Off-Shore Navigation Using MS Excel

Common Small Vessel Navigation Calculations

By John Stevenson

Introduction

The Off-Shore Navigation Workbook is an Excel Visual Basic for Applications (VBA) set of functions and subroutines that are accessed through a single User-Form. The purpose of this workbook is to provide an integrated process for performing a number of computations that may be required in the navigation of a small vessel.

The current release of the new version of the Off-Shore Navigation Workbook is version 9.95. It is incomplete as a number of planned capabilities have not been implemented. See the "Planned Changes" worksheet in the program workbook for a list of the so far unimplemented enhancements. I anticipate that version 10.0 (or later) will be the first full implementation of the planned application. However I think the workbook is more than a complete replacement of version 8.54 and the previous Ship Log Template.

This document describes the installation, set-up and use of the Off-Shore Navigation Workbook.

What Does It Do

With release 9.95, the application can do the following:

- Calculate sight reductions of the Sun, Selected Stars, Jupiter, Venus, Mars and Saturn without the use of an external Nautical Almanac or sight reduction tables. Enter the sight data (time, altitude, corrections) and the program will produce the azimuth and intercept LOP for the sight and an Estimated Position (EP - where intercept line intersects the LOP).
- Using a Nautical Almanac the program will perform a sight reduction of a Moon sight. Eventually the program will have a Moon Ephemeris and the NA will not be required.
- Collect the sight reduction data in a separate workbook for later review and analysis
- Provide twilight, sunrise/set and Local Apparent Noon (LAN) times for any date and location
- Create a Day Almanac report for the above celestial bodies for a range of dates. The format of this report is similar to the Nautical Almanac daily pages. If one wishes to have a printed Nautical Almanac on board, the program will produce one for planned voyage instead of the entire year. It will also produce the report across the end of a year (December – January).
- Create and update a Ship Log calculating a DR position between fixes.
- Generate a position Fix based on two sight reductions.
- Insert a calculated position into the Ship Log as either an EP or a Fix.
- Generated a computed Sun Sight using Linear Regression Analysis from a series of sequential sights.
- Provide a toolset for planning waypoint and great circle routes
- Integrates routes with the Ship Log

What Do I Plan for It To Do?

- Calculate sight reductions for the Moon without the need for a Nautical Almanac or sight reduction tables. The Nautical Almanac data is the current hang up. The algorithms to calculate GHA and DEC for the moon are a bitch
- Add current set and drift calculations to the Ship Log (a limited capability exists with version 9.95)
- Generate analysis and historical reports from the Ship Log data.
- Generate route waypoints from the Ship Log workbook and integrate that with my Waypoints Management Tool.
- Implement a tool set for navigation to include solutions to common or not-so common navigation problems.

What Do I Use it For?

I started to create this application set for really three reasons.

1. To see if I could do it.
2. As a learning tool for the underlying disciplines
3. Possibly to actually use it when planning and navigating an ocean passage.

Well I think I've proven to myself I can do it, and I've learned a lot from the past and on-going development. I've also learned a lot about MS Office/Excel VBA in the process. Now I intend to use it in practice. I have actually used an earlier, standalone version of the Ship Log on two trans-Atlantic passages, and it proved very effective. I also had the earlier, standalone version of the sight reduction routines on board, but never got around to taking any sights. Don't know why, except GPS/Chart Plotter navigation makes going "Old School" pretty difficult. With watch keeping, cooking, maintaining radio schedules and occasionally sleeping it's hard to find time for Celestial Navigation when you can just glance at the GPS and see your coordinates and then glance at the chart plotter and see your position graphically. That is one of the ultimate results I hope to achieve with the program – eliminate the tedious and time consuming sight reduction process so that I might find time to actually practice taking sights. The real skill in Celestial Navigation is not the process of the reduction, but the process of the taking the sight, which requires a lot of practice while at sea. Hopefully this program will allow me to take the sights, then quickly see the results and compare them with the GPS position. That practice, when the sight derived position is not required, may make me ready for the time when it is.

Data Formats

Before you can actually use the application you need to be aware of the unique data formats that I have implemented for the entering and displaying time and angle (course, latitude, longitude, altitude, etc.) values. The conventional notation used to express these values is not easily accepted by Excel without the use of the shift keys. I also wanted to be able enter all values using only a numeric keypad with no spacebar or comma key (on a USA numeric keypad). So I implemented the formats described below.

Time Values

Time is normally entered with the hours, minutes and seconds separated by a colon (:) or other character depending on the geographic region. Excel is quite good at accepting this format (e.g., "12:34:15 PM) and converting it to a number that can be easily manipulated by the program. However the colon character requires depressing the shift key at the same time as depressing the [:/;] key. For me this usually resulted in a miss-typing of the time and always was very slow. My solution was to use the following format for the entry and display of time

HHMM.SSt, where HH = hours
MM = minutes
SS = seconds
t = tenths of a second

The period is used to provide a separator. The absence of a period indicates the time is being entered only to the whole minute. The program also expects the time to be entered in 24 hour format (i.e., no AM or PM designation).
Below are some examples of how various time values are entered and displayed

8:23 PM is entered/displayed as 2023
16:48:18.2 is entered/displayed as 1648.182
5:56:3 AM is entered/displayed as 556.03

Angle Values

Angle values are normally expressed using the degree symbol (°) which requires using the Insert/Symbol menu in Excel. Minutes of arc are identified by apostrophe (‘) and seconds of are identified by the quote (“) character. All of this is too much typing and also results in a string value in Excel, which requires additional program manipulation. For navigation purposes angle values need only be expressed to a tenth of minute, so in this program I implemented two formats for entering angle values:
Format “A”

DDD.MMt, where DDD = degrees of arc
MM = minutes of arc
t = tenths of a minute of arc

Again the period is just a separator; the absence of the period means the value entered or displayed is whole degrees of arc.
Below are some examples of how various angle values are entered and displayed.

A course of 242 T is entered/displayed as 242. Note all course and bearing angles are expressed as True not magnetic nor compass. Magnetic and compass values must be converted to True before entry. Only True values are displayed by the program.

A GHA value of 143° 15.2' is entered and displayed as 143.152

A Sextant Altitude of 23° 8.6' is entered and displayed as 23.086

A position of 43° 16.2' N, 158° 32.4W is entered and displayed as 43.162, -158.324

A position of 58° 2.6 S, 98° 14.5 E is entered and displayed as -58.026, 98.145

Note that North Latitude and East Longitude are positive values; South Latitude and West Longitude are negative values.

Format "B"

DDD°MM.t, where DDD = degrees of arc
MM = minutes of arc
t = tenths of a minute or arc

Here the degree symbol ("°") is not required for data entry. In format "B" the program will display all arc values with the degree symbol, but for data entry either the space (" ") or plus sign ("+") can be used as the separator character between the degrees and minutes. The space bar is probably more convenient when entering values from the standard keyboard, but the plus sign is probably more convenient when using a numeric keypad for data entry.

Below are examples of arc values entered and displayed under format option "B":

A GHA value of 143° 15.2' can be entered as 143 15.2 or 143+15.2.

A sextant altitude of 23°8.6' can be entered as 23 8.6 or 23+8.6

A position of 43°16.2' N, 158°32.4W can be entered as 43 16.2,-158 32.4 or as 43+16.2,-158+32.4

The arc value format option is specified on the Files page of the main program form, as shown below.

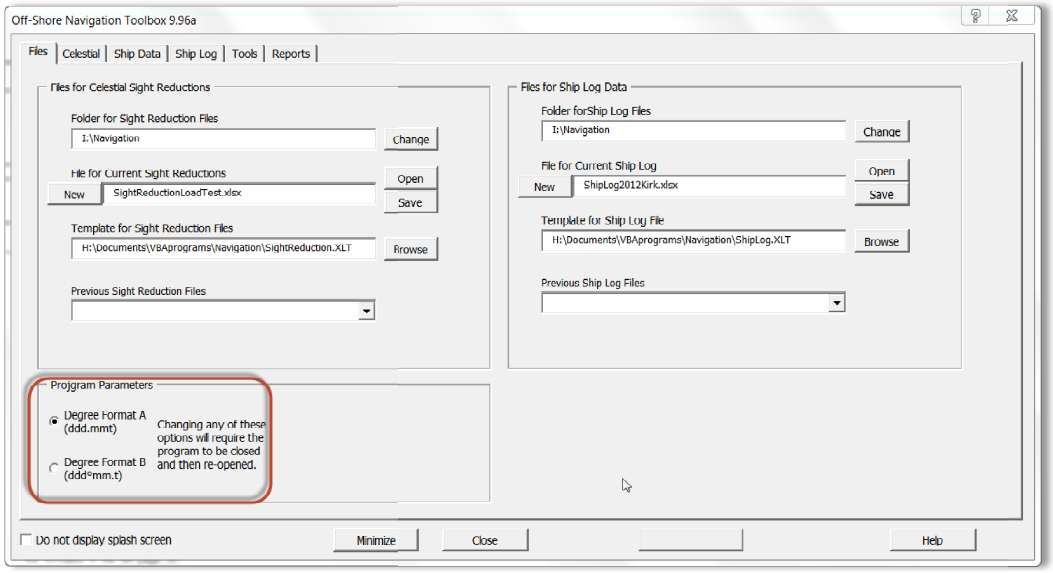


Figure 1, Degree Format Option

The default setting for this option is Format "A". If the option is changed the program will automatically close. When you re-open the program the new option will be in effect.

Prior to version 9.96 option "A" was the only single format used by the program. Implementing the option of format "B" required changes in the Sight Reduction workbook used by the program to store sight reductions. Sight Reduction workbooks created by program versions prior to 9.96 can no longer be loaded directly into the program. Those earlier workbooks can be loaded by using the Load Sights function on the Tools Page.

Installation

The application is distributed in a zip file named OffShoreNavigation200xVnnn.zip, where 200x is the Excel version (2003 or 2007) and Vnnn is the version number (e.g., V9.93b). There are separate zip files for installing the program in the Office 2003 and Office 2007 environments. If you use Winzip to extract the programs the contents of the zip files should look like the screen captures below.

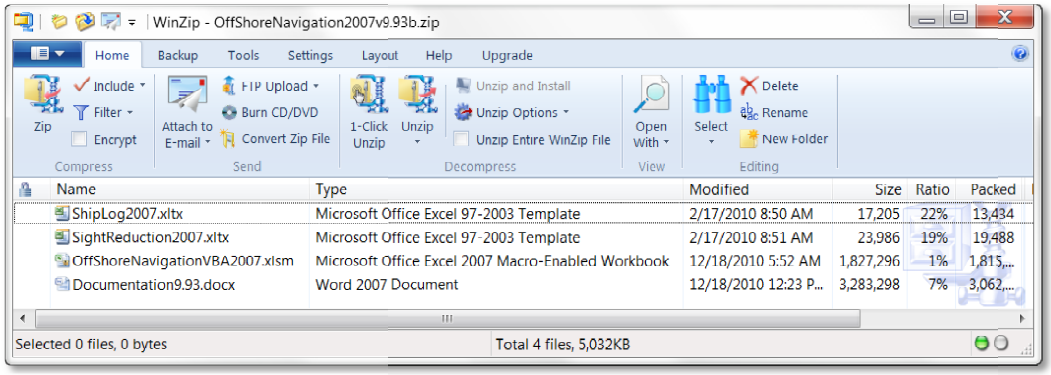


Figure 2, Zip File for Office 2007 Program Version

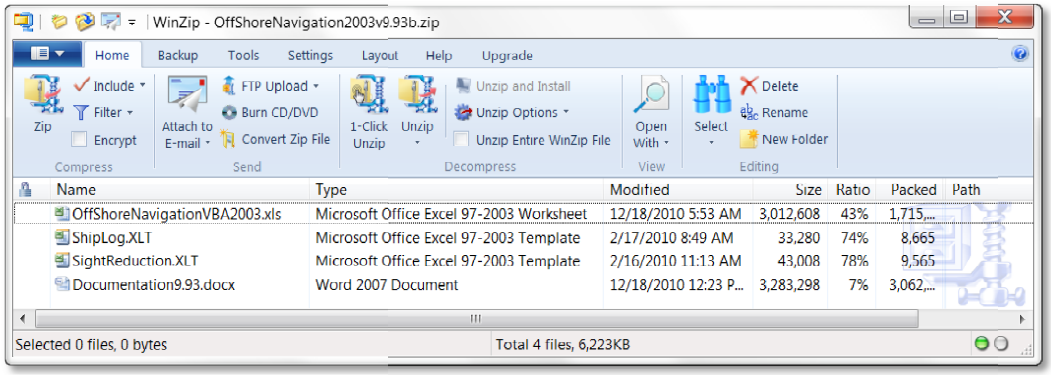


Figure 3, Zip File for Office 2003 Program Version

There are three MS Excel Workbook files and one documentation file in each zip file. The workbooks named OffShoreNavigationVBA2003.xls and OffShoreNavigationVBA2007.xlsm are the program workbooks. These workbooks contain all of the VBA code and userforms that comprise the application.
The other two of the workbooks are Excel Template files, (SightReduction.xlt/xltx and ShipLog.xlt/xltx). These templates are used to create workbooks to save Sight Reduction and Ship Log data, respectively.

Getting Started and Setting-Up

There are two ways to implement the program on your system.

1. As a standard MS Excel workbook with macros
2. As a MS Excel Add-In with macros

If you are going to use the application on a navigation computer at sea I recommend installing the program as an Add-In. That makes the application instantly available from within Excel. If you are testing the program and using it at home then there is no real need to implement it as an Add-In.
If you intend to use the application as a standard Excel workbook, once you have extracted the files to a folder on your system you are ready to start and you can just load the OffShoreNavigationVBA.xls/xlsx workbook in whichever version of Excel is

installed on your system and skip to Using the OffShoreNavigationVBA Workbook section, below.
If you intend to use the program as an Excel Add-In, you must first save a copy of the Workbook as an Excel Add-In on your system and install it as an Add-In to Excel First open the OffShoreNavigationVBA workbook as a normal Excel Workbook, then save it as a MS Excel-Adding as shown in the screen captures below.

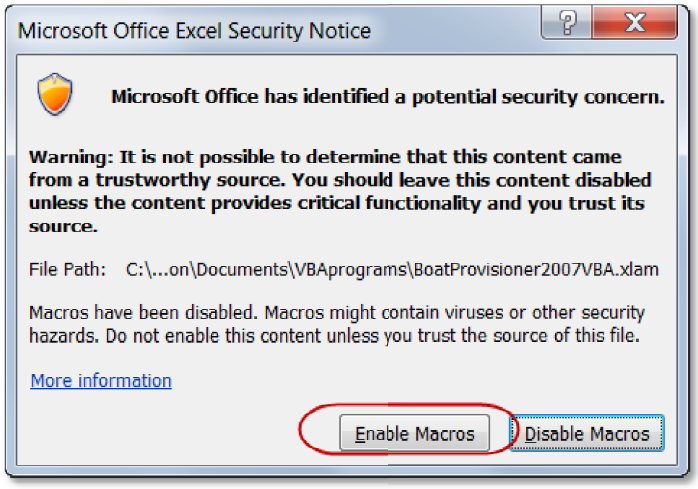


Figure 4, Excel 2007 Security Warning

When you first open the program workbook you will receive a warning about macros in the workbook. The screen capture above is from Excel 2007, Excel 2003 will provide a similar warning. These macros make up the code that provides the program function. In order to use this application you must click the "Enable Macros" button. If the security on your system is set to a very high level Excel may refuse to load the workbook and you won't see this warning. If you are very concerned about allowing macros to execute on your system (they are the source of many viruses) you should choose to keep your security at the high level or click the "Disable Macros" button, in which case this program will not execute on your system.

Assuming you are willing to accept these macros into your system and click the "Enable Macros" button the program will load an initialize.

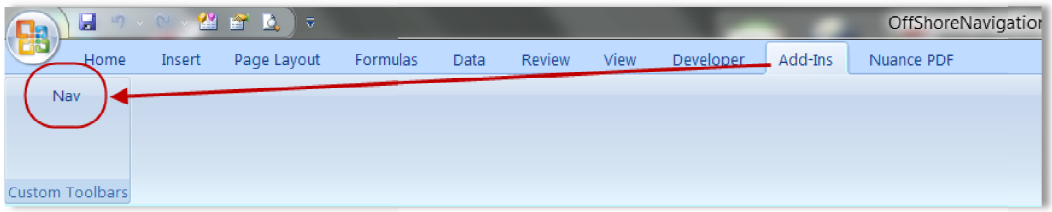


Figure 5, The Nav Button in the Excel 2007 Ribbon

Depending the version of the Excel installed on your system a "Nav" button will appear in different locations in the Excel window. For Excel 2007 the button will appear in the Ribbon at the top of the window under the "Add-Ins" tab, as shown above. For Excel 2003 the button will appear in the status bar at the bottom of the window, as shown below.

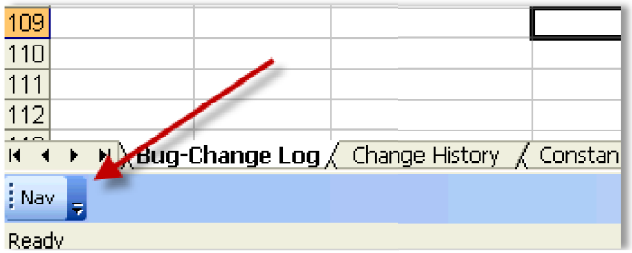


Figure 6, The Nav Button on the Excel 2003 Status Bar

If this is the first time you've loaded the program and/or you don't intend to run the program as an Excel Add-In, the installation is complete. You can skip the following sections and start Using OffshoreNavigationVBA.

In spite of the label on the Ribbon tab in Excel 2007, the program is not yet a true Add-In. Excel 2007 appears to group all macro-enabled buttons as Add-Ins.

Now we can save the workbook as a true Excel Add-In. If you are installing the program as an Excel 2003 Add-In you should still read the following section, which covers the Add-In process for Excel 2007. Then read the Excel 2003 Add-In installation section as it will explain the differences in the process for Excel 2003.

Installing the Program as an Add-In under Excel 2007

Under Excel 2007 creating an Add-In is accomplished by first clicking on the Office Button ( ) in the upper left corner of the Excel window, then mouse over the "Save As" button and click on the "Other Formats", as shown below.

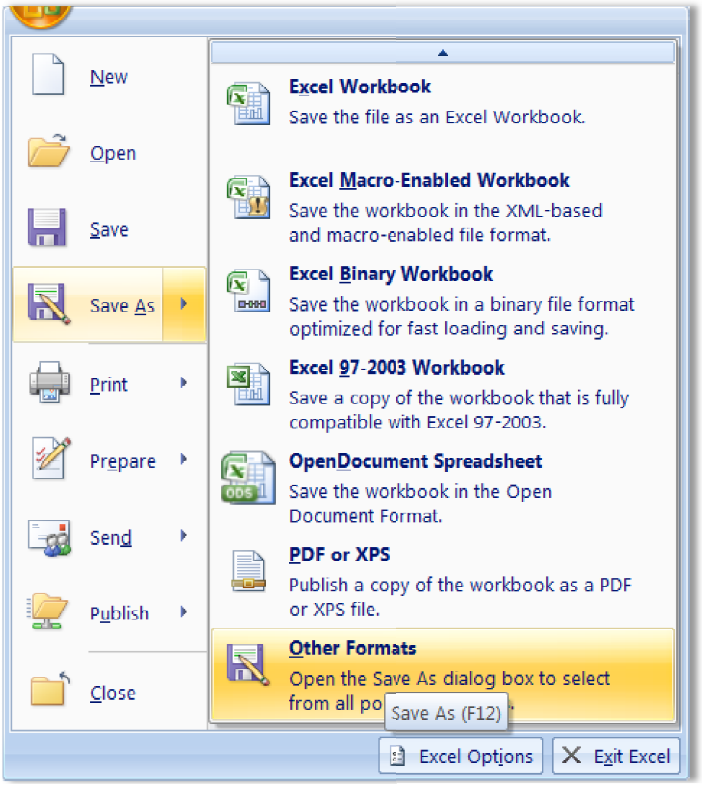


Figure 7, Save the Workbook in Another Format

This will open the Save As dialog box with many options for the save. Select the "Excel Add-In" as shown in the figure below. When this selection is made Excel will automatically switch the destination folder to the standard Add-Ins folder for Excel. There is no major problem in using this standard destination for the file, but I recommend saving the workbook in special folder for just this workbook (or similar ones). In this case I have selected a folder "VBAprograms" under "My Documents". During execution this program will generate one of more text files with configuration and status information in the same folder where the program workbook resides. I do not want those files to be created in the MS Office defined folders. Again, it is only my preference and the program will execute the same no matter in what folder it resides.

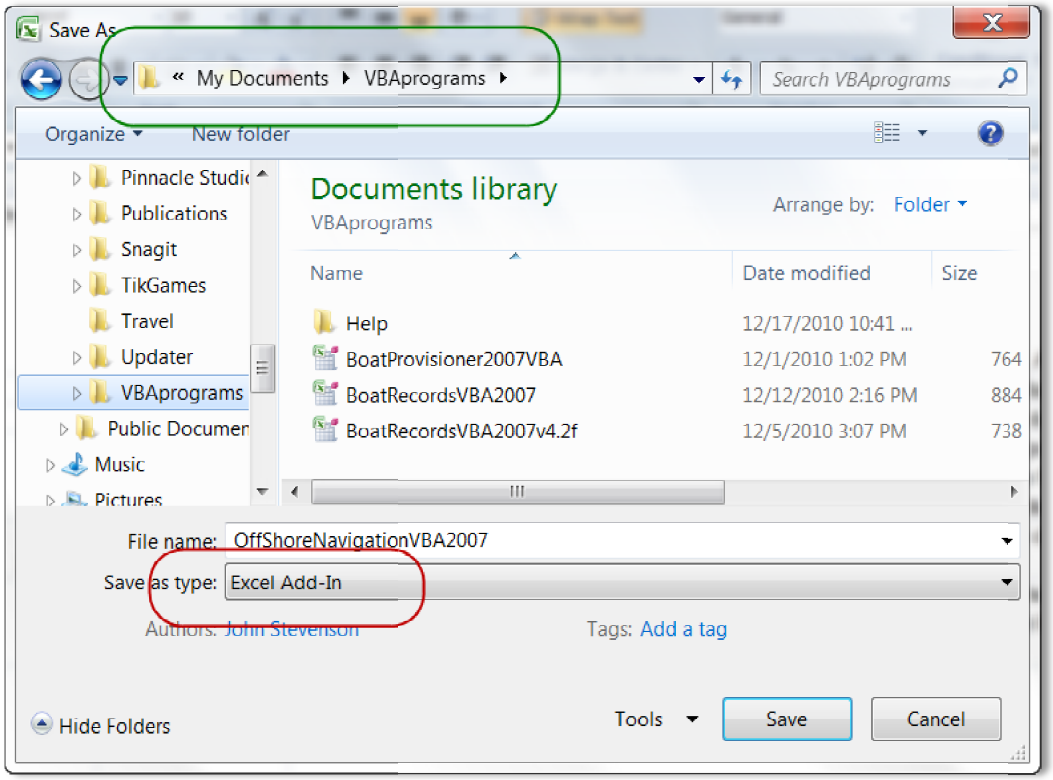


Figure 8, Saving the Workbook as an Add-In

Now the workbook has been saved in the Add-In format, but it still must be registered as an Add-In. You can close the open workbook at this point, because we are only going to work with the previously saved Add-In version.
To register that workbook as an Add-In once more click on the Office Button and click on the "Excel Options" at the bottom of the menu.

