or the Ctrl-i keyboard shortcut.

Expedition can be configured to talk to all the main types
of instrument systems, either via a network (ethernet or
wireless) or a serial connection. Expedition will
automatically detect available serial ports on your
computer and they will be listed on the left side the
window. Select the page for the appropriate serial port or
network connection and proceed with the configuration
described for your individual instrument system.

Non-WGS84 charts are automatically corrected by
Expedition to the WGS84 datum where possible. For this
reason, it is generally preferable to use the WGS84
datum in your GPS or other position fixing device.

The common functions are described below. Depending
on the instrument system selected, different options will
be available on this page and from the *System* button.

GPS Source

Boats can have GPS data available from multiple
sorces - Instruments, AIS, Backup, NMEA 2000 etc.

Generally only one should be used at a time.

The GPS tab on the instruments window allows the desired source to be selected.

Also available from the Instruments menu on Expedition's System menu or Ctrl-G

User command

This box, although not commonly used, allows you to send a command to the instrument system. Beware of what you send!

Reconnect

Can be useful to pick up a dropped network connection, especially wireless.

Wake

Some instrument systems, need to be instructed what data to send by Expedition. Normally, this happens automatically but, if desired, this button forces all the wake-up commands to be immediately re-sent to the instruments.

Raw data

Displays data being received from the instruments. This can be very useful for tracing instrument connectivity problems. Use the *Export incoming data* button to save the incoming data to a text file.

System

Opens an interface specific for the instrument system selected on this page.

Broadcast

Forwards received data as a UDP broadcast to a port.

This is one method of sharing data from one source between different programs on the same or different computers.

For example, Expedition could receive AIS data and forward the same data stream to B&G Deckman software.

GPS Source

Boats can have GPS data available from multiple sorces - Instruments, AIS, Backup, NMEA 2000 etc.

Generally only one should be used at a time.

Interface

Avaliable from the Instruments menu on Expedition's System menu.

Also available on from the Instrument connection interface.

Ctrl-G keyboard short-cut.

Notes

This only feature only applies to Boat zero.

GPS data is available from most instrument systems. However, there are certain advantages (precision, timeliness and range of data available) to receiving the GPS position fix directly from its NMEA output rather than from your boat's instrument system.

It is recommended that any NMEA 0183 GPS data is sent to Expedition as NMEA 0183 v2.0 or higher rather than NMEA 0183 v1.5.

Example

GPS data may be available from each of the AIS, NMEA and B&G H5000 connections.

In this example, Expedition is using the NMEA feed on Com 4 for GPS data.

GPS ✕

GPS Source to use

Currently selected: Com 4, USB Serial Port, NMEA 0183

→ Com 2
    NMEA 0183 AIS

→ Com 4
    USB Serial Port, NMEA 0183

→ Network 0
    B&G H5000 WebSocket

→ Cosworth

→ Dfw

→ Expedition DLL

→ Garmin

→ Windows sensors

→ Cancel

Calculations

Expedition's calculation functions are accessed from the Instruments item on the Application button, the relevant instrument page.

In most cases, the calculation functions will not be used.

Calculate

Leeway from heel and bsp
Leeway from bsp components
Pitch and roll rates
Set and drift

ROT limit for current calculations sets an upper limit at which the current set and drift will be calculated. For example, you don't want to calculate current during a tack.

Twa & Tws
Twd
Yaw rate (ROT)

The checkboxes on the left of the Expedition calibration page control the calculation of various parameters.

For example, if *Twa* is selected, it will be calculated from Aws, Awa, Bsp etc. If not selected, Expedition will use the value received from the instruments. This is useful if your instruments don't send some values.

Mostly, these options should not be checked, but it may be desired in cases where the instrument systems doesn't send all data.

If using LogPlayer, these should all be de-selected.

Notes:

Leeway from bsp components is not often used and is currently only available if NMEA 2000 PGN 130578 data is available.

Yaw rate calculation is not recommended if ROT is available from the instruments.

NMEA 2000

Many NMEA 2000 systems do not send TWA, TWS or TWD, so these need to be calculated by Expedition.

Nexus

If Expedition is connected to the Silva NX2 Sail Performance program rather than directly to the instruments, TWA, TWS and TWD may need to be calculated by Expedition.

Nexus FDX apparent wind speed and direction
are already corrected for heel if available, so do
not select this option with Nexus instruments.

Tactick

TWD may need to be calculated by Expedition.

KVH Quadro

TWA and TWS may need to be calculated by
Expedition.

Options

Correct for heel

Heel affects the apparent wind measurement.

Nexus FDX apparent wind speed and direction
are already corrected for heel if available, so do
not select this option with Nexus instruments.

Use pitch and roll rates

Corrects AWA and AWS for the motion of the
masthead.

Use SOG as Bsp

Use SOG instead of Bsp in wind calculations,
polar bsp%, target bsp% and start calculations.

Use COG as Hdg

Exp can use COG in wind calculations, polar bsp%, target bsp% and start calculations.

Notes on sign of data

Expedition uses the standard sign conventions, as below.

Twa & awa

Positive on starboard, negative on port.

Trim (pitch)

Bow up pitch is positive.

Heel (roll)

Roll is positive to starboard (sailing on port).

Leeway

Leeway is normally signed so clock-wise leeway is positive, thus leeway is > 0 on port.

course = heading + leeway

Thus

leeway ~ k . heel / bsp^2

Serial ports

Available from the Instruments item on the Application button menu or the ctrl-i key stroke.

RS-422 and RS-232

Most PC serial ports use RS-232 whereas NMEA 0183, B&G 5000 etc use the RS-422 electrical standard.

It is normally best to use a USB to RS422 adaptor rather than a low cost RS232 to USB adaptor. An RS422-RS232 convertor is an option for existing RS232 ports.

See the Expedition instruments web page for USB-RS422 adaptors. A common solution is the Actisense USG-1.

This overcomes issues associated with ground loops and the different electrical standards.

Different electrical standards

The RS232 standard as used by the PC uses ground and receive to get data from a connected system. Data is sent as voltages referenced to ground on a single transmit line. This type of drive is known as single-ended.

NMEA 0183 uses a differential system, with positive and negative data connections.

Ground loops

These occur when using a standard USB to serial converter or a RS232 port as the ground of the PC is then shared with the NMEA 0183 system ground, which may be different.

When the PC and the NMEA 0183 system have different grounds, data can be corrupted and damage can occur to the PC and/or NMEA device in extreme cases.

Instruments, baud rate etc. settings

Select the appropriate instrument type, serial port settings (baud rate etc.) and the boat to which the incoming data will be mapped. Most users will only want to map data to boat zero and throughout this help file we assume the system is set at Boat 0.

When you select an instrument system, Expedition sets the default settings that usually are best for that system.

DB9 pins

1 Received Line Signal Detector (Data Carrier Detect)

2 Received Data

3 Transmit Data

4 Data Terminal Ready

5 Signal Ground

6 Data Set Ready

7 Request To Send

8 Clear To Send

9 Ring Indicator

Networking

Available from the Instruments item on the Application menu or the ctrl-i key stroke.

Expedition can exchange data with instances Expedition on other computers or to any supported instrument system over a network using TCP, UDP or Websocket network protocols.

For data streaming, UDP is generally preferred. Websocket is used for connections to B&G H5000.

By default, Expedition has no network connections available. If one or more network connections are required, this can be set with the Number of network connections item from the Instruments item on the Application button menu.

Receiving instrument data

Notes

It may be necessary to set Windows' firewall to enable both Public and Private networks for Expedition, epecially for UDP connections.

NMEA has registered port 10110 for NMEA 0183 over UDP and TCP.

On a Network page

Select the instrument system to exchange data with and the port to connect to.

Expedition will automatically select default settings for each instrument system.

The port should be between 1024 and 65535. Ports below this are assigned for common services, so shouldn't be used.

TCP client

Enter the address and port number of the server computer (eg. 192.168.1.128 port 5242).

UDP

Some systems (Ockam and Onboard Assistant) require data to be sent to a port one greater than the Rx port.

UDP to IP address

The UDP to IP address options allows Exp to send data to a specific IP address (for example, Koden radar).

Enter the port number and network address (eg. 192.168.0.1 port 10001) to

send to.

UDP Broadcast note

The default Microsoft solution broadcasts to 255.255.255.255, but this may not the best option for sending UDP broadcasts as some routers/firewalls block it unless configured otherwise.

A better option is to use the NIC's actual subnet broadcast IP instead.

For example, if a UDP socket is bound to local IP 192.168.0.1 with a subnet mask of 255.255.255.0, then the broadcast IP for that subnet is 192.168.0.255.

Note that the default x.x.x.255 is just the first address Exp finds - it may not be what you want.

Common connection scenarios

1. Ethernet, connecting the two computers through a router,

2. Ethernet, connecting the two computers directly using a cross-over cable,

3. Wireless, using a wireless DHCP access point,

4. Wireless, using an ad-hoc network.

In cases 2 and 4, you need to give each of the two computers their unique IP address. For example, set the IP addresses to 192.169.0.1 and 192.169.0.2 and the subnet mask on each computer to 255.255.255.0

For cases 3 and 4, you also need to set up the wireless connection. Assuming a wreless system, you need to set the network wireless mode to infrastructure for case 3 or to Ad-hoc for case 4. You also need to make the SSID (e.g. default), the channel (e.g. 6) and the transmit rate (e.g. 11 Mbps) the same on all devices.

This is very brief and it is a good idea to read your manuals. The main disadvantage with an Ad-hoc network is that it is point-to-point - if you want more computers listening to the host computer, you need to use an Access point.

Sharing data between computers

Note that you should not select the same item to be both sent and received on the same PC.

Broadcasting data to Expedition on other computers

Expedition can broadcast selected data to other computers on your local network using UDP.

On a Network page,

Select Expedition from the instrument drop-list.

Select UDP or UDP to IP address as the connection type,

Select a port between 1024 and 65535 to broadcast to. Ports below this are assigned for common services, so you shouldn't use these.

From the System button, select the desired Expedition channels to broadcast on the Expedition output filter page.

See also Slave mode.

Receiving broadcast data

To receive Expedition data broadcast by another PC.

On a Network page,

Select Expedition from the instrument drop-list,

Select UDP as the connection type,

Select a port to receive data on. This is the port number as set above to broadcast the data on.

From the System button, select the desired Expedition channels to receive on the

Expedition input filter page.

Expedition data exchange between specific computers

Expedition data can also be exchanged between any two computers rather than the whole network.

On a Network page,

Select Expedition from the instrument drop-list,

If using UDP (recommended), the sending computer can be set to send data to the IP address of the receiving computer,

If using TCP, one computer should be set as the TCP server and the other as a TCP client. The server listens for a connection request from the client. The IP address of the server needs to be entered on the client computer network page.

Select a port to receive and send data on.

From the System button, select the desired Expedition channels to send and receive.

Windows sensors

At present, this interface only enables GPS data to be used by Expedition, but other data and sensors can be added as needed.

AIS

AIS is a shipboard broadcast system operating in the VHF maritime band that is capable of handling well over 4,500 reports per minute and updates as often as every two seconds. The system coverage range is similar to other VHF applications.

Expedition can read and decode AIS messages from most standard AIS receivers.

AIS targets may be drawn on the chart significantly more accurately that with ARPA/MARPA radar target plotting. Expedition can also calculate the distance and time to the point of intersection with each AIS target.

Expedition can also display AIS-SART messages.

Instruments, baud rate etc. settings

The default AIS serial port settings are 38400, 8, N, 1.

Baud rate	38400
Data bits	8
Parity	None
Stop bits	1

Connecting an AIS device to the PC's RS232 serial port

Most computers have a 9 pin serial port or can use a USB-serial port adaptor if lacking a serial port.

DB9 pin	PC	AIS device
2	Receive data +ve	AIS device output +ve
3	Transmit data +ve	AIS device input +ve
5	Signal ground	Signal ground

NMEA 2000

Exp can also receive AIS data from a NMEA 2000 source using the Actisense NGT-1 USB adaptor.

AIS Settings

More advanced interface options are available by clicking on this button, also available from the AIS target list window, where double-clicking on the target list toggles the toolbar on and off.

AIS Pane

AIS parameters to display on the AIS pane. The list of attributes of each AIS target that may be

listed include:

MMSI number

Vessel Name

Call sign

Vessel type

Destination,

Navigation status

Safety message

Time since receiving the AIS signal

Range to target

Bearing to target

CoG

SoG

Hdg

Distance from target at closest point of approach (CPA)

Time to closest point of approach

True wind direction

True wind speed

Rate of turn

Position

Vessel dimensions

AIS SART, MOB and EPRIB

Expedition will display the icon for these with the special SART symbol (a red circle with a red cross in it).

In addition, non test messages will be shown as a pop-up notification. In order to save screen clutter, new messages are not displayed until the existing message is cleared.

AIS target to boat mapping

Map a target to an Expedition boat (1 to 7) by MMSI number. This can be useful if tracking a competitor. The cog, sog, range and bearing can then be displayed in number boxes, sent to instrument displays etc.

An AIS target may also be mapped to a boat by right clicking on it and selecting *Map AIS target to boat* from the pop-up menu.

AIS target filter

Ignore Type B

Class B transponders are designed for carriage by sub-SOLAS vessels. With the proliferation of AIS equipped vessels, the

screen may quickly become cluttered. This provides a means to reject these.

Log

Log raw AIS messages in the AisLog folder in the Expedition data folder.

Warn if AIS target enters race note area

Displays a pop-up window if an AIS target enters a race note area with the 'Avoid' flag set. Also writes an entry to the event list in the database.

This also makes the Windows Exclamation sound. To change the default sound, go to the Control panel, Sound, Change system sounds.

MMSI

Enter your boat's MMSI number if sending AIS data so you don't display your own boat.

Filter

Instructs Expedition to not decode data from targets not in \config\AisFilter.csv.

Just a list of MMSI numbers.

Only for specialised use.

CPA filter

Colours the target red (see below) and draw closest point of approach (CPA) for vessels where the CPA is less than the specified time and distance.

Distance between at CPA

The minimum CPA distance.

Time to CPA

Ignore CPA if the time to the CPA is more than this value.

Warnings

If Warnings is selected, a popup warning should show if a target's CPA is less than the filters.

Using AIS with Expedition

Displaying AIS targets on the chart

Received AIS targets as well as their ship name and/or Cog & Sog may be displayed on the

chart. See the display settings help for more details.

Colours:

Red	CPA less than as defined in AIS settings, defaults 30 minutes and 0.5nm
White	no recent position fix received
Green	sog >= 1kt
Yellow	stationary or sog < 1kt

List of AIS targets

Expedition can list the AIS targets in a customisable list, along with time and distance to point of intercept.

This list may be displayed at all times and may be toggled on and off using the AIS from the Window menu.

Individual elements listed may be turned on and off using from the AIS settings page or by clicking on the toolbar on the AIS target list window.

B&G Hydra

H1000, 690, 790, H2000, H3000 and H5000 processors.

Connection settings

Hydra (690, 790, H1000, H2000 & H3000) instruments communicate using the NMEA 0183 protocol, so the default serial port settings are 4800,8,N,1. For H3000 using the USB connection or the RS-232 port, the connection speed default is 115k.

See the NMEA help for more information on the NMEA standard and interface. In addition, Hydra supports custom NMEA strings.

Wiring to connect a H1000 to a PC's serial port:

H1000		Colour	DB9
1	NMEA Tx (+)	Blue	2
2	NMEA TX (-)	Green	3
5	NMEA RX (+)	Red	5

Output

Select desired NMEA sentences to send back to your instrument system.

Hydra custom NMEA data

Expedition automatically sends some basic performance data to the B&G Hydra processor. However, you need a v9.0 NMEA FFD for this sentence support in H2000.

These may not yet be available on H3000 or H5000.

The following are available on the Hydra processor:

PERFORM

POL SPD (kt)
POL PERF (%)
LAYLINE distance (nm)
LAYLINE time hh/mm, Exp sends *Time to Gun* in the pre-start

WIND

TARG AWA (Expedition outputs Target Twa to this channel instead of Target Awa)

NAVIGATE

TARG HDG NL (near layline)
TARG HDG FL (far layline)

Not yet implemented

WAYPOINT - DIST TSL
WAYPOINT - TIME TSL HR/MS

Settings

More advanced interface options are available by clicking on this button.

B&G H2000 / H790 / H690

Including 690, 790 and 2000 performance processors with newer B&G software.

Connection settings

Expedition defaults to 9600, 7, E, 1 when the H2000/790/690 instrument system is selected (6.2 on the FFD).

Baud rate	9600
Data bits	7
Parity	Even
Stop bits	1

Note: Occasionally, you may find 2 stop bits works best with B&G.

Wake

Each time a Hercules system is turned on, it has to be instructed what data to send by Expedition. Normally, this happens automatically. This button forces all the wake-up commands to be immediately resent to the instruments.

Instrument system wiring and set up

Recommended serial port wiring

	B&G 390	B&G 690+	DB9	DB25
RS232 gnd	7	11	5	7
RS232 Tx	2	10	2	3
RS232 Rx	3	9	3	2

Jumper	4 to 6	4 to 5
Jumper	7 to 8	6 to 20

While the normal PC hardware might well run with just Tx, Rx and Ground connected, some driver software will wait forever for one of the handshaking lines to go to the correct level. Depending on the signal state it might sometimes work, other times it might not. The reliable solution is to loop back the handshake lines if they are not used.

When the lines are handshake looped, the RTS output from the PC immediately activates the CTS input - so the PC effectively controls its own handshaking.

A more complete solution for B&G 690 onwards systems is

	B&G 690+	DB9
RS232 CTS	7 Green	4*
RS232 RTS	8 Violet	8
RS232 Rx	9 Red	3
RS232 Tx	10 Blue	2
RS232 Gnd	11 Black	5

* link pins 4 and 6.

B&G instrument setup

On an FFD, set the B&G to 9600 baud, even parity, 7 data bits and 1 stop bit. To do so, select *Waypoint / cross tr* on one section of the display and *Calibrate / cal val1* on the other. Set the value to 0.

Select *Waypoint / cross tr* on one section of the display and *Calibrate / cal val2* on the other. Set the value to 6.2.

GPS Position

Most Expedition users prefer to use a GPS position directly from NMEA 0183 as the position received from the H2000/790/690 can have noticeably reduced precision.

B&G H2000 settings

More advanced interface options are available by clicking on this button.

Accesses the interface to instrument polars, calibration values and tables.

Expedition can exchange polars and calibration values with the instrument system. This is a very useful function for backing up calibration values. Depending on the version of the instrument system, it occasionally takes several 'uploads or 'downloads' for Expedition to accurately send or retrieve the full polar.

B&G nodes used are those defined in custom configuration below.

Settings

Magnetic mode

Used if the B&G processor is in magnetic mode.

Send mark information

Tells Expedition to send mark bearing, range, time etc to the H2000/790/690.

Polars

Expedition can update or retrieve performance polars stored on the instrument system.

Custom

External channels

Expedition can exchange data with the B&G processor's external channels. Simply choose the desired channel and select the

number/function from the drop down menu. Note that you can also select one of Expedition's alternating numbers.

Selecting the damped check-box next to any external channel will cause damped data to be sent.

Selecting refresh tags sends tag text every 10s even if not changing.

Selecting Send alternating tag names means tags on the external channels will be continually updated to change with the alternating channel.

Important note

It is recommended the alternating numbers period is not set to less than 3 seconds.

Linear channels

Hercules linear channels 1 to 10 (such as Forestay load) can be mapped to Expedition system channels.

Custom configuration

Advanced users only.

Expedition uses a configuration file to determine the functions Expedition instructs the B&G H2000/790/690 performance processor to send.

Expedition creates the file, H2000_config.txt, in the Instrument folder in the Expedition data folder.

This file can be edited - any line can be disabled or comments added by putting an exclamation mark (!) at the start of the line.

There are several options with H690, H790 and H2000 processors, but for more details on function and node numbers, please see your B&G documentation.

B&G #OV command

This command requires the B&G node and function number

! node, function
5, 11 rudder

For example, you may have a compass on different nodes, so it is possible to specify which node the compass to be used is on.

The text is optional in the Expedition configuration file, but is useful for editing purposes.

B&G #OE command

This command just requires the Hercules or Remote channel number and a tag to say whether it is a Hercules or Remote channel being requested. These tags are just H or R characters.

```
!690/2000 Hercules functions
H, 10 aws

!690/2000 Remote functions
R, 17 cog True
```

The text is optional in the Expedition configuration file, but is useful for editing purposes.

Example of an *H2000_config.txt* configuration file

```
! use an exclamation mark to comment out functions
!
! H690,790,2000,3000 functions
! node, function
5, 11 rudder
13, 16 Linear 5
13, 17 Linear 6
13, 18 Linear 7
13, 19 Linear 8
5, 28 air temp F
! 5, 29 air temp C
! 1, 30 sea temp F
! 1, 31 sea temp C
! 5, 52 heel
! 5, 56 Linear 1
! 5, 57 Linear 2
! 5, 58 Linear 3
! 5, 59 Linear 4
112, 64 Digital load cell
```

! 1, 65 bsp
! 16, 73 heading : Halcyon 2000 on Fastnet Bus
! 5, 73 heading : Super Halcyon 3 on CPU
! 15, 73 heading : Halcyon Gyro on Gyro Processor
! 18, 73 heading : Halcyon Gyro on ACP Pilot
! 96, 73 heading : NMEA compass on FFD
! 5, 77 aws
! 5, 81 awa
! 5, 85 tws
! 5, 89 twa
5, 102 keel angle
5, 103 canard / forward rudder, (node correct?)
5, 104 trim tab, (node correct?)
! 5, 109 twd
5, 130 leeway
! 9, 131 drift
! 9, 132 set
5, 135 barometer
! 5, 141 battery volts
5, 155 trim
! 15, 155 trim on Gyro compass
! 18, 155 trim on ACP pilot
5, 156 mast angle
5, 163 daggerboard
5, 164 boom position
! 1, 194 depth ft
! 1, 233 cog True (may as well ask for it in its original reference frame, not magnetic)
! 96, 233 cog True (on first NMEA FFD)
! 1, 235 sog
! 96, 235 sog (on first NMEA FFD)
!
!690/2000 Hercules functions
H, 10 aws
H, 13 awa
H, 12 tws
H, 14 twa
H, 15 twd
H, 27 sea temp C
H, 0, heel
H, 1, bsp

H, 5, hdg

H, 23 leeway

H, 7, volts

H, 8, depth ft

H, 28 Linear 1

H, 20 Linear 2

H, 26 Linear 3

H, 18 Linear 4

!