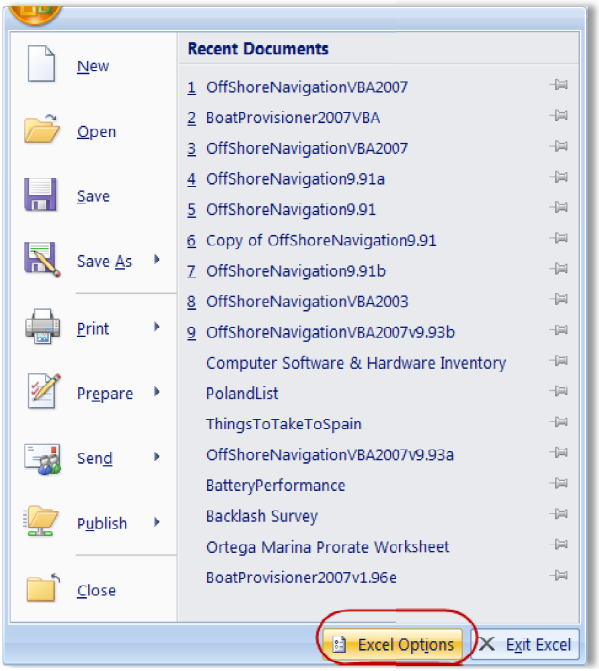


Figure 9, Selecting Excel Options

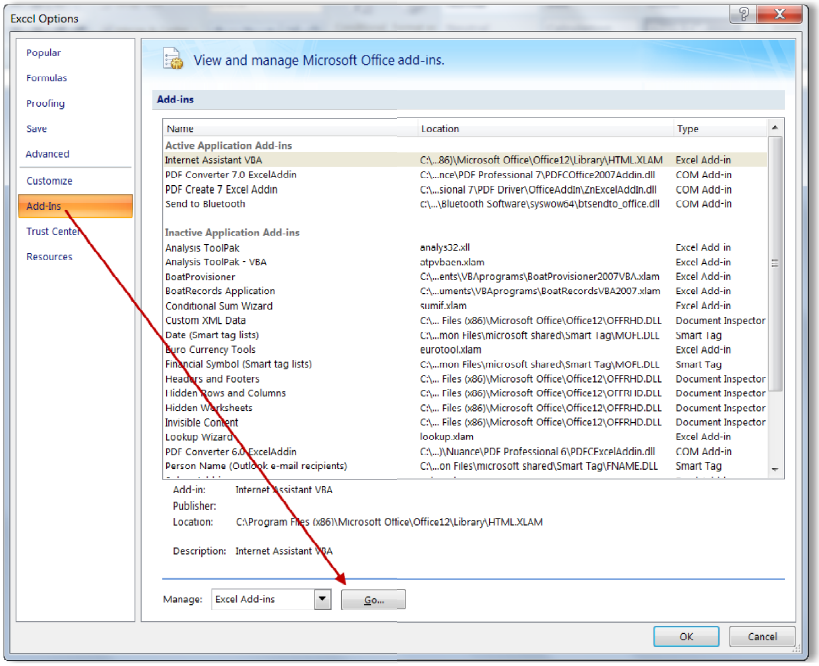


Figure 10, The Excel Options Dialog Box

This will open the Excel Options Dialog Box. Click on the "Add-Ins" option in the frame on the left side of the box, then Click "Go" at the bottom of the box.

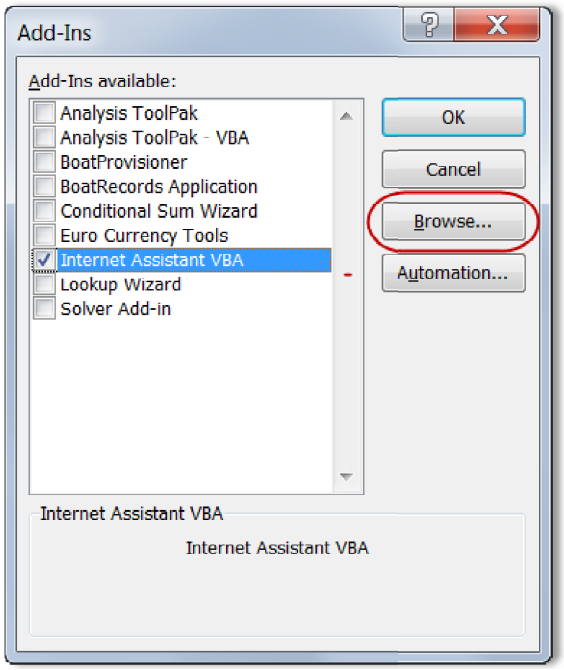


Figure 11, The Add-Ins Dialog Box

Now we are finally at the Add-Ins dialog box, where we will register OffShoreNavigationVBA as an Excel 2007 Add-In. First we have to identify the location and name of the workbook we want to register. Click on the "Browse…" button to perform this identification.

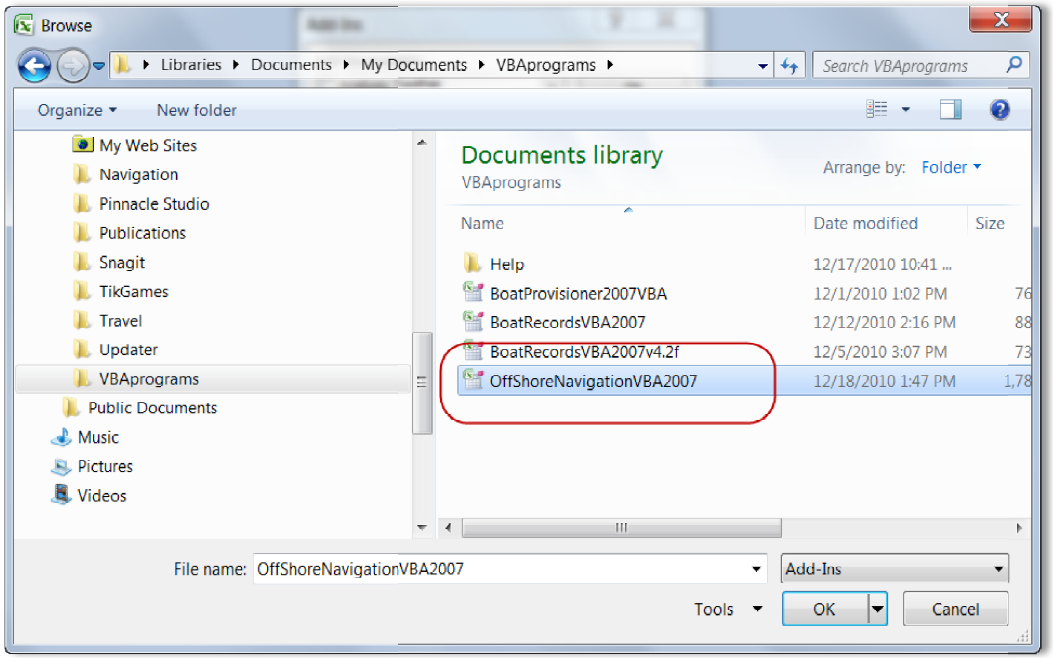


Figure 12, The Browse Dialog Box

The "Browse…" button opens a standard file browse dialog box, which will initially be set to the Excel Add-Ins folder. If you've saved the Add-In version of the workbook in a different folder navigate to that folder. Then select the OffShoreNavigationVBA workbook that you previously saved as an Excel Add-In.

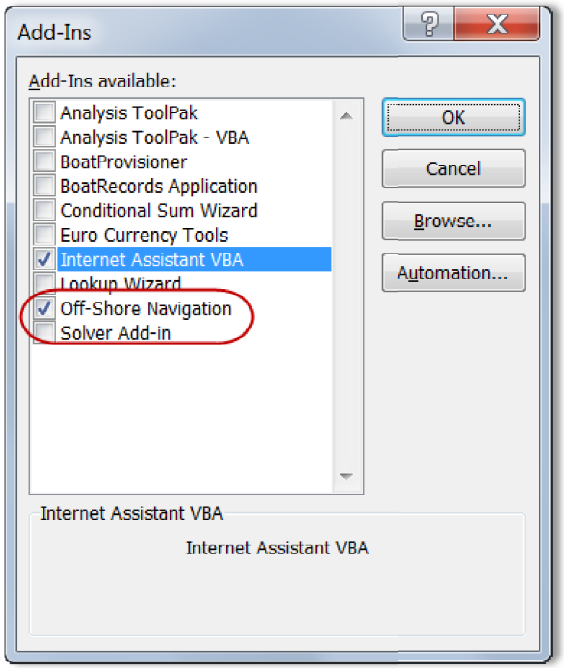


Figure 13, OffShoreNavigationVBA Registered as an Add-In

Then the Add-Ins dialog box will re-appear with the program added to the list of available Add-Ins and the check box next to the list entry will have been checked. You can use this check box in the future to activate and de-activate the program without having to repeat all of the steps above. When this check box is checked, the program will be loaded into the Excel background every time Excel is started. If the box is cleared, the program will be unloaded from Excel and will not be re-loaded until the box is once more checked.

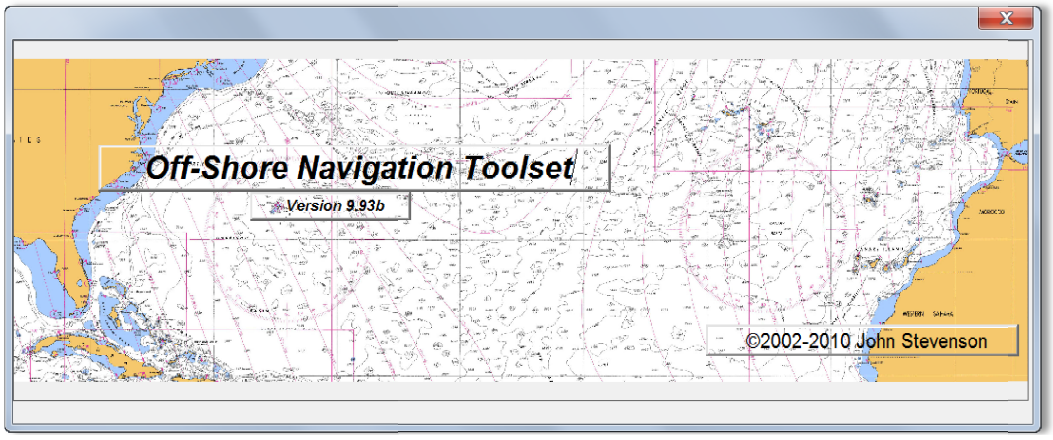


Figure 14, The OffShoreNavigationVBA Splash Screen

When the "OK" button in the Add-Ins dialog box is clicked the program will be loaded and the splash screen shown above will be briefly displayed. This screen confirms the version of the program that has been loaded as an Add-In. When a new version of the program is installed I normally save it over the previous version. This is all I have to do to install the new version as it will be loaded automatically as an Add-In. Activating the new program will require closing and re-opening Excel or going to the Add-Ins dialog box and clearing then re-checking the program check box.

Once the program has been activated as an Add-In the "Nav" button will appear in the "Custom Toolbars" section of the Add-Ins tab on the Ribbon. The program can now be executed as an Add-In.

Installing the Program as an Add-In under Excel 2003

The process of installing the OffShoreNavigationVBA program as an Excel 2003 Add-In involves similar steps as in Excel 2007, however the menus and dialog boxes are different.

The first step is to save the workbook as an Excel Add-In, just like for Excel 2007, except this process is done using the File/Save As menu item as shown below.

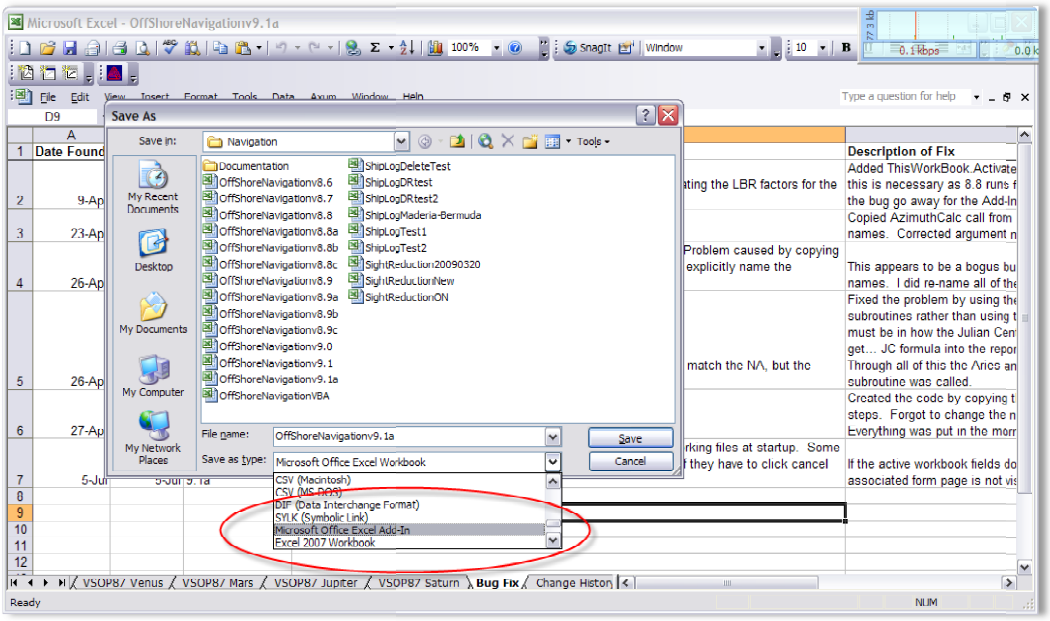


Figure 15, Save Workbook as Excel Add-In with Excel 2003

Next close the workbook and click on the Tools/Add-Ins menu as shown below

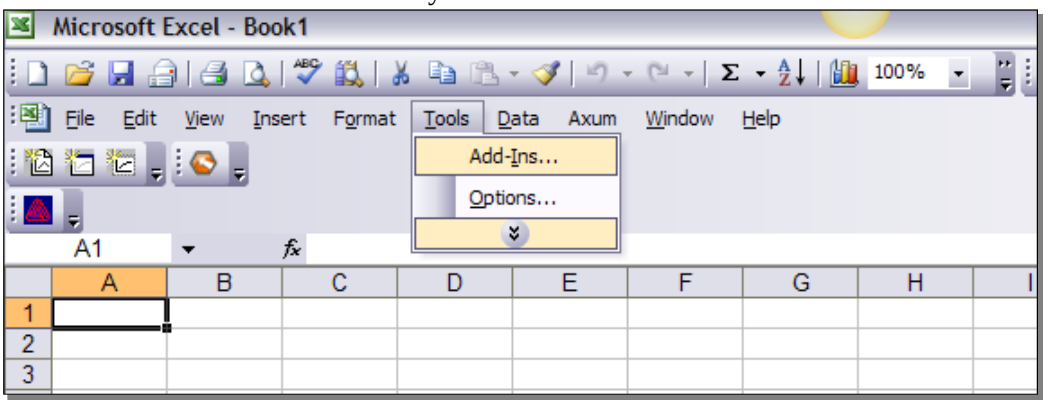


Figure 16: Open Add-In Management Tool

If the Add-Ins menu item is greyed-out you may have to close and restart Excel to get access to the Add-Ins tool. I don't know why this happens in Excel 2003, it just does – at least for my Excel 2003.
When the Add-In dialog box appears click on the Browse button to select the version of the OffShoreNavigationVBA workbook you just saved as an Add-In.

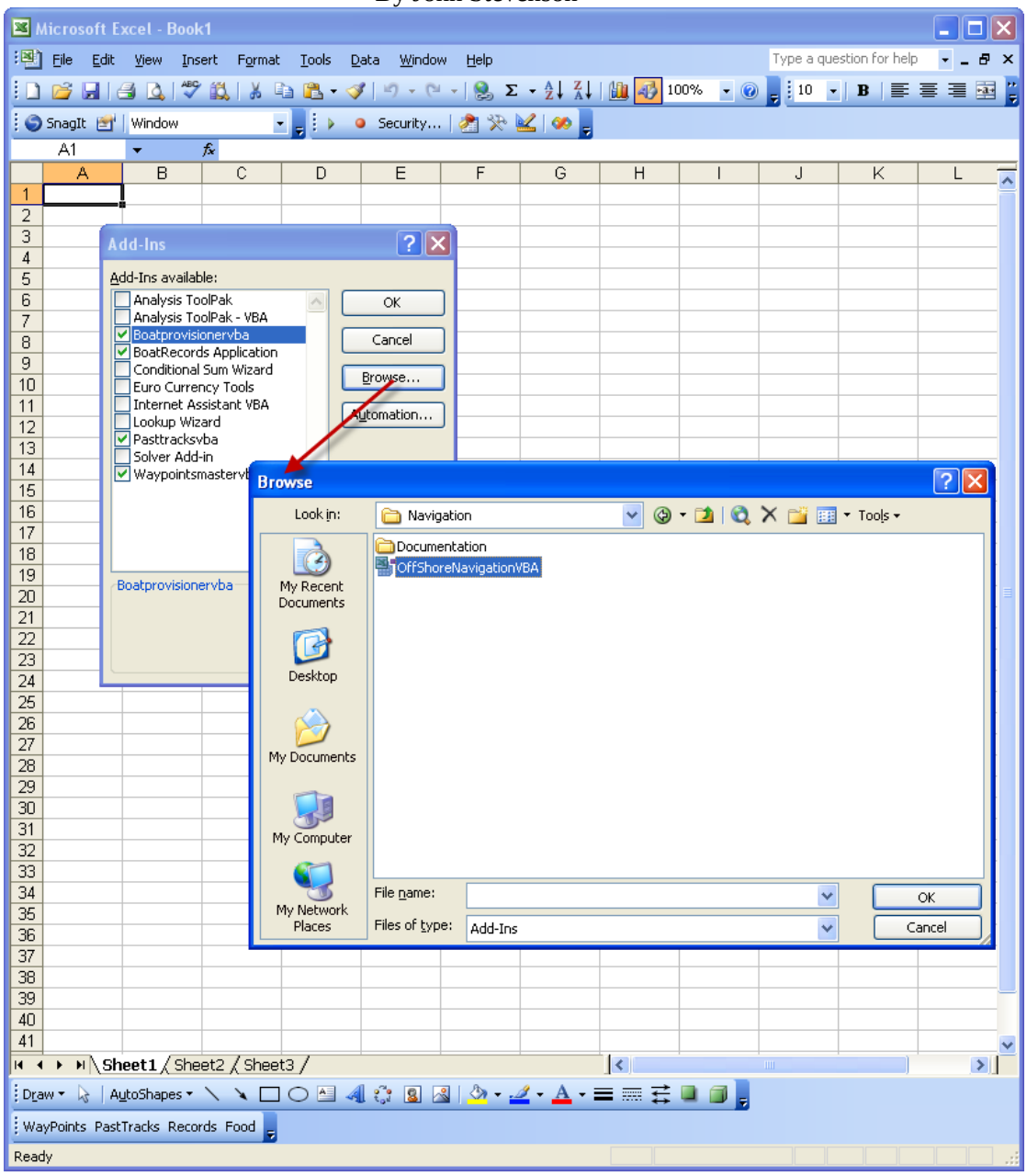


Figure 17: Open Add-In

Now the workbook appears in the list of Add-Ins available.

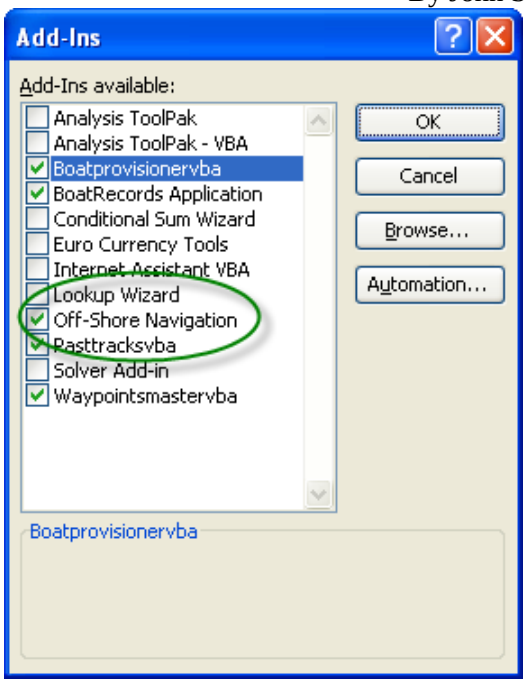


Figure 18: Add-In Now Available

When you close the Add-Ins tool by clicking the OK button, the OffShoreNavigationVBA Add-In will be loaded and available for use. The Add-In will be loaded each time you start MS Excel. If you don't want to have the workbook opened each time you start Excel you can uncheck this box before closing Excel. You can still activate the workbook on the next Excel session by once more checking the box.

Installing the Help Files

Although I try to keep the documentation file (available for download from http://www.svsarah.com/Sailing/ewTechniqueExcelNavigation.htm) up to-date, I also provide a Help function for the program that also can be downloaded from the same web page cited above. The Help function is not a Windows-type Help, but a much more limited one for this application. It is however, context-sensitive to the program form or page that is active when you click the Help button (lower right corner of most forms). The Help files must be installed in a sub-folder, by the name of Help, to the folder in which the program is installed.

This one more reason to install the Add-In version of the program in the same folder as the workbook program version rather than the default Windows Add-In folder. If you install both the standard workbook version of the program and the Add-In version in the same folder then you only have to install the Help files in one sub-folder . If you install the Add-In version in another folder then you must install the Help files in a sub-folder of the Add-In folder.

The Help feature is distributed in a zip file as shown below.

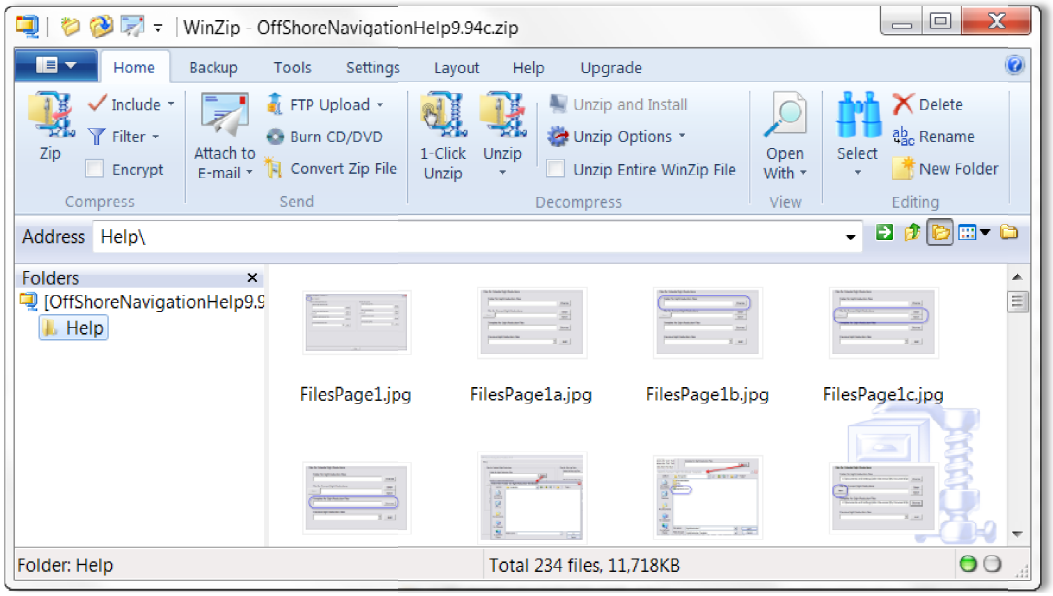


Figure 19, The Help.zip File

This screen capture is from a recent version of Winzip. Notice that the files collected and compressed in this zip file all under the sub-folder Help. If you extract the entire contents of this zip file into the folder in which the program has been installed, it should create the Help subfolder and place all of the files in that sub-folder. At that point the program Help feature should be operational.

Using the OffshoreNavigationVBA workbook

If you are using the workbook version of the program you must first load the workbook in Excel to perform any of the navigation functions. Once the work book is loaded the "Nav" button will appear in the Custom Toolbars section of the Add-Ins tab on the Excel 2007 Ribbon.

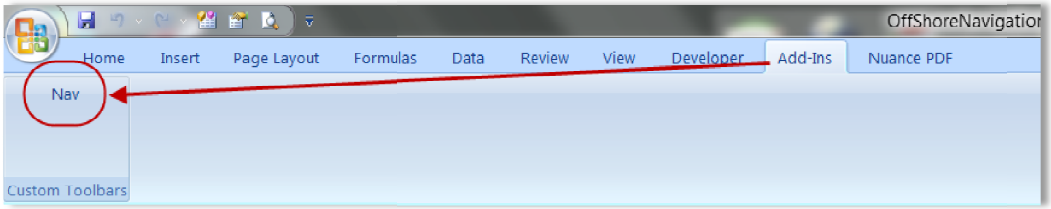


Figure 20, The Nav Button in Excel 2007

Or it will appear at the bottom of the Excel 2003 window.

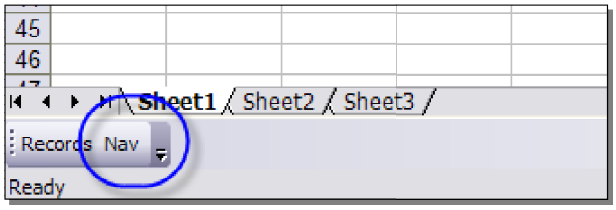


Figure 21: The Nav Button in Excel 2003

If you installed the Add-In version this "Nav" button will appear each time you start Excel. There is no functional difference in the program whether it is executed as an Add-In or a standard workbook. There is also no functional difference in the program between Excel 2003 and Excel 2007.