!690/2000 Remote functions

R, 17 cog True (may as well ask for it in its original reference frame)

R, 19 sog

R, 28 set

R, 29 drift

B&G HLink

B&G H3000 and H5000 processors

Connection settings

Expedition defaults to 115,200, 8, N 1 when B&G H3000 or H5000 instrument systems are selected.

Baud rate	115,200
Data bits	8
Parity	None
Stop bits	1

H5000 RS-422 and RS-232

The H5000 port is a RS422 port. See the serial port connection help.

GoFree alternatives

Expedition can use the H5000 Web Server interface.

Expedition can also use B&G's GoFree wireless interface to receive basic NMEA 0183 and AIS data. Note that this does not give the full HLink functionality.

Log on to the B&G on board GoFree wifi from the laptop

In Expedition instruments

1. Select Network 0

2. Select NMEA 0183 as the instrument type

3. Select TCP Client

4. Input your B&G Zeus 2 plotter IP address (as this unit supplies the NMEA data which it gets from the CPU). The IP address will be different for each plotter, but you can find it in the Network Settings pages.

5. Select Port 10110

6. Select "Reconnect"

Wake

Each time a H3000 or H5000 system is turned on, it has to be instructed what data to send by Expedition. Normally, this happens automatically, but if desired, this button forces all the wake-up

commands to be immediately re-sent to the instruments.

B&G instrument setup

See the H3000 or H5000 manual.

It is recommended that awa heel correction (awa cal 2, heel_crn) is set to 1 (on).

It is recommended that the twa and twd calculations are set to use leeway (leeway cal 2, use_lwy).

B&G H3000 & H5000 settings

More advanced interface options are available by clicking on this button.

Accesses the interface to instrument polars, calibration values and tables.

Expedition can exchange polars and calibration values with the instrument system. This is a very useful function for backing up calibration values.

B&G nodes used are those defined in custom configuration below.

Settings

Magnetic mode

Used if the B&G processor is in magnetic mode. This should be set automatically for H3000 and H5000 systems.

Send mark information

Tells Expedition to send mark bearing, range, time etc to the H3000 or H5000 .

Send COG Magnetic to H3000

B&G H3000 needs the NMEA VTG sentence for magnetic COG. If the H3000 is only receiving COG from RMC, it will only have true COG.

The solution is to always send VTG from the GPS to H3000. If this is not possible, it is possible to send magnetic COG to the H3000 from Exp.

This option should not be selected in the majority of cases.

Polars

Expedition can update or retrieve performance polars stored on the instrument system.

Custom

External channels

Expedition can exchange data with B&G's external channels. This is limited to Performance and possibly Hercules level H5000 CPUs.

Simply choose the desired channel and select the number/function from the drop down menu. Note that you can also select one of Expedition's alternating numbers.

Selecting the damped check-box next to any external channel will cause damped data to be sent.

Selecting refresh tags sends tag text every 10s even if not changing.

Selecting Send alternating tag names means tags on the external channels will be continually updated to change with the alternating channel.

Important note

It is recommended the alternating numbers period is not set to less than 3 seconds.

Linear channels

Hercules linear channels 1 to 10 (such as Forestay load) can be mapped to Expedition system channels

Custom configuration

Advanced users only.

Expedition uses a configuration file to determine the functions Expedition instructs the B&G H3000 or H5000 performance processor to send.

Expedition creates the file, *H3000_config.txt*, in the Instrument folder in the Expedition data folder.

This file can be edited - any line can be disabled or comments added by putting an exclamation mark (!) at the start of the line.

For more details on function and node numbers, please see your B&G documentation.

B&G #OV command

The B&G #OV command requires the B&G node and function number

! node, function
5, 11 rudder

An example of an *H3000_config.txt* configuration file

! use an exclamation mark to comment out functions
!
! H3000 functions
! node, function
5, 11 rudder
13, 16 Linear 5
13, 17 Linear 6
13, 18 Linear 7
13, 19 Linear 8
5, 28 air temp F
!5, 29 air temp C
1, 30 sea temp F
!1, 31 sea temp C
5, 52 heel
5, 56 Linear 1
5, 57 Linear 2
5, 58 Linear 3
5, 59 Linear 4
112, 64 Digital load cell
1, 65 bsp
16, 73 heading : Halcyon 2000 on Fastnet Bus
!5, 73 heading : Super Halcyon 3 on CPU
!15, 73 heading : Halcyon Gyro on Gyro Processor
!18, 73 heading : Halcyon Gyro on ACP Pilot
!96, 73 heading : NMEA compass on FFD
5, 77 aws
5, 81 awa
5, 85 tws
5, 89 twa

5, 102 keel angle

5, 103 canard / forward rudder, (node correct?)

5, 104 trim tab, (node correct?)

5, 109 twd

5, 130 leeway

9, 131 tide drift

9, 132 tide set

5, 135 barometer

5, 141 battery volts

5, 155 trim

!15, 155 trim on Gryo compass

!18, 155 trim on ACP pilot

5, 156 mast angle

5, 163 daggerboard

5, 164 boom position

1, 194 depth ft

1, 233 cog True (may as well ask for it in its original reference frame, not magnetic)

!96, 233 cog True (on first NMEA FFD)

1, 235 sog

!96, 235 sog (on first NMEA FFD)

B&G H5000 WebSocket

Expedition can connect to B&G's H5000 processor's Webserver.

Connection settings

Either direct via ethernet or via a WiFi router, see the H5000 installation manual.

In the Expedition instruments interface,

1. Select network 0,

2. Select B&G H5000 GoFree as the instrument type,

3. WebSocket will be automatically set as the connection type,

4. 2053 will be automatically selected as the port,

5. 192.168.0.2 will be automatically set as the IP address. This is the H5000 default if it does not see a DHCP server.

B&G H5000 WebServer settings

More advanced interface options are available by clicking on this button.

Accesses the interface to instrument polars, linear and remote channels.

Calibration and other system settings are not included as they can be accessed with a web browser.

Race timer changes and setting line ends are automatically sent from Exp.

H5000

AIS Traffic

Accepts AIS data from GoFree. Not implemented in H5000.

AIS from NMEA 0183 or NMEA 2000 is recommended over this option.

Send navigation data

Sends mark bearing, range, time, xte and layline range & time to H5. May not be implemented in H5000.

Send waypoint

Sends the active waypoint to the H5. May not be implemented in H5000.

Send start events

Send start timer and line ends pings to H5000. If disabled, Exp can receive the start timer from H5000.

Start times may only be sent in whole minutes.

Start line ends set from a GFD or MFD may not be sent by the H5000.

Polars

Expedition can exchange performance polar values with the instrument system.

Alternating

Expedition's alternating numbers.

Exp cals

Expedition calibrations. Should not be needed for H5000.

Exp calcs

Expedition calculations. Should not be needed for H5000.

Custom

External channels

Expedition can exchange data with B&G's external channels. This is limited to Performance and possibly Hercules level H5000 CPUs.

Simply choose the desired channel and select the number/function from the drop down menu. Note that you can also select one of Expedition's alternating numbers.

Selecting the damped check-box next to any external channel will cause damped data to be sent.

Selecting refresh tags sends tag text every 10s even if not changing.

Selecting Send alternating tag names means tags on the external channels will be continually updated to change with the alternating channel.

Caption names / tags

The *Custom name* fields lets the user over-ride the default external channel caption name.

Selecting *refresh tags* sends tag text every 10s even if not changing.

Selecting *Send alternating tag names* means tags on the external channels will be continually updated to change with the alternating channel.

Linear channels

Linear channels 1 to 10 (such as Forestay load and analogue channels) can be mapped to Expedition system channels.

Custom configuration

Advanced users only.

Expedition uses a configuration file to determine the functions Expedition instructs the H5000 performance processor to send over the websocket.

The *H5000_config.xml* file is installed in the \Expedition\instruments\ folder in program files.

This file may be copied to the instrument folder in the Expedition data folder and edited. If available, Expedition will use this file in preference to the installed configuration.

The file maps B&G websocket vars and Expedition channels.

id_bg	the B&G websocket var id
id_exp	the Expedition channel id, from usr_channels.h
sysval	true to use the B&G system value,

	false to use the user val
linear	id if a linear channel (1-16)
name	Expedition channel name, just for readability

sysval should be true for the fundamental channels so Expedition knows the units.

B&G channel (id_bg) 125, magnetic variation should not be deleted.

B&G WTP

Dfw2Exp

B&G does not allow full direct access to the WTP processor.

However, Expedition has a small utility (Dfw2Exp) that allows Expedition to exchange data with Deckman For Windows (Dfw) software.

WTP Fastout

Expedition can use the fastout data from the WTP processor.

The data to be sent is specified in the WTP fastout.d file. Please see the WTP user manual for details.

There is a file (wtp_fastout_config.txt) in the config folder in the Expedition data folder that may be used to map WTP fastout tags to Expedition channels.

Bravo Systems

Bravo Systems from Spain is universally acknowledged as being one of the highest performing instrument systems available. For example, it was used by 6 of the teams challenging for the 2007 America's Cup and Oracle in the 2010 Americas Cup.

Expedition provides a simple, intuitive and seamless interface to Bravo Systems .

Updates of settings and values are generally transferred automatically between Bravo Systems and Expedition. However, most pages in the interface allow the user to manually exchange data (such as calibration tables or waypoints) with Bravo Systems. In most cases, this will not be necessary.

Yes, the documentation below is short and simple, but it really is that simple to use Expedition with Bravo Systems.

Web

www.bravosystems.es

Connection settings

Expedition can connect to Bravo Systems via a network or a serial connection. The network connection is preferred for speed. A serial connection could be a physical wire or Bluetooth or WiFi.

Network

The default address the Bravo Systems server is 192.168.25.225. However, this can be changed by the

user. The default port is 5242. Exp should be set up as a TCP client.

Serial

The default connection settings are 38400, 8, N, 1, but other settings are possible.

Bravo Systems settings

More advanced interface options are available by clicking on this button.

System

A summary of the Bravo Systems processor version. Please quote this with any queries - the text in this can be copied.

Events

The Bravo Systems processor supports a large number of *events*, such as a start timer, mark rounding etc. Expedition does not yet support all events, but is adding new functionality as requested.

Vars

The Bravo Systems processor can support a vast number of variables in addition to the ones we are already familiar with.

This page provides a simple, graphical interface to map Bravo Systems vars to Expedition variables and boats and there are some default mappings to simplify the task.

Similarly, Expedition variables can be mapped to Bravo Systems vars for display on instruments etc.

The variable mappings can be saved to a file (RB_Map2.dat) for archive purposes or for transfer to another computer.

The right hand column in the list contains the current values being received from Bravo Systems.

Settings

This is the list of Bravo Systems server settings/customised server parameters. For example, bsp, awa and aws calibration values.

Curves

These are just one dimensional tables. Often used for calibration, but can be used for other purposes.

Tables

Often used for calibration, but can be used for other purposes. There are two types - standard and advanced. For an example of the difference see the section on polars below.

Interpolation of values uses a smooth spline technique by default.

Polars

Polars in Bravo Systems can be in two forms - standard and advanced.

Examples of each are -

Standard

A two dimensional table in twa and tws. There will always be 10 rows for tws and 17 columns for twa from 20 to 180 and 4 extra columns for target speeds and wind angles.

	20	30	40	50	…	160	170	180	BspUp	TwaUp	BspUp	TwaDn
2												
4												
6												
10												
12												
14												
16												
20												
23												
26												
30												

Advanced

The advanced form of tables and polars is similar to Expedition's polar format. The main difference is that the advanced polars in RB require a column for upwind targets and another for downwind targets whereas the Expedition polars can have the targets spread over several columns.

	v0	a0	v1	a0	v2	a2	…	v_n	a_n
2									
4									
6									
10									
12									
14									
16									
20									
23									
26									
30									

Caveats for exchanging Bravo Systems advanced polars with Expedition polars:

Requires size of polars to be the same.

Bravo Systems requires specific columns for upwind and downwind targets. Targets can be across different columns in Expedition, so for the moment we have restricted it to the second and second to last columns.

Dampings

Damping values in Bravo Systems. There are two types of Bravo Systems damping.

NODYN - a single parameter for the damping value in seconds.

DYN - dynamic damping.

Displays

Controls the behaviour of the Bravo Systems displays.

Waypoints

Bravo Systems can contain waypoints or marks.
Expedition can retrieve these from the instrument system
or send the active course to the Bravo Systems server.

Chetco SeaSmart

Expedition can receive NMEA 2000 data packaged in Chetco's SeaSmart format.

Web

www.seasmart.net

SeaSmart gateway

www.seasmart.net/marine-wireless-networking-AGW.html

KBox open source gateway

www.tindie.com/products/sarfata/kbox-open-source-boat-gateway

Cosworth

Expedition can connect to Cosworth systems using a serial connection or directly to the Cosworth CAN bus.

Web

www.cosworth.com

CAN connection

Cosworth2Exp uses a Kvaser CAN adaptor to connect directly to a Cosworth CAN bus. The direct CAN interface is faster and generally superior to a serial connection.

Serial port connection

Expedition defaults to 115,200, 8, N 1 when Cosworth instrument systems are selected.

Baud rate   115,200

Data bits   8

Parity   Even

Stop bits   1

Cosworth settings

Accesses the interface to instrument polars, calibration values and tables.

Cosworth uses a protocol very similar to B&G's HLink for compatibility with existing systems. In general, the function numbers and nodes are identical.

Expedition can exchange polars and calibration values with the instrument system.

Polars

If the performance polar contains more than 10 wind speed rows, only the first ten rows will be sent.

External channels

Expedition can exchange data with B&G's external channels. Simply choose the desired channel and select the number/function from the drop down menu. Note that you can also select one of Expedition's alternating numbers.

Selecting the damped check-box next to any external channel will cause damped data to be sent.

Selecting refresh tags sends tag text every 10s even if not changing.

Selecting Send alternating tag names means tags on the external channels will be continually updated to change with the alternating channel.

Linear channels

Linear channels 1 to 10 (such as Forestay load) can be mapped to Expedition system channels

Custom configuration

Advanced users only.

Expedition uses a configuration file to determine the functions Expedition will decode from the Cosworth processor data stream.

Expedition creates the file, *Cosworth_config.txt*, in the Instrument folder in the Expedition data folder.

This file can be edited - any line can be disabled or comments added by putting an exclamation mark (!) at the start of the line.

For more details on function and node numbers, please see your Cosworth documentation.

Each line contains the function number, node and the Expedition var to map to.

For example:

```
! function number, function, exp var
52, 5, 18  Heel Angle
65, 1, 1   Boatspeed
73, 1, 13  Heading
```

DMK Yacht

Exp can receive AIS, NMEA 1083 and CAN data from the DMK box over a wireless UDP connection.

The DMK box can send legacy Raymarine Seatalk data, howver Exp can not use this. SeatalkNG is effectively NMEA 2000, so Exp can use this.

Note that the DMK box is not yet NMEA 2000 certified. At present, Exp does not support sending NMEA 2000 data to the DMK Box.

Web

dmkyacht.com

Connection settings

UDP connection to the DMK Box on port 1703.

There are several ways of setting up the DMK Box (see the documentation), but default Wi-Fi network settings are

SSID   dmkyacht

WEP Password   0123456789

Fore an ad-hoc connection, suitable network settings for the computer are

IP Address   192.168.1.2

Subnet mask   255.255.255.0

DSC

Expedition supports Digital Selective Calling (DSC) messages from NMEA 0183 and NMEA 2000 (via the Actisense NGT-1 USB adaptor) sources.

DSC targets are displayed in the list in the AIS and DSC window and on the chart. See the display settings help for more details.

Expedition can also display AIS-SART messages.

Expedition simple protocol

Background

A simple protocol to exchange data over networks or via serial connections with Expedition on other computers or third party products such as Ventus. It is also useful for weather boat fleets etc.

Output (Tx) filter

Select desired parameters to send.

Send damped

Option to send damped vars instead of raw.

Default

Default data selection to send.

Ventus

Default selections to send data to Ventus.

Input (Rx) filter

Select desired parameters to receive.

Developer information

The Expedition communication protocol is a simple text based protocol.

Each sentence starts with a # and ends with *XX\r\n, where the XX is a checksum.

The streaming data is of the format:

#boat id,var1,val1,var2,val2,var3,val3,…*XX\r\n

External channel data is sent in the format:

#E,var1,val1,var2,val2,…*XX\r\n

Commands

There are various commands a third party can send to Exp. This may not be complete and can be added to on request.

For alternating channels, the id of the mapped channel is sent as the value. In the case of Sailmon, the value is sent intaed of the id.

Gun

#G,SYNC*XX

Synchronises the start countdown timer.

#G,val*XX

Sets the start countdown timer. Val is in minutes. A negative number will kill

the timer.

For example, #G,12.34*62\r\n

#G,KILL*XX

Kills the start countdown timer.

Line

#L,P*XX

Pings the port end of the line

#L,S*XX

Pings the starboard end of the line

#L,P,lat,lon*XX

Sets the port end of the line

#L,S,lat,lon*XX

Sets the starboard end of the line

Mark

#M,id,name,latitude,longitude,flag*XX\r\n

Mark id is normally 0,1,2,3,4 etc, but may be ACTIVE for the active mark. For example:

#M,ACTIVE,name,latitude,longitude,flag*XX\r\n

A MOB position may appear as:

#M,MOB,MOB,latitude,longitude,X*XX\r\n
#M,ACTIVE,name,latitude,longitude,X*XX\r\n

Valid flags:

X   MOB

P	Leave to port
S	Leave to starboard
M	Sail direct to mark

#M,PING*XX

Pings a mark at the current location (bow or GPS).

#M,PREV*XX

Sets the previous mark in Exp's active route as active. Exp will reply with the new, active mark.

#M,NEXT*XX

Sets the next mark as active. Exp will reply with the new, active mark.

#M,QUERY*XX

Queries the active mark. Responds with the mark details, see above.

#M,QUERYNEXT*XX

Queries the next mark.

#M,QUERYALL*XX

Queries all marks of the active route.

#M,MOB*XX

Sets Exp's MOB. Exp will reply with the new, active mark, see above.

#M,AT,N,rng,brg*XX

Creates a new active mark and route at the range and bearing.

#M,AT,A,rng,brg*XX

Adds a mark after the active mark at the range and bearing.

Route

#C,GETCOURSENUM*xx\r\n

> Requests the number of routes.
> Returns:
>
> #C,COURSENUM,n*XX\r\n
>
> where n is the zero indexed number of routes.

#C,GETCOURSENAME,n*xx\r\n

> Requests a route name for index n.
> Returns:
>
> #C,COURSENAME,n,s*XX\r\n
>
> where s is the route name.

#C,SETCOURSE,n*xx\r\n

> Sets route n to be the active route.

#C,CREATECOURSE,s*xx\r\n

> Creates an empty course 's' and makes active.

Sails

Sends the sail name if set to be in Send (Tx) filter. See above.

> #S,*c,sailname**xx\r\n
>
> > c can be one of:
> >
> > A   Current sail,
> > M   Sail to mark
> > N   Sail for next leg

Event

Tells Expedition to create an event in the database.

> #E,*xx\r\n

#E,*comment**xx\r\n

System

#S,RECONNECT*xx

> Tells the receiving computer to reconnect all network connections.

#S,GETCHANNELNAME,channel*xx
#S,GETUSERCHANNELNAMES*xx

> Gets the channel name. Exp replies with

> > #S,CHANNELNAME,channel,name,shortname*xx

#S,SETCHANNELNAME,channel,name,shortname*xx

> Set the channel name. Name should be less than 28 characters and shortname less than 10.

> For example (for User0)

> > #S,SETCHANNELNAME,172,My new name,MyName,*xx\r\n

#S,LICENCE*XX

> Request the Exp site code. Exp replies with (eg)

> > #S,LICENCE,9ac6c16a*xx\r\n

Expedition event

Background

Uses a serial port to send events to Expedition.

MOB

While this can be used as an MOB button, we recommend using a fixed button onto a stand-alone GPS as the computer running Exp is more likely to experience a problem at a crucial time than a dedicated GPS display.

Events

Each serial port may have up to 4 event functions from this list.

MOB
Sync gun
Kill gun
Gun plus 1 min
Gun 5 min
Gun 4 min
Gun 1 min
Set port end
Set starboard end
Previous mark
Next mark

This list can be added to as needed.

Serial port wiring

Using a DB9 connector, an event is triggered by briefly connecting

Pin 4 to

> Pin 8 : Event 1
>
> Pin 6 : Event 2
>
> Pin 1 : Event 3
>
> Pin 9 : Event 4

Furuno NAVnet

Furuno systems can send instrument data over ethernet. This also contains NMEA 0183 and AIS data, so can be used by Expedition.

Connection settings

A network connection is needed in Expedition.

Set NMEA 0183 as the instrument type.

Set UDP Tx & Rx as the connection type.

Set the port to 10021.

Garmin GND10 and NX2 FDX

Expedition can also communicate with the GND10 and Nexus NX2/NXR servers using the FDX communication protocol. This allows faster transfer of data to and from the server and allows the upload of calibration values to the server.

If are using the Nexus NX2 Race software, it creates a virtual serial port that Expedition can talk to, so both software packages can talk and listen to the instruments at the same time.

FDX data received from the NX2 server is not damped, so may need to be damped within Expedition.

The heading is always sent from the FDX server in degrees true, so you may need to set variation in the server.

Web

www.garmin.com

Connection settings

Expedition will set the serial port settings below. Do not change these.

Baud rate	19200
Data bits	8
Parity	None
Stop bits	2

On start up, the FDX server will be in NMEA mode. Expedition switches the server to FDX mode. To revert to NMEA, the Nexus server has to be powered off and on.

Also see the NMEA 0183 and serial port help

FDX Settings

More advanced interface options are available by clicking on this button.

Custom

Damp | Output

Allows Expedition data to be sent to the 10 custom channels available in the FDX processor. The data sent can also be damped.

Note that the alternating channels can be sent to these channels, effectively doubling the user channels available for display on

the Nexus NX2 instruments. For example, Target Bsp and Target Twa could be mapped to Alternating 0, which could then be sent to CFD.

The Custom name fields lets the user over-ride the default external channel tag.

Input

Allows any of the 6 Nexus AdBox custom channels to be mapped to Expedition channels.

Nexus

Allows any Expedition channel to be sent to the three user channels available on the NX2 processor. The data sent can also be damped.

TBS

Target boat speed, but you could send other data such as polar boat speed.

CAD

Custom angle data - normally for angle or bearing data such as leeway, target TWA etc.

CFD

Custom fixed data - normally for other data such as Bsp percentage, distance to line etc.

Note that the alternating channels can be sent to these channels, effectively doubling the user channels available. For example, Target Bsp and Target Twa could be mapped to Alternating 0, which could then be sent to CFD.

Send mark information

NOTE: This must only be used with GND10 and not for connections direct to the FDX server.

Garmin NMEA 2000

Expedition can send data to the Garmin custom channels over NMEA 2000 using the Actisense NGT-1 adaptor.

At 20 September 2020, this applies to GNX120, GNX130 and GMI20 displays and GPSMAP plotters.

Also, Quatix 5, Quatix 6, MARQ Captain, MARQ American Magic watches and GPSmap 86 series hand held via an ANT connection from a GPSmap plotter.

Web

www.Garmin.com

Custom channels

Expedition can send data to Garmin displays. Simply choose the desired channel and select the number/function from the drop down menu. Note that you can also select one of Expedition's alternating numbers here.

Selecting the *damped* check-box next to any external channel will cause damped data to be output.

The *Custom name* fields lets the user over-ride the default external channel tag.

Selecting *refresh tags* sends tag text every 10s even if not changing.

Selecting *Send alternating tag names* means tags on the external channels will be continually updated to change with the alternating channel.

Update rates

Each Garmin display can update at 5Hz at most.

These are large data packets, and are sent at most at 10Hz, so sending more data will reduce the refresh rate. For example

1 custom channel will update at up to 5Hz

2 custom channels will update at up to 5Hz

5 custom chanels will update at up to 2hz

10 custom chanels will update at up to 1hz

Garmin NX2

Connection settings

NX2 instruments communicate using the NMEA 0183 protocol, so the default serial port settings are 4800,8,N,1. See the NMEA 0183 and serial port help for more information on the NMEA standard and interface. However, there are also several custom NMEA strings.

Baud rate 4800

Data bits 8

Parity   None

Stop bits 1

NX2 Settings

By clicking on the Settings button, further Nexus and NMEA functions are available.

Nexus

Allows any Expedition channel to be sent to the three user channels available in the NX2 processor. The data sent can also be damped.

TBS

Target boat speed, but you could send other data such as polar boat speed.

CAD

Custom angle data - normally for angle or bearing data such as leeway, target TWA etc.

CFD

Custom fixed data - normally for other data such as Bsp percentage, distance to line etc.

Note that the alternating channels can be sent to these channels, effectively doubling the user channels available. For example, Target Bsp and Target Twa could be mapped to Alternating 0, which could then be sent to CFD.

NMEA output

Select NMEA sentences to send back to your instrument system.

Garmin2Exp

Garmin2Exp - Garmin USB interface

Expedition can receive position, cog, sog and satellite date from Garmin devices with a USB interface. This is quite useful as a backup GPS solution.

This is designed for devices such as the 18x USB, but can also be used with hand-held Garmin GPS devices that have a USB port.

Many handheld GPSs can send NMEA over the USB port instead of Garmin data, so it is arguably better to bypass Garmin2Exp and read the NMEA data directly into Expedition.

Another option is to use GPSGate Client.

Web

www.Garmin.com

Driver

The Garmin USB driver needs to be installed.

As of 28 April 2012, this is available at

http://www8.garmin.com/support/download_details.jsp?id=591

If the driver is installed correctly and the device connected, it should be visible in Windows' device manager:
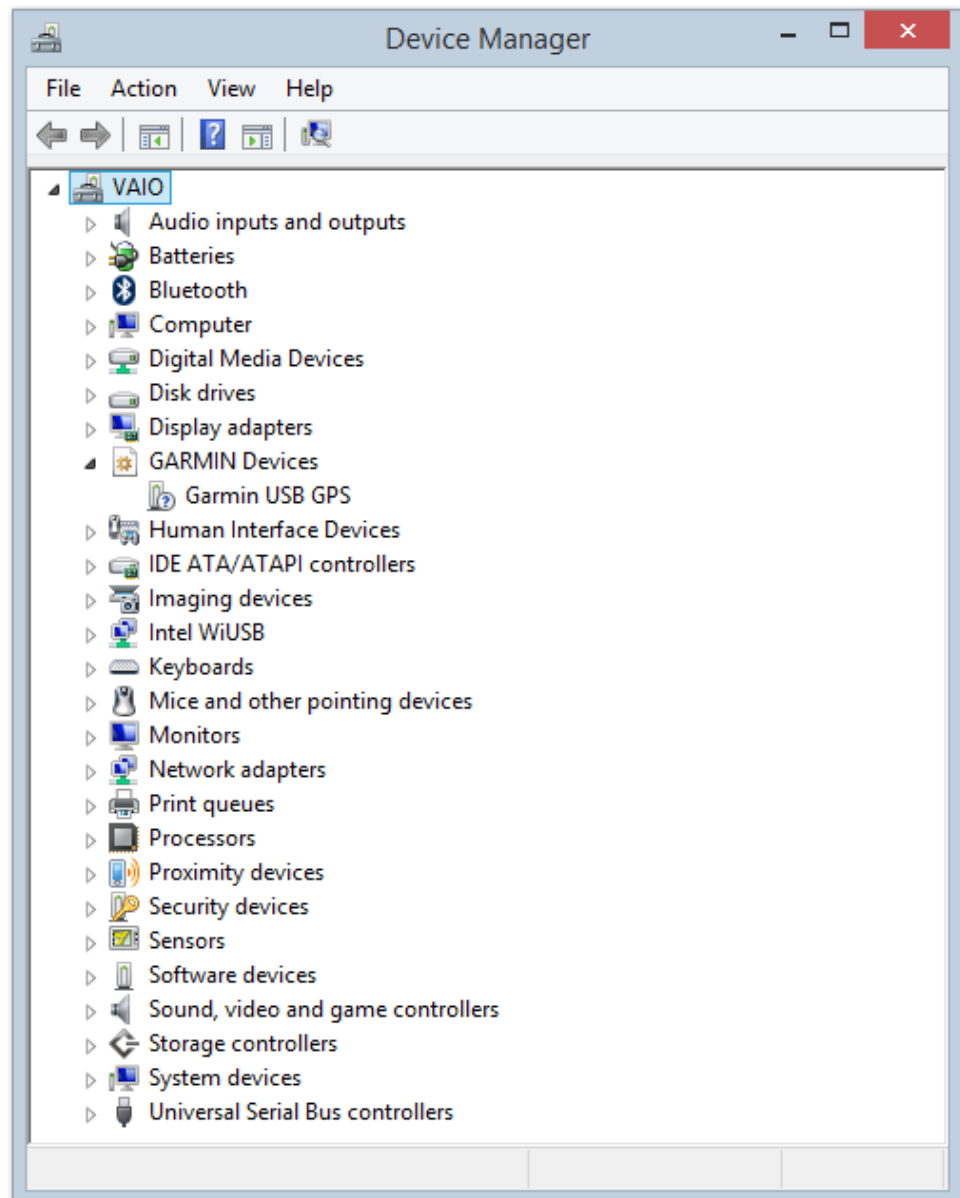
Sailing Performance

There are two options in Exp - iDataNet and Onboard Assistant.

Web

www.sailingperformance.com

Onboard assistant

For Onboard Assistant, it is required that data to be sent to a port one greater than the Rx port.

Instructs Exp to save Onboard Assistant events in the events database and save tests.

Output (Tx) filter

Select desired parameters to send to SailingPerformance's iDataNet.

Advanced

More Expedition channels.

Send damped

Option to send system damped vars instead of raw.

Default

Default data selection to send.

Koden RADAR*pc*

Expedition supports Koden radars - with the radar image displayed on the chart or in a dedicated radar window.

Web

Koden

Also sold by Si-Tex

Radar systems

The RB805 to RB809 require an MDS-11R interface box between the computer and the radar antenna.

Legacy MDS-1R/8R/9R/10R radars have an ethernet cable from the radar.

Legacy MDS-50 to 63R radars need an MDS-5R or MDS-6R interface box between the computer and the radar antenna.

There are advantages to both approaches. The MDS-1R to 10R solutions are lighter and cheaper, but cannot connect to a Koden display as is possible with the MDS-50 to 63R systems.

There are other differences. For example, the MDS-9R antenna is slightly smaller than the MDS-51R antenna so while both are rated at 4kW peak power, the larger 51R antenna has a smaller beam width. The 9R operates at 24rpm, whereas the 51R also has a 48rpm option.

Radome antennas

System	Interface	Antenna	Power		
MDS-1R		MRT-152R	2kW	24nm	0.9'
MDS-8R		MRT-158R	2kW	24nm	1.5'
MDS-9R		MRT-150R	4kW	36nm	1.8'
MDS-50R	MDS-5R	RB714A	2kW	24nm	1.2'

System	Interface	Antenna	Power		
MDS-51R	MDS-5R	RB715A	4kW	36nm	2'
MDS-1105R	MDS-11R	RB805	4kW	36nm	2'

Open antennas

System	Interface	Antenna	Power		
MDS-10R		MRT-147R	4kW	48nm	3.5' or 4.5'
MDS-52R	MDS-5R	RB716A	4kW	48nm	3 or 4'
MDS-61R	MDS-6R	RB717A	6kW	64nm	4 or 6'
MDS-62R	MDS-6R	RB718A	12kW	72nm	4 or 6'
MDS-63R	MDS-6R	RB719A	25kW	96nm	4, 6 or 9'
MDS-1104R	MDS-11R	RB806	4kW	48nm	3' or 4'
MDS-1106R	MDS-11R	RB807	6kW	64nm	4 or 6'
MDS-1112R	MDS-11R	RB808	12kW	72nm	4 or 6'
MDS-1125R	MDS-11R	RB809	25kW	96nm	6 or 9'

Connection settings

Expedition connects to the Koden radar using an ethernet network connection.

For the integrated radars (MDS-1R,8R,9R and MDS-10R), select Koden MDS-1/8/9/10R from the Expedition drop-list.

The default radar UDP address is 192.168.0.1 and the default UDP port number is pre-assigned to 10001. The address should be disabled as Exp should be set to UDP broadcast as default.

For other Koden radars with the MDS-5R or MDS-6R control boxes, select Koden MDS-5/6R.

The Expedition radar interface is available by

Clicking on the System button on the appropriate network, settings page

Selecting the Radar item from Instruments on the Application button menu,

The optional Radar toolbar button,

The Ctrl + K key stoke.

It may be necessary to configure the fire-wall at the host PC.

Display

The radar image may be displayed on the chart.

It may also be drawn in its own, dedicated radar window.

Warming up time

In order to protect the magnetron in the radar transmitter, it is required to warm the radar for 1.5 minutes (MDS-1R/8R), 2 minutes (MDS-9R/10R, MDS-50R/51R/52R/61R/62R) or 3 minutes (MDS-63R (25kW)) before use.

Transmission on & off

Stop or start radar transmission by using the Start Radar and Stop Radar items on the dedicated radar window or the Application menu.

If the radar is an open antenna system, it may be desirable to park the antenna when stopping transmission. This is achieved by selecting the Park antenna checkbox and entering an appropriate angle (in the adjacent edit box) to park the antenna at.

Koden settings

More advanced interface options are available by clicking on this button.

Range

The maximum range varies depending on the output power of the radar transmitter.

```
MDS-1R/8R 2kW Dome antenna 24nm
MDS-9R     4kW Dome antenna 36nm
MDS-10R    4kW Open antenna  48nm
```

Range can be selected on the Koden instrument settings page.

Auto-range

Selecting auto-range instructs Expedition to select the best range to fit the displayed chart scale.

Heading offset

Allows the radar to be aligned with the boat.

Resolution

Selects the Koden radar echo data resolution sent to Exp.

Number of pixels in each sweep range from 256 to 1024 and the number of sweeps in one rotation of the radar antenna range can be either 2048 or 4096.

256 x 2048
256 x 4096
512 x 2048
512 x 4096
1024 x 2048
1024 x 4096

Colour

Colour to paint radar echoes. Target intensity of shown in shades of this colour.

Other options are to fade the echoes by intensity or to use a colour spectrum.

Interference rejection

Used to reduce or eliminate interference from other radars.

Tuning

Gain, Tuning, STC and FTC is automatic on selected models.

However, manual tuning of the Koden radar may be accomplished on the System settings page above by selecting the relevant check-box and changing the value.

The Default button returns these values to their defaults.

Gain

Manually adjust the radar gain.

STC

Sensitivity Time Control. Also known as Anti Sea Clutter.

FTC

Fast Time Constant. Also known as Anti Rain Clutter.

Transmission trigger delay

This allows the user to make accurate distance measurement with the radar sensor by adjusting the transmission time delay. In practice, you need to align the start of the sweep with the leading edge of the transmission pulse. Use the following procedure.

1. Set up the radar controls as follows before doing the following set ups.

   The range must be 0.25 nm, FTC minimum and the GAIN is set to the best picture. Adjust the STC until the TX pulse can be seen as a round point in the screen centre.

2. Adjustment of distance

   Transmission trigger delay is adjusted to a point that the centre looks as shown in the diagram (b) below. Transmission trigger delay must be tuned so that a target such as a bridge or a breakwater displays as a straight line on the screen.
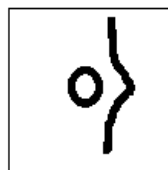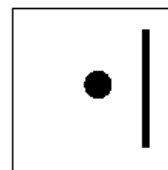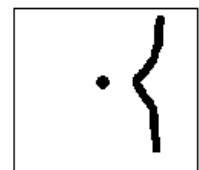
a) Too long   b) Correct   c) Too short

KVH Quadro

Web

KVH no longer manufactures or supports their Quadro range of instruments, however a few documents may be found at www.kvh.com.

Connection settings

KVH Quadro instruments communicate using the NMEA 0183 protocol, so the default serial port settings are 4800,8,N,1. See the NMEA 0183 and serial port help for more information on the NMEA standard and interface. However, there are also several custom NMEA strings.

KVH Quadro does not send TWA or TWS, so Expedition needs to calculate them. Select these on the calibration page.

Output

Select desired Nmea sentences to send back to your instrument system.

KVH Quadro custom NMEA data

Expedition automatically sends some basic performance data to KVH Quadro instruments.

The following are available:

Polar bsp %,
Twa,
Target twa,
Target bsp,
Vmg,
Layline time,
Layline distance,
Vmc,
Twa for optimum vmc,
Mark range,
Next mark twa,
Sog,
Twd,
Mark bearing,
Polar bsp.

KVH Quadro settings

More advanced interface options are available by clicking on this button.

Lasers

Connection settings

There are no standard NMEA sentences that support output from laser range finders. Expedition supports several models, including Laser Atlanta, Lasercraft XLRic and the Trimble Pro-XL/XR

	Laser Atlanta	Lasercraft XLRic
Baud rate	4800	19200
Data bits	7	8
Parity	Even	None
Stop bits	1	1

The laser may be connected to the PC's serial port or, if using a Bluetooth equipped laser, to a virtual bluetooth serial port.

If the laser is being used to 'ping' another boat, it is recommended to set the connection to say 'boat 1' as all derived numbers are relative to boat 0.

Maretron compass

Maretron SSC200 Solid State Rate/Gyro compass

Calibration and modification of compass settings can be accomplished with a Maretron display. This is not possible on many boats as the Maretron compass is used with another instrument system. Expedition therefore has functionality to perform functions normally performed by a dedicated Maretron display. Please read your Maretron manual.

There is other functionality associated with the Maretron that could be implemented. If required, please contact Expedition.

Web

www.maretron.com

Connection settings

The Maretron SSC200 rate/gyro compass communicates using the NMEA 0183 protocol (or NMEA 2000 protocol), so the default serial port settings are 4800,8,N,1. See the NMEA 0183 and serial port help for more information on

the NMEA standard and interface. However, there are also several custom NMEA strings.

Baud rate 4800

Data bits 8

Parity   None

Stop bits 1

Maretron SSCS200 Settings

More advanced interface options are available by clicking on this button.

Set heading

This is the command used to perform installation-offset where the compass is aligned to a known heading and the pitch and roll are zeroed to the vessels current attitude.

Set ROT damping

The damping of rate of turn can be set to values from 600ms to 60s.

NMEA output control

The Maretron SSC200 compass can output several NMEA sentences.

HDG (magnetic and true heading)

HDM (magnetic heading)

HDT (true heading)

ROT (rate of turn)

PMAROUT (heel and trim)

Set any transmission interval in milliseconds (for example, a value of 100 would cause a 10Hz transmission rate).

Setting any value to zero disables transmission.

Deviation calibration

In general, the compass will be connected directly to your instrument system. However, it is can be convenient to connect it directly to Expedition for calibration purposes.

The Expedition initiated deviation calibration is accomplished by turning the vessel through at least 3 complete circles. The procedure is as follows:

1. Ensure that the compass has been properly installed. Read your Maretron manual for further details.

2. Warm up the compass by operating it for approximately 10 minutes.

3. Open the Maretron system page by clicking on the *System* button on the relevant instrument page in Expedition. Start turning the vessel (in either direction) such that you complete a full 360° turn in 2° minutes or less (try not to go below 1 minute for a complete circle).

4. Click the *Calibrate compass* button. This will initiate a compass reset and force the SSC200 to start the calibration process. It will also instruct the compass to temporarily stop sending normal periodic data so to make messages more easily discerned.

5. Continue turning the vessel through at least 3 circles until you see one of the following Maretron proprietary sentences:

$IITXT,01,01,01,Deviation Calibration Started*17

This sentence indicates a successful calibration.

$IITXT,01,01,02,Deviation Calibration Successfully Completed*17

This sentence indicates a successful calibration.

$IITXT,01,01,03,Deviation Calibration Failed To Complete*43

This sentence indicates that the calibration failed. The SSC200 attempts to perform calibration 5 times before giving up and issuing this sentence. Each time the SSC200 encounters an error (see message identifiers 04, 05, and 06) it restarts the calibration process. Upon the 5th error, the SSC200 exits the calibration routine and it must be restarted before it will once again try to perform deviation calibration.

$IITXT,01,01,04,Deviation Calibration Turning Too Fast*

During calibration, the vessel must not turn to fast where the SSC200 is unable to reliably develop deviation data. If the SSC200 senses the vessel turning to quickly, it will issue this message and restart deviation calibration as long as it has not failed five times.

$IITXT,01,01,05,Deviation Calibration Turning Too Slow*

During calibration, the vessel must not turn to slowly where the SSC200 is unable to reliably develop deviation data. If the SSC200 senses the vessel turning to slowly, it will issue this message and restart deviation calibration as long as it has not failed five times.

$IITXT,01,01,06,Deviation Calibration Invalid Movement*

> During calibration, the vessel must not jerk or reverse directions where the SSC200 is unable to reliably develop deviation data. If the SSC200 senses an invalid movement, it will issue this message and restart deviation calibration as long as it has not failed five times.

Occasionally after an unsuccessful calibration, it may be necessary to click the *Start periodic data* button to turn the periodic transmissions back on.

Mer Agitée Trim Control

Expedition can connect to Mer Agitée electronic telltales.

Web

www.meragitee.com

Connection settings

Either direct via ethernet or wireless, serial or UDP (virtual serial port), see the TrimContol installation manual.

Settings

Mer Agitée Trim Control settings on the instrument connection in Expedition.

Each telltale may be given a user-friendly name and mapped to an Expedition user channel.

The damping period sets the period the standard deviation of the angle is calculated over. This is used to determine whether the telltale is furled, attached or stalled.

Navico radar

Expedition supports Navico radars, with the radar image displayed on the chart or in a dedicated radar PPI window.

Expedition does not currently support more than one radar or target tracking.

Web

www.navico.com

Navico distributes radars under the Simrad, Northstar and Lowrance brands.

Navico radars supported

BR24 Broadband radar
3G Broadband radar
4G Broadband radar
HALO Pulse Compression radar
HALO Dome radar
12U/6X Pulse radar

Navico licence

Note that the connection requires an additional Navico licence per radar.

When purchasing from your Navico dealer, as well as your name etc, please supply these details:

- The radar Lock ID, obtained from the Lock/Unlock button in Expedition's radar interface

- Radar serial number

- Radar type (BR24, 3G, 4G, HALO etc)

- Key type: LL1

- Part Number: 000-10173-001 BRPC UNLOCK KEY - LL1

- Customer: Expedition (BRPC104)

These can be copied from the Locked/Unlocked button.

Minimum radar firmware requirements

BR24 radars must be running RTM2 software (2.9.271 and above).

3G radars must have software version 3.0.38 or later.

4G radars must have software version 4.1.57 or later.

Older radars will require a firmare upgrade, available from your Navico dealer.

Connection settings

Expedition includes a separate program (BR24toExp.exe) to connect to the Navico radars using an ethernet network connection. At present, only one one radar connection is supported. If multiple radars are required, we can extend this.

The radar interface can be started from Expedition's application button, Windows' Start menu, by clicking on the Radar pane setting button or be automatically started with Expedition.

Notes

Older radars (BR24, 3G and 4G)

It is recommended that the radar is connected to the computer via an RI10 or RI11 interface box. This allows the radar to receive heading from an external compass, improving the radar image.

Navico has an adaptor cable to connect a standard ethernet RJ45 to the RI10 or RI11 interface. The part number is:

000-0127-56 ETHRNT YELW CBL 5 PIN MALE:RJ45 FMALE 2M

Halo 20, 20+ and 24 radars do not need RI10 or RI11 interface boxes.

Connecting via wireless is not recommended.

If connecting directly to the PC, a cross-over adaptor or cable may be required. Depending on

the radar model, there may be issues connecting to the radar via a DHCP server.

Note that the BR24toExp.exe app needs to have firewall access granted for both public and private networks.

Symptoms associated with both firewall and DHCP issues include being able to connect to the radar, but data and commands not be exchanged.

Display

The radar image may be displayed on the chart. Expedition will need to be supplied with a GPS position. Exp also needs a heading input if the radar does not have a compass connected.