When the Nav button is clicked the application will attempt to open an initialization file, which is a text file of the same name as the Excel Application (e.g., OffShoreNavigationVBA.txt). The initialization file is used to restore data between program sessions. On the first execution of this application the Init File does not exist, and you will see a blank form as shown below. Every time the program is closed by clicking on the "Close" button, the contents of the "Files" page (and other pages) are saved to the initialization file.
The Initialization file is also specific to the version of the program. The program will not use data from an Initialization file that was created by a different program version. This is done to prevent program update problems that include changes to the Initialization file. I could provide a conversion feature when such changes occur, but it is easier (for me) and I believe safer to just ignore the initialization file from a different program version.

Files Page

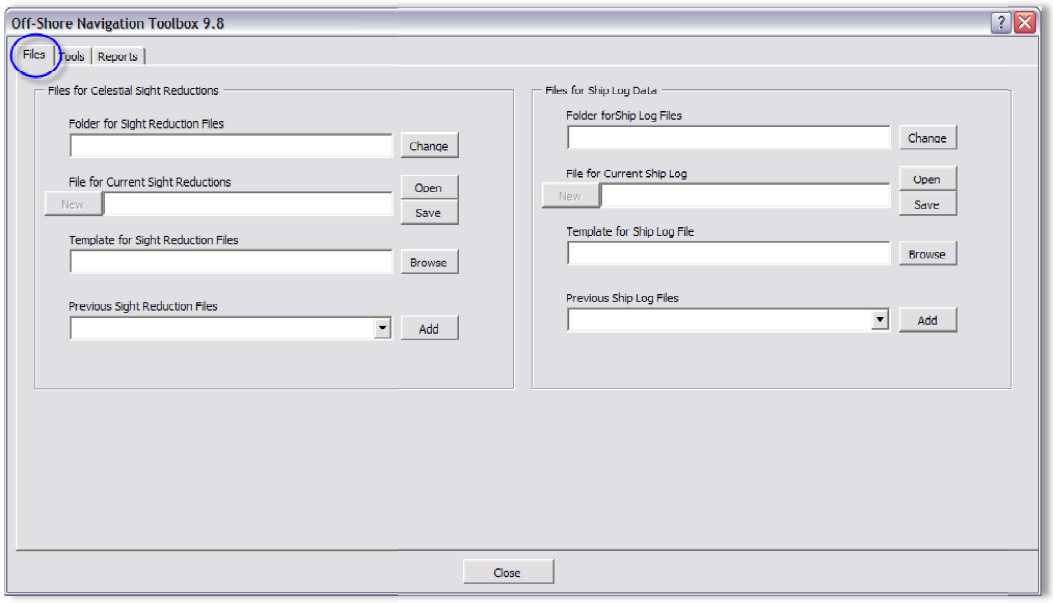


Figure 22. Initial Program Form

There are two frames of data boxes and controls on the Files Page, the left frame contains the data for the files and folders associated with Celestial Navigation. The right frame is for the Ships Log. The two frames contain the folder and file names used by each part of the application. If the "File for Current Sight Reductions" field is empty, the Sight Reduction application cannot be accessed. Similarly the Ship Log application cannot be accessed until the "File for Current Ship Log" field has been filled in with a valid file name.
If this is the first time you've used the program you will not have any existing SightReduction or ShipLog workbooks. You will need to create them using the workbook templates included in the download zip file. Skip to Creating a SightReduction Workbook.

To open an existing sight or log file, click on the "Open" button on the right of the appropriate text box.

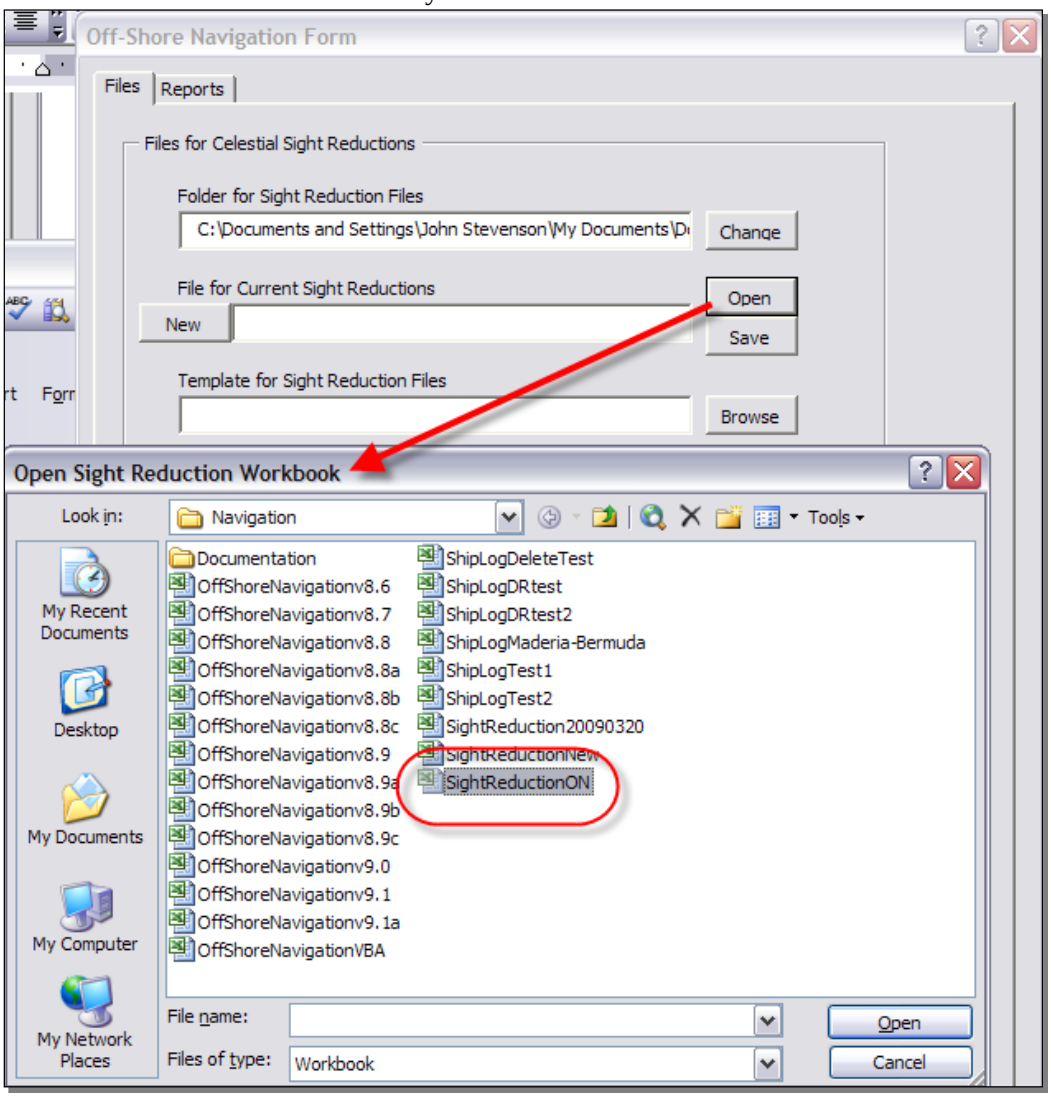


Figure 23. Open the Sight Reduction Workbook

Once the workbook has been opened the "Folder for Sight Reduction Files" is also filled in with the name of the file selected.

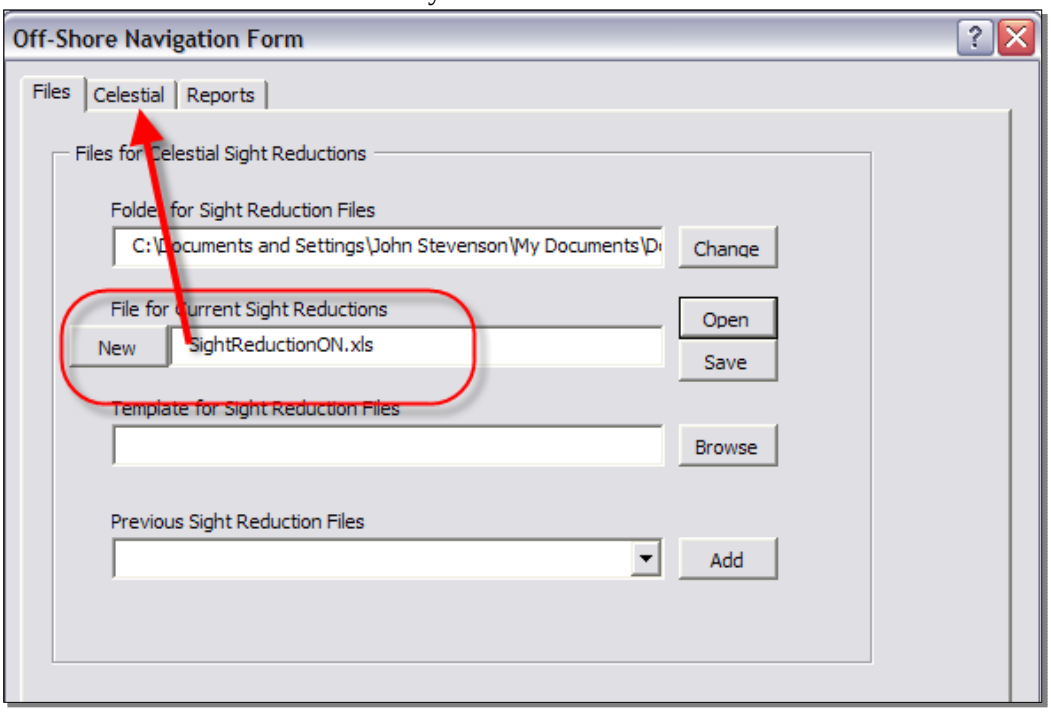
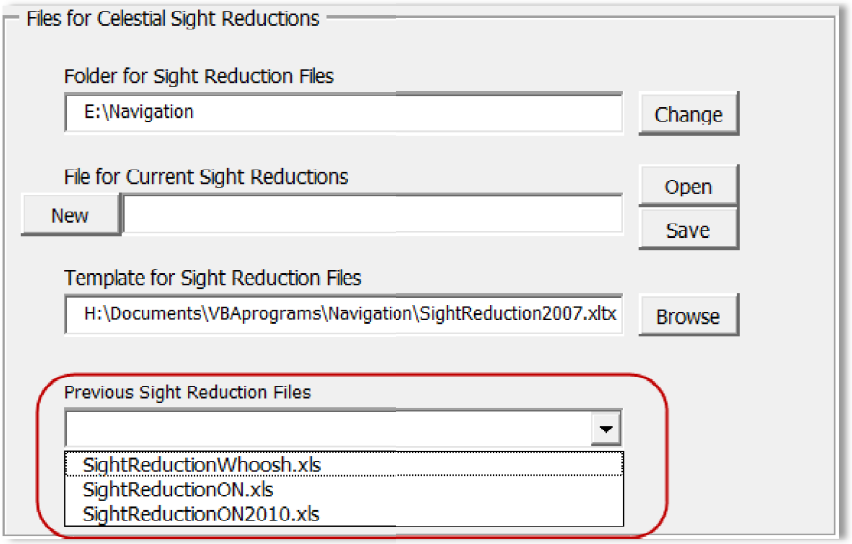


Figure 24, Sight Reduction Workbook is Open

Now with a Sight Reduction Workbook open the "Celestial" page on the form is visible. You now have access the Sight Reduction application, which is described in a later section of this document and by the Help screens accessible on that page.

Opening a SightReduction Workbook Using the Drop Down List

An alternative way to open an existing workbook is to use the "Previous Sight Reduction Files" drop down list at the bottom of this section of the Files page.



©

Figure 25, Sight Reduction Workbook Drop Down List

The workbooks included in this list are those that reside in the folder specified at the top of the section. If the SightReduction workbook you want to load was not saved in that directory you will need to use the Open button to load that workbook.
Notice that all of the workbooks in the drop down list start with the letters "SightReduction". This is how the program decides which of workbooks in the folder contain sight reduction data and should be included in the list.

Creating a SightReduction Workbook

Of course the previous section is a little out of order if you are using this application for the first time because you haven't created a Sight Reduction workbook as yet. To do that we need to use the SightReduction.xlt template file. Below the File Name box for the SightReduction workbook is a field called, "Template for Sight Reduction Files". We must put the path and name of the template in this field using the browse button on the right.

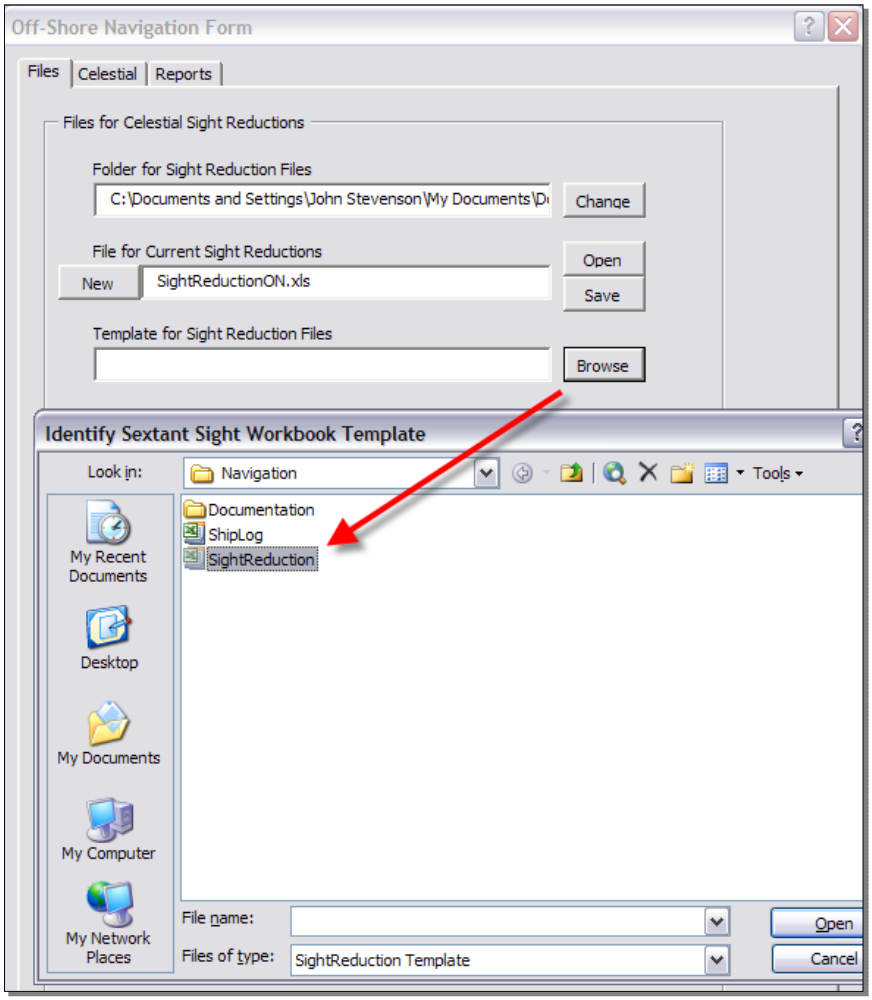


Figure 26. Open the SightReduction Template

Once the SightReduction workbook template has been identified, click on the "New" button to create a Sight Reduction Workbook from the Template.

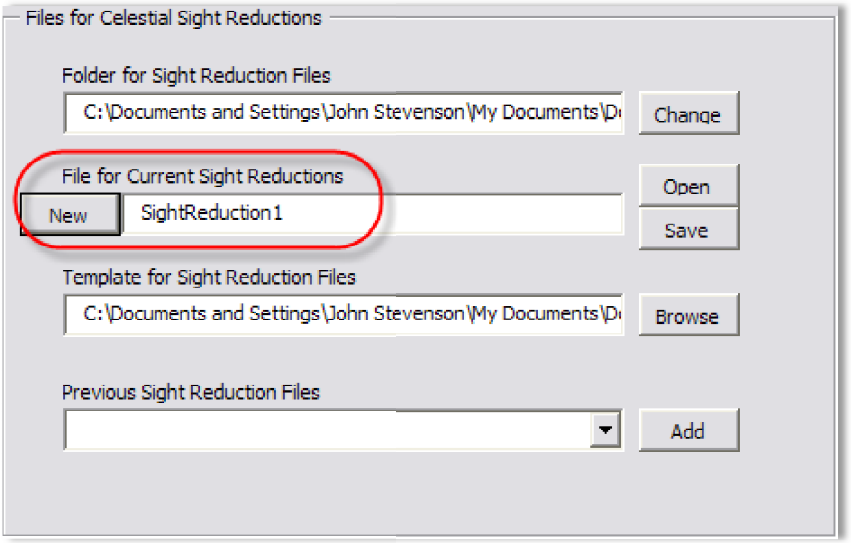


Figure 27, Create a New SightReduction Workbook

This action closes the active SightReduction workbook (if any was open) and creates a workbook with the name "SightReduction1". Notice that there is no file type extension on this name. This is because the workbook has not yet been saved. First I want to change the name a bit so it means something to me.

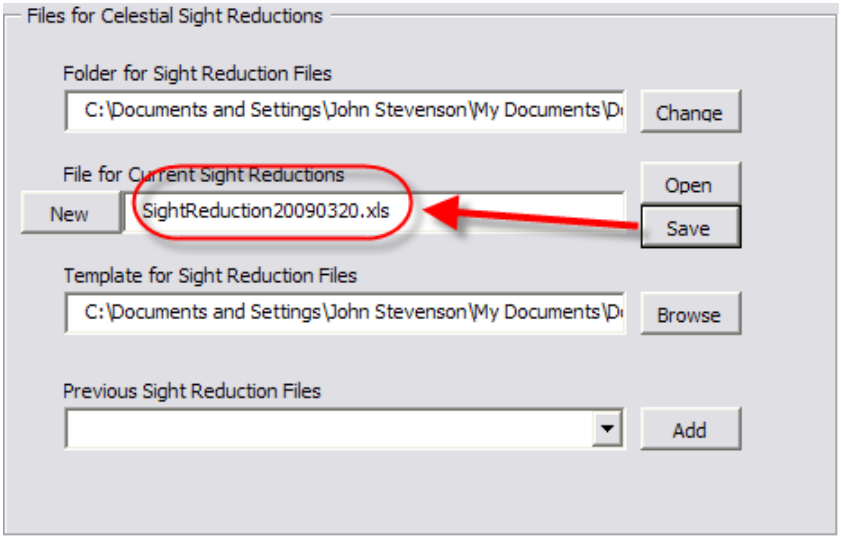


Figure 28, Rename and Save the Sight Reduction Workbook

I edited the name to make it more meaningful; in this case I appended the current date to the file name. It is important to leave the "SightReduction" characters at the start of the file name. The application uses that part of the file name to locate sight reduction files on your system and populate the "Previous Sight Reduction Files" drop down list at the bottom of this section of the Files page. If you don't leave the "SightReduction"

characters as the first part of the file name the new file can still be used by the program, it just will not appear in the drop down list. To access that file you will have to use the "Open" button.
When I clicked on the "Save" button the file now has the .xls extension (it would have the .xlsx extension under Excel 2007).

Now I am ready to perform some sight reductions by clicking on the "Celestial" page tab.

Celestial Page

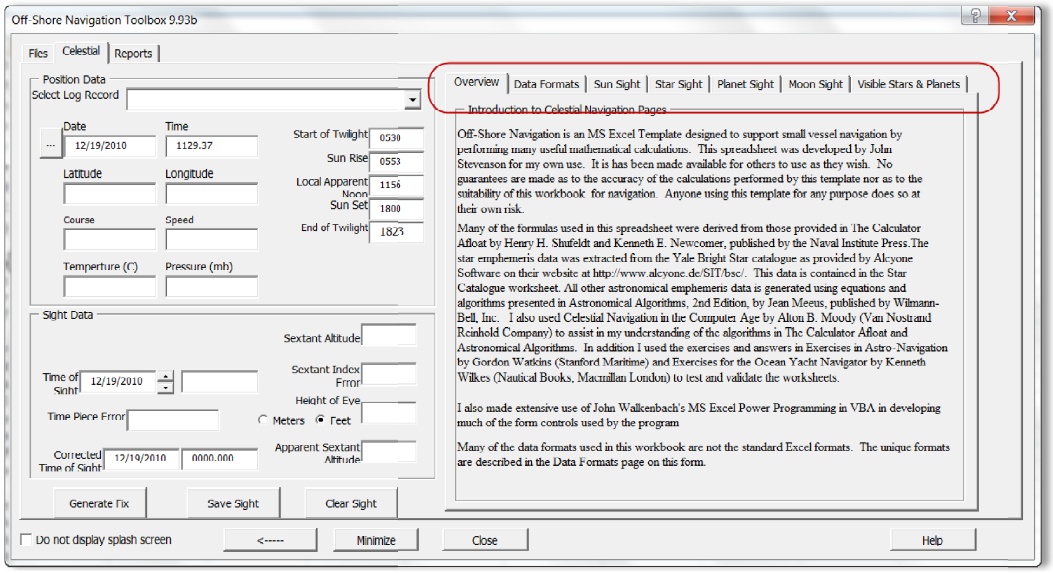


Figure 29: The Celestial Page

The Celestial Page, shown above, consists of three sections. The upper left part contains information on the Dead Reckoning position of the vessel. .

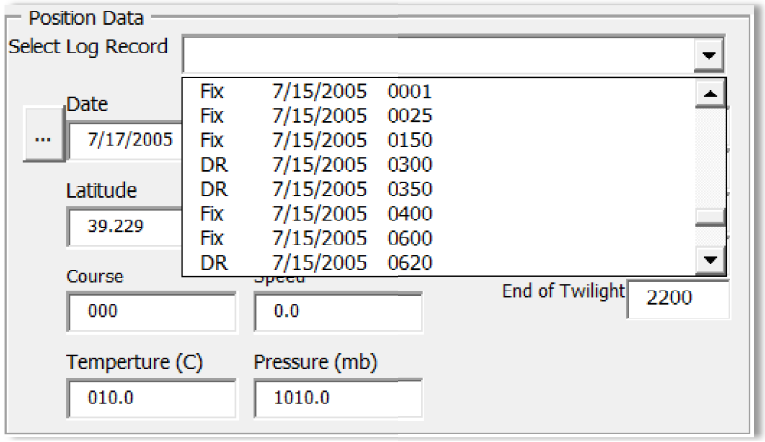


Figure 30, Position Data from Ship Log

The DR data that is required for the Sight Reduction sub-pages includes the Date, Time, Latitude and Longitude. Course and Speed can also be entered if you want to update the ships position to the time of each sight that will be reduced for this DR.
When the Celestial Page is initially opened the Position Data is extracted from the most current record in the ShipLog workbook (if the workbook is open). The position data section also contains a drop down list of all records in the Ship Log. Any of these records can be selected to provide the Position Data for the sub-pages.

You can also enter the time and position data into these boxes and over-write the values from the ShipLog workbook.
On the right side of the position data section are five boxes that contain the GMT times of the significant Sun events for the date, Start of Civil Twilight, Sunrise, LAN, Sunset, and End of Civil Twilight for that date and location.

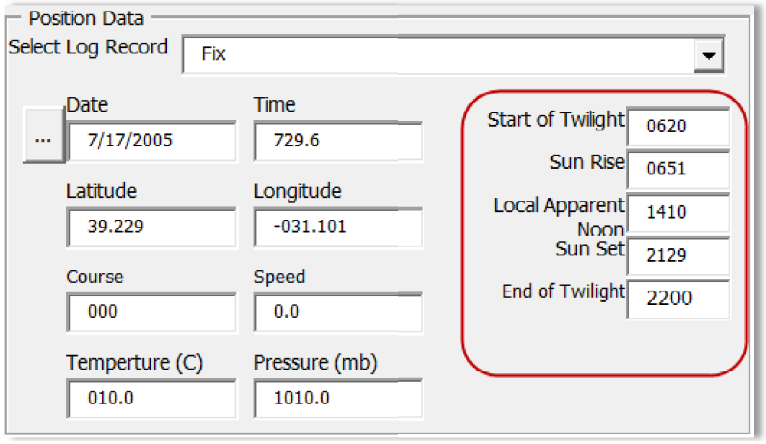


Figure 31, Times of Sun Twilights, Rise, Set and LAN

The lower left section of the Celestial page contains the sight data.