It may also be drawn in its own, dedicated radar window.

Warming up time

Unlike magnetron based radars, warm-up time is negligible. However there may be a 15-20 second period between turning the radar on and it being available.

Transmission on & off

Stop or start radar transmission by using the *Start Radar* and *Stop Radar* items on the Application button

menu, on the radar window toolbar or on the Navico radar to Exp application.

Expedition display settings

To draw radar echoes on the chart, select Radar overlay in display settings. Echo colours may be selected in the radar settings, as described below.

Colour

Colour to paint radar echoes. Target intensity of shown in shades of this colour. Other options are to fade the echoes by intensity or to use a spectrum of colours.

Settings

Scanner

As well as licensing and operation, this page gives the radar details and controls.

Lock / Unlock

Unlock the radar. This interface also gives the LockID needed when requesting a Lock key.

Control

Scanner power

Sets the power state of the radar to on or standby.

Transmit

Starts or stops transmission. Also available from the *Start Radar* and *Stop Radar* items on Exp's Application button menu, on the radar window toolbar.

Timed transmit

Set the timed transmission state of the radar.

This will cause the radar to alternately transmit for a period and then enter standby mode for a period of time.

Transmit period

The number of seconds to transmit for.

Standby period

The number of seconds remain in standby for.

Use mode

Selet the use mode. The modes available are radar dependent, but include:

- manual

- harbour

- offshore

- weather

- bird

LEDs

Sets LED lighting level if available.

Doppler mode

Only available for LL2.

However, if there is a Navico display in the network that sets the radar into a Doppler mode, Expedition will display the Doppler data.

Select normal radar mode, show both approaching and receding targets or show approaching targets only (receding targets will be coloured as for targets with no Doppler).

Doppler threshold

Only available for LL2.

Sets the lowest radial speed relative to the radar that will result in Doppler data.

Note these values are in m/s and normally accepted values are the range 0 to 16m/s.

Knot values are approximately twice m/s.

For example, 1kt threshold is about 2m/s.

1kt ~ 1/0.5144 ~1.94m/s

Image

It can be useful to have the radar PPI window showing when adjusting these values for feedback.

Factory defaults

Restores default radar settings.

Minimal

Default settings for minimal image processing.

Fast scan mode

Selects between normal and fast scanner rotation speeds. If available, options are

24 RPM (normal / off)
36 RPM
48 RPM
60 RPM

Note that other controls, such as range and noise-reject, can restrict the maximum RPM available to lower than this setting.

Also not supported when in use modes other than manual.

Not supported for BR24 and older 3G hardware.

Main bang suppression

Sets the main bang supression state.

Only available for LL2.

IR Level

Sets the interference reject level in the radar. 0 means IR is disabled, 3 is maximum interference rejection.

Local IR

Can reduce interference from other onboard devices. 0 is disabled, 2 is high.

Beam sharpening

Improves the azimuth resolution of the radar.

Target boost

Used to expand targets. 0 (disabled) gives better target resolution and 2 gives maximum target emphasis.

Gain

Automatic or manual radar gain adjustment.

Rain

Manually set rain clutter rejection level. 0 is minimum clutter rejection, 255 is maximum.

FTC

Manually set the Fast Time Constant. 0 to 255.

Sea clutter

Automatic or manual control of the sea clutter sensitivity rejection level. 0 is minimum clutter rejection.

Side lobe

Automatic or manual control of the radar side-lobe mode and level. 0 to 255.

Noise rejection

Increases sensitivity or radar improving target detection, but reducing sharpness of the image. 0 is disabled, 2 is high.

Installation

Antenna height

Sets the antenna height for better automatic tuning.

Heading offset

This can be used to correct for errors due to misalignment of the radar installation in the boat.

Antenna height

Sets the antenna height. This improves the automatic radar tuning.

Radar to GPS

Distance radar is in front of the GPS in metres.

Range

Select the range of the radar image.

Auto-range to fit chart

Selecting *auto-range* instructs Expedition to select the best range to fit the displayed chart scale.

Allow Exp heading

Normally checked on. If the radar has a heading input, heading data for each radar spoke should be received from the radar. If this is selected, Exp will attempt to use its own heading for the radar data. If the heading into Exp and the heading from the radar do not agree, it is possible to turn the heading from Exp off.

Allow User heading

If no heading from the radar or Expedition, allows the user to define a heading value for the radar. This is useful in land based applications.

Allow User position

If no position is available from from Expedition, allows the user to define a position for the radar. This is useful in land based applications. The format is (eg)

12 34.567s 123 45.678e

Send navigation data

If COG, HDG, SOG or BSP are not available on the Navico network, this allows Expedition to send them to the radar.

The default is to have a lower priority than the Navico network, but the radar can be instructed to prefer the Expedition data.

Guard zones

NKE
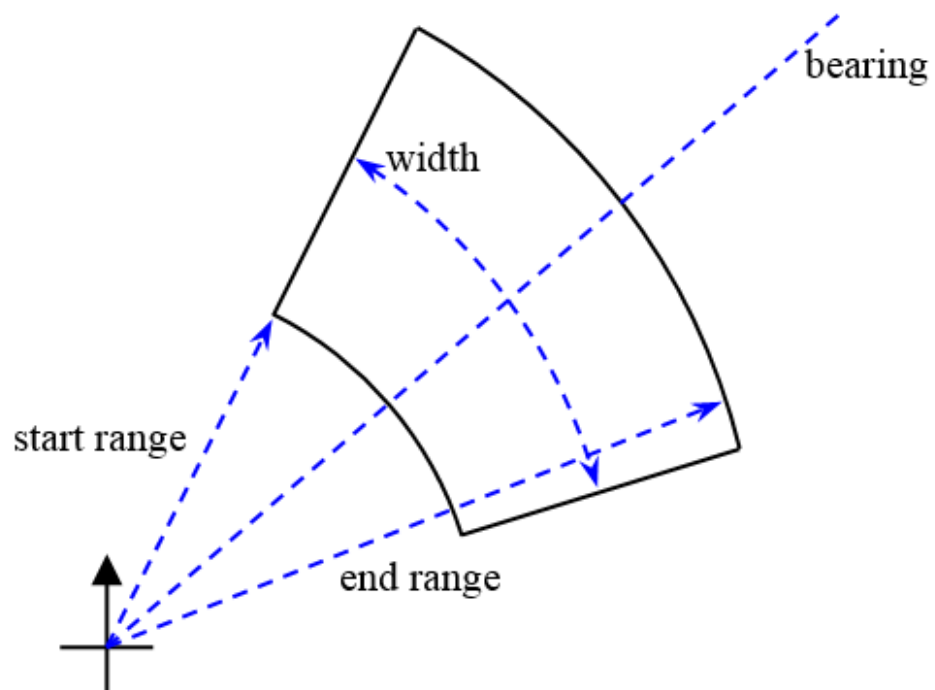
Web

www.nke.fr

Connection settings

NKE instruments communicate using the NMEA 0183 protocol, so the default serial port settings are 4800,8,N,1. See the NMEA 0183 and serial port help for more information on the NMEA standard. However, there are also several custom NMEA strings.

Custom NKE output

Expedition will send the following data to the NKE instruments:

Target Bsp
Opposite track
Target Twa
VMG%
Polar Bsp %
Set
Drift

NKE Settings

More advanced interface options are available by clicking on this button.

NMEA 0183

Select standard Nmea sentences to send back to your instrument system.

Custom

Send Exp data to NKE Dynamic displays.

NMEA 0183

www.nmea.org

Connection settings

The default NMEA 0183 serial port settings are 4800,8,N,1. Occasionally will you find NMEA devices that operate at different settings.

Baud rate	4800
Data bits	8
Parity	None
Stop bits	1

Tacktick, Silva, NKE and B&G Hydra instruments communicate using the NMEA 0183 protocol, but have extra custom sentences.

It is recommended that you configure your GPS to output NMEA 0183 v2.0 rather than NMEA 0183 v1.5. For example, the precision in latitude is just under 1m with 2.0 whereas it is just under 10m with 1.5.

Connecting a NMEA device to the PC's RS232 serial port

NMEA 0183 uses the RS422 electrical standard, so an optically isolated or RS-422 to RS-232 adaptor is recommended. See the serial port connection help.

DB9 pin	PC	NMEA device
2	Receive data +ve	Nmea device output +ve
3	Transmit data +ve	Nmea device input +ve
5	Signal ground	Signal ground

So, for example, you connect the NMEA out from the instruments or GPS to Pin 2 of the DB9 adaptor of the isolated adaptor.

Network connection

If connecting to a NMEA 0183 network service over UDP or TCP, the default port is 10110.

NMEA 0183 settings

More advanced interface options are available by clicking on this button.

Send RTE and WPL

Sends mark and route information from the active route in RET and WPL sentences.

NMEA sentences decoded by Expedition

Expedition can send receive NMEA sentences to your instrument system.

Notes:

HDT is normally turned off as Exp uses magnetic heading wherever possible.

DSC message data is viewed in the AIS pane and on the chart window.

If BWC is selected and Expedition receives a valid BWC sentence, the mark received will replace the active mark being used by Exp.

In addition, XDR fields to be decoded are selected on this page.

BWC	Bearing and distance to waypoint
DBT	Depth below transducer
DPT	Depth below keel
DSC	Digital Selective Calling information
DSE	Expanded digital selective calling
FRPLC	Cariboni hydraulics, requires cariboni_config.txt
GGA	GPS fix
GLL	Position
GSA	GPS DOP
GSV	Satellites in view
GXA	Position (obsolete)
HDG	Heading
HDM	Heading - magnetic
HDT	Heading - true
MDA	
MOB	Man Over-Board
MMB	Barometer
MWD	TWD and TWS
MTA	Air temperature
MTW	Water temperature

MWD	Wind direction and speed	
MWV	TWA and TWS or AWA and AWS	
OSD	Own ship data	
OWD	Heading	
PASHR	RT300 roll and pitch	
RMA		
RMC		
ROT	Rate of turn	
RPM	Revolutions	
RSA	Rudder sensor angle	
RSD	Radar System Data	
TLL	Target latitude and longitude	
TTM	Tracked targets	
VBW		
VDR	Set and Drift	
VDM	AIS	
VDO	AIS Own ship	
VHW	BSP and HDG	
VLW	Trip log	
VTG	COG and SOG	
VWR	AWA and AWS	
VWT	TWA and TWS	
XDR	* see below	
WIMDA	Airmar meteorological message	
ZDA		

XDR

XDR sentences can be used for data not specified in other NMEA 0183 sentences.

Currently (September 2020), Expedition options include:

	NMEA ID	Alternative IDs	Type	Expedition channel
Barometer	BARO	BAROMETER, BG, PRESSURE	P	Barometer
Humidity	AIR		H	Humidity
Leeway	LEEWAY	LWY, LWAY, LEEW	A	Leeway
Pitch / trim	PITCH	TRIM, PIT, PTCH, RDG10.IMU.PITCH	A	Pitch / trim

Roll / heel	ROLL	ROL, HEEL, RDG10.IMU.ROLL	A	Roll / heel
Heave	HEAVE		D	Heave
RPM	ENGINE1, ENGINE2		T	RPM1, RPM2
Rudder	RUDDER, RUDDER1, RUDDER2		A	Rudder, Rudder P, Rudder S
Temperature	AIR	TEMPAIR, ENV_OUTAIR_T	T	Air temperature
		ENV_WATER_T	T	Sea temperature
Voltage	BATTERY	BAT, HOUSE	U	Volts
Foils	BOARD		D	Board
	FOILP		A	Foil P
	FOILS		A	Foil S
	KEEL		A	Keel angle
Rig	MAST		A	Mast angle
	FORESTAY		D	Forestay length
	FORESTAY		N	Forestay load
	BOBSTAY		N	Bobstay
	RUNNERP		N	Runner P
	RUNNERS		N	Runner S
	D0P		N	D0 P
	D0S		N	D0 S
	D1P		N	D1 P
	D1S		N	D1 S
Sails	MAIN		N	Main sheet
	TRAV		D	Traveller
	J1		N	J1
	J2		N	J2
	J3		N	J3
	J4		N	J4
Stowe load cells			N	custom

These can be turned on or off as above. The alternative NMEA IDs are for non-standard or custom terminology.

Some mappings may depend on the data type. For example, forestay length or load.

Output

Expedition can send various NMEA sentences to your instrument system. Note that in the case of sentences containing Twd, Twa or Tws, the source (whether instrument, what-if? or calculated by Expedition) will be used. See the What-if? help for more information.

APB	Autopilot sentence 'B'
BWC	Bearing and distance to waypoint
DPT	Depth

GLL	Geographic position - latitude and longitude
HDG	Heading - deviation & variation
HDM	Heading - magnetic
MOB	
MTW	Water temperature
MWD	TWD and TWS
MWV	TWA, TWS, AWA and AWS
RMB	Recommended minimum navigation information
RMC	Recommended minimum navigation information
RSA	Rudder sensor angle
VBW	
VDR	Set and drift
VHW	BSP and HDG
VTG	CoG and SoG
VWR	AWA and AWS
VWT	TWA and TWS
XTE	Cross track error
ZCD	
ZDA	Time & date
ZTG	UTC & time to destination waypoint

NMEA 2000

Web

www.nmea.org

Background

NMEA 2000 is a combined electrical and data specification defined and maintained by the National Marine Electronics Association (NMEA).

NMEA 2000 is much faster than NMEA 0183 (250k bits per second vs 4.8k bits per second) and, unlike 0183, it supports a disciplined multiple talker and listener data network.

As well as the electrical and data specification, NMEA 2000 uses the DeviceNet cabling standard.

NMEA 2000 and Expedition

Exp supports several NMEA 2000 interfaces.

Notes

It may be necessary to set Windows' firewall to enable both Public and Private networks for Expedition, epecially for UDP connections.

Actisense NGT-1 USB adaptor.

This appears as a serial port - just select Actisense NMEA 2000 from the drop-list as for any other instrument system. Note that the Actisense option only appears when the NGT-1 adaptor is connected.

The NGT-1 sends all the data it receives to the Exp.

The NGT-1-USB can work up to 230400 baud, but the NGT-1-ISO is limited to 115200 baud due to the opto isolators in the ISO-Drive system.

A baud rate of 115200 is sufficient for even a 45-50% loaded NMEA 2000 network.

Older USB devices were limited to 115200 baud, but can be updated. Firmware updates are available at:

https://www.actisense.com/downloads/

For devices with v2.600 or later firmware, 230400 baud is the default baud rate.

Actisense W2K-1 wireless adaptor.

Select Actisense from the Expedition instrument type drop-list.

These notes apply for W2K-1 firmware 1.213 and later.

The W2K-1 data server can operate in several modes, see the W2K-1 user manual. Expedition supports:

N2K ASCII

RAW ASCII

NMEA 0183

Actisense N2K ASCII is recommended, especially as it can receive data from Expedition. We can't imagine a reason for using NMEA 0183 or RAW ASCII.

Actisense recommends TCP as the connection protocol, but UDP is often preferred. However, the W2K-1 does not currently support receive when using the UDP protocol.

Yacht Devices

NMEA 2000 USB Gateway YDNU-02

NMEA 2000 Wi-Fi Gateway YDWG-02

NMEA 2000 Ethernet Gateway YDEN-02

Select Yacht Devices from the drop-list.

Chetco SeaSmart

SeaSmart Vessel Analog Gateway

Note that depending on the devices connected to the NMEA 2000 network, it may be necessary or desirable to calculate leeway, twd, tws, twa, set and drift in Exp.

NMEA 2000 settings

N2K PGNs

Controls receiving and sending of NMEA 2000 PGNs. If Exp is in true mode, these will be sent in degrees true where applicable.

Note that the NGT-1 is limited to 30 Tx and 28 Rx slots. Exp uses some of these for system purposes, so the PGN lists are limited to 29 for Tx and 26 for Rx.

See below for NMEA 2000 PGNs Expeditoin can receive and send.

N2K System

Use mode

Data from any node can be set to be used or ignored.

- Used
- Ignore
- Ignore GPS data
- Use on port only
- Use on starboard only

The Ignore GPS data option can be useful for AIS devices if you have a different GPS source.

The Use on port and starboard options are for multi-hulls or boats with two speed sensors. Heel is used if available, else AWA is used to determine port or starboard.

N2K Sources

Allows the user to specify NMEA 2000 nodes to be used for different data.

For example, there may be multiple GPS sources in the system, but only the position from one may be wanted.

Custom

Expedition can send almost any data to Garmin custom channels.

PGNs receivable by Exp

Note that 127245 may be used for a mast rotation sensor.

65288	Tinley load cell
65293	Diverse HLA load cell
126992	System time
126996	Product information
127233	Man Overboard Notification (MOB)
127245	Rudder
127250	Heading (magnetic,true)
127251	Rate of turn
127252	Heave
127257	Attitude (heel/roll and trim/pitch)
127488	Engine parameters, rapid update
127489	Engine parameters, dynamic
127508	Battery status

128000	Nautical leeway angle
128259	Speed, water referenced
128267	Water depth
128275	Distance log
129025	Position, rapid update
129026	COG & SOG, rapid update
129029	GNSS position data
129038	AIS Class A position report
129039	AIS Class B position report
129040	AIS Class B extended position report
129041	AIS Aids to Navigation (AtoN) report
129285	Current set and drift
129539	DOPs
129540	Sats in view
129793	AIS UTC and date report
129794	AIS Class A static and voyage related data
129798	AIS SAR Aircraft position report
129802	AIS safety related broadcast message
129809	AIS Class B static data
129810	AIS Class B static data
130306	Wind data (tws, tws, awa, aws, twa, tws)
130310	Environmental parameters (barometer, air and sea temperature)
130311	Environmental parameters (obsolete)
130312	Temperature
130313	Humidity
130314	Pressure

130316	Temperature, extended range
130323	Meteorological station data - these get filed as weather boats
130577	Direction data
130578	Vessel speed components

PGNs sendable by Exp

Note the option for 127488 to send Polar Bsp % as RPM.

126720	Garmin custom data
127245	Rudder
127250	Heading (magnetic,true) and variation
127251	Rate of turn
127257	Attitude (heel/roll and trim/pitch)
127258	Magnetic variation
127488	Engine parameters, rapid update
127488	Engine parameters, rapid update - Exp fudge to send bsp% as RPM
127508	Battery status
128000	Nautical leeway angle
128259	Speed, water referenced
128267	Depth
129025	Position, rapid update
129026	COG & SOG, rapid update
129029	GNSS position data

129283	Cross track error
129284	Navigation data (mark range bearing, latitude, longitude)
129285	Navigation - Route/WP information
129291	Set and drift
129301	Time to mark or layline
130306	Wind (tws, tws, awa, aws, twa, tws). The B&G twa/tws option may be required for B&G displays.
130310	Environmental parameters (barometer, air and sea temperature)

Ockam

Web

www.ockam.com

Connection settings

The default Ockam serial port settings are 9600, 8, N, 1.

Baud rate 9600

Data bits 8

Parity   None

Stop bits 1

Instrument system wiring and set up

Ockam recommended serial port wiring

	Ockam	DB9	DB25
RS232 gnd	7 black	5	7
RS232 Tx	3 green	2	3

RS232 Rx	2 blue	3	2
Jumper	7 to 8	4 to 6	4 to 5
Jumper		7 to 8	6 to 20

While the normal PC hardware might well run with just Tx, Rx and Ground connected, some driver software will wait forever for one of the handshaking lines to go to the correct level. Depending on the signal state it might sometimes work, other times it might not. The reliable solution is to loop back the handshake lines if they are not used.

When the lines are handshake looped, the RTS output from the PC immediately activates the CTS input - so the PC effectively controls its own handshaking.

Also see the NMEA 0183 and serial port help.

DB9 pins

1 Received Line Signal Detector (Data Carrier Detect)
2 Received Data
3 Transmit Data
4 Data Terminal Ready
5 Signal Ground
6 Data Set Ready
7 Request To Send

8 Clear To Send

9 Ring Indicator

Network

For local UDP network connections to OckamSoft, it is required that data to be sent to a port one greater than the Rx port.

Ockam instrument set up

The default Expedition settings for Ockam are 9600, 8, N, 1 to suit the T1. Older Ockam systems are often set to 4800,8,N,1.

To set the Ockam RS232 interface to 9600, 8, N, 1, set switch A to 4 and switch B to D.

To set the Ockam RS232 interface to 4800,8,N,1, set both switches A and B to 9.

NMEA 0183

Exp can also use the embedded NMEA 183 data from Ockam. If using DBT or DPT, Exp will ignore the Ockam 'w' depth tag. This is the preferred method of getting depth from Ockam systems.

If not using embedded NMEA 0183 data, de-select DBT and DPT from the Ockam NMEA options to enable Exp to receive depth data.

Ockam calibration data

Ockam calibration values are also mapped to user channels 10-18. These user channels will be renamed appropriately when data is received from the Ockam T1.

User 10	Cal bsp
User 11	Cal bsp offset
User 12	Cal awa
User 13	Cal aws
User 14	Cal upwash
User 15	Cal leeway
User 16	Cal twa
User 17	Cal tws

Settings

More advanced interface options are available by clicking on this button.

User channels

This tool is highly useful if you want to send some of Expedition's numbers/data to your Ockam instrument system for display on deck. For example you might want to display *target speed* when sailing a windward leeward course, or *polar percentage* when sailing a reaching

course. Ockam has ten available external channels available for this purpose. Simply choose the desired channel and select the number/function from the drop down menu. Note that you can also select one of Expedition's Alternating channels here.

Selecting the *damped* check-box next to any external channel will cause damped data to be output instead of raw data.

The *Custom name* fields lets the user over-ride the default external channel tag.

Occasionally, your Ockam system will be receiving user data on a *user channel* (for example, a keel string-pot). In this case you don't want to send data to the particular Ockam user channel, but map the data Expedition receives from the Ockam system for that user channel to an Expedition channel. This is accomplished by checking the relevant send checkbox and selecting the appropriate Expedition channel to map the data to from the drop list. Note that the Ockam user data could be mapped to the Expedition *User n* channel.

Expedition uses Ockam's user tag 9 for its own purposes, so this is not available for use.

Auxiliary channels

Here you can map Ockam auxiliary channels 0, 1, 2 and 3 (such as Forestay load) to Expedition system channels.

Ockam user tag data

Ockam User tag data may also be stored in User0-8. Ockam user tag 9 is used by Expedition internally and is not available for other use.

Calibration

Expedition can send the following single calibration values to the Ockam T1:

Mast height, O8

Heading offset, O17

Wind weight, O20.

Auto calibration

Be VERY careful when using this feature.

Expedition can send automatic calibration values to the instruments. These are derived from Expedition's calibration tables or linear calibration values. Select which auto-cal values to send by using the appropriate check-boxes.

Note: Interpolation of values uses a smooth spline technique by default. If linear

interpolation is desired, this can be manually set by adding the text "linear" to the first line of any calibration table file.

Auto-cal values Exp can send to the Ockam T1:

Bsp, K1

Table dependant on Bsp across,
Default value = 1.0.

Bsp offset, K2

Single default value = 0.0.

Leeway, K3

Table dependant on twa across and tws down,
Default value = 10.0.

Awa offset, K4

Single default value = 0.0

Aws, K5

Single default value 1.08

Upwash, K6

Table dependant on twa across and tws down,
Default value = 0.0.

Upwash slope, K9

Single default value = 0.0.

Aws offset, K10

Single default value = 0.55.

Twa, K11 & K12

Table dependant on twa across and tws down,
Default value = 0.0.

Tws, K13 & K14

Table dependant on twa across and tws down,
Default value = 0.0.

Transducer depth, K15

Single default value.

Keel depth, K16

Single default value.

Ockam settings

Allows control of Ockam magnums (see the help on the U@=JmTn<CR> command in the Ockam manual).

Update magnums at start-up

Updates the Ockam Magnums when Expedition is started.

Set auto-cals to hardware screw value on exit

Sends the Kn=D command for any auto-cals enabled in Expedition.

Expert users only. Default value if OFF.

Limit output (black RS232)

Slows output sent to older black RS232 interfaces.

Heading and Twd in true

In some cases with a compass that sends heading in true, Ockam will not correct for this.

Send mark

Sends Expedition's active mark to the Ockam T1.

Damping

Allows upload of damping variables to the Ockam system. Note that these values are independent of Expedition's internal damping values.

Raymarine Seatalk

There are two Seatalk networks - Seatalk and SeatalkNG

The original SeaTalk is a proprietary protocol used by Raymarine and cannot be connected to Expedition directly.

Seatalk NG

Seatalk NG is essentially NMEA 2000 with different connectors, so Exp can connect to the Raymarine SeatalkNG as a NMEA 2000 connection.

Actisense has an NGT-1 with a Seatalk connector.

Another option is to use a Raymarine SeatalkNG to NMEA 2000 adaptor cable and the Actisense NMEA 2000 adaptor.

Seatalk

The original Seatalk network was originally developed by Autohelm in the early 1990s.

Raymarine manufactured a E85001 Seatalk to NMEA 0183 converter, but no longer offers this this product.

Raymarine now has a Raymarine SeaTalk1 to SeaTalk NG Converter Kit (part number E22158).

Expedition can then connect to the SeatalkNG network as above.

There are several third party Seatalk to NMEA 0183 manufacturers. We have used or tested these, but note that they exist.

Seatalk USB Converter - Digital Yacht.

ShipModule

Raymarine Wireless (TackTick)

Raymarine Wireless instruments, previous Tacktick instruments.

Web

www.raymarine.com (previously www.tacktick.com)

Connection settings

Raymarine wireless / Tacktick instruments (via the T122 Wireless Interface) communicate using the NMEA 0183 protocol, so the default serial port settings are 4800,8,N,1. See the NMEA 0183 and serial port help for more information on the Nmea standard and interface, however, there are also several custom NMEA strings available with Tacktick.

Baud rate	4800
Data bits	8
Parity	None
Stop bits	1

Note: Tacktick does not send TWD, so Expedition needs to calculate it. Select this on the calculations page.

Tacktick settings

More advanced interface options are available by clicking on this button.

Output

Any Expedition channel, including alternating channels, can be sent to one of four or six Tacktick Proprietary NMEA sentences. See your Tacktick manual for further information.

Selecting the *damped* check-box next to any output channel will cause damped data to be output.

The *Custom name* fields lets the user over-ride the default external channel tag.

Some displays cannot display the proprietary data, please check your Raymarine/tacktick product documentation. The T210 Maxi, T215 Maxi and T110 displays can, but the T111 dual line and 215 dual maxi displays can't.

Because of the limited display space, values below -100 may not show the - sign.

NMEA 0183

Allows NMEA messages to be selected to receive and/or sent.

Tacktick cals

Send Twa and/or Twa *auto-cal* values to the Tacktick processor. Select which auto-cal values to send on the calibration system page.

Alternating

Alternating numbers.

Exp calibration

Advanced calibration and calculations.

Exp calculations

Tacktick does not send TWD, so Expedition needs to calculate it. Select this on the calculations page.

Stowe

www.stowemarine.com

Connection settings

The default Stowe Dataline GX Terminal Display serial port settings are 9600, 8, N, 1.

Baud rate	4800
Data bits	8
Parity	None
Stop bits	1

Connecting a Stowe Dataline GX Display to the PC's RS232 serial port

Most computers have a 9 pin serial port or can use a USB-serial port adaptor, if lacking one.

Also see the NMEA 0183 and serial port help.

DB9 pin	PC		Stowe
		Red	+12V power
2	Receive data +ve	Brown	Serial data Tx
3	Transmit data +ve	White	Serial data Rx
5	Signal ground	Green	Serial data common
		Black	0V power

Stowe settings

More advanced interface options are available by clicking on this button.

Expedition has 4 preset options for Stowe displays. Each preset may have 1 to 4 variable associated with it.

Pressing buttons 1 to 4 on the display will select which option will be sent to the display.

Stowe load cells

Exp can read XDR data from Stowe load cells.

This is selected from the XDR section of the NMEA 0183 input interface.

Load cell 001 is mapped to Expedition's forestay load channel. Load cells 002 to 008 are mapped to Expedition user channels.

VSPARS

Web

Connection settings

The default VSPARS connection is a UDP connection on port 5685.

VSPARS settings

More advanced interface options are available by clicking on this button.

Yacht Devices

Expedition can receive NMEA 2000 data packaged in Yacht Device's RAW format.

Web

www.yachtd.com

NMEA 2000

NMEA 2000 Wi-Fi Gateway YDWG-02

May be used with either NMEA 0183 or Yacht Devices RAW formats. Generally the RAW format is recommended as it will send the raw NMEA 2000 data to Expedition. Otherwise the device has to translate NMEA 2000 data to the older NMEA 0183 format.

This may require settings the data protocol to RAW from NMEA 0183. See the YDWG02 user manual - Configuration of Application Protocols.

Normally UDP is recommended as opposed to TCP.

NMEA 2000 USB Gateway YDNU-02

Communications

Expedition supports native Windows internet connections, Redport Optimizer, XGate and Iridium GO!

See also

Expedition internet settings.

Iridium GO! help.

Iridium GO!

Iridium GO! is a very nice, small and portable device that provides global voice calling, text messaging and data solutions at about 2400bps via a Wifi connection.

Web

www.iridium.com/products/iridium-go

Use with Expedition

There are several ways to use Iridium GO! to obtain data for Expedition.

Expedition can connect directly or a third party application my be used.

While a third party application such as Airmail or SquidX may sound inconvenient, there may be advantages in delegating what can be a lengthy download to another app.

Expedition direct connection

Expedition can connection directly to the Iridium GO! and automatically handle connections.

Airmail

Airmail from Sailmail is a very nice way to use an Iridium GO!

It is an email app that can be used to request and download data. The Saildocs grib request system integrated into Expedition can be used to request grib data, but it can be used to download almost anything.

SquidX

SquidX from Great Circle is a very nice app that retrieves grib and other data from their service. The grib and satellite data can be then used in Expedition.

XGate

XGate can be used to manage a connection to the Iridium GO! , although this has not been tested here.

GMN has a short description:

How To Use Iridium GO! and Microsoft Windows Together

Direct Connection in Expedition

Open Expedition's internet settings age.

Select Iridium GO! as the connection type. This should automatically select 'Direct to internet' as the Access Type.

If the address of the device, user-name or password are different from standard, these can also be set here.

With multiple networks, it may be required to specify the address of the device instead of the default http://iridiumgo.lan . Normally it is 192.168.0.1.
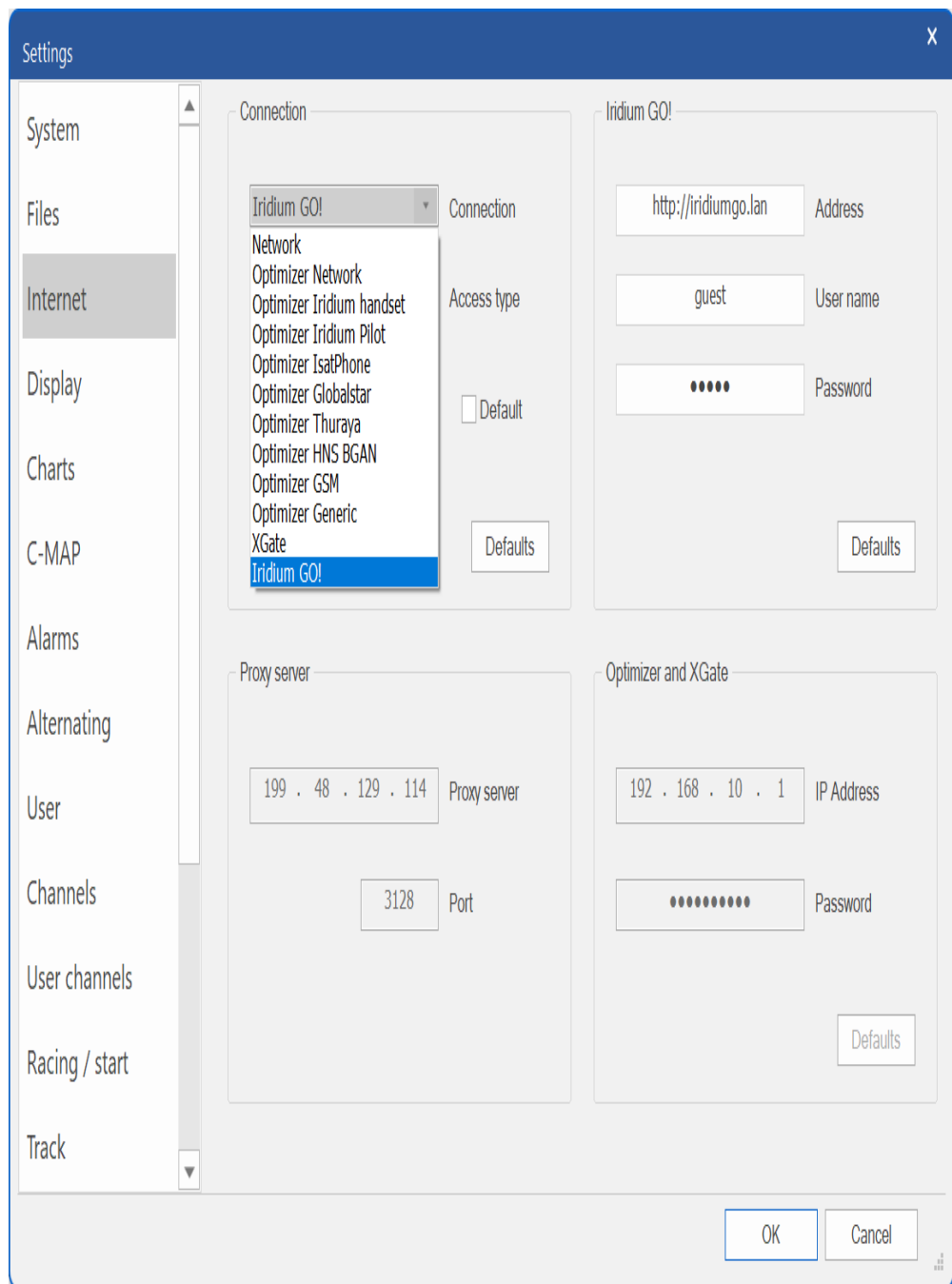
Usage notes

We recommend always using an external antenna with GO!
Connections will be at the same nominal speed, but reliability and
effective speeds will be much higher than using the pop-up
antenna because of reduced loss of signal and connections.

Make sure the Iridium GO! is pwers on and has 5/5 signal strength
before use. It may work with a lower signal strength, but not nearly

as well. Expedition intermittently checks the signal strength, but the display on the device itself will give an more frequently updated indication.

When you attempt to download data, Expedition will automatically instruct the Iridium GO! to make an internet connection. This may take 30-60 seconds and signal strength, status updates etc will be displayed on a new panel on the Weather data ribbon.
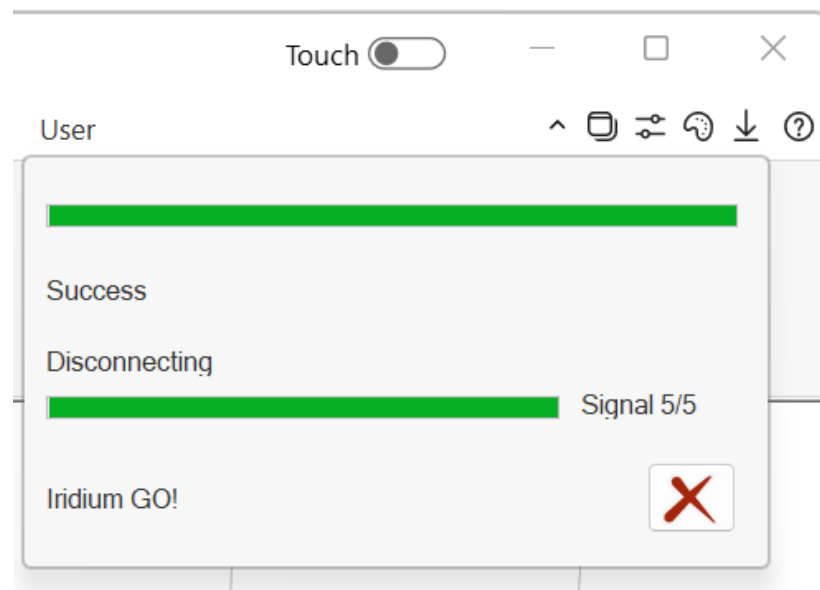
After the download is complete, Expedition will disconnect the internet call, but it is good practice to confirm the Iridium GO! internet connection has been disconnected.

Multiple devices can be connected to the Iridium GO!, however, only one active voice or data connection can be active at a time. If another device is using the Iridium GO!, Expedition will not attempt to connect.

It may be worth changing the default login name and/or password if the Iridium GO! is powered on in an enironment such as a marine where other users may be within Wifi range. Don't forget to set the new user-name and password in Expedition's internet settings.

We recommend being careful with data requests as it is only a 2400bps connection. For this reason, for grib data, consider restricting the area, number of time steps and resolution. As an example, downloading GFS data from Saildocs at 0.5 degree resolution will be about 1/4 of the size of 0.25 degree data.

A direct Wifi connection to the Iridium GO! is recommended, not via any other networking devices.

These comments also apply in most part to Airmail and SquidX.

Settings

System

System files

Internet

Display

Charts

C-MAP

Alarms

Alternating numbers

User

Channels

User channels

Racing / start

Track

Weather

Weather data

Tides

Optimal routing

When you first use Expedition, and indeed every time you use it, you may want to review and configure many

settings.

The settings pages may be accessed from the Application button or the charts or weather panels. You will need to go through each of the tabs in this menu to configure Expedition for your needs.

System settings

Controls various aspects of the Expedition system.

System modes

Local time

Display all times (displayed or user input) in local time. If this box is unchecked, UTC (Universal or Greenwich Meridian Time) will be displayed. Normally you select local time for buoy racing and short offshore racing. It is often desirable to operate in UTC time mode in longer, offshore races.

Magnetic

Display all bearings and directions in degrees magnetic. Normally you will select this feature, but in certain cases it can be useful to operate in *True* magnetic mode, especially when you are in the Southern Ocean and the variation is 60°!

Fahrenheit

Display in temperatures in Fahrenheit. Default is degrees Celsius.

Keypad

Display pop-up keyboard when using edit controls for tablet use.

Tablet

More touch friendly ribbon with larger buttons for tablet use.

Also available with a switch at the top right of Expedition.

Slave

Puts Expedition in a slave mode. In this mode, Exp will not calculate most derived values.

This is useful if you want to send all the data from one computer to another using the Expedition instrument protocol, for example to a coach boat.

Port

For Port & Vesper ICAS customers. ICAS is a custom build.

ICAS users must specify the SQL database.

Simple ribbon

Simple and small ribbon, primarily for tablet use.

Also available with a switch at the top right of Expedition.

System options

Check for updates at start-up

Checks if there is an update available when Expedition is started. Also see the system menu.

XTE calculated between marks

The default is for XTE to be the distance from the great circle path to the active mark from the preceeding mark.

Deselect this to over ride the default behaviour. In this case, the preceeding mark is over-ridden to use the GPS position when a mark is set active. The Reset XTE option on the marks panel also resets the preceeding position for the XTE calculation to the boat position.

Units

Distance

Changes the units used when displaying distance in most of Expedition's numbers. Normally this is set to nautical miles for navigation purposes, but it may be helpful at times to use a different measurement unit such as boat lengths.

If this setting is in nautical miles, distances in the starting line calculations will be displayed in boat lengths (e.g. Start distance to line).

Depth and height units

Select depth (feet, metres or fathoms) and height (feet or metres). This applies globally (ENC charts, C-MAP charts, tides and instrument data).

Speed

Start

Metres or boat lengths for start distances.

System files settings

Data files used by Expedition.

Data folder

Where Expedition stores most data - log, grib files etc.

This may be changed to use (eg) a Microsoft OneDrive synchronised folder.

Default is C:\ProgramData\Expedition.

Marks database

Contains all Expedition's marks and routes.

Race tracking

The race tracking database. Often a different database is used for different races. The .mdb button allows importing from legacy Expedition Access databases.

User database

Much Expedition data is saved in a database - tests, sails, events &tc. The database file can be copied to

other computers or backed up.

By default, this file is called *Expedition.mdb*. The default name is sufficient for most purposes. However, if you sail on different boats if may be more convenient and safer to have a database file with a name unique to each boat. Any Expedition database (*.mdb) can also be selected just by dragging it onto the user settings page.

Compact database

This compacts and repairs the database file (*.mdb) currently being used.

Internet settings

Connection

Expedition supports native Windows internet connections, Redport Optimizer, XGate and Iridium GO!

Windows internet

Select Network from the connection drop-list.

Iridium GO!

See the Iridium GO! help.

Optimizer

Redport Optimizer is described in more detail at the Global Marine Networks site.

It is a very nice device - just connect your satellite phone to the Optimizer and connect to the Wifi network the Optimizer provides.

Then select one of the Optimizer connection options from the drop-list.

Optimizer Network

Optimizer Iridium handset

Optimizer Iridium Pilot

Optimizer IsatPhone

Optimizer Globalstar

Optimizer Thuraya

Optimizer HNS BGAN

Optimizer GSM

Optimizer Generic

You may need the Optimizer IP address and password. For most users these are default settings.

XGate

XGate is described in more detail at the Global Marine Networks site.

Select XGate from the drop-list.

Internet access type

Use Windows settings

The default access type is using Windows connection settings.

Direct to internet

Windows settings may be over-ridden by specifying direct access.

Through a proxy

Windows settings may be over-ridden by specifying a proxy server.

Proxy server settings can also be specified in Windows network settings. for example - Internet Explorer | Internet options | LAN Settings.

Optimizer

For Optimizer and XGate connections, the default connection is using GMN's proxy server.

Time-outs

Over-ride the default Windows time-out values for slow internet connections or servers.

Display settings

Various check boxes and controls on this page allow you to select whether or not to display various details on the chart.

Update frequency

Sets maximum screen refresh rate in Hz.

The default value is 8Hz. If using a remote desktop or display, it can be a good idea to reduce the refresh frequency to say 4Hz.

Boat real size

Select small, medium, large or to scale boat icon.

Boat colour

Select colour to paint boats.

Route colour

Select colour for marks and route.

Weather observation colour

Select colour to plot weather observations. Can also be drawn using the 10m wind colouring scheme, see below.

Font size

Size of the text font used.

Range circle radius

Controls the size of the *range circle* drawn around the boat. See *range circle* below

Period for Cog and heading

Controls the size of the predictor lines and the polar range circle. See below.

Layline bounds

Sets the period of time for the *Layline bounds as described above.*

Auto-pan

Automatically pans the chart when using visual marks, dividers etc. Only applicable in drag chart mode.

Notifications

MOB and SART pop-up warnings

Display a pop up message on receipt of a SART or MOB message.

Marks and routes

Leg details

Display range and bearing of all legs in a route and *Divider* measurements.

The range will be displayed in user selected units. The bearing can be displayed in either degrees true or magnetic. On a long leg a straight line appears curved because it is a great circle. In a great circle, the bearing displayed is the bearing at the starting point.

Current leg

Draw the leg of the route from your boat to the next mark.

Mark names

Display mark names. If you move the mouse over a mark, any comments associated with it (that you have entered when editing or creating a mark) will pop up.

Mark range circles

Draw range circles around marks for which you have set up a range circle (when editing the mark's details).

Racing

Laylines

Draw laylines that will emanate from the *active* (yellow or green dot) mark. By default, these laylines are a function of the active polar, the leeway, the damped true wind and the damped current.

Expedition allows you to override the instrument wind/current and to have the laylines drawn oriented to a contrived, user selected wind and current. This is especially helpful when the wind/current instruments are acting up, or when studying possible tactical scenarios. Learn how to force what if wind and/or currents using the What if? help.

You can change the active mark (displaying the yellow or green dot) to another mark in a route by clicking the *previous* or *next* buttons on the marks panel or the *right/left* arrows on the keyboard.

Layline bounds

Similar to *laylines*, but are extreme laylines for a preceding period of time as defined in the *Layline bounds (minutes)* control. Often if displaying laylines, you may wish to also display these.

Laylines from boat

Similar to *laylines*, but emanating from the boat's position.

Laylines using predicted tides

As for laylines above, but uses tidal model data if available instead of using set and drift at the boat (from instruments, predicted or what-if? values).

This will results in laylines curved to take account of the tidal current model.

Note that these laylines use the instrument (or what-if?) wind values at the boat, which are even more likely to change than the current.