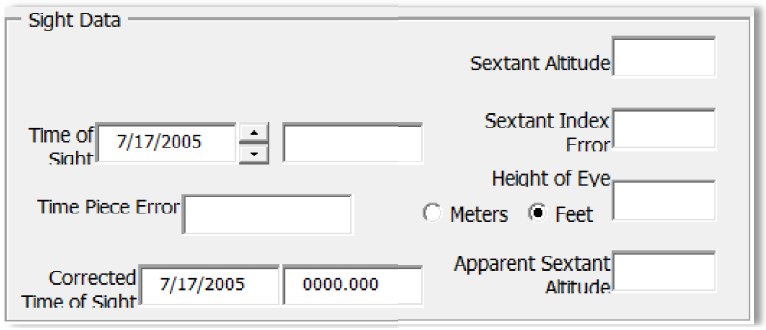


Figure 32, Sight Data Section

It is in this section that the sextant data will be entered for a given sight, no matter which celestial body was observed. The date is initially filled in with the date entered in the Position Data section. You can use the spin button to the right of this box to increment or decrement the date to that of the actual sight. The time of each sight is entered in the box to right of the date. Any time piece error should be entered in the box below the date and time in the program standard format. For example a clock error of 2 seconds fast would be entered as "-0.02". The program will apply the error correction and display the corrected time at the bottom of the section. This is the date and a time that will be used to calculate the reduced sight data.
On the right side of the Sight Data section are the boxes to enter the sextant data. The program will apply the index error and the correction for height of eye to the sextant

altitude entered to produce the apparent sextant altitude. Further corrections may be applied depending on the celestial body observed. The values entered in the Time Piece Error, Index Error, and Height of Eye boxes will be saved when the program is closed and will be reloaded the next time the program is executed. These values do not vary much (except maybe the Time Piece Error), if at all, during the voyage so they only have to be entered once.

The right portion of the Celestial Page is a group of sub-pages, where the sight reductions are performed. The initial sub-page is the Overview Page, which is an introduction to these sub-pages and acknowledgements to the sources used to develop this program. There is also a Data Formats sub-page, which explains the formats used to enter and display data (see Data Formats section above).
The other pages are used to reduce a Sun Sight, Star Sight, and Planet Sight, respectively. However, if I am just planning what sights to take on this date I may want to find out what stars and planets will be visible during the twilight periods. To identify those celestial objects I clicked on the "Visible Stars & Planets sub-page tab.

Visible Stars & Planets Sub-Page

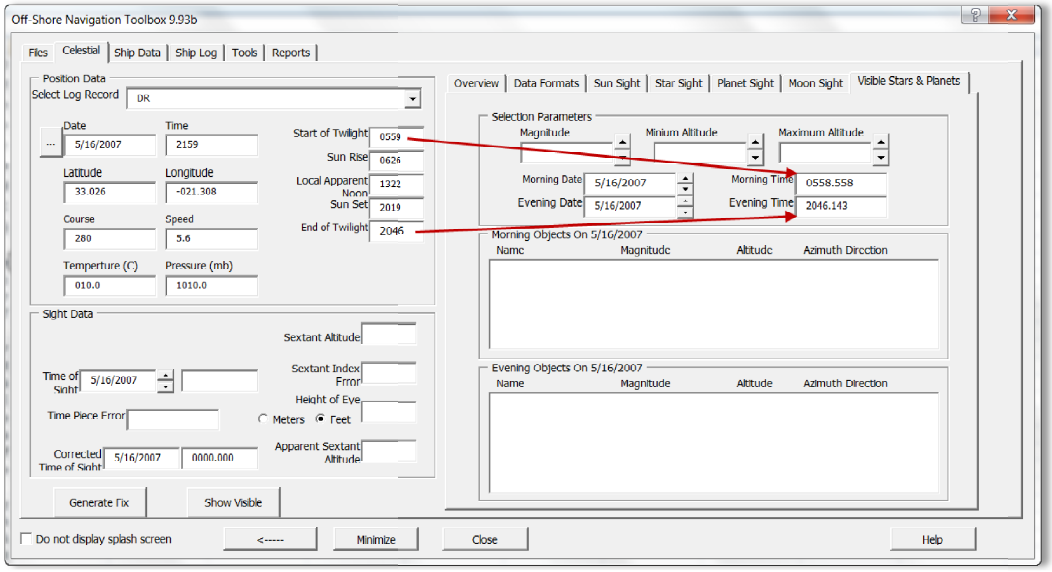


Figure 33: Visible Stars & Planets Sub-Page

This sub-page consists of three sections, the Selection Parameters and two lists for the objects visible during the morning and those visible during the evening.

Before the form will display a list of visible objects I must specify the selection criteria, which consist of the minimum magnitude for the objects, and the minimum and maximum altitudes for the objects, but I may also want to adjust the date and time for the calculations.

The date and time of the start and end of twilight have been supplied from the Position Data section as the times to be used to identify the visible objects. These dates and times can be changed. For example the DR position time is 2159 GMT, but the end of the evening twilight is 2046 GMT. So the time of the end of twilight has passed for this day (May 16, 2007). The next end of twilight occurs on the day following (remember all dates and times are GMT/UTC not local or zone time).

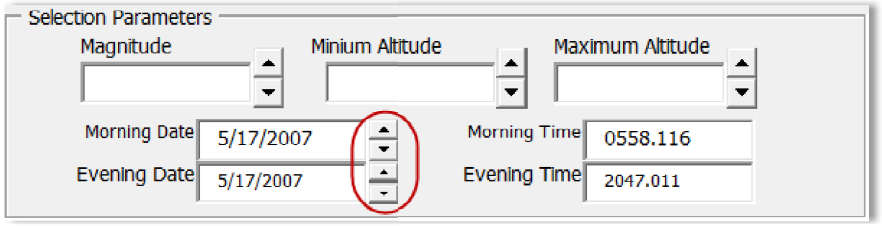


Figure 34, Change Date for Evening Twilight

Therefore I have changed the evening and morning dates by clicking the up arrow on the spin buttons next to each date box. This buttons have incremented the dates to the next day and now the times are for beginning and end of the respective twilights for May 17, 2007.

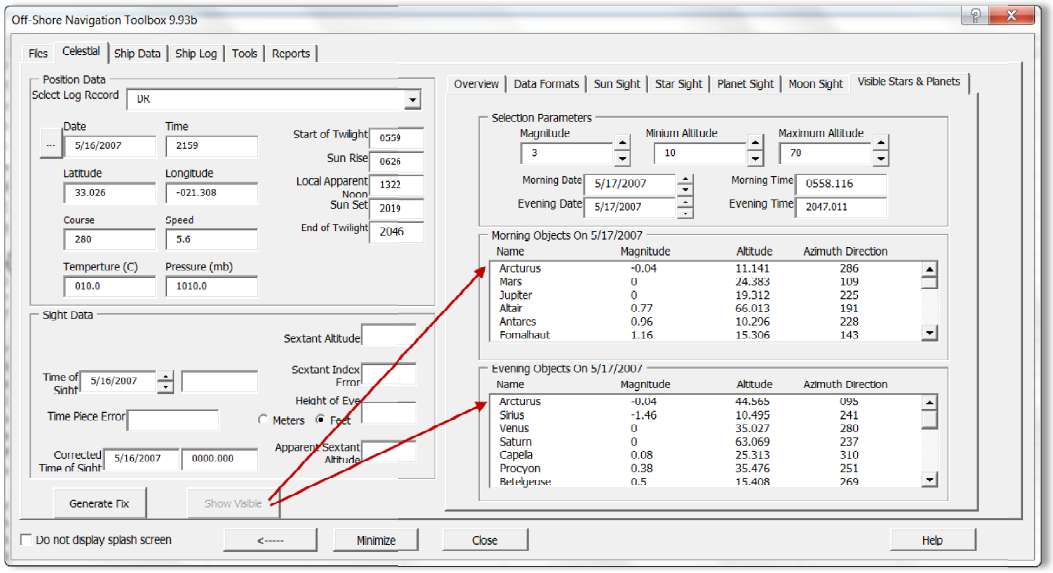


Figure 35: Visible Objects Listed

In the screen capture above I have specified a minimum magnitude of 3. Any objects of lesser magnitude (larger number) will not be selected for the list. I have specified a minimum altitude of 10 degrees and a maximum altitude of 70 degrees. When I clicked on the "Show Visible" button (grayed out now after clicking) the two list boxes have been populated with the objects that meet the selection criteria for the morning and evening times specified in the Selection Parameters frame. So now I have the information I need to plan either or both of my morning and evening sights for the following day. I know the expected altitude and the azimuth direction for each of the objects to facilitate locating them in the sky. The lists are in order of decreasing magnitude, so the brightest objects are the first objects in each list. The azimuth direction can be used to select a group of objects that would provide a good intersection of LOPs for a position fix.

I have not yet implemented the calculation of the magnitude of the planets in version 9.94. I have arbitrarily given them a magnitude of zero until the calculations have been implemented. The magnitude of the planets varies greatly during the year. They are sometimes much greater than 0 and at other times much less.

.

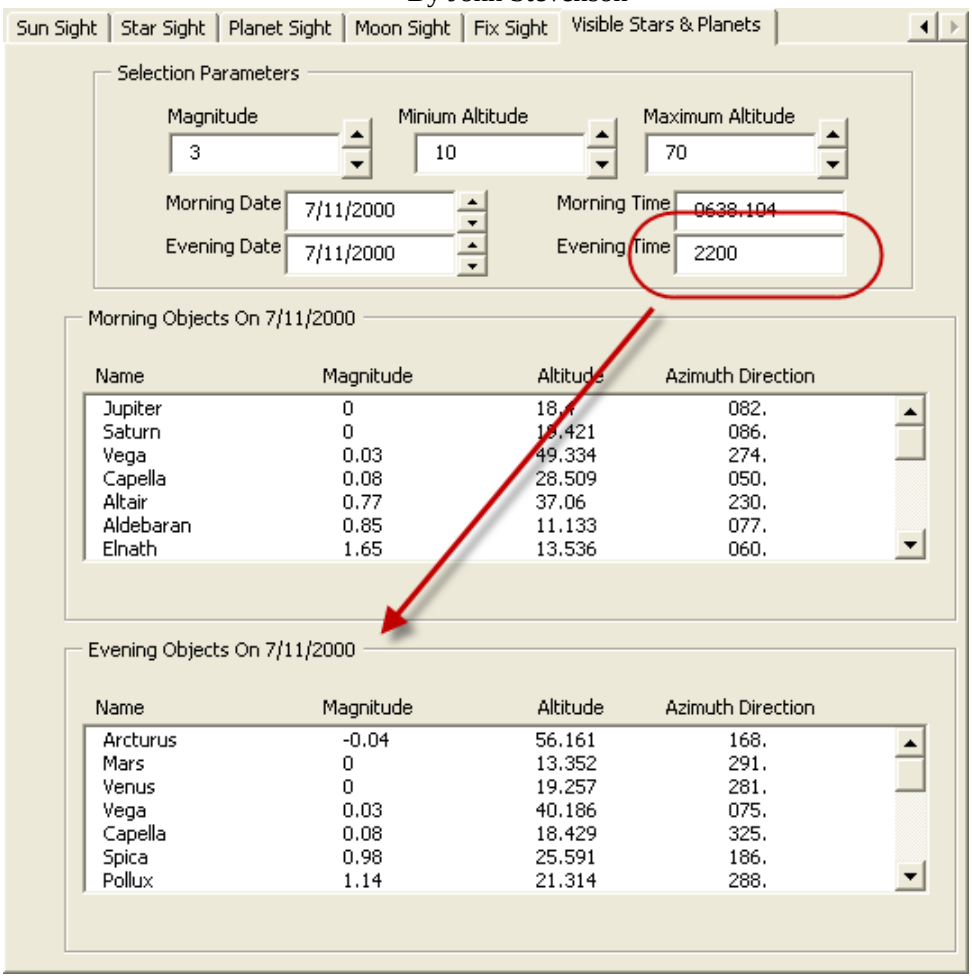


Figure 36, Arbitrary Time for Visible Objects.

It is not necessary to use the twilight times for the visible object lists. In this screen capture I have set the evening time to 2200, which is nearly 2 hours before sunset.

Sun Sight Sub-Page

The first of the Sight Reduction sub-pages is the Sun Sight Page.

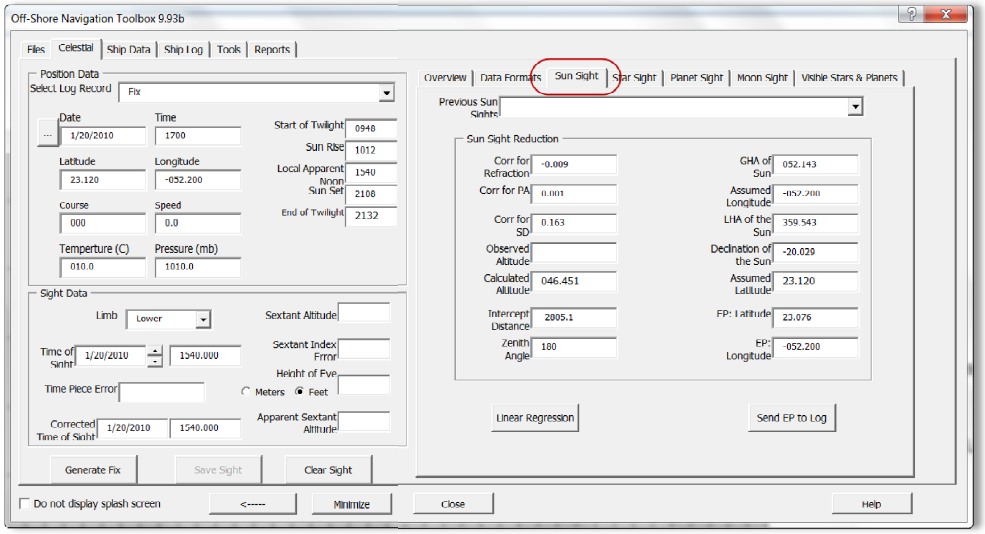


Figure 37: The Sun Sight Sub-Page

This sub-page, like the other sight reduction pages contains the calculated sight reduction values based on the position and sight data entered. Only the Assumed Latitude and Longitude boxes in this sub-page can be directly modified. The others can only be modified by changing the data in the position and sight data sections. There is a drop down list at the top of the sub-page that contains any Sun sight reductions previously recorded in the workbook.

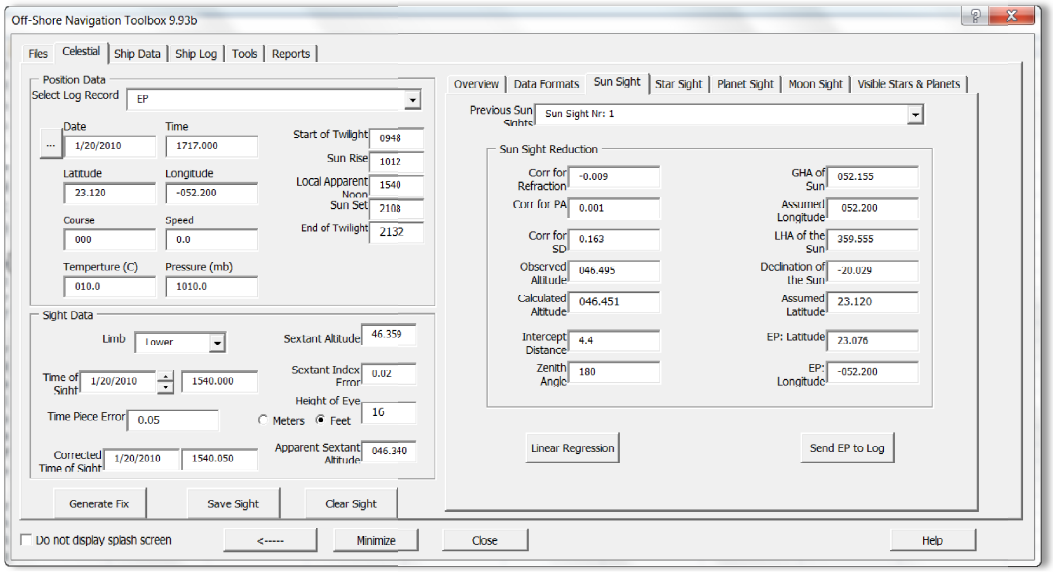


Figure 38: Sun Sight Reduction

In the screen capture above, I have entered the data for a sun sight into the data section. First I entered the time of the sight as 1540.00 (15 hours 40 minutes and 0 seconds). My watch was running 5 seconds slow so I entered a time correction value of 0.05, which produced a corrected time of the sight of 1540.05 (15 hours 40 minutes, 5 seconds). Next I entered the measured sextant altitude of 46.359 (46 degrees 35.9 minutes) and selected Lower as the limb of the Sun measured from the drop down list. The index error of the sextant was 2 minutes off the arc so I entered a correction of 0.02. Finally my estimated height of eye for the sight was 16 feet, which is entered on the form resulting in an apparent altitude of 46.340 (46 degrees, 34 minutes). The program calculates and applies the Dip correction (Height of Eye), but does not display that value.

From the data entered the program has reduced the sight to Intercept and Zenith Angle values of, respectively, 4.4 (4.4 nm toward) and 180 degrees true. This sight was taken near the time of Local Apparent Noon (LAN).

On the left side of the Sun sub-page are the further corrections to the sextant altitude resulting in an observed altitude of 46.495 (46 degrees 49.5 minutes). The additional corrections to the sextant altitude are for Refraction, Horizontal Parallax (HP) and the Sun's semi-diameter (SD).

On the right side of the section are the calculated astronomical values for the Sun at the date and time of the sight. The Greenwich Hour Angle (GHA) of the Sun at that time is 52.155 (52 degrees 15.5 minutes). The program has used the DR longitude of -52.200 (52 degrees, 20 minutes West). West Longitude and South Latitude are entered as negative numbers. If the course and speed data boxes had been filled in the assumed position would have be updated to the time of the sight using those values. If you wish to use a different assumed Longitude it can be entered directly into this box on the Sun sub-page. The Local Hour Angle (LHA) of the Sun is calculated from the GHA and Assumed Longitude values. Below that the calculated Declination (DEC) of the Sun is displayed as -20.029 (20 degrees 2.9 minutes West). Below the DEC value is the

Assumed Latitude of the sight, which is pulled from the DR position data. You can also change this assumed Latitude to any value you wish.

From the Intercept, Zenith Angle, and Assumed Latitude and Longitude values an Estimated Position (EP) of 23.076 (23 degrees 7.6 minutes North), -52.200 (52 degrees 20 minutes West) has been calculated. This EP could be used to update the ships position in the Ships Log or the Intercept and Zenith values could be plotted with other sights to produce a more refined position if not a fix.

Now that the sight has been reduced I want to save the sight data in the Sight Reduction Workbook.

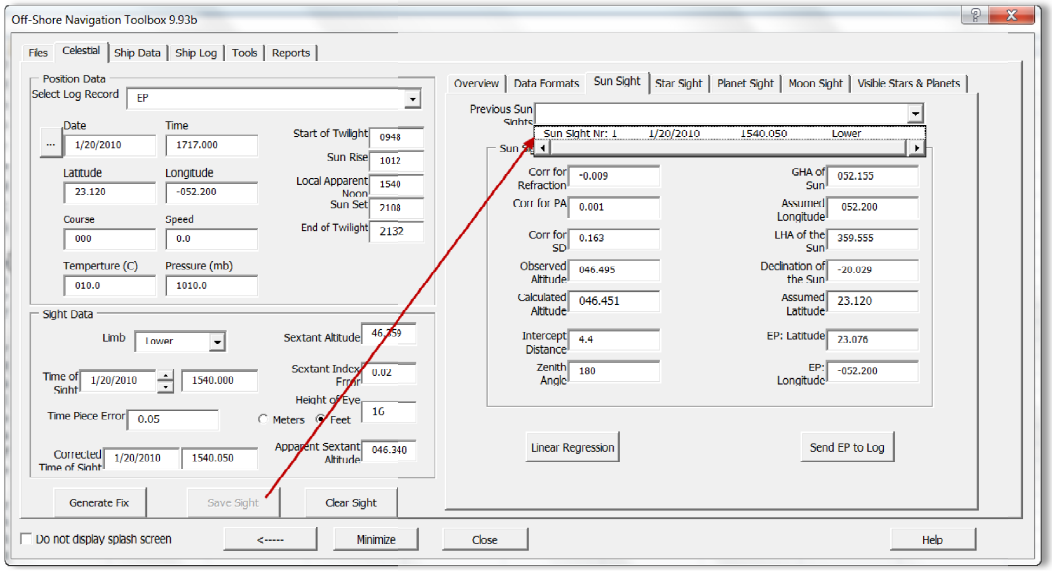


Figure 39: Save Sun Sight

In this screen capture I have clicked on the Save Sight button to store the sight data in my Sight Reduction Workbook. This also puts the sight in the Previous Sun Sights drop-down list (red arrow). This is a list of all Sun Sights in the workbook (currently just the one entered). This drop down list can be used to call back any of the recorded sights for further analysis or corrections.

	A	B	C	D
1	**Legend**	**Sight ID**	Sun Sight Nr: 1	
2	**Time - hhmm.sst**	**DR Lat**	23.12	
3	**Angle - ddd.mmt**	**DR Lon**	-52.2	
4		**DR Date**	01/20/10	
5		**DR Time**	1717	
6		**Course**	0	
7		**Speed**	0	
8		**Temp C**	010.0	
9		**Pressure (mb)**	1010.0	
10				
11	Calendar Date	**Date**	01/20/10	
12	Watch Time	**Time Rec**	1540	
13	Watch Error	**Time Corr**	0.05	
14	Observation Time	**GMT**	1540.050	
15				
16		**Limb**	Lower	
17	Dip in Feet or Meters	**DipFeet**	FALSE	
18	Sextant Altitude	**Hs**	46.359	
19	Index Error	**IE**	0.02	
20	Height of Eye (Feet)	**Dip**	16	
21	Apparent Altitude	**Ha**	46.34	
22	Refraction	**Ref**	-0.009	
23	Parallax	**HP**	0.001	
24	Semi-Diameter	**SD**	0.163	
25	Observed Altitude	**Ho**	46.495	
26				
27	GHA	**GHA**	52.155	
28	Assumed Longitude	**aLon**	-52.2	
29	LHA	**LHA**	359.555	
30	Declination	**Dec**	-20.029	
31	Assumed Latitude	**aLAT**	23.12	
32				
33	Calculated Altitude	**Hc**	46.451	

Reports | ChartLRA | LRA | LOPFix | **Sun Sights** | Moon Sights | Pla

Figure 40: Sun Sight Saved in the Sight Reduction Workbook

This is a screen capture of the Sight Reduction Workbook and the Sun Sight reduction data just entered. There are separate Worksheets in the Sight Reduction Workbook for the Sun, Moon, Planet and Star Sights.

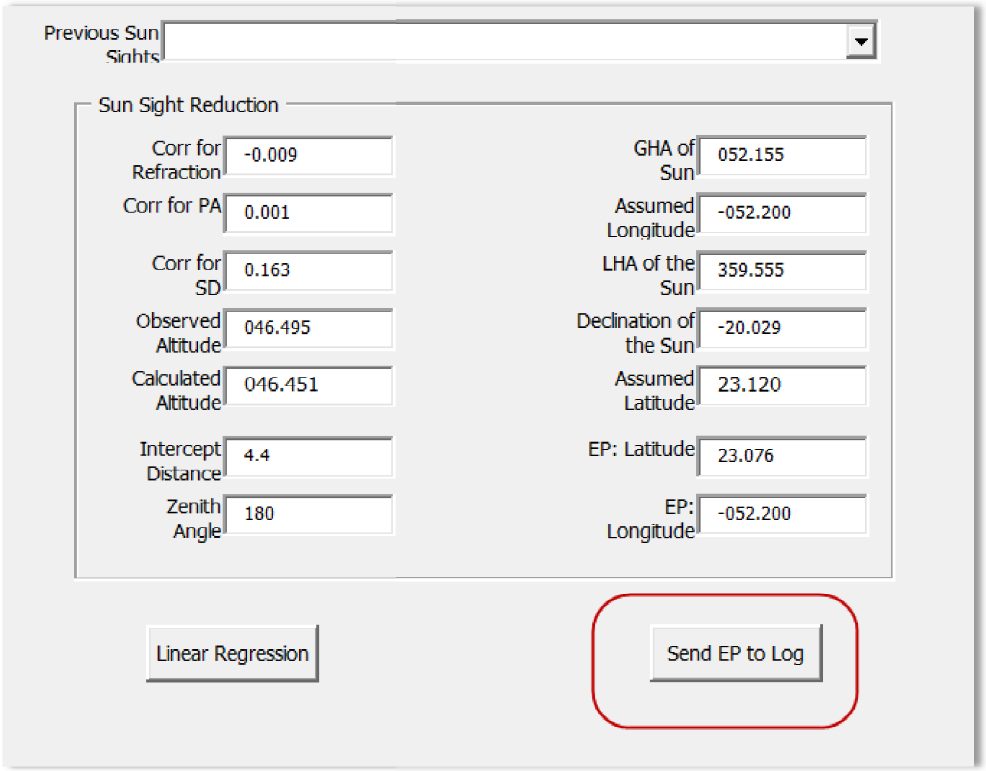


Figure 41, The "Send EP to Log" button

With version 9.51 the “Send EP to Log” button has been added to each of the sight reduction sub-pages. If a ShipLog workbook is open, clicking this button will create an EP log entry ready to be added to the ShipLog workbook as shown below.

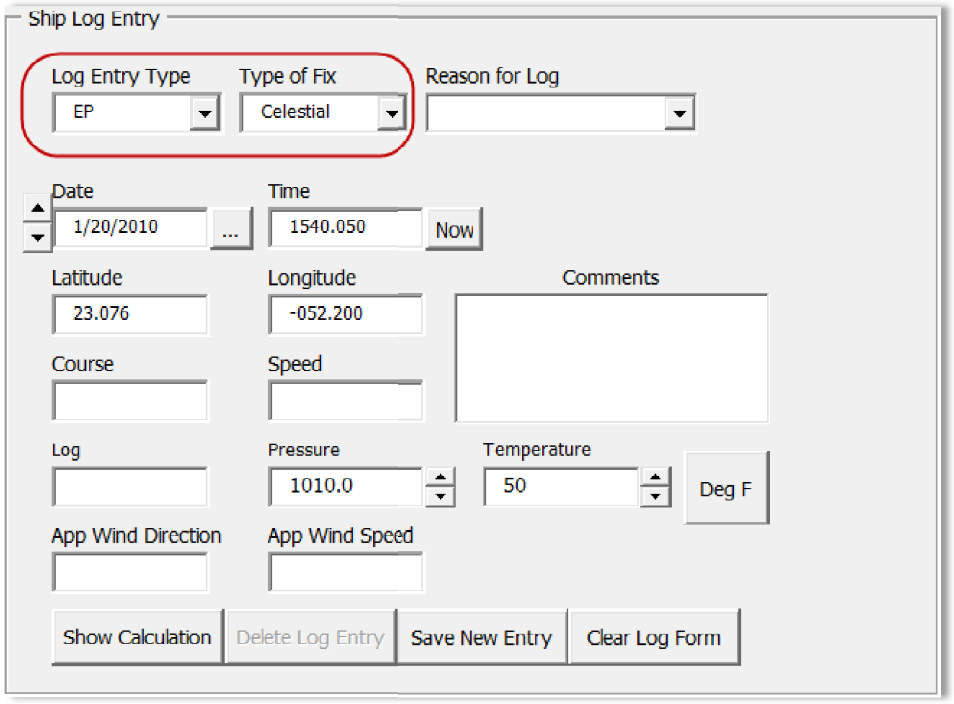


Figure 42, Ship Log Entry Filled in with EP Data

The screen capture above shows the Log Entry created by the sun sight EP. When the navigator clicks the "Save New Entry" button, this EP will be added to the ShipLog workbook. The navigator can add the other ship data to this log entry and can change the Log Entry Type to a Fix. See the section in this document on the ShipLog workbook for an explanation of how the various Log Entry Types are used by the program.

Linear Regression Analysis

The most common Sun Sights, other than noon sights, are morning and afternoon sights. A morning sight can be advanced to the time of an afternoon sight and a running fix obtained from the two sights. The Fix Sight form will calculate this running fix. Another advantage of the morning and afternoon sights is that the track of the Sun across the sky is nearly linear, and a Linear Regression Analysis can be performed on a series of sights to produce a statistically more accurate sight than what can be accomplished with a single sight in the morning and a single sight in the afternoon.
With version 9.54 of Off-ShoreNavigationVBA a linear regression analysis of a series of Sun Sights can be performed.

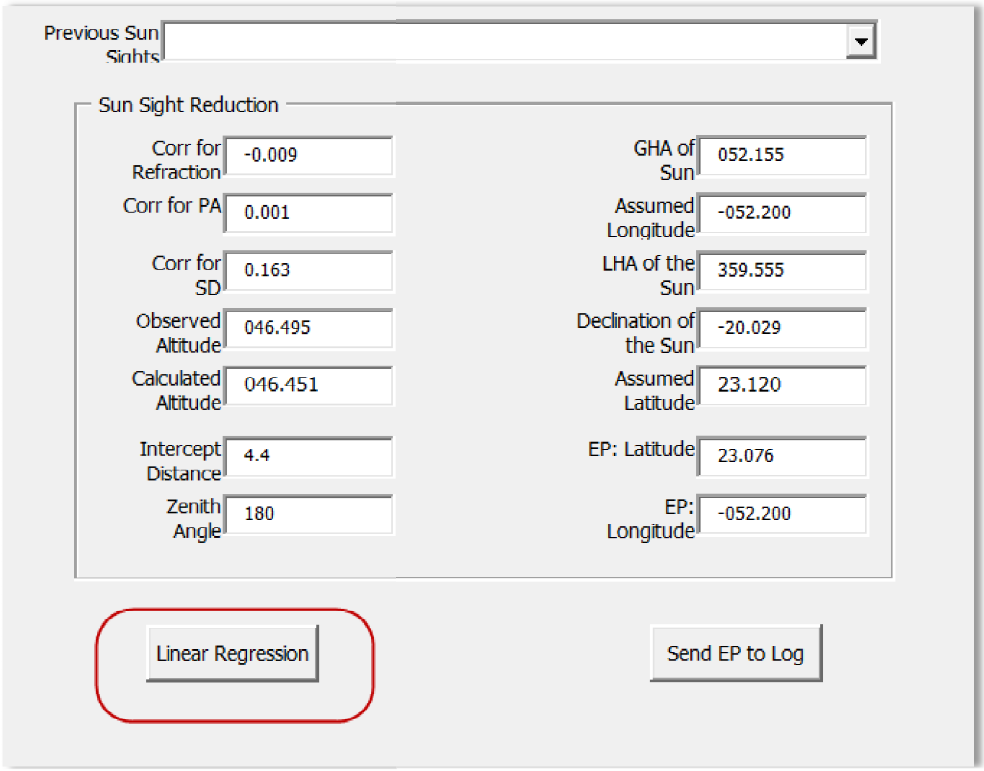


Figure 43: The Linear Regression Button

Clicking the Linear Regression button on the Sun sub-page will start the analysis of a sight series.

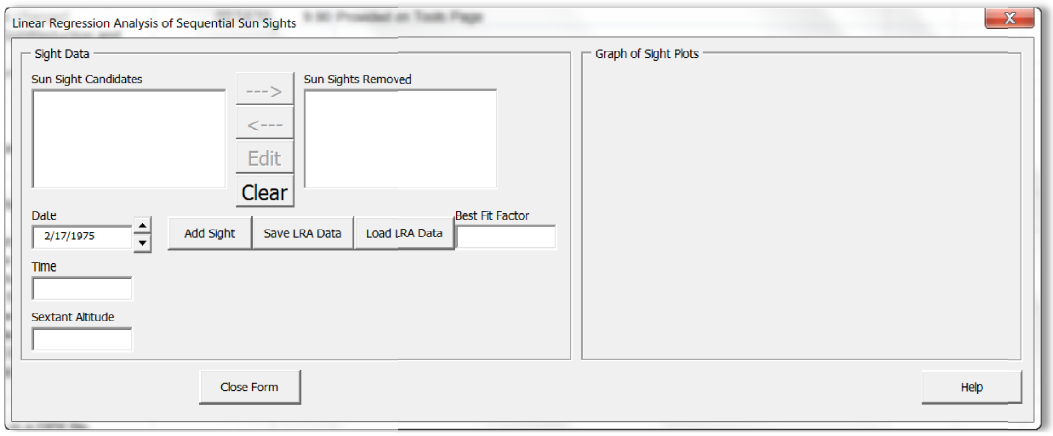


Figure 44: The Linear Regression Analysis Form

Clicking on the button will call up the Linear Regression Analysis form as shown above. At the bottom of the form is the Sight Data section where the series or Sun Sights is

entered. The date has been set based on the DR position data on the Celestial page. The date can be changed incrementally using the spin button to the right of the field.
Now I need to enter the times and sextant altitudes from the sight series.

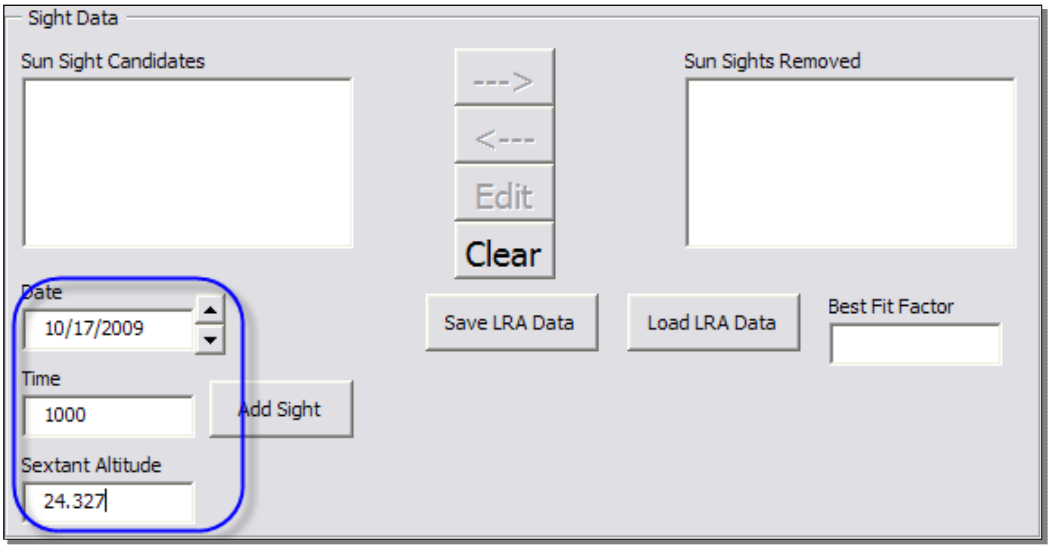


Figure 45: Entering the First Sight in the Series

In the screen capture above I have entered the time and sextant altitude for the first sight in the series. The sextant altitude is the uncorrected value read from instrument. The time of the sight has also not been corrected. I have entered a sight taken at 10:00:00 on Oct 17 with an altitude of 24° 32.7'.

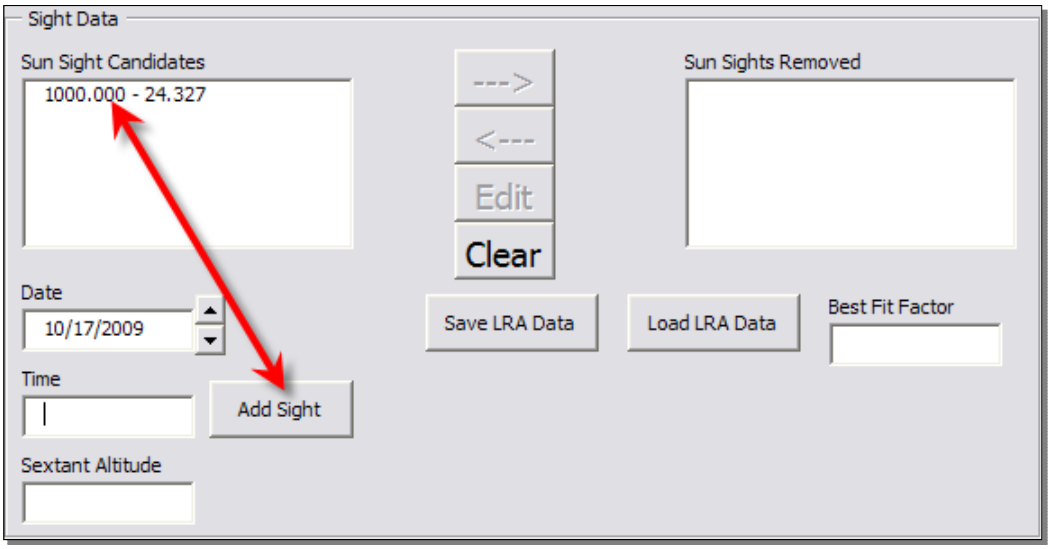


Figure 46: Adding the Sight to the List

When I clicked on the Add Sight button the first sight has been added to the Sun Sight Candidates list box.

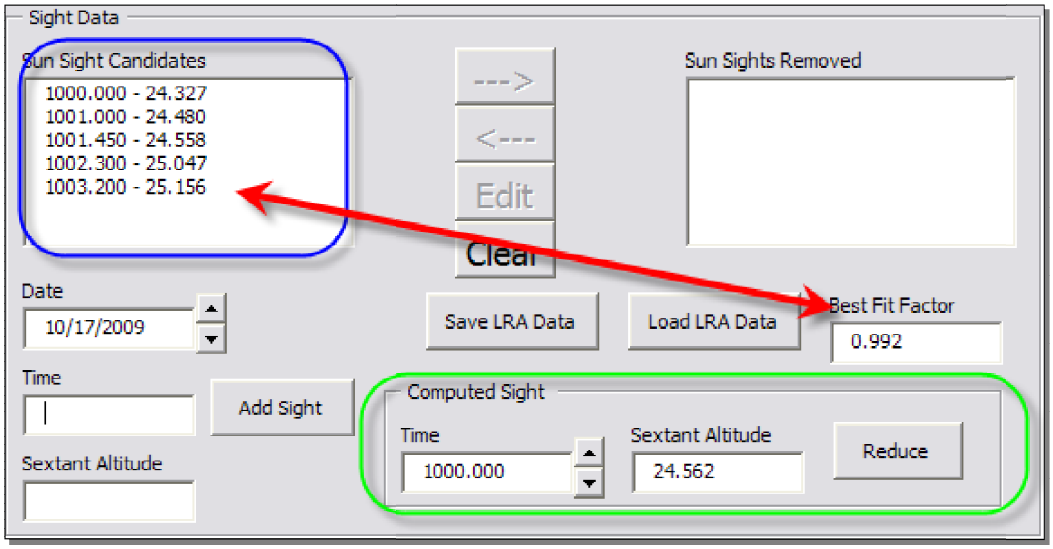


Figure 47: Complete Sight Series Entered

I then added four more sights for a total of five. The minimum number of sights required to perform the analysis is three, but 5 or more sights are recommended. One of the things the analysis will do is identify outlier sights, ones that do not conform a best fit line for the sight series. Those outlier sights can be discarded to produce a better fitting line. When I entered the third sight the form began computing the Best fit Factor on the right side of the form (red arrow). The closer this number is one (1) the better the fit. The Computed Sight section shows a preliminary best fit sight for the data entered.

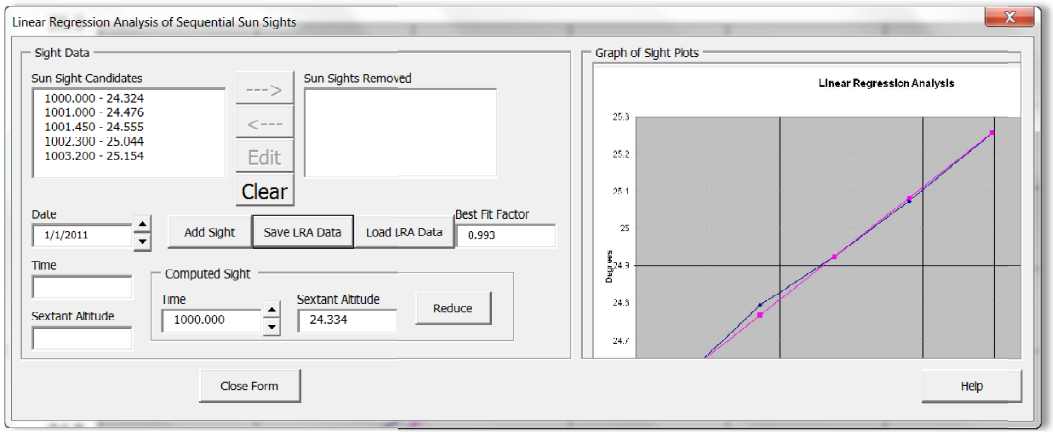


Figure 48: Sight Data Saved and Plotted

When I clicked on the Save LRA Data button, the sight data is saved to the LRA worksheet in the active Sight Reduction workbook. A graph of the plotted sights is now displayed on the form. This display may be difficult to see. The graph can also been seen in the Chart Sheet. Just move the form out of the way temporarily

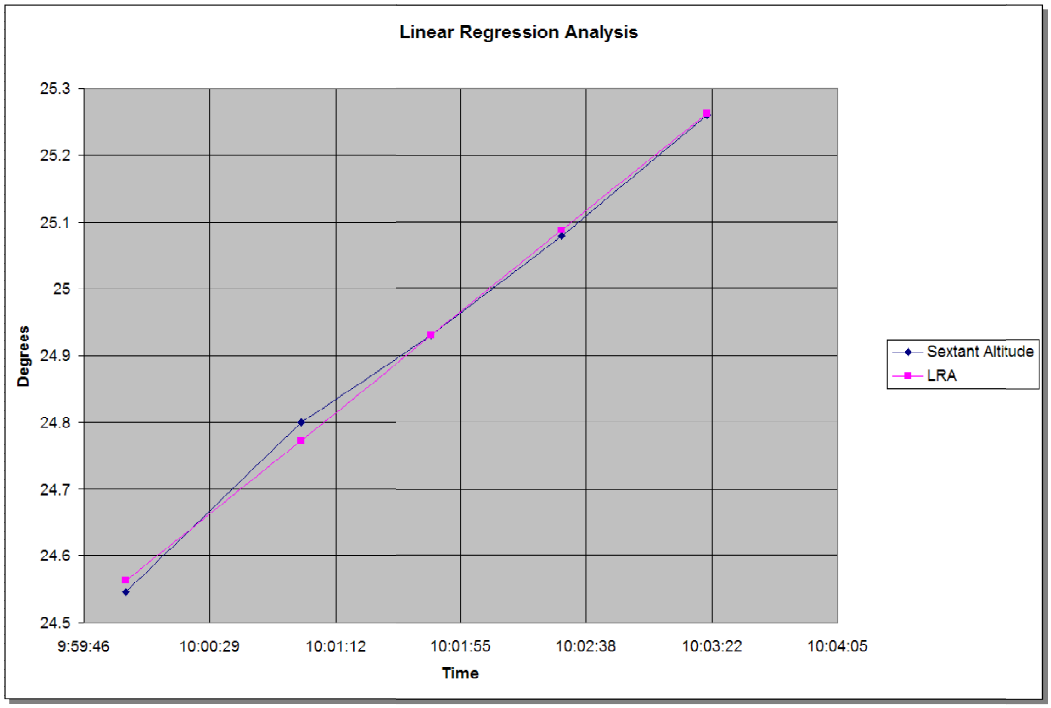


Figure 49: The Chart Sheet

Here you can see the plot of the sights entered (blue line) and the computed straight magenta line that best fits these plots. You can see the plotted sights are very close to the line, but the sights do not produce a straight line.

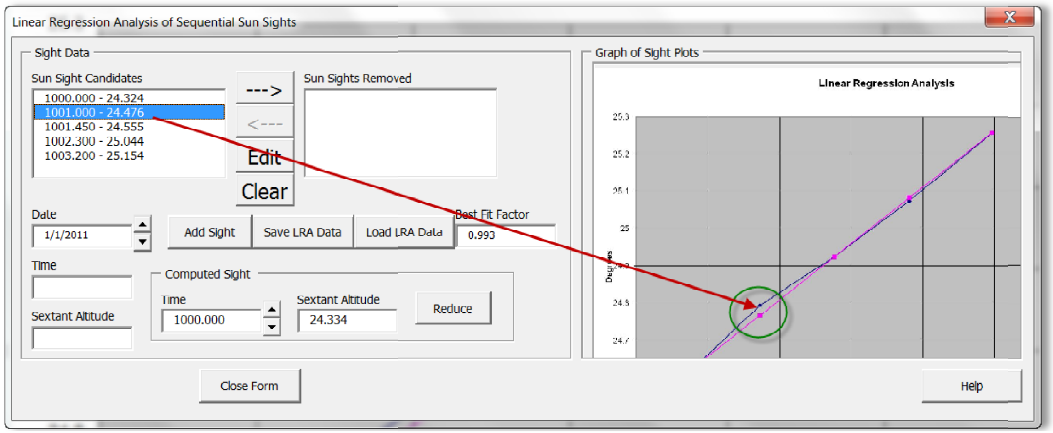


Figure 50: The Outlier Sight

The second sight at 1001 (green circle) appears to be the furthest from the LRA line.

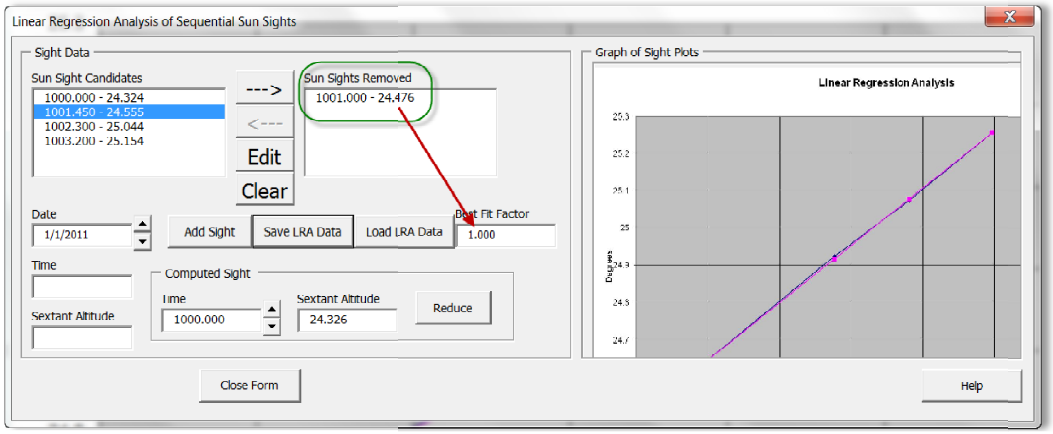


Figure 51: Removed the Outlier

In the screen capture above I have used the → button to remove the 1001 sight from the Candidate List. It now appears in the Sun Sights Removed list. Looking at the chart the blue line of the plotted sights is much closer to the magenta LRA computed line. The Best Fit Factor is 1.000. It was 0.992. If this action did not produce a good result I could use the ← button to add the sight back to the candidates list.

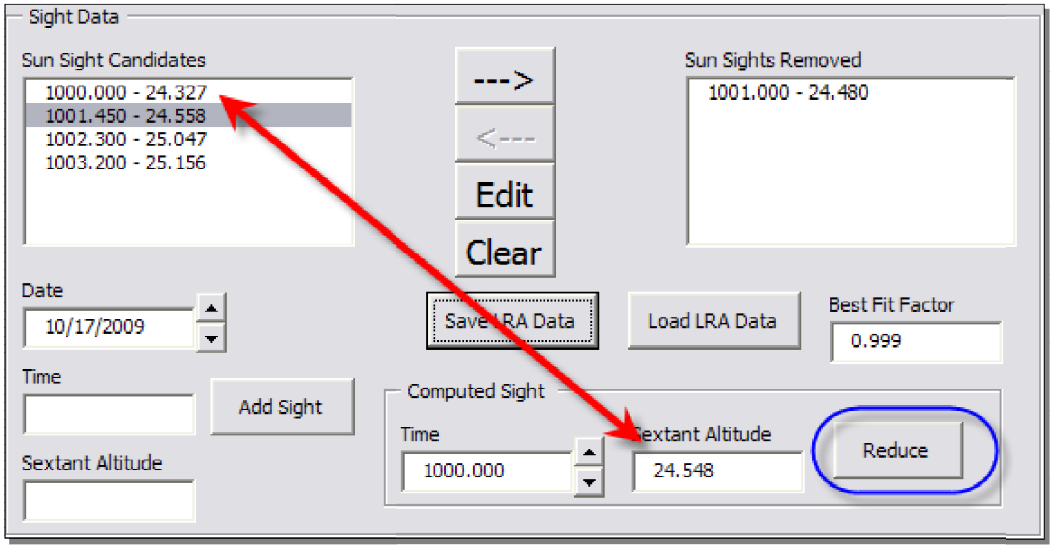


Figure 52: The Computed Sight

The main purpose of the LRA form is to compute a sight that lies on the computed best fit line once we have achieve a Best Fit Factor as close to 1.000 as possible. I believe I have done that. The computed sight section now shows a computed Sextant Altitude of 24° 54.8' for 10:00:00 rather that the recorded sight of 24° 32.7' (This screen actually shows a program error. The computed sextant altitude should have been 24.329. This error has been corrected in version 9.54a). I can now click on the Reduce button to send this sight data to the Sun Sight sub-page.