In addition to the graphical representation, there are 6 channels that can be displayed in number boxes or lists. These are the times to the port and starboard sides of the course:
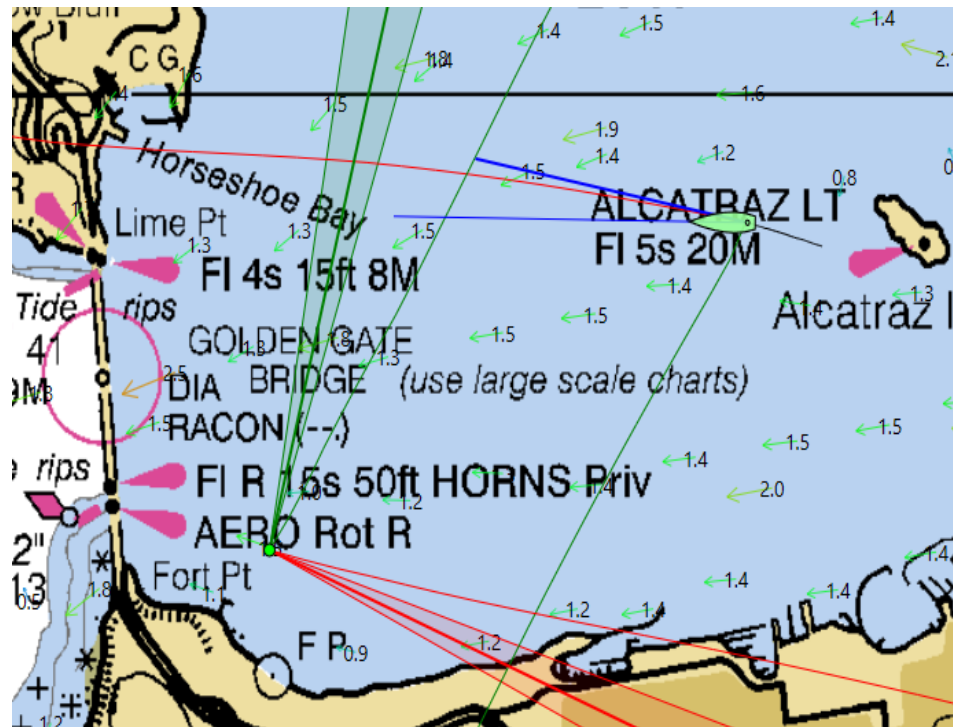
To the port side of the course

- Lay tide port side port time - Time on port from the boat
- Lay tide port side stbd time - Time on port to the mark
- Lay tide port side time - total time to the mark
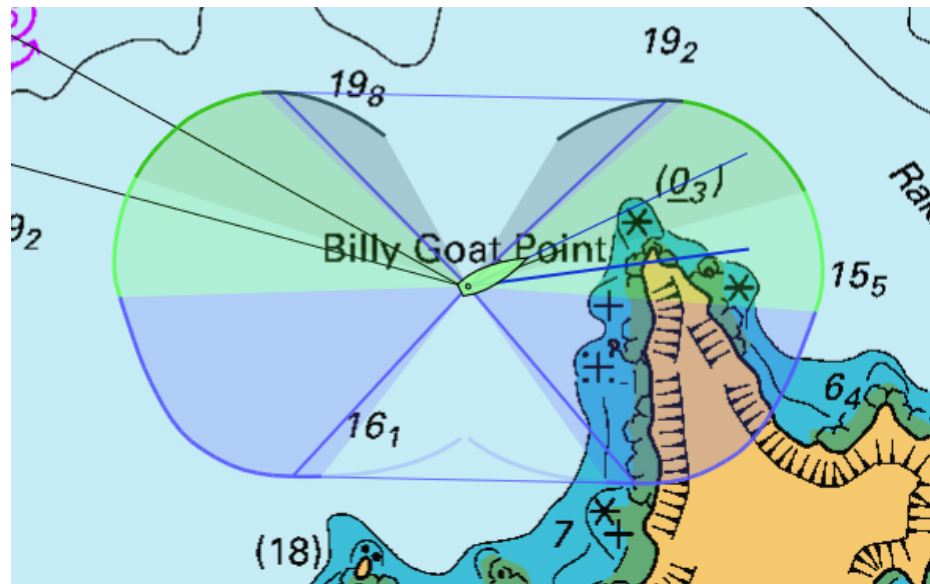
To the starboard side of the course

- Lay tide stbd side port time - Time on starboard from the boat
- Lay tide stbd side stbd time - Time on starboard to the mark
- Lay tide stbd side time - total time to the mark

In this example, the solid lines are the laylines based on the measured current and the thin lines are laylines based on the tidal current model for San Francisco:

Opposite tack

Draws a *predictor line* for the opposite tack or gybe.

Race notes

Draws race notes on the chart.

Polar range circle

Draws a polar around the boat. The size of the polar dependent on the number of minutes entered.

The polar curve will be drawn in the sail colours.

Race tracking

Display other boats' tracks if you are using Race tracking. This is very useful in an ocean race when there are daily position reports that you enter into Expedition's Race tracking.

Select which boats to display in race tracking and on the chart from the Edit boats interface, available on the sail panel.

To view other boats' tracks, you must have entered other boats' positions in the race tracking database (see the help on Race tracking) and the program time/date shown in the upper left corner of the main chart window must be concurrent to or after the range of time for these schedule/position entries. To view other boats' position at a point in time, the time/date displayed in the upper left of the main chart window must be during the range in time for these schedule/position entries. It helps a lot to have a weather GRIB file covering this range of time loaded into Expedition. (See the help on weather for more on GRIB files).

Use the Time button on the weather display panel to set the display time to the sched time you are interested in.

Race tracking all

Draws all of each boats' track, else just draws up to the current display time.

Maybe be useful to deselect when playing back a race,

Race tracking tracks in bold

Draws race tracks as thicker lines.

Start line

Draw the start line (and laylines for it) if you have one set up.

Boat

Advantage line

Boat winds

Display a boat's damped wind speed and direction in a data box next to the boat and a wind barb emanating from the boat's position. This is normally turned off, but can be especially useful when there are several boats in the system (e.g. 2 boat testing or a multi boat weather program).

This was a very cool part of the Stars & Stripes weather program where we had up to a dozen instrumented boats connected to Expedition - both race boats, all the weather boats and the support vessels as well as several weather buoys and land stations.

Compass

Draw a compass rose (in magnetic degrees corrected for the local variation) on the chart. You can drag the compass around the screen.

Heading, course and CoG

Draw heading, course and/or CoG predictor lines from the bow of the boat. The user enters how long the line will be by entering a time value in minutes. For example, if you enter *5 minutes*, the predictor line will show you where you will be in 5 minutes if you

keep the present course and speed). This is very helpful for coastal navigation and when monitoring how long you have to go before a manoeuvre/course change. See the help on *centre chart ahead of boat*.

Radar overlay

Draws Navico or Koden radar echoes on the chart.

Range circle

Draws a range circle around the boat. Note that you can also draw range circles around marks. The size of this is controlled by Range circle radius (see above).

Estimated horizontal position error

Draws a series of shaded rings around the boat given information from the GPS. Each ring is approximately one standard deviation.

For example, this means any given GPS fix has about a 95% chance of being within the first two rings.

This feature is intended purely as a visual aid to monitor GPS performance and in no way reduces or replaces the requirement to use official printed charts or prudent use thereof. See the Expedition licence and also the disclaimer when starting Exp.

Name

Boat name.

AIS and DSC targets

Targets

Draws AIS and DSC targets on the screen.

De-clutter

Show less AIS targets at lower chart scales.

Tooltips

Shows tooltips for individual AIS targets if tooltips (below) is selected.

Name

Displays the name of each AIS target next to its symbol if *AIS targets* is also selected.

Call Sign

Displays the radio call sign of each AIS target next to its symbol if *AIS targets* is also selected. Note this also applies to both boat descriptors for boats > 0.

CoG & SoG

Adds CoG and SoG text to each AIS target next to its symbol if *AIS targets* is also selected.

Predictor lines

Draws a predictor line from each target, based on its Sog, Cog and the specified period.

Status

Target status.

Trails

Trails.

CPA

Displays a blue line at the closest point of approach (CPA).

Weather observations

Observations

Displays weather observation data on the chart.

Wind observations only

Only draw weather observations that include wind data

Observation wind text

Wind direction and speed text.

Observation all text

Mslp, temperature and dew point text.

Use 10m colour

Colour weather observations using the 10m wind colouring scheme, else specify a colour as above.

Other

Tooltips

Enables tooltips for marks, tide stations, events, race notes, weather boats, AIS targets etc. This can be useful if using a remote desktop tablet for example.

WRF

Draws Expedition WRF forecast areas on the chart.

MyGrib

Draws [MyGrib](#) forecast areas on the chart.

Tidetech

Draws [Tidetech](#) forecast areas on the chart.

Predictwind

Draws Predictwind areas on the chart.

Status-bar

Controls the parameters listed on the [Status bar](#).

Alarms settings

Alternating number settings

Expedition has ten channels that can be set to alternately display different channels. These numbers can be displayed on the screen or output to the instrument system.

Selecting alternating numbers

For each alternating number, select desired numbers for each situation. Set any cell to blank if that option is not desired. If redundant options are selected, the precedence when selecting the channel is:

1. MOB

Man Over Board.

When the MOB attribute is set for the active mark.

2. Pre-start

Channel to use before the gun

3. Timer 1, Timer 2

These two numbers alternate on the display at the period as entered in the Alternating period (s) box

4. Reaching, Upwind & Downwind

The alternating number will be one of the numbers selected in these columns depending on the true wind angle

Twa from targets to display reaching number determines how far from the target angle to display the up-wind, down-wind or the reaching number

5. Port, Starboard

Channel to use when on port or starboard

Alternating numbers can be nested. In the example below, time to gun is displayed in the pre-start. Then the display shows target bsp when upwind, polar bsp% when reaching and alternates between target bsp and target twa when downwind.

Alternating period(s)

This determines the period at which the numbers alternate at. Please note that some instrument systems (e.g. B&G 20/20 or GFD displays) will have problems and may lock-up if the alternating period is too short (e.g. less than 3 sec).

Twa from targets to display reaching number

This determines when to switch from display the up-wind, down-wind or reaching number.
For example, if the target wind angle is 40 and, then with 10° entered, Exp will display the upwind selection from zero to 50°, then the reaching number at greater angles.

User settings

Use this page to control many functions in the system. Before using Expedition, you will want to look through this page and make sure the settings are to your liking. The User settings page also includes control over the logging of data.

Boat logging

Log data

To log instrument data, enable the Log boats check-box. The No Log warning will appear in the status bar if you are not logging data.

The frequency at which data is logged can also be changed. The default is to log data at 1hz (once per second). For example:

10Hz is ten times per second,
5Hz is 5 times per second,
0.5hz is once every two seconds,
0.1Hz is once every ten seconds.

Normally 1Hz is sufficient, but for offshore racing, you may want to decrease the frequency (i.e. 0.5hz - 2 seconds between samples) so the log files are smaller.

Expedition only logs select functions that are of use in instrument tuning, navigation and performance analysis.

Log files may also be imported directly into Excel.

Where does the logged data go?

Data that is logged is saved in a folder (usually named Log) located in the Expedition app data folder. This folder can be easily accessed by clicking on the Exp data folder item on the Application button.

The data is saved in a simple comma delimited text file that is easily opened by many programs, including spread sheet programs like Microsoft Excel. The time stamp is either in UTC or local time, depending on what you have chosen (in the Display settings *local time* check box), but the second number logged is a Microsoft DATE type and is always in UTC for consistency.

All data for a particular day is saved in a file that is named for the date it is logged. For consistency, the date is saved in UTC, so if you are logging data on a boat on the west coast of the USA when the local time clicks past 1700 Pacific Daylight time (0000 in UTC time) a new log file will be created and begin to be

populated. If you close Expedition and re-launch it on the same day, the logged data will continue to be written to that day's log file.

Error logging

Used to log system errors. Very incomplete and is mostly only added to as Nick wants to look at things.

Archive

Controls Expedition's archive behaviour. The archive function can be disabled and the number of days to keep archived files altered to suit individual user requirements.

Several critical files are archived from Expedition's data folder (see below) by default whenever Expedition is started. The files archived are:

marks.dat

the database in use

the *Polars* folder and files

the *Config* folder and files

the *States* folder and files

the *Stripchart* folder and files

the *Instruments* folder and files.

These files are archived to a daily folder in the Archive folder in the Expedition data folder.

NOTE: It is recommended that the archive folder is saved regularly in a secure location (e.g. a USB memory stick).

Boats

Edit boat names. Your boat is normally boat zero, other boats may be from telemetry or mapped from AIS targets.

Auto-start

Select Stripchart, Dfw2Exp etc to start these applications when Expedition starts.

Auto mark advance

Automatically advances the active mark to the next mark of the route.

The decision to advance the mark depends on the mark range and/or when pass the bisector between the legs.

Channels settings

Damping

Sets damping for each Expedition var in seconds.

This is similar to the damping in most instrument systems. Entering a non-zero number (seconds) next to a particular variable (channel) dampens that variable.

Some instrument systems will output damped data to Expedition and others will output raw data. Obviously, if the instrument system is sending damped data, it may be undesirable to further damp numbers in Expedition.

Targets, Polars, Layline and start line calculations use the damped values of Twd and Tws. For twd and tws, good starting damping values are 3-5 seconds for high end instrument systems and say 6-10s for simpler instrument systems.

Normally only damp Twd and Tws need to be damped - all other functions are left at 0 seconds damping.

Both raw and damped values in number bars in the main chart window. The damped values will be underlined.

The default Exp damping weights the value to the most recent measurements. The box-car option uses an average of all data samples over the period.

Precision

Precision is the number of digits displayed after the decimal point. Leave blank for defaults.

User channels settings

User channels

Allows Expedition's user channels to be renamed. Note that in some situations (with Racing Bravo for example), this happens automatically.

The settings are saved in a file in the Exp data folder - \config\UserChannels.csv

Current options for var type are:

Bearing
Boat length
Distance
Latitude
Longitude
Percentage
Sail
Time
Time span
Vector

Track settings

Track colouring

Limit track

Enable this to specify the number of minutes of track to draw.

Load day track at startup

Loads the day's logged track if restart Exp.

Track width

In pixels.

Track

Draw your track/trail on the screen. This is normally selected and is very valuable for repositioning marks that you have rounded.

You can load a track from a log file by selecting the *Load track* button on the Tools panel.

Track currents

Draws current vectors along your track. The length of the vector can be controlled by changing the *maximum value* for current on the weather tab. For best resolution, set your maximum current about equal in magnitude to the maximum expected current. This feature is very useful in studying current flow over a race track and to troubleshoot instrument (heading, leeway and speed) calibration errors - if your current changes from tack to tack, you may have a calibration error in your compass or boat speed.

Currents obtained from the instruments will be displayed unless using Expedition derived currents for calculations (see what-if?).

Track winds

Winds obtained from the instruments will be displayed unless using Expedition derived winds for calculations (see what-if?).

Weather settings

Available from the weather display panel.

The weather settings page is used to manage how weather data is displayed in Expedition and also to scale, colour etc tidal and track currents.

Displaying and working with GRIB data in the main chart window

See the weather display panel and the weather data settings help.

Display control

The controls on the left of the weather settings page are used to select what information from the grib data is drawn on the chart and how. Just change the options for each grib parameter (wind, mean sea level pressure, current etc).

The Defaults button has some useful presets to populate these.

Options include:

Contours

For example, contouring mean sea level pressure will give you a weather map similar to the ones we are all used to. Contouring wind

speed gives a visual representation of areas of light or strong wind and wind speed gradients. For example, it may be helpful to display wind speed contours whilst stepping forward in time and studying an optimal route, as this will depict the hot and cold spots of wind velocity more obviously than standard wind barbs.

Shading

Fills the chart with transparent shading, varying in intensity between the shade min and shade max values. Colours used in the shading can be set using the colour and colour mode properties.

Fade colours

Use brighter colours at larger values. This can be useful to visually show areas of light wind and may be combined with either the colour or spectrum options. The fade effect will be between the contour min and contour max values.

Colour

Colour contour lines, arrows or barbs in a single specified colour.

Colour mode

Select whether to draw contour lines, arrows, barbs or shading in the colour selected or in a

spectrum based on red to blue, a grey scale or the beaufort scale.

Arrows

Select whether to draw vectors with arrows or barbs.

Line width

Select with of contours or barbs.

Contour step

How often to draw the contours. For example, selecting 4 for pressure will draw pressure lines every 4mb.

## Contour high-light

Draws the selected level in bold. This may be useful for emphasising an area of strong or light winds, temperature or a jet stream for example.

In the example below

Rain is drawn with shading and contouring selected. The contour interval is 0.5mm/hr.

Winds are drawn using barbs and a spectrum of colours. This can give a good visual reference. Wind speed is often contoured.

Surface pressure is drawn using 2 pixel width contours every 2mb.

The time is displayed in UTC at the top-left of the screen. Local time could be selected on the System settings page.

Display
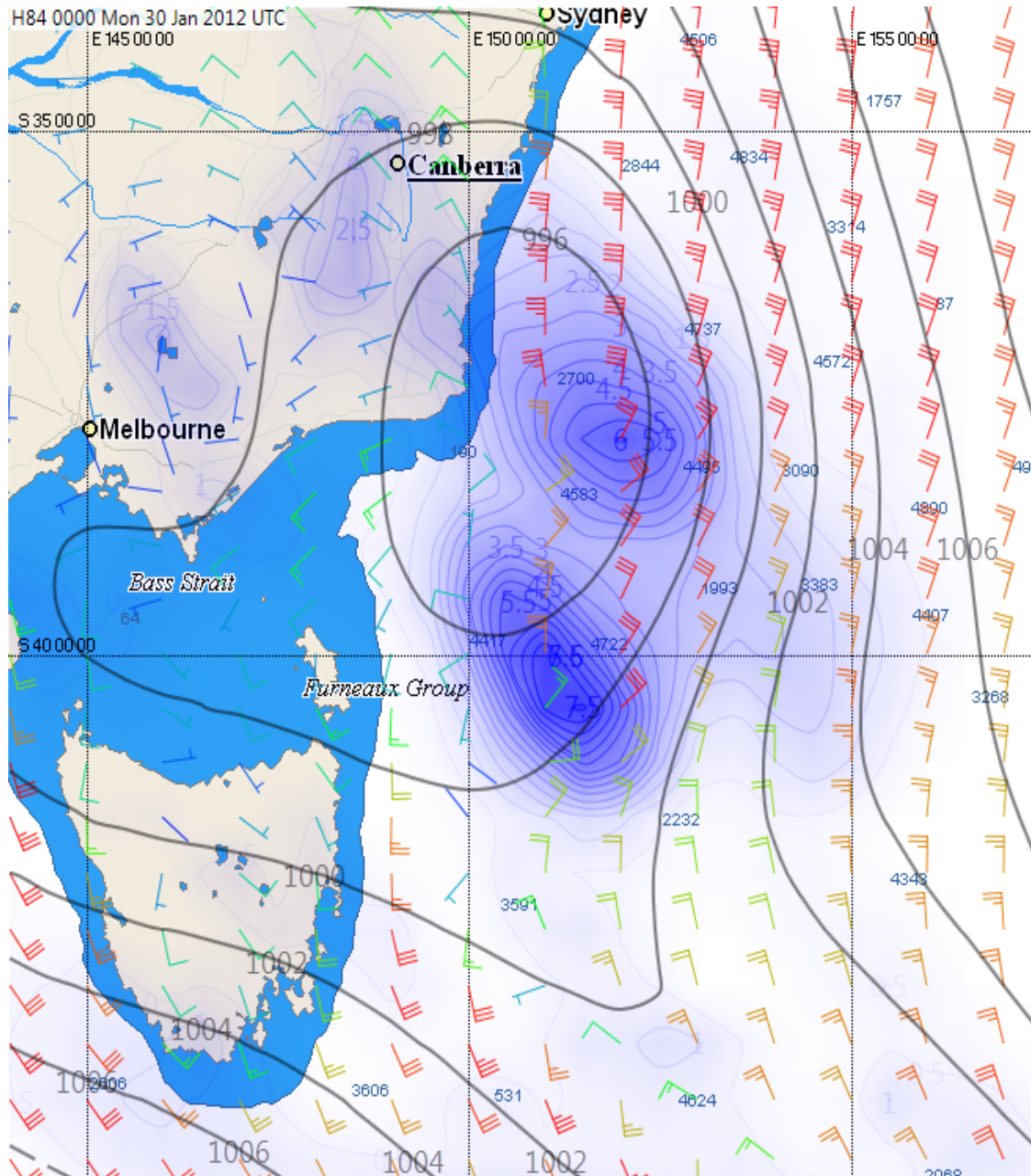
Animation interval (minutes)

Set at 60 minutes by default, but the user can change the animation interval or time step when moving forward or backward in time whilst studying a GRIB or stepping through an optimal route.

Use the forward or reverse buttons on the weather display panel to step forward or backward in time. (You can also use the keyboard up arrow or down arrow to move forward/backward in time.) Time is displayed in the upper left corner of the main chart window and is in either UTC or local computer time depending on how you have configured Expedition in the *Local time* check box on the system settings page.

Always show currents and SST

Often, ocean current, temperature or height anomaly grib data will be an historic analysis, so won't normally be displayed at the same time as weather forecasts. Select this option to always display this data when showing weather forecasts.

This option is especially useful for races such as the Bermuda and Sydney to Hobart races where currents are very important.

Data

Scale currents

Expedition can apply a multiplication factor (in percent) to the currents in a GRIB file. (The default is 100%). This might be desirable if you believe the

GRIB file is incorrectly predicting current speed. This factor has no effect on the current speed and direction reported by the instruments (or the *What If?* currents set by the user. These instrument or *What If?* currents drive the laylines and times whilst sailing. The GRIB file currents (which can be scaled here) are used for route optimizations.

Rotate 10m wind

Allows the user to rotate the GRIB winds by a fixed number of degrees. You might want to do this if you determine the GRIB file is systematically incorrect in direction by a few degrees. Normally you leave this at 0, but if you do want to tweak the GRIB, a positive number rotates the winds in a clockwise direction and a negative number rotates in counter-clockwise in the specified number of degrees.

Scale 10m wind

Similarly, Expedition can scale the GRIB file's wind speed. Why scale the GRIB winds? Because wind speed usually increases with height and you are going to use these GRIB files for either route optimization or for study before a race. If it is the latter, you want the wind speed to be scaled to your masthead/instrument height so that the predictions match your expectations. If you are doing route optimisation, you want the wind speed to be scaled to the wind speed height that the polar is based upon. Although most yacht designers' polar files are scaled to a 10 metre height wind, most sailors want

the polars and targets scaled to masthead instrument height.

Converting polar files to masthead height is simply done in Expedition as we will learn in the section on polars. Wind speed generally increases with height. There is a simple formula that can be used to estimate how more wind is at masthead height than it is at 10 metres (which is a common height that GRIB files are scaled to).

$$Tws_{wand} = Tws_{10m} \cdot (h / 10)^a$$

where h is masthead/instrument height in metres and a is a constant which is normally in the range 0.11 to 0.14.

Example: If your mast/instrument height is 20 metres and your polars are scaled to this height then you can use the formula above to figure out what the percentage scaling you should apply to a 10 metre height GRIB file.

The answer is:

$$x = (20/10)^{0.12} = 1.09 \sim 109\%.$$

So you should enter 109 into the Scale winds % edit box.

User per-model scaling

Expedition allows the 10m win to be scaled independently for different windspeeds for different models.

To enable, select this checkbox. Click the Models button to edit.

The scalings are saved in the WxModels.xml file.

⛵ Weather data settings

Available from the Weather data panel.

The weather data settings page is used to manage weather data in Expedition.

Displaying and working with GRIB data in the main chart window

See the weather display panel and the weather settings help.

Loading GRIB files into Expedition

The main window on the weather page shows the Grib files (if any) that are currently loaded into Expedition. There is no practical limit to the number of Grib files that can be loaded at one time. For example, Expedition can use both current and wind files in route optimisation and can merge have several Gribfiles that cover different times or areas.

Only grib files that are checked are actually used by Expedition.

Grib files may be loaded into Expedition several ways:

Select and drag

Drag them to the list on the left of the weather settings page.

Grib files can also be added by dragging them onto the main chart window if they have .grb, .grb1, .grb2 or .bz2 suffixes. This automatically loads the grib file into Expedition, but does not remove grib files from the grib file list. It is advisable to remove any unnecessary grib files from the list. Bz2 files will be automatically decompressed and the original .bz2 file moved to Windows' recycle bin.

Add file

The Add file button on the weather settings page opens a Windows' window that can be used to select grib files to add to the list.

If the Grib files do not have a .grb, .grb1, .grb2 or .bz2 suffix, they will not be automatically visible in the Windows open file dialog. Select All files at the bottom of the open file dialog and they will appear.

Note that more than one file may be selected.

Grib folder

As for Add file, but defaults to the Expedition grib download folder.

Squid

As for Add file, but defaults to the Squid grib download folder. Note this is only useful if using Squid to download Squid grib data. If using the Squid download integrated into Exp, these will be saved into Expedition's grib folder and automatically loaded.

If using Exp's integrated weather services (such as Expedition, Saildocs, Squid or Tidetech) to obtain grib files, these will be automatically loaded into Expedition.

To remove a Grib file from Expedition

Select the file or files to be removed, then click on the *Clear Selected* button.

SkewT

Enable if using the pop-up SkewT diagram.

This is normally left unchecked as the extra data may make route optimisation etc slower.

Tides settings

Using the Tides tab you are able to study tidal information for various areas and select it for display on the main chart window.

Disclaimer

> The tides tools were developed to allow the addition of tidal stream information for the purposes of yacht racing. The ability to predict heights is just a bonus. As for the charting functionality in this system, do not rely on the heights computed by this software for anything that could in any way endanger you, your vessel, anyone else or anything else. Always use official tide height data and your own good judgment and seamanship when piloting shoal waters. See the licence document.

Displaying tide data for individual tide stations

> Individual tidal stations can be accessed by right-clicking on the ◇ tide icon on the chart.
>
> If a C-MAP tide station, select 'Query C-MAP object' from the pop-up menu.
>
> If an Expedition tide station, select 'Tides' from the pop-up menu.

The full list of Expedition tide stations loaded can be accessed by clicking on the Tide stations button on the weather data panel.

Display

Tidal stations

Displays primary tidal stations and their information on the chart. These locations are listed in Tides on the tree in the window to the right.

When selected, these a pop-up tool-tip will display their name when the cursor is moved over the icon. Right-clicking on the icon will display tidal height information.

Secondary tidal stations

Displays similar tidal height information for even more locations (from the Secondary tides list).

Tidal streams

Displays tidal current stream information on the chart.

Make sure the maximum displayed current speed is set to a reasonable number on the weather settings tab. This is venue dependant,

but usually a setting of about 2 knots will suffice.

Selecting the Weather tooltip will display the tidal set and drift as the cursor is moved over an area with tidal stream data.

The time displayed in the upper left of the main chart window is the time the tidal streams are drawn at. See the help on weather to review Expedition's time controls.

Tidal stream labels

Draws the predicted drift as text label beside each current arrow.

Tidal stream offset

Allows the tidal streams predictions to be shifted in time if they are early.

For example, if you expect the tide to change 30 minutes before the models expect it to, enter -30.

So that changing this value is a conscious decision each time you run Expedition, this value is not saved on exiting. So, it you restart Expedition, it will be reset to zero.

Tide sources to use

Select or deselect tide sources to use and display in Expedition. Expedition also performs faster when unnecessary tides sources are not selected.

For example, when in the following locations:

Europe

Select Europe.

If Winning Tides (Solent) is licensed, select this also.

If either of the SHOM areas are, select these also.

Messina Strait

Select Messina.

New Zealand

Select New Zealand.

USA

Select US West Coast currents and/or heights or US East coast and/or heights depending on location.

Or select the US Model area valid for your area. These are relatively low resolution

models, but may be sufficient in many cases.

US Models

Expedition also includes a range of model datasets for the north-west Atlantic and north-east Pacific. Because of size, these are limited in extent, but we can add areas as they are requested.

Winning tidal currents

Expedition supports the Winning Tides tidal stream database for the Solent area. To use this dataset, it needs to be licensed (see Licences on the Application button). Contact Winning Tides for further information.

SHOM tidal currents

Expedition supports the SHOM tidal stream database for French coastal areas. To use these datasets, they need to be licensed.

Important note on model data

The tidal currents from model predictions (the US models, NZ and SHOM models) are just that - models. They may not show features in

complicated situations or features of an inherently unpredictable nature.

For example, the San Francisco model doesn't show the tide changing first inshore along the city front. This is because the effect is mostly smaller than the resolution of the model. When racing there, we are interested in every extra metre we can get out of or into the tide. The model does however give a good picture of the general flow and when changes happen.

XTide

Expedition can also use the Xtide software distribution tidal station databases available at http://www.flaterco.com/xtide.

These can contain a lot of other tidal information, for example Puget sound currents.

This option is provided merely for user convenience. While Expedition uses a different technique for computing tides to Xtide, the results should be very similar.

Download the harmonics *.txt or *.tcd file, extract and select it using the Xtide button.

Note. Extracting tcd files from the tar using Winzip can be unreliable.

Optimal routing settings

Available from the Optimal panel.

See below for advanced settings.

See also the optimal routing help.

Configuration

Start time

The time and date to start the routing from.

Now

Sets the time to now. The time will either
be local or UTC depending on how you've
configured Expedition using the local time
check box on the system settings page.

Also see *Optimise from current position
and time* below.

Resolution settings

Resolution

Determines the resolution and isochrone interval to use.

Medium

Useful for older hardware, routing studies and the mulitple routing options (ensemble, fleet polar%, mutiple routing etc).

High

Default. Will yield a 'better' solution than medium, but will take longer.

Custom

Allows the user to specify the grid and isochrone resolutions.

It is normal to select Medium or High resolution, which tells Expedition to automatically choose the routing resolution based on the grib time and/or grid resolution and leg length.

If not using auto-resolution, the grid resolution or isochrone time step can be defined. The smaller the resolution or time step, the longer the calculation will take, but will more accurate (depending on the resolution of the

GRIB files and the length of your route).

For the isochronal algorithm, the time step is controlled by the isochrone resolution.

For the grid based algorithm, the resolution is controlled by the grid resolution.

Initial scan angle

Initial search angle for route optimisation.

Expedition will initially search half this value each side of the great circle path, but larger values will also increase the search area. Note that the Draw paths option is useful for visualising the search area.

Default is 180°.

Isochrone resolution

Used in custom resolution (see above).

Grid resolution

Used in custom resolution (see above).

Drawing options

Shade options

Shades the optimal routing area by the selected weather parameter.

Isochrone drawing interval

The time step to draw isochrones at. May be approximate with isochronal solutions.

Shade time sensitivity

Shades an area where the routing is within the specified number of minutes of the optimal path.

Note that the 'Calculate reverse isochrones and sensitivity' option must be selected for this.

Number of previous route optimisations to keep

Expedition can remember your previous route optimisations to be displayed on the screen or in the optimal route tables. This sets a limit on how many to keep in memory and display - for

example, you may wish to only keep the previous one or two.

Configuration options

Optimise from current position and time

Route from your current position and time. This is the normal mode during a race. For pre-race planning, deselect this and manually set the start time.

Optimise first leg only

If a multiple leg route, only optimise the first leg of the route or the leg to the active mark. Often this is all you are interested in and it can speed the calculation.

Isochronal routing may only optimise the first leg.

Optimise along great circle

Used for planning. Sails along a great circle route between marks. When current are included, will approximate a great circle.

Only valid for the grid based routing algorithm.

Prefer tacks and gybes at routing steps.

May reduce usefulness of the output and may not be available for the grib based algorithm.

Not normally used or recommended, especially for the grid algorithm.

Correct polar for waves if available

Uses the waves correction tables and grib data if available to modify the optimal route for wave effects. This uses the significant wave height and the swell wave direction. If the swell wave direction is not available, it will use the wind wave direction.

Wave heights are in metres.

Sail polars

Advanced users only.

Calculate reverse isochrones and sensitivity

Enabled by default as are very useful, but may not be needed for (eg) routing studies.

See comments on display options below.

Use port and starboard asymmetric polars

Allows separate polars to be used instead of the nav polar.

The most likely use of this is if a foil is damaged on one side of a foiling boat.

Motor if speed below minimum sailing speed

As set on the advanced optimal routing settings page.

Land options

Avoid land

Instructs the route optimisation to avoid land.

This option uses the simple world chart installed with Expedition. This is an approximation of the real coastline.

It does slow the route optimisation, so may not be needed offshore or for routing studies.

Note that race notes can also be used to mark custom areas to avoid, such as shipping channels and ice exclusion zones.

Avoid land high resolution

As for Avoid land above, except using higher resolution data and is a slower option.

Avoid ENC land

If using ENC charting, the routing can attempt to avoid land areas as well as depth areas and contours shallower than the safety depth in ENCs currently being used.

Probably only useful for very fine scale routing. Not normally needed or used and will slow the route optimisation, especially for the grid algorithm.

Misc options

Load previous optimised routes at startup

Saves the route optimisations for when Expedition is restarted.

Export optimal route to marks database

Outputs the computed optimal path to the mark database.

This feature is rarely used, but it can be very helpful for archiving optimal routes for comparing the results using different GRIB files or polars.

Data options

Use tidal streams

With this feature selected, tidal streams from the tidal databases (see tide settings) will be used in the route optimisation. This will override any current GRIB files so be very careful when selecting this feature.

The use of tidal streams slows route optimisation, so if you are using a custom grib file for currents, routing away from any tidal stream data or across ocean an ocean, it may pay to turn this off.

Tidal stream data is used in preference to grib current data where both are present. So for example in a Newport to Bermuda race, Expedition will use tidal stream predictions to start with then start using your grib data containing Gulf Stream information when you get away from land.

You need to select the tidal stream source to use on the tide settings page - NOAA in the US, Exp diamonds in most other places or Winning Tides in the Solent.

Use instrument wind

Starts the optimal routing calculation using the damped instrument wind instead of the wind from the Grib file. The utility of this feature is still under review and it isn't often used. The default is to leave this check box empty.

In practice, this option has negligible benefit.

Use weather boats

Performs the routing using weather boat data across teh race track instead of forecast data.

Extend wind forecast in time

If your wind Grib file only covers the next 3 days, but it will take 3 days to get to your destination and you leave this box empty, the optimal routing calculation cannot complete. The best solution is to get a GRIB file that covers the final day, but that is not always possible. When you can't get the full time scale GRIB then you can force Expedition to return an optimal route solution by checking this box. The program then assumes the last wind field in the GRIB continues on forever into the future with no change.

If the router can only complete part of the route before the weather GRIB comes to an end, the resultant Optimum route on the screen will converge back to the great circle route from the moment the GRIB ends.

Extend current forecast in time

This check box is even more useful as ocean current GRIB files are often only valid for a single time step and it is a reasonable assumption to consider that the flow pattern will remain fairly static over a few days.

Display options

Optimal route

Draws the optimal route calculated. You pretty much always want this feature enabled.

Important note

Dashed lines indicate tacking or gybing for that part of the optimal route. Sometimes this might be one tack or gybe, but in other cases it might mean staying in a lane of stronger wind for example.

These areas will have TWA values is in parentheses in the optimal route summary, for example (-12).

Isochrones

Isochrones are curves that indicate where a boat could sail to in a certain amount of time. Isochrones are calculated when Expedition calculates an optimal route and are displayed

on the main chart window if this box is selected. This is a useful tool to leave enabled. Depending on the length of the route, you will vary the time step for the drawn isochrones. For a 2000 mile race every 12 or 24 hours will usually suffice. For a 100 mile race, you might want them drawn every 2 hours or so.

Reverse Isochrones

When selected, reverse isochrones are also drawn. This is a very useful tool for studying the sensitivity of a calculated optimal route. Reverse Isochrones use fancy math to work the optimal route backwards through the GRIB fields from finish to start. When displayed concurrently with forward isochrones you can more easily see the moments in a race when a particular side of the route is especially good or bad.

Reverse isochrones are lines of points equidistant in time from the finish whereas isochrones are lines of points equidistant in time from the start. So, if another boat is on the same reverse isochrone as you, they should finish at the same time. Thus, the reverse isochrones can also be used as a way of seeing who is ahead.

Note that the 'Calculate reverse isochrones and sensitivity' option must be selected for this.

Paths

Draws all the possible paths (not just the fastest one) successful paths obtained whilst computing the optimal path.

Paths can be useful when studying routes or to help understand options for other boats around you.

It can also be useful for visualising the route optimisation search area.

Winds on optimal route

Draws expected wind barbs along the route. This is quite helpful in pre race planning when showing other crew members roughly what wind speeds and angles to expect but it adds to the screen clutter if you are also displaying a GRIB file's wind barbs.

Winds everywhere

Shows wind arrows everywhere Exp has explored for the route optimisation.

Currents on optimal route

As for winds.

Highlight previous optimal routes

Draws all previous optimal paths in bold (previous runs, fleet optimal routes etc).

Shade time sensitivity

Shade time sensitivity for previous routes

These shade areas where the routing is within the specified number of minutes of the optimal path.

Note that the 'Calculate reverse isochrones and sensitivity' option must be selected for these.

Advanced settings

Avoid

Avoid significant waves over <x> feet

Forces the routing to avoid areas with significant wave heights over the set value.

Maximum upwind TWS
Minimum upwind TWS
Maximum downwind TWS
Minimum downwind TWS

Forces the routing to avoid areas with wind speeds outside these limits.

Penalties

Adds user-defined seconds to each tack or gybe.

Wind

Time shift

Apply a shift in minutes to the wind if a change is happening more or less quickly than your grib files suggest.

Scale wind

These are in addition to the scale and rotate 10m wind options under weather settings.

One use is if the weather is different from forecast, but you expect it to become more in line with the grib forecast in the future.

Reduce scaling and rotation over <selected> minutes

Check this box and enter a value in minutes to linearly reduce the values

entered in *rotate and scale winds* above. The amount of rotation will reduce linearly from the maximum value at the current time to zero after the desired time period.

Other programs

Stripchart

System Restore

Exp DLL

Cosworth USB-CAN

Dfw2Exp

Garmin USB

Navico radar

Stripchart

Stripchart is a very powerful and easy to use program that graphs numbers, follows trends, computes averages and saves tests and events (notes). It is especially valuable for quickly and efficiently reviewing data from a race and calibrating instruments.

Using Stripchart

Stripchart can be started from Expedition's application button or Windows' Start menu. Stripchart can also be automatically started with Expedition.

Display and time

Use the Time menu or toolbarbuttons to change the time scale displayed.

The Time drag mode, Back in time and Forward in time toolbar buttons are used to navigate in time.

The Draw in real time mode always shows the most recent data.

Display frequency

Select the display frequency from the Frequency menu. The display frequency is always displayed on the status bar.

The default update frequency is 1Hz. Lower frequencies use less memory as Stripchart has to store less data. Cruising boats may be content with 0.5Hz (one sample every two seconds), while in short course races 2Hz or even 5Hz may be useful. Obviously collecting data at 5Hz uses 5 times the memory as sampling at 1Hz.

Setting configurations

Set the number of channels to graph from the View menu.

The Stripchart panes can be dragged to rearrange their order.

Right clicking on a channel's horizontal pane displays a pop-up menu

Delete

Enables any individual strip-chart to be removed.

Edit

Allows all attributes for that strip-chart top be edited.

Move up

Shuffles a strip-chart up.

Move down

Shuffles a strip-chart down.

Set event

Sets an event, see below.

Notes

Take some time to experiment with these settings to get comfortable with what things like Shift Max (setting the maximum amount the top and bottom value of the graph will jump) and roll (keep the min and max span the same and simply roll the top and bottom values up and down to keep the new data on the screen) do when you change them.

Remember, unless you are configured in a multi boat program, your data is for Boat 0.

Saving and loading configurations

StripChart configurations can be saved as files (use the File menu or the toolbar buttons), so it is easy to change plots simply by loading pre-saved configurations. These files can be copied to other computers. The most recently used configurations are available from the File menu and the Recently used file list on the toolbar.

StripChart configuration files can also be opened by being dragged onto the Stripchart display.

Post race analysis

You can also load log files from the File menu for analysis later. This is especially useful to analyze data and save tests after a race or testing session. It can also be very helpful in instrument calibration.

Expedition log files can also be opened by being dragged onto the Stripchart display.

Averaging the data & setting wands

Use the left mouse button to set wands (up to 4 red vertical lines) and thereby select the start and finish of up to two discrete time sections. Once you set these wands across a particular time span, Stripchart will display the average of the data for that time span in the wanded section of each pane. At the top of the screen, just below the toolbar, Stripchart will display the time of the left hand (oldest) wand and also the duration of the time span that is wanded.

Use the Show 4 wands item from the View menu to select two or four wand display modes.

You can also use the Set wand now toolbar button to lay a wand at the current time. You can insert a permanent marker at a particular point in time with the Set flag toolbar button. This is a very useful feature for temporarily flagging events such as a sail change.

Averages for the display Stripchart data can be turned on or off using the *Show means* item on the *View* menu.

Use the delta toolbar button to display differences between two wanded regions. This can be useful for calibration.

This process of setting wands is very valuable and powerful for instrument calibration and studying data. For example, you can quickly and accurately determine average rudder angles or wind angles for each tack this way.

Each panel can show a second data plot. This may be useful for comparison purposes or to save space. In this case, the mean and standard deviation for the second parameter will be in parentheses ().

For GPS parameters COG and SOG, a delta value is computed based on the position at each wand and the time difference. This value will be presented in square brackets [].

Saving tests

Once you have set the wands at desired points in time, you can save the averages of the time span in Expedition's test database. A typical time span for a test would be in the 2 to 5 minute range.

Simply use the Save test to database button to save the averages within the *wanded* time span as a discrete test. A window will open where you can enter or change other test details such as sails or sea state as well as comments before finally saving.

Items such as sails available in the test database can be added to the test (see polars).

Once a test has been saved, that section of time will be shaded grey in Stripchart so you know not to save another test during that time span.

These saved tests are then available for viewing in the
tests list and analysis. The tests will also appear as data
points in the polar edit window and can be displayed on
the sail chart.

Saving events

Use the Event item on the Test menu to set an event at
the current time. Events can be useful to record sail
changes or items of interest. Events can also be set using
the set event button in Expedition.

Events can also be set at point in time on the Stripchart
using *Set event* from the right click pop-up menu.

System restore

System restore is a small application found in the Expedition folder in the Windows' Start menu that allows the user to clear all settings they have customised for Expedition.

It can be also be used to delete the marks & routes database as well as the chart database (of course, this can also be accomplished by manually deleting the marks.dat and charts1.dat files found in the Expedition folder). It can also be used to delete the licence keys from the computer.

Note: It is always a good idea to back-up marks.dat from time to time.

⛵ Exp DLL

The ExpDLL.dll file is supplied to allow third party software to query Expedition data as well as to send data to Expedition. It is supplied with a header file that may be used to link to the DLL.

As an aid to developers, the location of the Expedition program files folder is saved in the registry key

> HKEY_CURRENT_USER\SOFTWARE\Expedition\Core\Location

Note that any directions returned will be in degrees magnetic.

The relevant lines in the header file include:

> extern "C" __declspec(dllimport) void __stdcall SetExpVar(short id, double value, short iBoat);
> extern "C" __declspec(dllimport) void __stdcall GetExpVar(short id, double* pValue, short iBoat);
> etc.

id

Identifier of the parameter to pass. See UsrChannels.h.

value

The value to pass to Expedition.

iBoat

The boat id. For GetExpVar, SetExpVar and SetBoatName, the allowable values are 0 to 99 (as at 01 Sep 2020) inclusive.

name

The maximum size allowed for the boat name is 32 characters. Any more characters than this will be discarded.

Accept GPS data from DLL

Can disable GPS data obtained from the Exp dll.

See the Exp system settings.

Dfw2Exp

Dfw2Exp is a utility that lets Expedition exchange data with Deckman for Windows.

User channel mappings are saved in the Dfw2Exp folder in the Exp data folder.

Receiving data

Dfw2Exp allows data defined in Dfw's *j_varsxx.d* file to be passed to Expedition. The default mappings are listed below. Any other Dfw channel defined in *j_varsxx.d* can be mapped to any Expedition User channel using the control on the left hand side of Dfw2Exp. Simply click in the cell immediately to the right of the desired Dfw channel and select the Expedition user channel from the pop-up list.