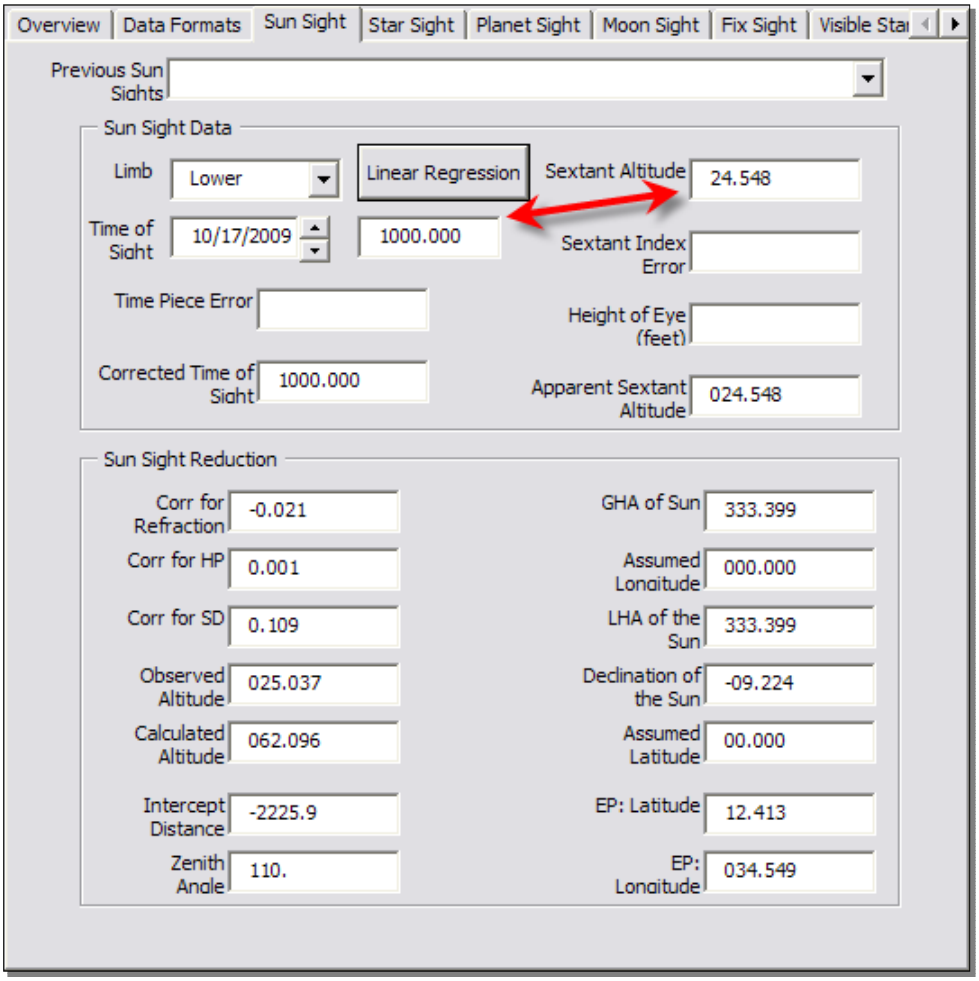


Figure 53: Computed Sight Transferred to the Sun Sight Sub-Page

Now the sight time and the sextant altitude have been entered in the Sun Sight sub-page and I can apply the time and sextant corrections to reduce the sight to a potentially more accurate EP than would have been produced by any of the recorded sights.

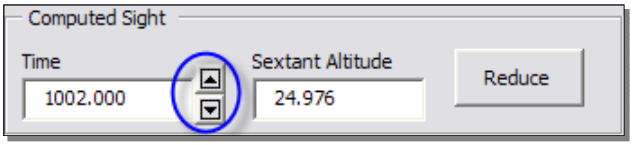


Figure 54: Changing the Computed Sight Time

The program arbitrarily sets the compute sight time to that of the first sight in the list. If I wanted to use a different time for the reduction I can use the spin button (Blue Ellipse) to

change that time in increments of 1 minute. The sextant altitude is then re-calculated for the new time.

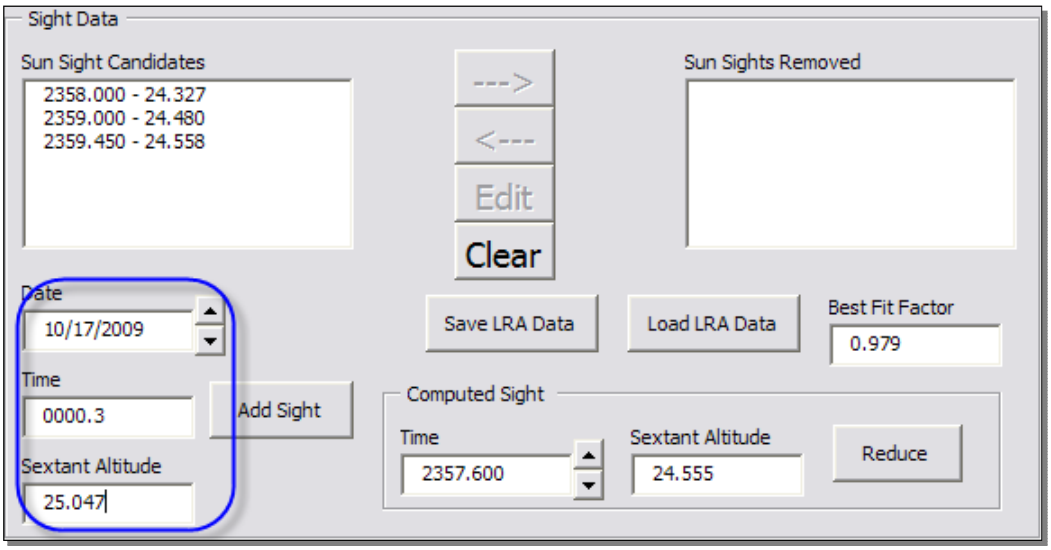


Figure 55: Sight Series Crosses Midnight

Care must be taken when entering a sight series that crosses midnight UTC. In the screen capture above I have entered three sights leading up to midnight. I have entered the time and altitude of the next sight which is 30 seconds past midnight UTC. I have neglected to increment the date using the spin button next to the field

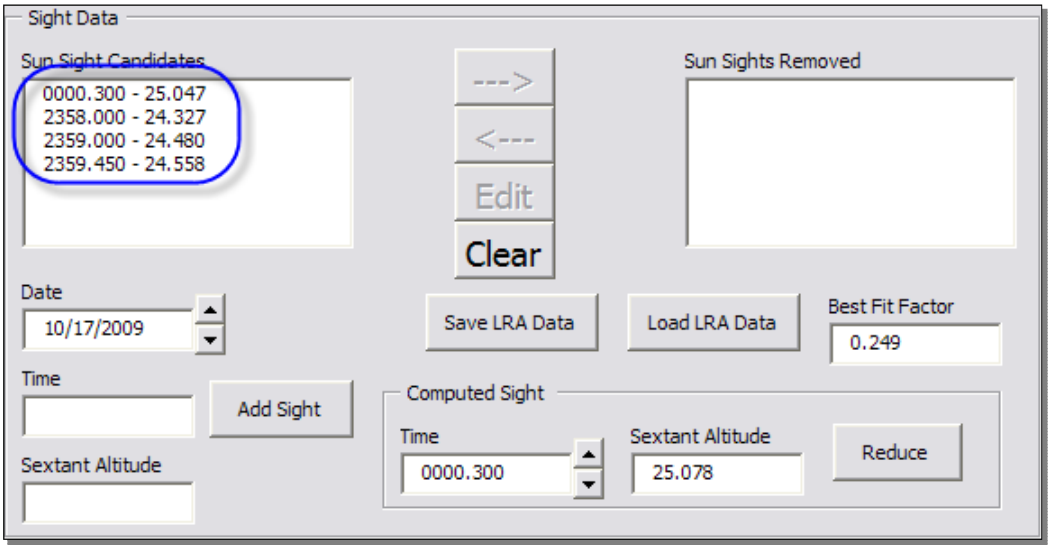


Figure 56: Sight Entered for Previous Date

When I clicked Add Sight the data was entered into the list, but for the wrong date – 10/17 rather than 10/18. The sight data is shown in the Candidates List, but at the top of the list. This list is sorted by time in descending order – earlier times on the top. So the program now thinks this sight was taken nearly 24 hours before the other sights rather than a minute or so after them. This will not produce a valid LRA. Notice the Best Fit Factor is 0.249 – not very close to 1.000.

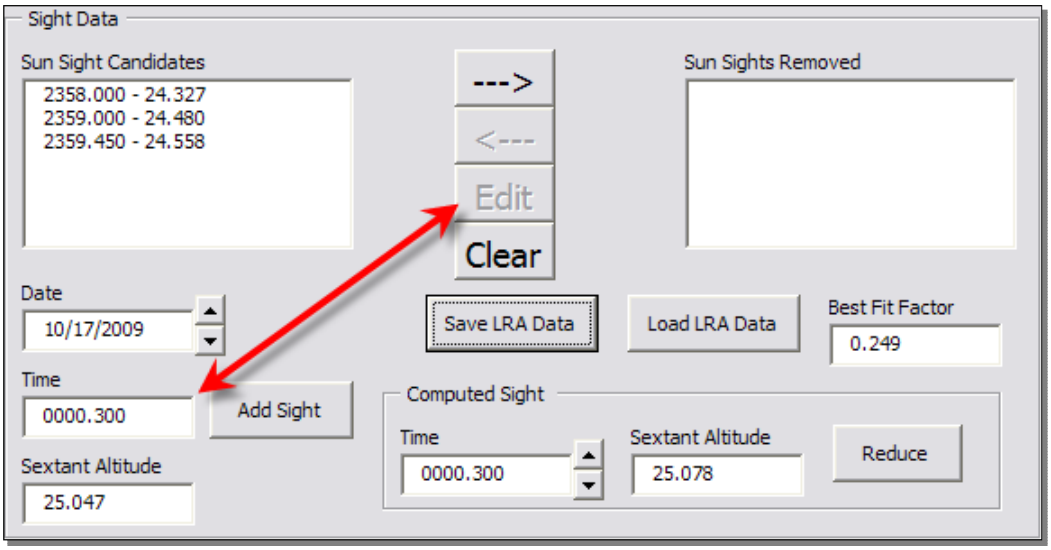


Figure 57: Editing the Sight Data

To fix this I selected the sight in the candidates list then clicked on the Edit button. This removed the sight from the candidate list and put the data in the entry fields (red arrow).

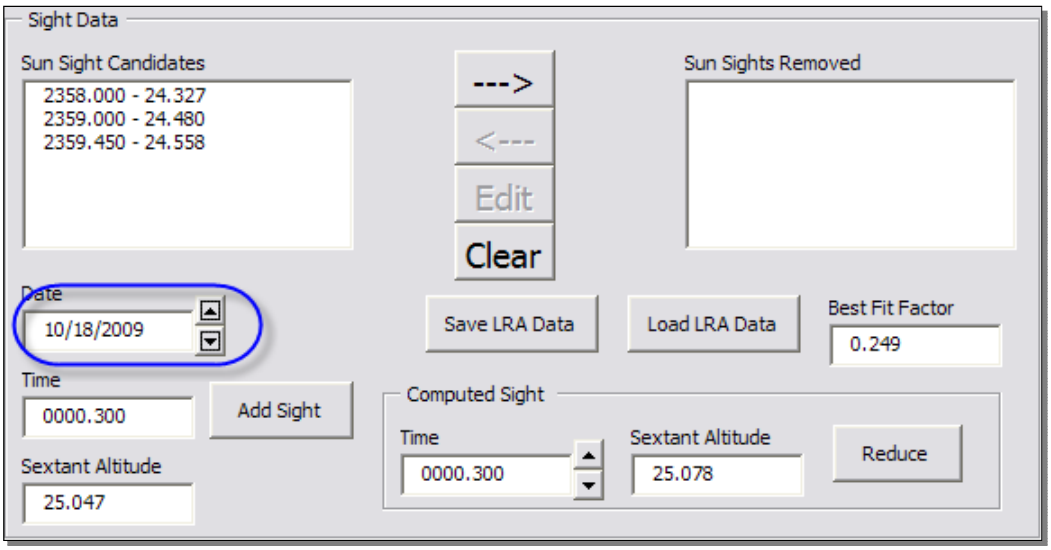


Figure 58: Increment the Date Field

Using the spin button, I then incremented the Date field to 10/18.

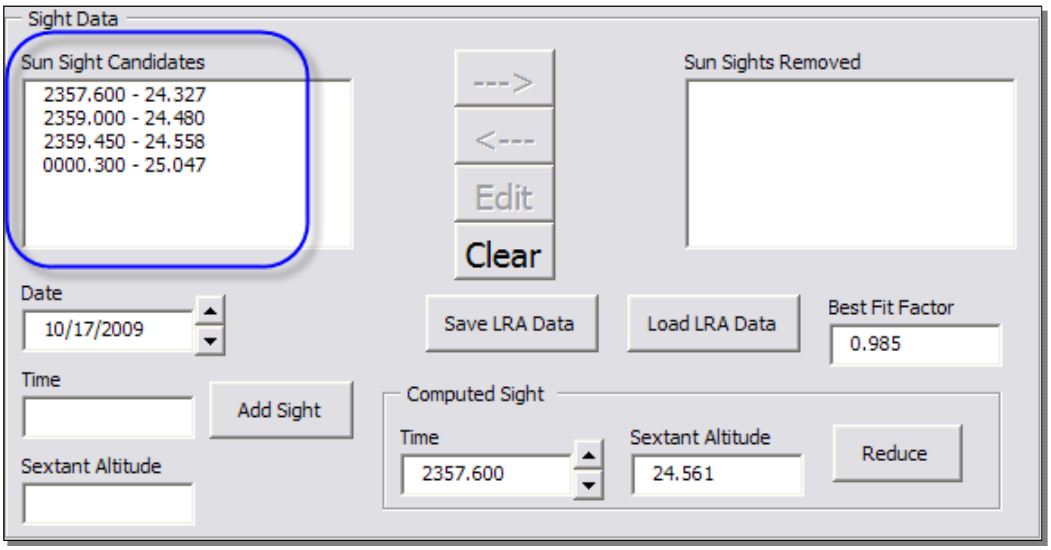


Figure 59: Edited Sight Back in List

Then I clicked on the Add Sight button and the 00:00:30.0 sight is back in the list, but this time properly at the bottom in chronological order. Notice that the Best Fit Factor is now much closer to 1.000

Star Sight Sub-Page

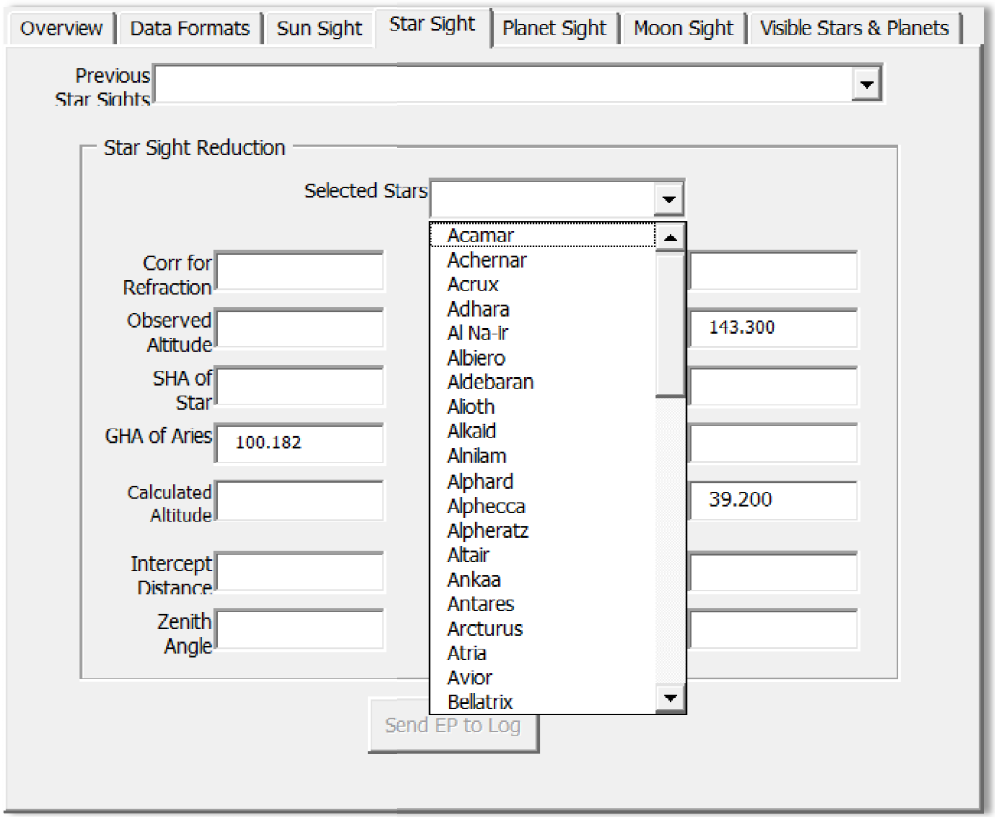


Figure 60: The Star Sight Sub-Page

The Star Sight Sub-Page, shown above, is very similar to the Sun Sight Sub-Page. It has similar Data and Reduction sections. In the Star Sight Data section there is a drop-down list of the stars for which astronomical data has been included in the Off-Shore Navigation Workbook. This includes all of the Selected Stars in the Nautical Almanac. To reduce a Star Sight, select the observed Star from this list.

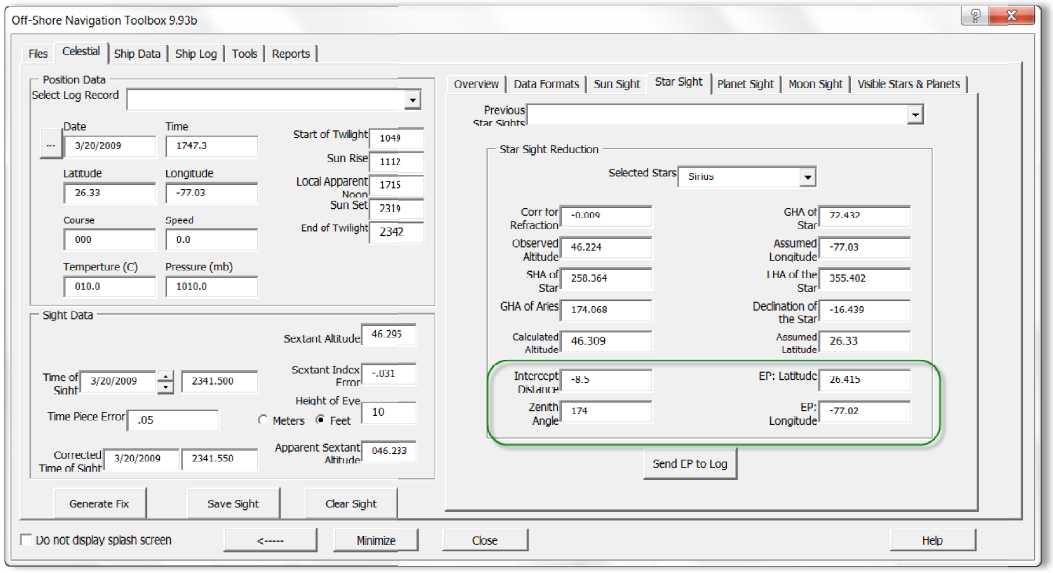


Figure 61: Sirius Star Sight Reduction

I have entered sight data for the Star Sirius. For a Star Sight the only correction to the Apparent Altitude is for refraction. The calculation of the GHA of Sirius requires the calculation of the Sidereal Hour Angle (SHA) of Sirius and the GHA of Aries. From these values the GHA of Sirius is computed.
The results of the Sight Reduction are highlighted by the green ellipse.

Planet Sight Page

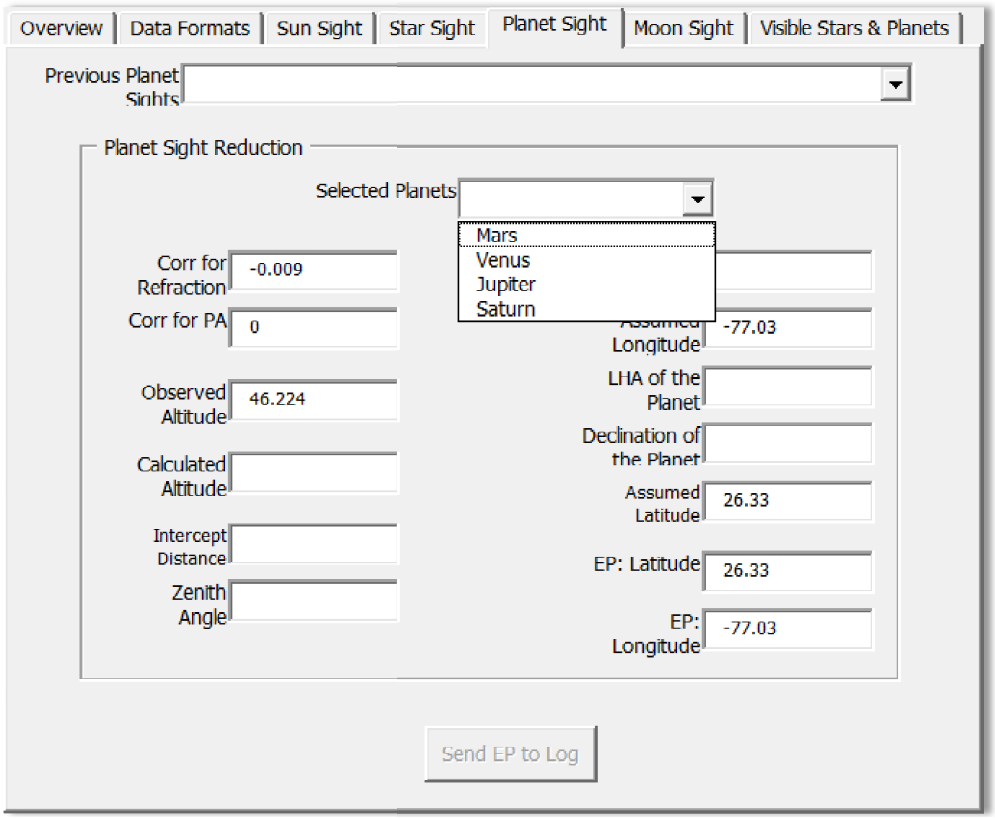


Figure 62: Planet Sight Sub-Page

The Data Section of the Planet Sight sub-page contains a drop-down list of the planets for which the Off-Shore Navigation Workbook can provide sight reductions. At the time this screen capture was taken (version 8.8) this list was limited to Mars, Venus and Jupiter. Saturn was added in version 8.9.

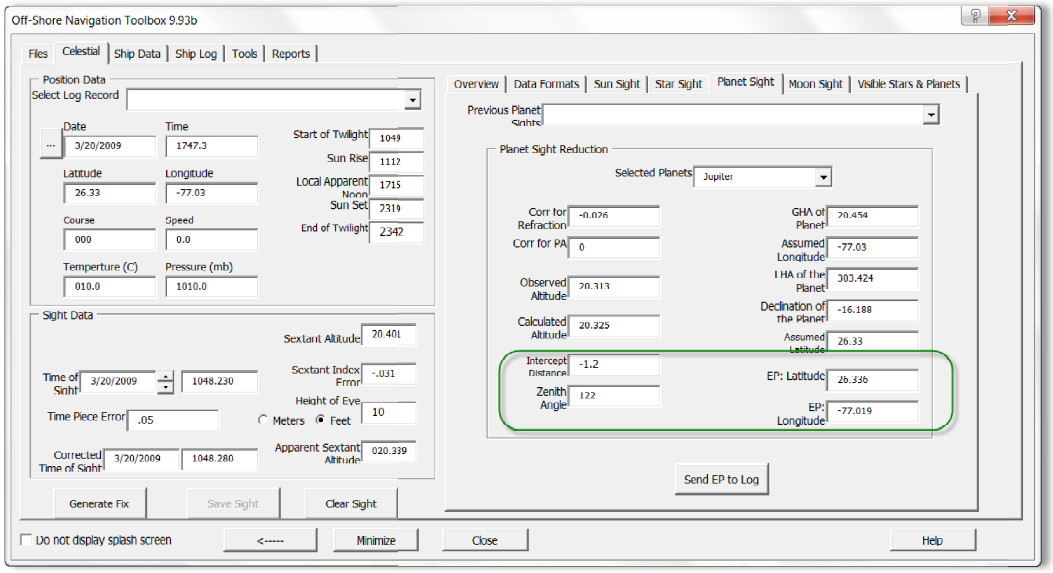


Figure 63: Jupiter Sight Reduction

This screen capture shows the results of a sight reduction for Jupiter.

Moon Sight Page

The Moon Sight Page performs the reduction of Moon Sights. With version 9.4 this reduction does require data from the Nautical Almanac.

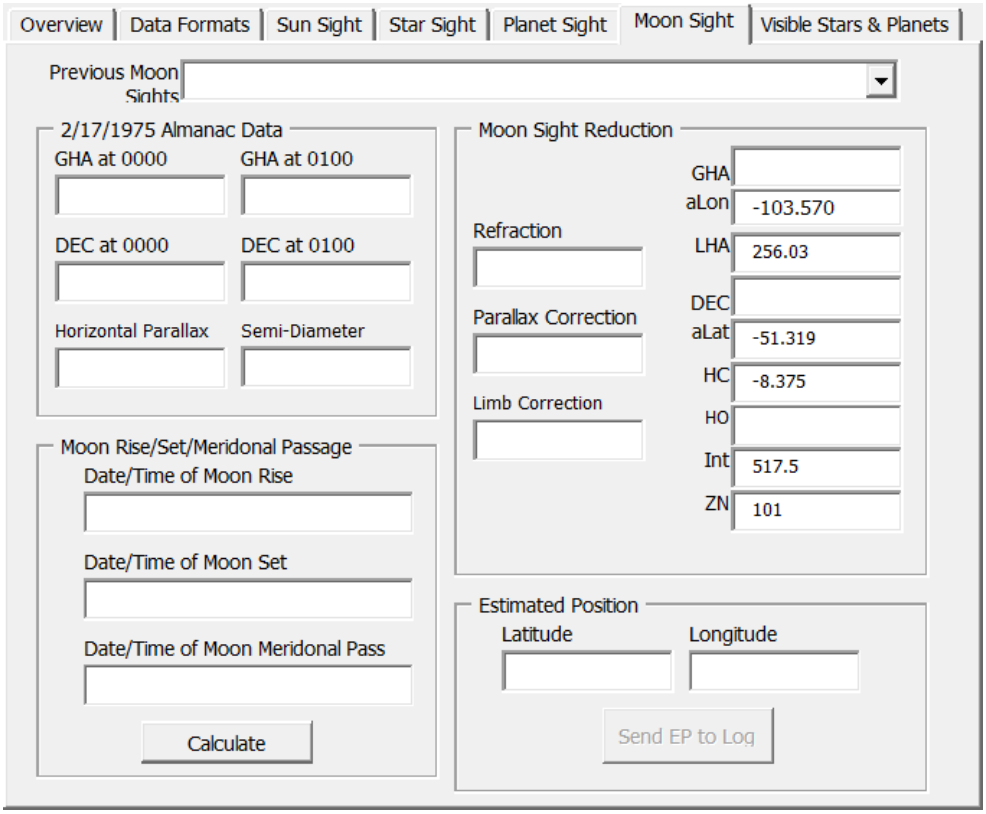


Figure 64, The Moon Sight Page

This page looks a little more cluttered than the other pages because of the need to enter data from the Nautical Almanac. The information is organized differently than on the other sight reduction sub pages.

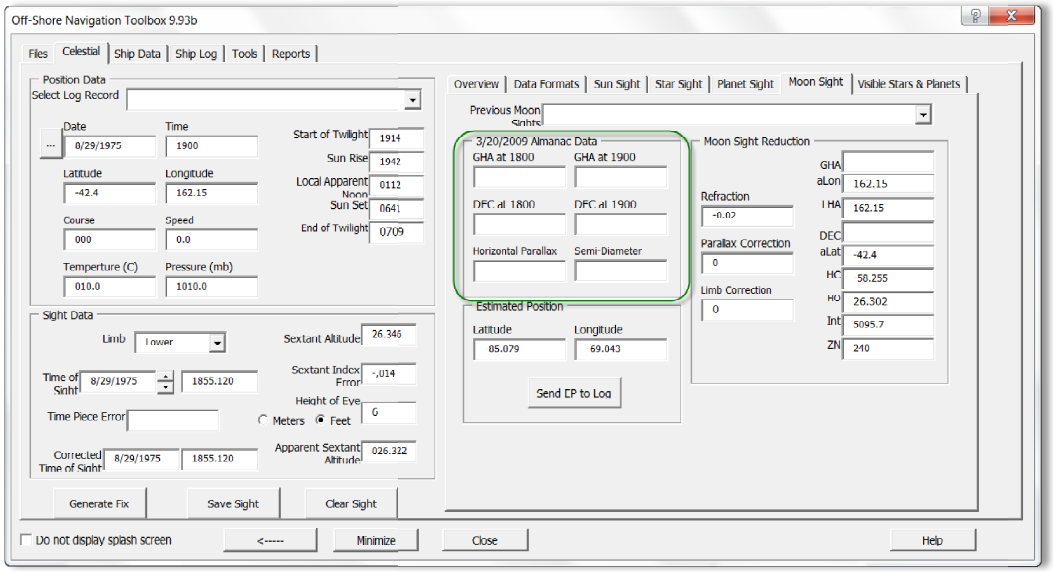


Figure 65, The Almanac Data Section

Entering the sight data is the same as for all of the other sites. Enter the time and any time correction, then the sextant altitude, sextant error and height of eye. At this point for the other sight reductions you would be done and the program would give you the Intercept and Zenith Direction of a Line Of Position (LOP) for the sight.
With the Moon Sight you need to enter 6 items from the Nautical Almanac in the Almanac Section of the page (green outline).

1. The Greenwich Hour Angle (GHA) of the Moon for the hour just prior to the time of the sight (in this case 1800 GMT)
2. The GHA of the Moon for the hour just past the time of the sight (1900 GMT)
3. The Declination (DEC) of the Moon for the hour just prior to the time of the sight.
4. The DEC of the Moon for the hour just past the time of the sight
5. The Moon's Horizontal Parallax value
6. The Moon's Semi-Diameter value.

All this information is available on the daily pages of the NA. There is no need to go to the corrections pages; the program will interpolate the GHA and DEC for the time of the site.

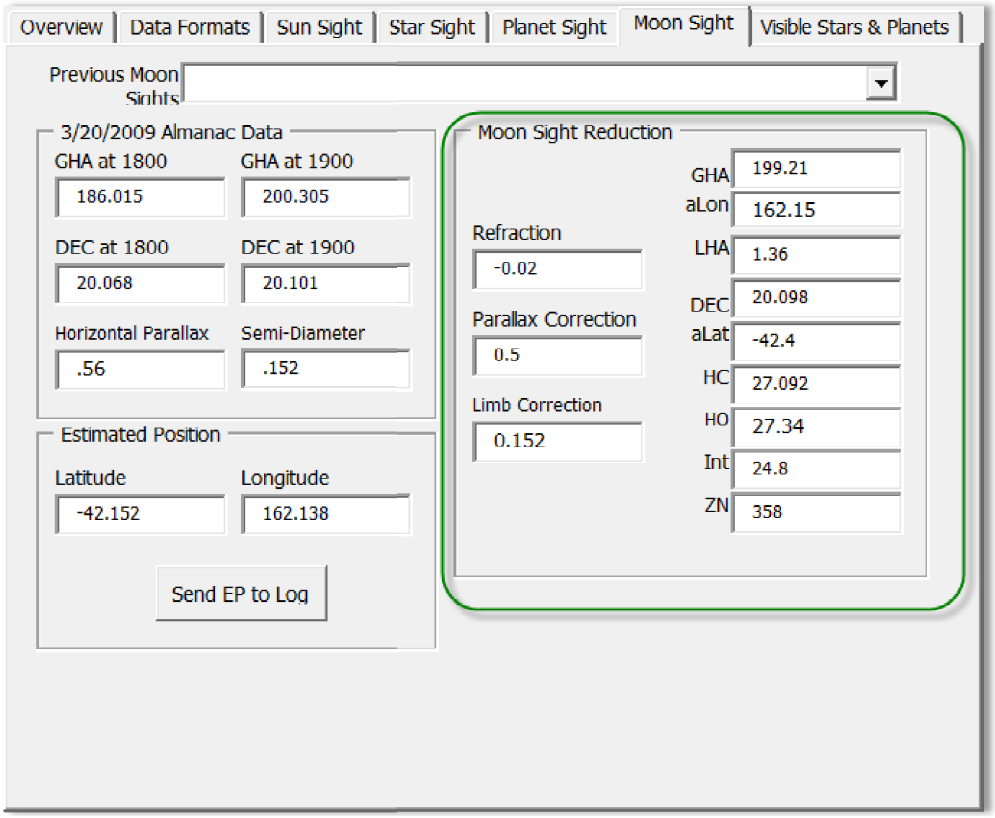


Figure 66, Moon Sight Reduction

In the screen capture above the almanac data has been supplied and the sight has been reduced to provide the Intercept and Zenith Direction as well as an Estimated Position.

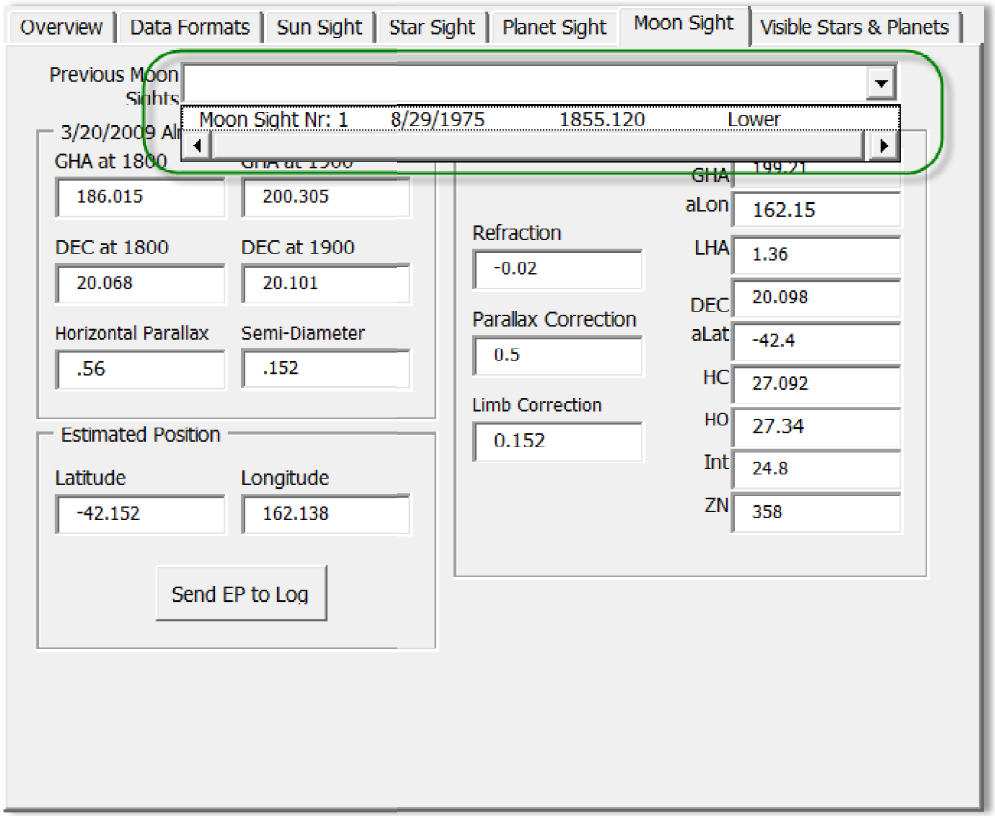


Figure 67, Saved Moon Sight Reductions

You can also save the results of the Moon Sight Reduction to the active SightReduction workbook, and recall the site later from the drop down list.

Moon Rise/Set/Meridian Passage

In addition to providing the reduction of a moon sight, the Moon Sight page also provides (version 9.94 and later) a means to calculate the time of Moon Rise, Moon Set and Moon Meridian Passage for the date, time and Position Data section.

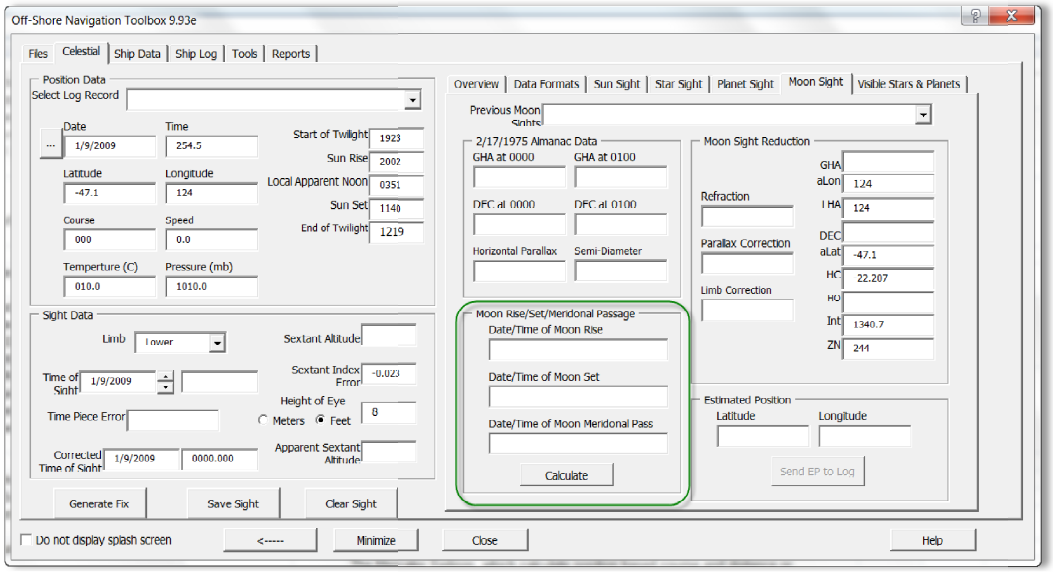


Figure 68, Moon Rise/Set/Merdian Time

The date and time of the rise, set and meridian passage are recorded in the lower left portion of the Moon Sight page. These times are calculated by clicking the Calculate button a the bottom of this section.

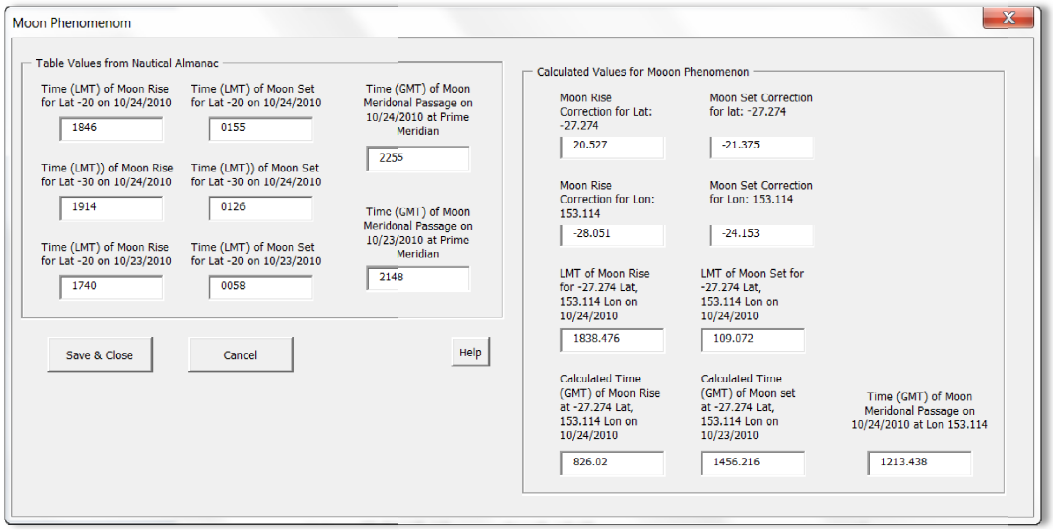


Figure 69, The Moon Phenomenon Form

The Calculate button opens the Moon Phenomenon form. Because the program currently (version 9.95) does not have built-in ephemeris, the calculation of the times of Moon Rise, Moon Set and Moon Meridian Passage depend on values extracted from the Nautical Almanac. This form replicates the calculations and table look-ups required by

the Nautical Almanac. The purpose of this form is to simplify the process and reduce errors.

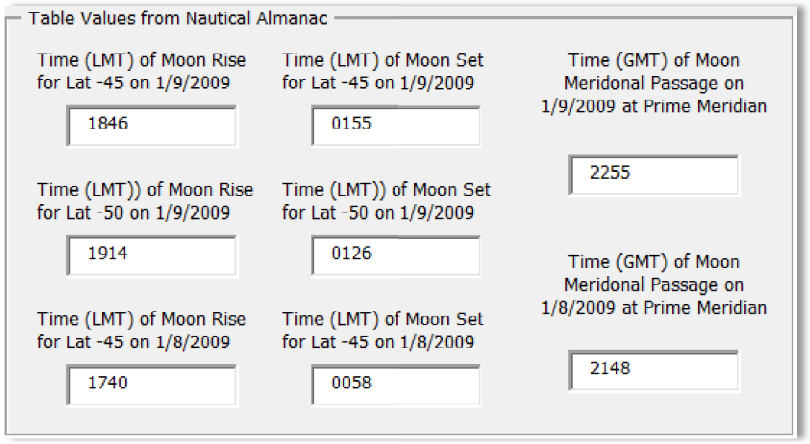


Figure 70, The Table Values From the NA

On the left side of the form is the section for entering the Nautical Almanac data. There are three columns of data to be entered. The leftmost column is for the Moon Rise data from the Nautical Almanac. The center column is for the Moon Set and the rightmost column is for the Meridian Passage.
Three values must be extracted from the Nautical Almanac for the Moon Rise and Moon Set. Two values are required for the Meridian Passage.
The labels above each of the text boxes provide a prompt for the data to be entered. For the Moon Rise and Set the form uses the DR latitude and Dr date to identify from which row and column in the Nautical Almanac daily pages to extract the time of rise or set. In this case the DR latitude is 47.100 S. The label prompts for the time from the Moon Rise table for latitude 45 S on Jan 9. 45 S is the closest value to the DR latitude in the Nautical Almanac table that is less the the DR latitude. In the second row the form prompts for the Moon Rise time for latitude 50 S, which is the next row in the table. The third row prompts for the time of Moon Rise for latitude 45 S for the previous day, Jan 8. The DR longitude is 124 E, if the DR position where west longitude the prompt would be for the following day or Jan 10.
From these three times in the Moon Rise and Moon Set tables in the Nautical Almanac daily pages the form will calculate the date and time of Moon Rise and Set for DR position and date.
The two values required for the calculation of the time of Meridian Passage are the times for the Upper Limb passage for the DR date and the previous day. Again this is because the DR longitude is east. If the longitude were west, the time of passage on the following day (Jan 10) would be required.
The text box labels will identify for which dates the table data should be extracted.

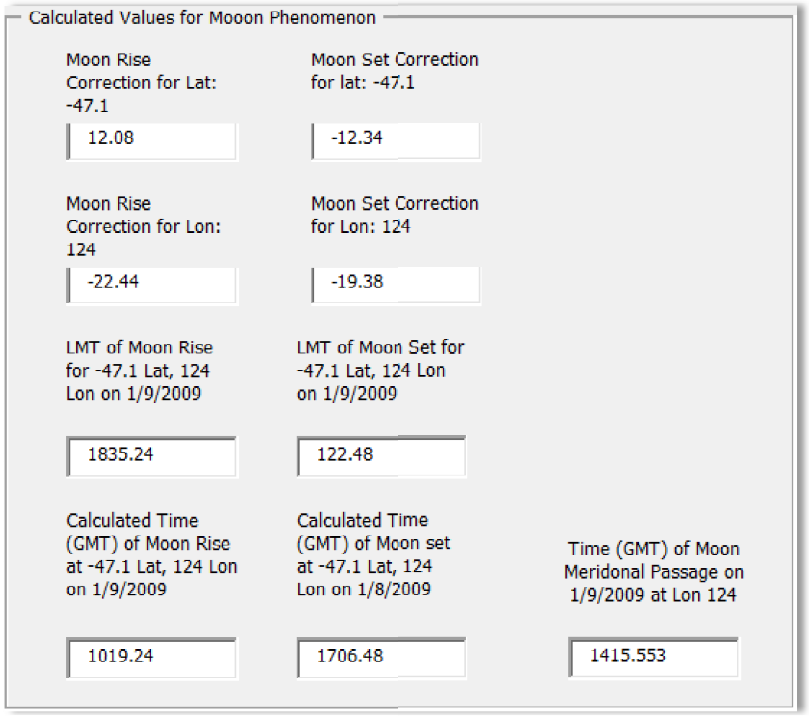


Figure 71, Calculated Moon Rise/Set/Merdian Times

The right section of the form displays the values calculated from the Nautical Almanac data entered on the left. The first two rows of this section display the intermediate corrections to the Moon Rise and Set times. These are displayed only for checking the calculation against manual table look-ups. As soon as I am convinced the calculations have no errors I will remove these columns and reduce the size of the form.
The bottom two rows display the times for Moon Rise/Set/Meridian. For the Moon Rise and Moon Set the first row displays the times in Local Mean Time or LMT. The bottom row displays the times in Greenwich Mean Time or GMT. The label on each of these boxes identifies the date for the time displayed.

If I am not interested in saving these times I can click on the Cancel below the right section of the form and return to Moon Sight page. If I want to keep these times I can click on the Save & Close button to save the GMT times in the Moon Sight page as shown below.

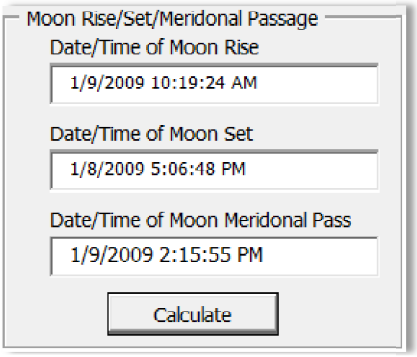


Figure 72, Save Times of Moon Rise, Set and Meridian Passage

It is not necessary to provide the Nautical Almanac data for all of these phenomenon. If all that is wanted is the time of Meridian Passage then only the Nautical Almanac times for that event need be entered in the form.

Multiple LOP Fix Form

The Multiple LOP Fix form can be used to generate a position fix from a series of Lines of Position (LOPs)

.

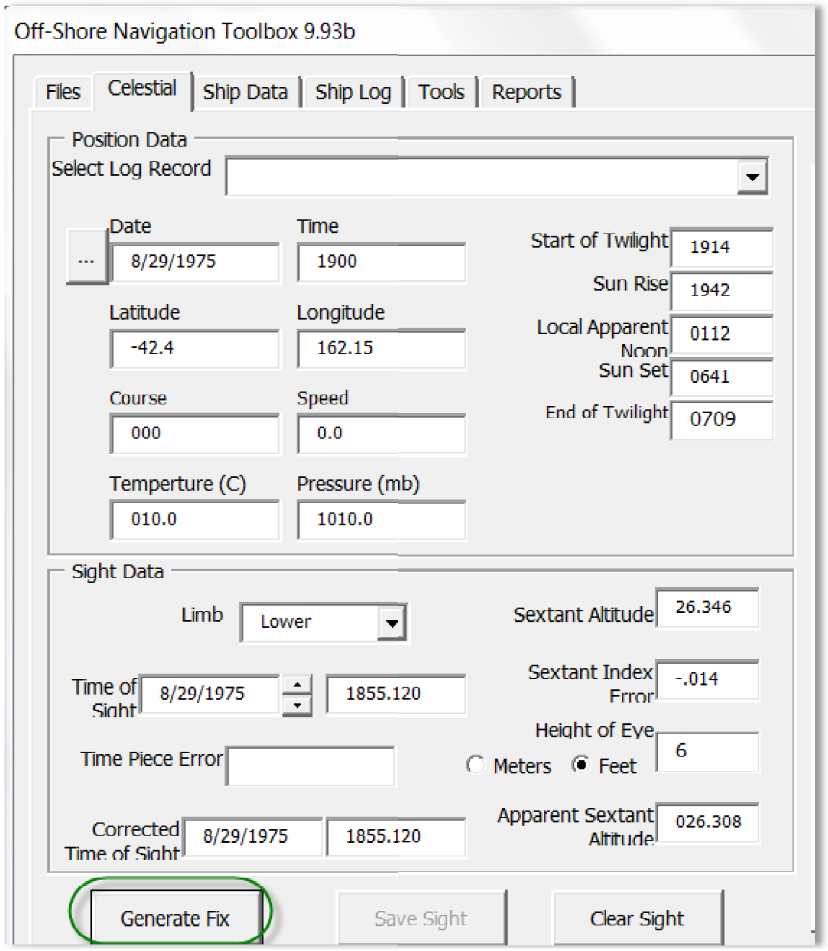


Figure 73, Generate Fix Button

The form is displayed by clicking on the Generate Fix button on the Celestial page.