Exp looks first for J_vars06.d. If it can't find it, Exp will look for other files called j_vars*xx*.d.

Notes

Data filed by Dfw2Exp isn't affected by Expedition calibration functions,

Heel is opposite in Exp from WTP (and Dfw when connected to WTP). This is because WTP is opposite to convention where a roll to starboard is positive.

The channels from *j_varsxx.d* that Expedition will automatically use include:

Heel
Boatspeed
AW_angle
AW_speed
mwa
mws
Leeway
Heading
TW_Dirn
TW_angle
TW_speed
Ext_SOG
Ext_COG
MCur_Rate
MCur_Dir
Depth (it is preferred Dfw outputs depth in metres, else units in Exp may be unreliable)
Rudder
Trim
Keel
Forestay
Seatemp
Airtemp
Trim_Tab
Rake
trav_pos
bksty_pres
outhaul

The following are mapped to boat 1 by default

O_Heel
O_Boatspd
O_TW_Dirn
O_TW_angle
O_TW_speed
O_AWA

O_AWS
O_Rudder
O_Tab
O_Forestay
O_SOG
O_COG
OBRng
OBBrg

Other settings

Depth in feet from Dfw

If the expected depth units from Dfw are in feet instead of meters.

Send names to remote channels

When sending data to remote channels, also update the tags.

Second boat

Asks for other boat data.

Heading, twd and cog in degrees true

If the data from Dfw is not in magnetic.

Use Dfw timer channel to set Exp timer.

Uses the TIMER channel to set the Exp timer.

Sending data

Any Expedition data can be sent to a WTP remote channel / function number using the control on the right hand side of Dfw2Exp. Simply click in the cell immediately to the right of the desired Expedition channel you wish to send data from and select the Remote channel from the pop-up list.

The channels need to be defined in the *\data\usermenu.d* file on the WTP.

Cosworth2Exp

Cosworth2Exp is a utility that lets Expedition exchange data directly with Cosworth systems.

Cosworth2Exp uses a Kvaser CAN adaptor to connect to a Cosworth CAN.

Changes to settings will be saved if Cosworth2Exp is closed using the OK button, but not if using the Cancel button.

Sending data

See the Mappings tab. Changes to mappings can be applied by clicking the Apply button.

Exp can send data to the Cosworth processor's ten remote channels. In addition, Exp can send predefined data to the Cosworth system:

Layline time and distance,
Mark position,
Current set and drift,
Magnetic variation,
Cross track error (xte),
Start line ends,
Time to gun.

Receiving data

Cosworth2Exp automatically sends data received from Cosworth to Expedition. This includes

GPS Position,
GPS SV number,
GPS Quality,
GPS CoG and SoG,
Sea and temperature,
AWA, MWA, TWA, TWD, AWA, MWS, TWS,
BSP,
Barometer,
Heading,
Voltage,
Forestay,
User 0 - 31.

Calibration

Damping

Polars

Technical notes / help

This is where we put technical notes to resolve common problems as we experience or resolve them.

[LogPlayback won't open today's log file](#)

[Mouse behaving unpredictably](#)

[No Start numbers](#)

LogPlayer

LogPlayer won't open today's log file

The log file currently being written to (today's log file) cannot be read by LogPlayer unless logging is turned off as Expedition would then be logging data from earlier in the log file.

One solution is to temporarily disable logging.

Crazy mouse

Nmea input detected as mouse input by windows

Occasionally, Microsoft Windows will detect instrument input into a serial port as a mouse. This can lead to the cursor jumping unpredictably around the screen. This is most common with Nmea input and USB-Serial port adaptors.

If you turn the instruments or GPS off, it will stop.

Solution

One option is to start the computer before turning the instruments or GPS on.

Microsoft has posted a fix for this as Knowledge Base Article Q131976. For your convenience, this material is posted below. Tasman Bay Navigation Systems makes every effort to keep this up to date, but be aware Microsoft may update its web information.

Note that to regain control of your computer you need to disconnect or turn off the instruments or GPS causing the problem.

My personal quick solution

When the problem next occurs (it may not happen every time), I try and disable the mouse. If it is deleted, Windows may still detect it at some future time.

1. Disconnect or turn off the Nmea GPS or instruments causing the problem. You need to do this to regain control of your computer.

2. Open Windows' *Device Manager* by clicking on the *Device Manager* button on the *Hardware* page of *System Properties*. You can access *System Properties* by right-clicking on *My Computer* on the desktop and selecting *Properties* or from *System* from the *Control Panel*.

3. Expand the *Mice and other pointing devices* section. Then disable the mouse Windows thinks your GPS is. It will probably be called *Serial Ballpoint Mouse* or just *Ballpoint mouse*.

4. Right click on the offending mouse entry and select *Properties* from the pop-up menu. On the page that appears, select the *Do not use this device (disable)* option from the *Device Usage* list.

Microsoft Knowledge Base Article Q131976

SUMMARY

This article explains how to modify the Boot.ini file to disable the detection of devices on COM ports.

When you start Windows NT, NTDETECT searches for the pointing device (usually a mouse). In the course of this process, data is sent to the serial (COM) ports. If a serial mouse is detected, Windows NT disables the port so a device driver for the mouse can load instead. If a device is not detected, Windows NT disables the port. A disabled COM port does not display any information in Control Panel Ports.

MORE INFORMATION

To disable the detection of devices on COM ports in Windows NT:

1. Make a backup copy of the Boot.ini file.

2. Remove the hidden, system, and read-only attributes from the Boot.ini file.

3. Using a text editor (such as Notepad) open the Boot.ini file.

4. Add the /NoSerialMice option to the end of each entry in the [operating systems] section of Boot.ini. See the example below for more information.

5. Save Boot.ini and quit Notepad.

6. Restore the hidden, system, and read-only attributes to the Boot.ini file.

7. Shutdown and restart Windows NT.

The following is a sample of the Boot.ini file:

[boot loader]
timeout=3
default=multi(0)disk(0)rdisk(0)partition(1)\WINNT35

[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINNT35="Windows
NT Workstation
Version 3.51" /NoSerialMice

multi(0)disk(0)rdisk(0)partition(1)\WINNT35="Windows
NT Workstation
Version 3.51 [VGA mode]" /basevideo /sos
/NoSerialMice

NoSerialMice Syntax

/NoSerialMice - Disables the detection of serial mice on
all COM ports.

/NoSerialMice:COMx - Disables the detection of serial
mice on
COM x, where x is the number of the port.

/NoSerialMice:COMx,y,z - Disables the detection of
serial mice on
COM x, y and z.

NOTE: The /NoSerialMice option is not case sensitive.

APPLIES TO

- Microsoft Windows NT Advanced Server 3.1

- Microsoft Windows NT Workstation 3.1
- Microsoft Windows NT Advanced Server 3.1
- Microsoft Windows NT Workstation 3.5
- Microsoft Windows NT Workstation 3.51
- Microsoft Windows NT Workstation 4.0 Developer Edition
- Microsoft Windows NT Server 3.5
- Microsoft Windows NT Server 3.51
- Microsoft Windows NT Server 4.0 Standard Edition

No start numbers

Expedition requires a start polar and estimates of the boat's acceleration and rate of turn characteristics in order to calculate the various start numbers.

So, if you have a start line defined and the display settings set to draw the start line, make sure you have a start polar loaded and values set for acceleration and rate of turn (these can be linear values or tables in your calibration file).

Appendix A : Channels

Expedition has channels for each boat.

Ahead of

Distance boat zero is ahead of boat n vmg-wise.

Air temperature

The air temperature.opp

Alternating 0 - 9

See alternating numbers.

Awa

Apparent wind angle. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Aws

Apparent wind speed. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Backstay

Barometer

Atmospheric pressure.

Battery current.

Amps.

Board

Board port

Board starboard

Boat bearing from boat 0

Boat range from boat 0

> Range and bearing of boat n from boat 0.

Boom

Bsp

> Boat speed. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Bsp transverse

Charge state

> Battery charge state %.

Cog

> Course over the ground. Heading + leeway + current.

Course

> Heading + leeway.

Course - COG

Cross track error

> XTE.

Current drift

> Current drift speed in knots. If selected under calibration, will be Expedition's internally calculated

and calibrated value.

Current set

Current set direction. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Current set predicted
Current drift predicted

Current set as predicted by diamonds, NOAA tides, Grib data, Winning tides tides etc.

Bsp - SoG

Deflector

Delta polar bsp

Delta target bsp

The difference between the current boat speed and the target boat speed at the current true wind speed.

Delta target heel (roll)

Delta target twa

The difference between the current true wind angle (see Twa) and the target wind angle at the current true wind speed.

Depth

Depth. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Diff station

Differential reference station ID.

Distance to finish

Distance to current mark and on to last mark in the active route.

Downhaul load
Downhaul load 2

Load on the downhaul. Mapped on an instrument page from a linear channel in B&G &tc.

Engine temperature
Engine oil temperature
Engine oil pressure

Engine temperature and oil pressure may be flagged red in number boxes for NMEA 2000 over temperature and low oil pressure warnings.

Error code

Exp value.

Finish

Forestay load
Forestay inner load

Load on the forestay. Mapped on an instrument page from a linear channel in B&G &tc.

Forestay length

Length of the forestay.

Fuel level

Gate bearing
Gate range

Gate time

Gate lay dist on port

Gate lay dist on starb

Gate lay time on port

Gate lay time on starb

Gate spot time on port

Gate spot time on starb

Distances and times to the gate laylines and G spot.

GPS age

Age of differential GPS data, time in seconds since last SC104 type 1 or 9 update, null field when DGPS is not used

GPS altitude

Antenna altitude above geoid.

GPS estimated position error

GPS geoidal separation

Geoidal separation is the difference between the WGS-84 earth ellipsoid and mean sea level (geoid). Negative if mean sea level below ellipsoid.

GPS PDOP

GPS HDOP

GPS VDOP

Dilution of precision, horizontal and vertical dilution of precision in metres.

GPS mode

0 fix not available.

1 GPS fix.

2 Differential fix.

GPS number

Number of satellites in view.

GPS position fix

1 not available, 2 = 2D, 3 = 3D.

GPS time

GWD

Ground wind direction. Wind direction over the surface of the earth. Twd is wind direction with respect to the surface of the water without regard to current set/drift.

GWS

Ground wind speed. Wind speed over the surface of the earth. Tws is wind speed with respect to the surface of the water with regard to current set/drift.

Heading

Compass heading. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Heading to steer
Heading to steer polar

Heading to steer to the mark, allowing for current. At Bsp or polar bsp.

Heel (roll)

Boat heel. Heel/roll is positive in for a roll to starboard (sailing on port).

Heel (roll) rate

Instrument trip log

Keel Angle

Keel angle (for canting keels).

Keel Height

Keel height (for retracting keels).

Rake

RPM1
RPM2

Engine rpm.

Rudder
Rudder forward
Rudder port
Rudder starboard
Rudder toe

Latitude
Longtitude

Layline bearing

Bearing to the mark of the layline boat n is heading towards.

Layline distance on port

Distance to the starboard layline.

Layline distance on starboard

Distance to the port layline.

Layline distance

Distance to the layline boat n is heading towards.

Layline port bearing

Bearing to the mark along the port layline.

Layline starboard bearing

Bearing to the mark along the starboard layline.

Layline time

Time to the layline boat n is heading towards at the target speed and angle.

Layline time GPS

Time to the layline boat n is heading towards based on cog and sog.

Layline time on port

Time to the starboard layline at the target speed and angle.

Layline time on starboard

Time to the port layline at the target speed and angle.

Layline tide port side port time
Layline tide port side stbd time
Layline tide stbd side port time
Layline tide stbd side stbd time
Layline tide port side time
Layline tide stbd side time

As above, but with predicted tidal stream at the mark.

Lay max bearing on port
Lay max bearing on strb
Lay min bearing on port
Lay min bearing on strb
Layline bearing on port
Layline bearing on strb
Layline dn bearing on port
Layline dn bearing on strb
Layline time on port ratio
Layline time on strb ratio
Layline up bearing on port
Layline up bearing on strb

Lead port
Lead starboard

Leeway

If selected under calibration, will be Expedition's internally calculated and calibrated value.

Load cell port
Load cell starboard

Log Bsp

Log of distance based on Bsp

Log Sog

Log of distance based on Sog

Magnetic variation

The variation between true north and magnetic north at boat n's current position.

MainSheet

Mark bearing
Mark range

Bearing and range to the current mark.

Mark current drift
Mark current set

Predicted current at mark at estimated time of rounding, based on *Mark polar time.*

Mark latitude
Mark longitude

Mark polar time

Time to the current mark based on the current wind direction and speed as well as the polar.

Mark time

Time to the current mark based on the current polars.

Mark GPS time

Time to the current mark based on the GPS CoG and Sog.

Mark twa

True wind angle if heading directly to the current mark given the current wind direction.

Mast angle

For rotating masts - the angle of the mast.

Mast butt

Mast butt position.

Mast rake

Mast rake.

Motion

MSLP predicted

MSLP predicted by loaded grib data.

MWA
MWS

Measured apparent wind angle and speed.

Next mark Awa

Expected apparent wind angle on the next leg.

Next mark Aws

Expected apparent wind speed on the next leg.

Next mark bearing
Next mark range

Bearing and range from the current markto the next mark .

Next mark polar time

Expected time for the next leg based on the current wind and your polars.

Next mark time on port

Time to the next mark spent on port based on the current wind direction and speed as well as the polar target angles and speeds.

Next mark time on starboard

Time to the next mark spent on starboard based on the current wind direction and speed as well as the polar target angles and speeds.

Next mark twa

True wind angle if heading directly to the next mark from the current mark given the current wind direction.

Opposite track

What the Cog (heading + leeway + current) would be on the opposite tack or gybe.

Opposite track cog

Cog +/- 2 x TargTwa. No currrent effects included.

Polar 5, 6, 7, 8, 5%, 6%, 7%, 8%

Custom polars.

Polar bsp

The polar boat speed at the current wind speed and angle.

Polar bsp%

The fraction of the current boat speed to the polar bsp, expressed as a percentage.

Polar heel

The polar heel angle at the current wind speed and angle.

Polar leeway

The polar leeway at the current wind speed and angle.

Polar Tws
Polar Tws delta
Polar Tws %

Uses the bsp nav polar and/or heel/roll and the heel polar to estimate tws.

Port gate lay dst on strb

Distance to the port layline to the port gate.

Port gate lay tm on strb

Time to the port layline to the port gate.

Port gate lay dst on pt

Distance to the starboard layline to the port gate.

Port gate lay tm on pt

Time to the starboard layline to the port gate.

Race note GPS reach distance to
Race note GPS reach time to

Radar bearing
Radar range

Rate of turn

ROT.

Relative humidity

Runner port

Runner starboard

Sail

Sail mark

Sail next mark

> From the sail chart.

Sail AI

> Lower Stripe Camber
>
>> Camber(at 25 % of P) expressed as a percentage of the local sail chord
>
> Lower Stripe Draft
>
>> Position of max camber(at 25 % of P) expressed as a percentage of the local sail chord
>
> Lower Stripe Twist
>
>> Twist in degrees(at 25 % of P) relative to the base chord
>
> Lower Stripe Entry
>
>> Entry angle(at 25 % of P)
>
> Lower Stripe Exit
>
>> Exit angle(at 25 % of P)
>
> Mid Stripe Camber
>
>> Camber (at 50 % of P) expressed as a percentage of the local sail chord
>
> Mid Stripe Draft

Position of max camber (at 50 % of P) expressed as a percentage of the local sail chord

Mid Stripe Twist

Twist in degrees(at 50 % of P), relative to the base chord

Mid Stripe Entry

Entry angle (at 50 % of P)

Mid Stripe Exit

Exit angle (at 50 % of P)

Upper Stripe Camber

Camber (at 75 % of P) expressed as a percentage of the local sail chord

Upper Stripe Draft

Position of max camber (at 75 % of P) expressed as a percentage of the local sail chord

Upper Stripe Twist

Twist in degrees(at 75 % of P), relative to the base chord

Upper Stripe Entry

Entry angle(at 75 % of P)

Upper Stripe Exit

Exit angle(at 75 % of P)

Sea temperature

SST

Shadow

The bearing of the centre of boat n's wind shadow.

Shadow opposite gybe

The bearing of the centre of boat n's wind shadow if on the opposite gybe or tack.

Slam

Volvo wave sensor parameter.

Sog

Speed over the ground.

Start bias angle

Bias of the start line in degrees given the current wind direction. Negative means the port end is favoured, positive means the starboard end is favoured. In the number bars, a port end favoured line will have a 'P' next to the number as in the display above.

Start bias length

Distance bias of the start line given the current wind direction at the favoured end. Negative means the port end is favoured, positive means the starboard end is favoured.

Start boat to pin time

Time to reach from the boat to pin end along the line.

Start distance below line

The minimum of the bow and GPS position below the line. This will be negative if over the line.

Essentially the XTE from the line.

Start distance to line

Minimum distance of the options selected (reach, starboard etc), including turns. This will be negative if over the line.

Start distance to line reach

Distance to the line at current heading based on the start polar.

Start GPS time to burn
Start GPS time to line

Start numbers based on GPS COG and SOG only.

Start gun dist below line

Distance below/above line at the gun.

Start gun bsp target %
Start gun bsp polar %

Target and polar bsp percentages at the gun.

Start layline on port
Start layline on starboard

Start line square wind

Wind direction at 90° to the start line.

Start pinch time to port
Start pinch time to starboard

Time to line end sailing at polsr bsp above (or below) targets.

Start port latitude
Start port longitude

Position of port end.

Start port with left turn
Start port with right turn

Start reach dist to line
Start reach speed to line
Start reach time to line

Time to the line at current heading based on the start polar.

Start speed to port
Start speed to starboard

Speed required to reach an end of the line at the gun.

Start speed on port
Start speed on starboard

Speed required to reach the line on port or starboard.

Start stbd latitude
Start stbd longitude

Position of starboard end.

Start stern below line

Start strb end time to burn, X secs
Start port end time to burn, X secs

Time to burn after tacking onto a point X seconds from the line on the starboard layline to the starboard end of the line.
Also for starboard layline to pin end.

These may not include current.

Start strb with left turn
Start strb with right turn

Times to the line on starboard after a turn to port or starboard.

Start target bsp
Start target twa

Start time to burn

Difference between time-to-line and time-to-start.

Start time to gun

Time to start gun.

Start time to go point

Time to burn after sailing parallel to the start line and tacking onto the starboard layline to the starboard end of the line.

Start time to layline P
Start time to layline S

Time to reach the starboard layline to port and starboard ends of the line, after turning and sailing parallel to the line.

Start time to line

Shortest time to the line at targets (includes tacking or gybing and acceleration) based on the start polar, rate of turn and acceleration settings. This will be negative if over the line.

Start time to port
Start time to starboard

Time to reach the port and starboard ends of the line based on the start polar.

Start time to port pinch
Start time to starboard pinch

Time to reach the port and starboard ends of the line, allowing to sail above targets (or below downwind targets).

Start time to port simple
Start time to starboard simple

As above, but without current, turning, acceleration or braking effects.

System - GPS time delta

Difference between system clock time and GPS.

Tab

Angle of the keel tab.

Tack/gybe loss metres
Tack/gybe loss time

Tacking angle
Tacking angle polar

Target awa

Target bsp
Target bsp nav

> Target boat speed upwind or downwind based on the current performance polar.

Target bsp %

> The fraction of the current boat speed to the target bsp, expressed as a percentage.

Target heel

> Target heel upwind or downwind based on the current heel polar.

Target leeway

> Target leeway upwind or downwind based on the leeway polar.

Target twa
Target twa nav
Target twa without leeway

> Target true wind angle upwind or downwind based on the current performance polar.

Target Twd
Target Twd Delta

> Estimated Twd based on course and target twa from the nav polar. The delta is the difference between this and the instrument Twd.

Target vmg

> Target vmg upwind or downwind based on the current performance polar.

Tide left port time

Tide left stbd time

Tide left time

Tide right port time

Tide right stbd time

Tide right time

> Tide affected laylines.

Tide station

> Nearets tide station.

Time

> The current date & time and is stored internally in UTC.

Transmission oil temperature

Transmission oil pressure

Traveller

Trim (pitch)

Trim (pitch) rate

> Fore-aft trim. Bow up pitch (trim) is positive.

Turn to mark

Twa

> True wind angle includes leeway. If your instrument system calculates Twa to the centerline of the boat, then Expedition will add the leeway value (if any) to that to generate Expedition's Twa. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Twd

> True wind direction. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Twd -90

Twd +90

> True wind direction +/- 90°.

Twd from targets

Twd Period

> Period of the dominant wind shift.

TWD predicted

TWS predicted

> TWD and TWS predicted by loaded grib data.

Twd to lay mark

Twd to lay mark opposite tack

> Twd to lay the mark - what the wind direction would have to shift to in order to lay mark.

Twd twist

Tws

> True wind speed. If selected under calibration, will be Expedition's internally calculated and calibrated value.

Tws Period

> Period of the dominant tws cycle.

User0-31

Channels for custom use.

Dfw2Exp will use some of these and rename them.

Ockam calibration values are mapped to user channels 10 to 18. Ockam User tag data may also be stored in User 0 to User 8.

Vang

Vmc

Velocity made course - the component of sog towards the current mark.

Vmc%

The fraction of the current vmc to the optimum polar vmc, expressed as a percentage.

Vmc optimum

Given the current polar and wind, what the optimum Vmc would be to the current mark.

Vmc optimumheading

The heading to achieve optimum vmc to the current mark.

Vmc optimum twa

The wind angle that would be experience if sailing at the optimum vmc heading.

Vmc polar

The vmc to the mark at the current heading based on the polar and given the current true wind angle and speed.

Vmc to mark polar

The vmc to the mark if headed directly towards the mark based on the polar and given the current true wind angle and speed.

Vmg

Velocity made good - the component of bsp and leeway upwind or downwind.

Vmg%

The fraction of the vmg to the target vmg, expressed as a percentage.

Voltage

System voltage.

Wind weight

In the Ockam sense - as a fraction.

Wave max height
Wave max period
Wave sig height
Wave sig period

From Volvo wave sensor.