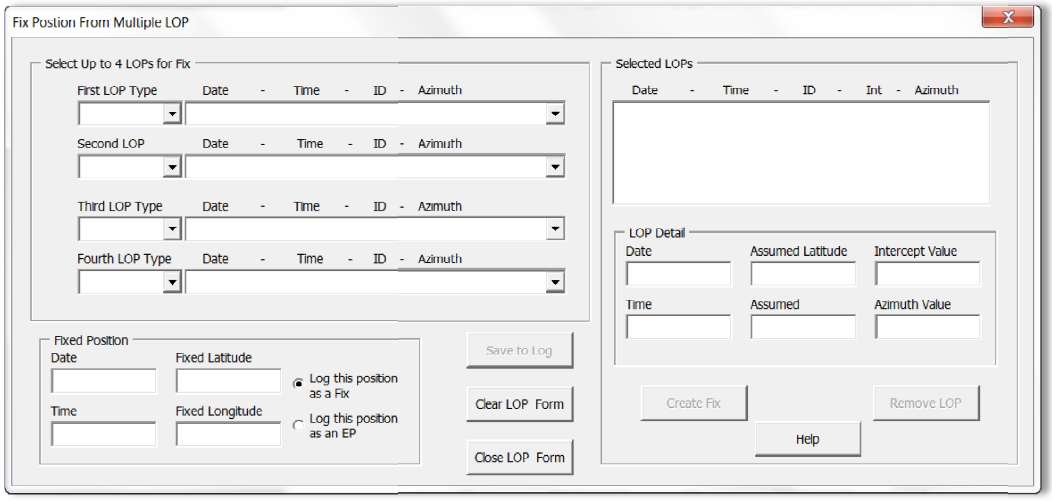


Figure 74, Fix Position from Multiple LOP

This form is shown in the screen capture above. When the form is first opened there are three sections visible.

1. Select Up to 4 LOPs for Fix: In this section the four LOPs that will be used to calculate a position fix are identified. These LOPs are sight reductiions that have been stored in the active SightReduction workbook.
2. Selected LOPs: This section contains the list of the Lines of Position (LOPs) from the sights selected. When one of the LOPs in the list is selected the details of the LOP data is displayed.
3. Fixed Position: This section contains the details of the position fix that resulted from the selected LOPs.

The first step is selecting a sight is to identify the type of sight.

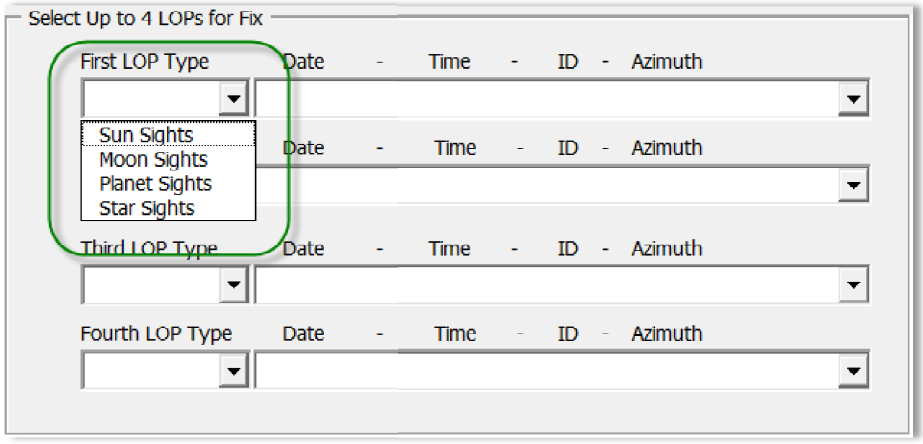


Figure 75, Sight Type List

In the screen capture above, the drop down list “First LOP Type” shows the types of sights that can be used to produce a position fix. Any sight reduction created by this program can be used. When you select the LOP Type the drop down list on the right is populated with all sights of that type in the active SightReduction workbook.

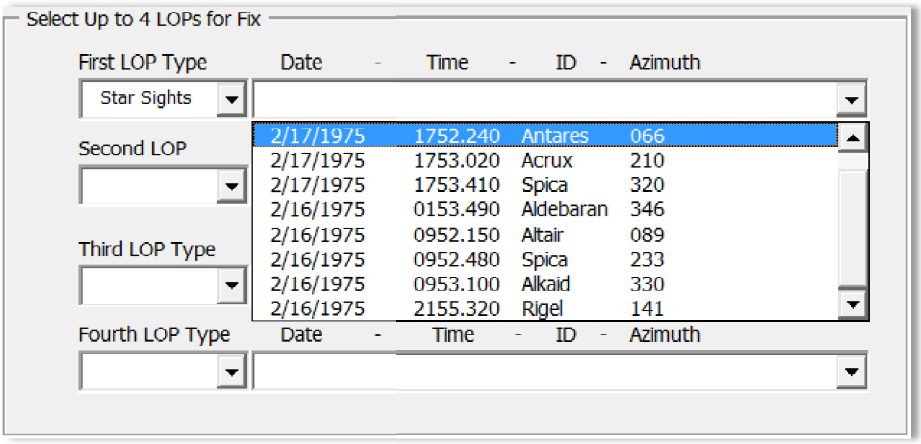


Figure 76, Available Sight Reductions

For the first LOP I have selected Star Sights and the drop down list shows the available star sights. The list shows the date and time and name of each sight and the azimuth angle of the reduction. The azimuth angle is important because you want to select sights which have azimuth angles that are as perpendicular as possible. More importantly you want to avoid sights with azimuth angles that are very close to each other (intersect at an acute angle).

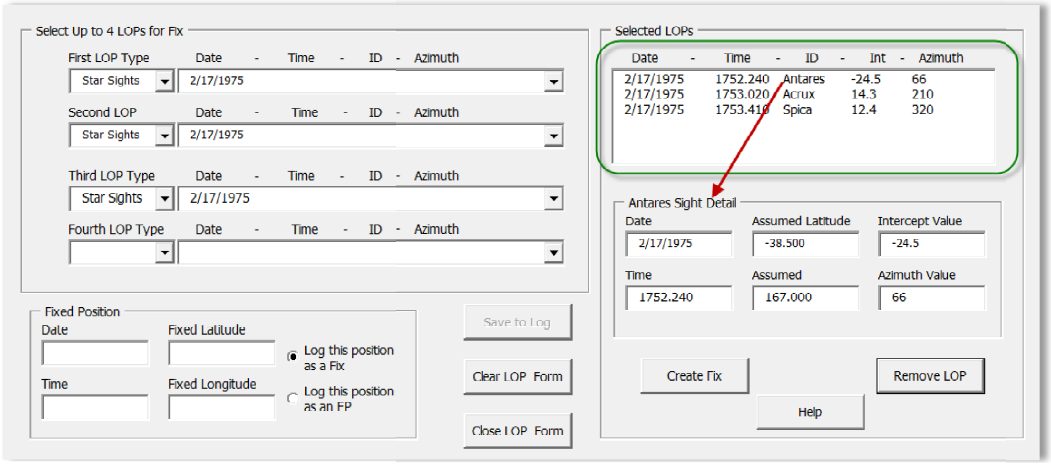


Figure 77, Three Star Sights Selected for the Fix

In the screen above, I have selected three star sights from the drop-down list; Antares, Acrux and Spica. These sights now appear the Selected LOPs list on the right. If I click on any of these sights, the details of the reduction of that sight appear in the section

below the list. You can review the selected sights and confirm they are the ones you want to use to generate a fixed position.

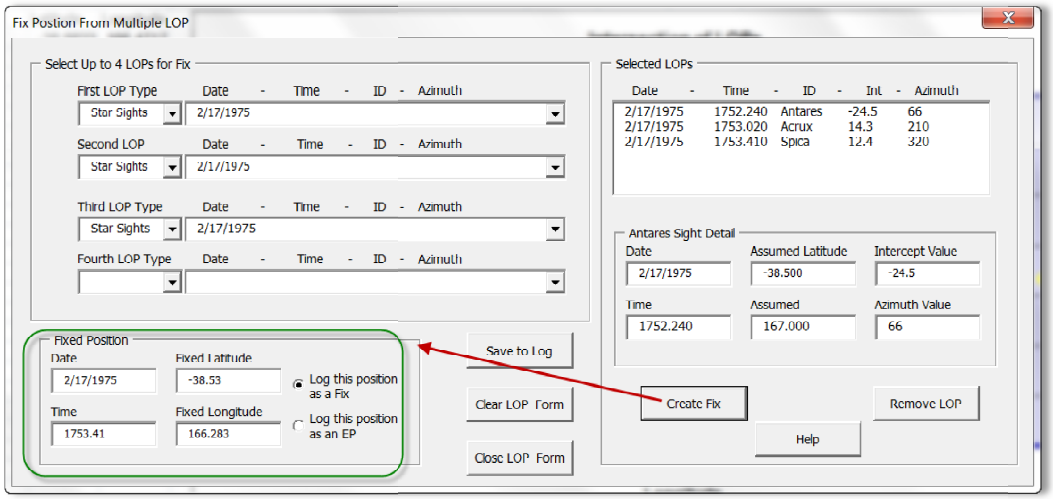


Figure 78, Position Fix Calculated

After confirming the selected star sights are the ones I want to use for the fix, I clicked on the Create Fix button and a Fixed Position is displayed in the section to the left. Now I can save this fix to the Ship Log (by clicking on the Save to Log button), clear the form and start over (Clear LOP Form button), or just cancel this attempt at a fixed position (Close LOP Form). Notice there are two radio buttons ot the right of the fixed position data. If you decide to save this fix to the Ship Log, they specify whether the log record will be a Fix or EP record type.

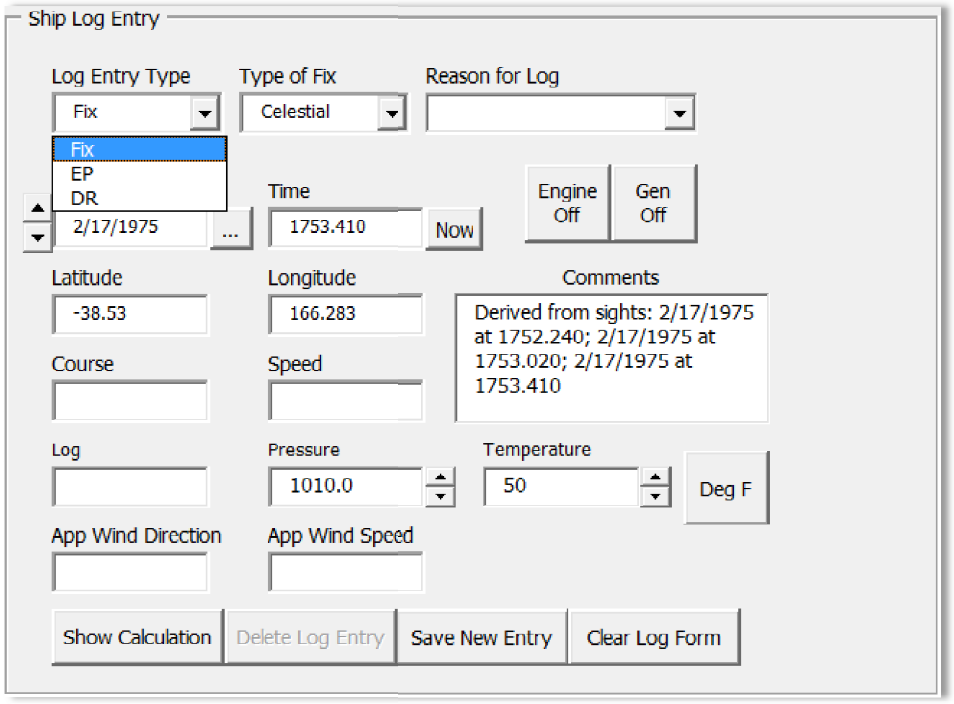


Figure 79, Position ready to be Saves to Ship Log

I decided to save this position to the log as a Fix and clicked the Save to Log button. The Ship Log Entry from now is displayed with the data from the fixed position just created. Notice the Type of Fix has been set to Celestial and the Comments field identifies the sights that were used to create the fix.
This data has not yet been saved to the log. It is set-up for the Navigator to modify the record or abandon it. For example, the Navigator may choose to save the entry as an EP rather than a fix, or he may want to enter course, speed, and Log data to this record.
Refer to the documentation on the Ship Log for more information on the Ship Log record.

Ship Log Page

The Ship Log application is accessed through the “Ship Log” page tab at the top of main form, which is not visible until a ShipLog workbook has been opened or created.

Create a Ship Log Workbook

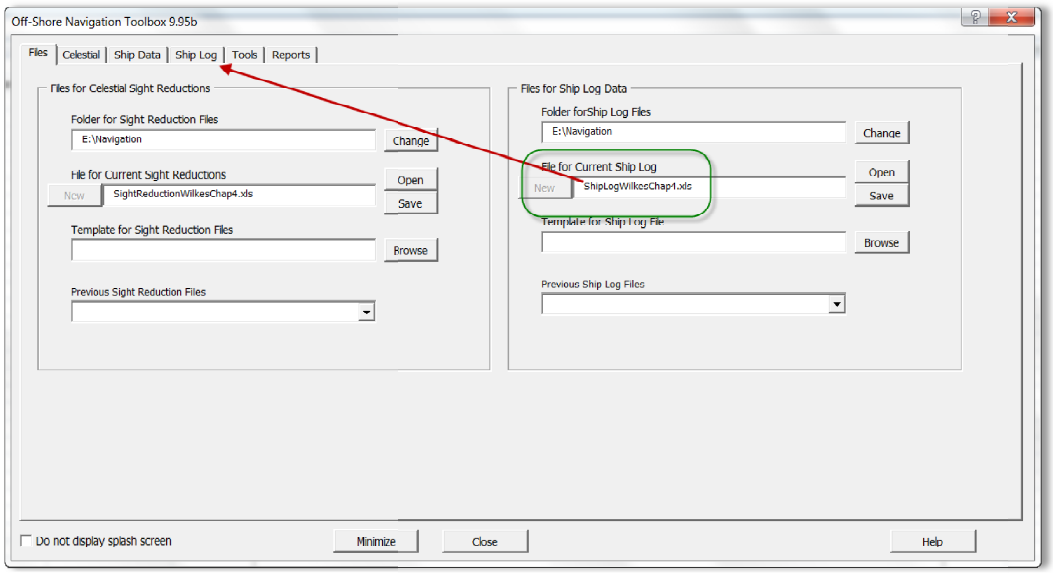


Figure 80, Create Ship Log

In the screen capture above I have used the same procedure to create or open a ShipLog workbook as I used for a SightReduction workbook described earlier in this document. The program also builds a drop down list of all Ship Logs in the active folder. This drop down list can be used to open any of these previously generated workbooks.

In this case I have opened an existing log file that I have been using to test the program.

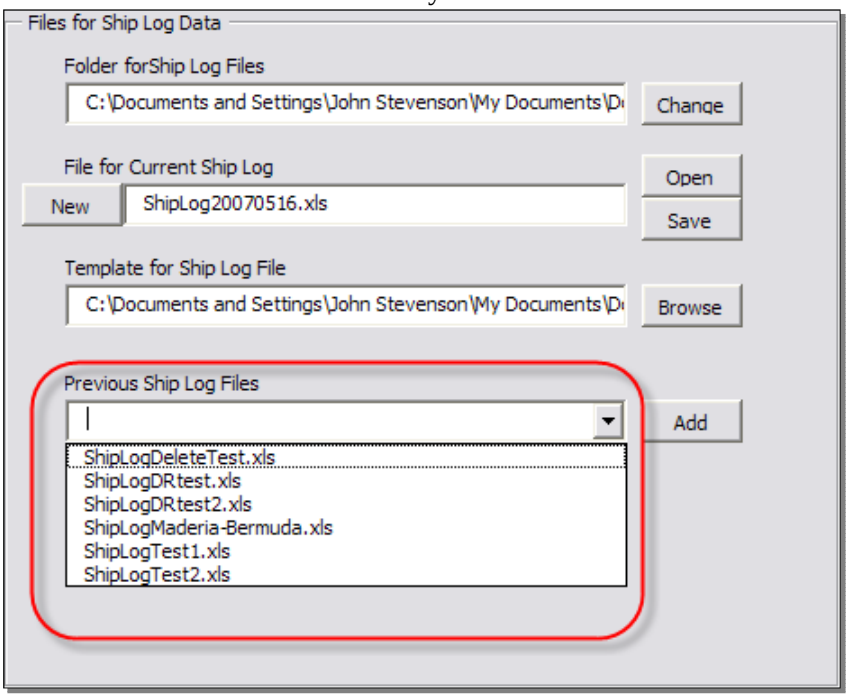


Figure 81, Ship Log Workbook list

This list will include only those ShipLog workbooks in the current folder. If the Ship Log you want to open is in another folder use the "Open" button, above.

Add Vessel and Crew Info

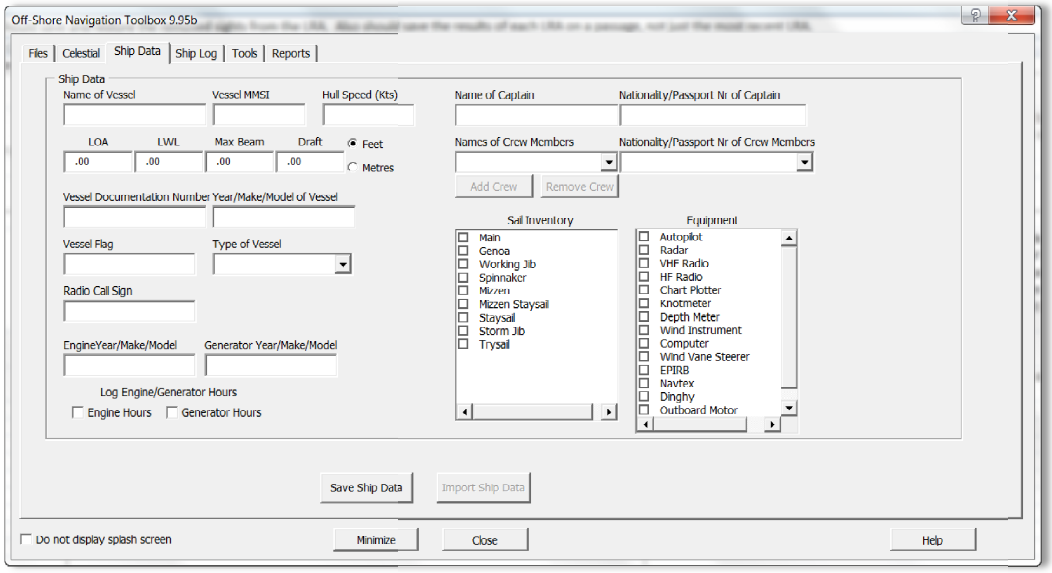


Figure 82, Ship Log and Calculation Forms

When you click on the Ship Data page tab the form shown appears. This form can be used to record information on the vessel and crew. All of this data is optional and is not currently (version 9.95) used in the navigation calculations. In the future some of this data (e.g., LWL and Vessel Type) might be used, but for now it is just documentation.

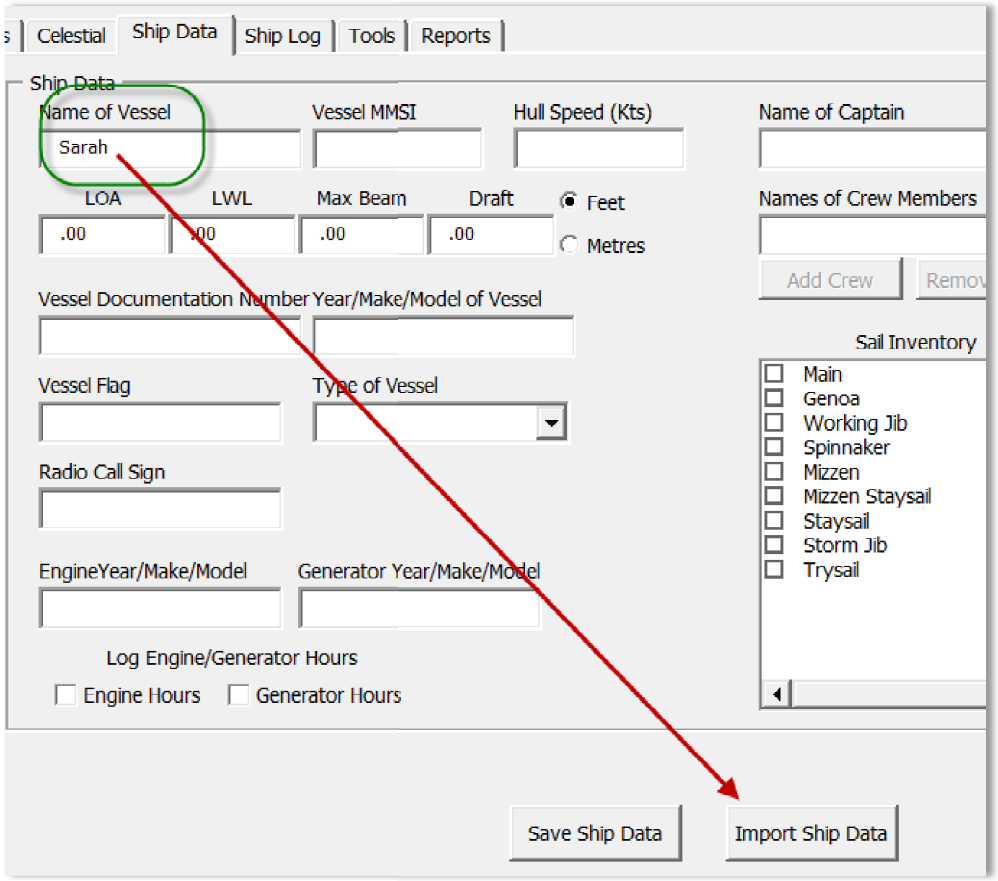


Figure 83, Import Ship Data

Once you have entered the data on your vessel and clicked the Save Ship Data button you can retrieve the data for any future workbook using the Import Ship Data at the bottom of the form. This button is activated when the name of the vessel is entered at the top of the form. This Ship Data is saved to a text file with the name of the vessel (e.g., "Sarah.txt") in the same folder as the ShipLog workbooks. When the Import Ship Data button is clicked the program will look for the file associated with this ship name and , if available, load the data from that file into the form.

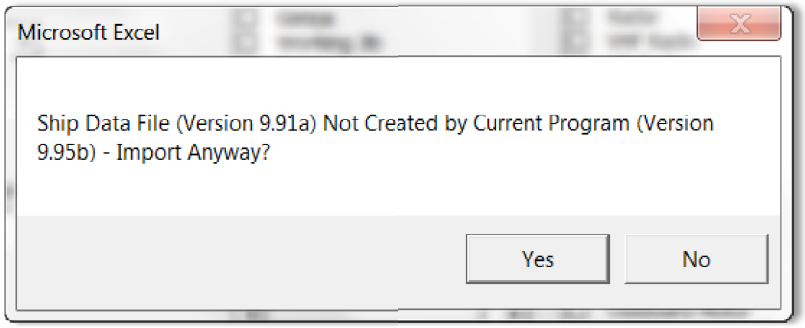


Figure 84, Ship Data from Different Program Version

In this case the data file on Sarah was saved by an earlier version of the program and this warning message is displayed. There is no real harm in importing this data, but it should be checked to insure it is stored in the form correctly.

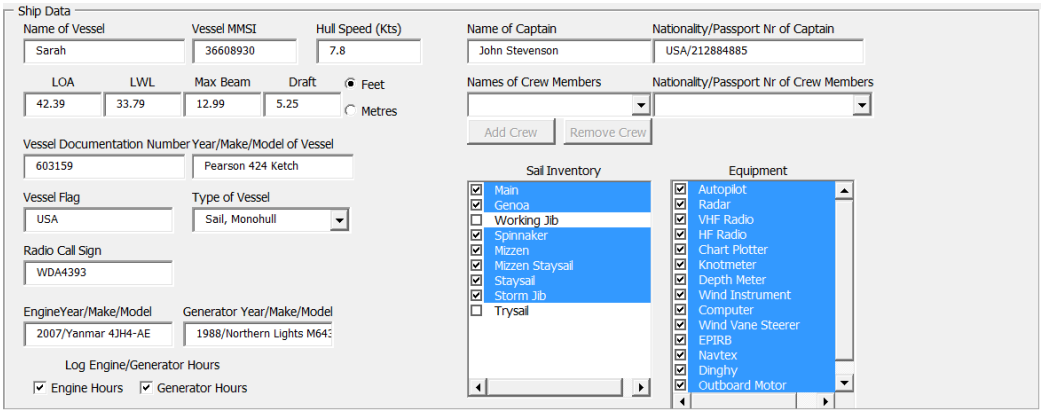


Figure 85, Ship Data Populated

In this case the data looks good, so I will click on the Save Ship Data button to update the file to the current program version.

Entering Ship Log Data

The first data to enter into the Ship Log are the departure and destination for the voyage. This is done in the Voyage Info Section on the right side of the Ship Log form.

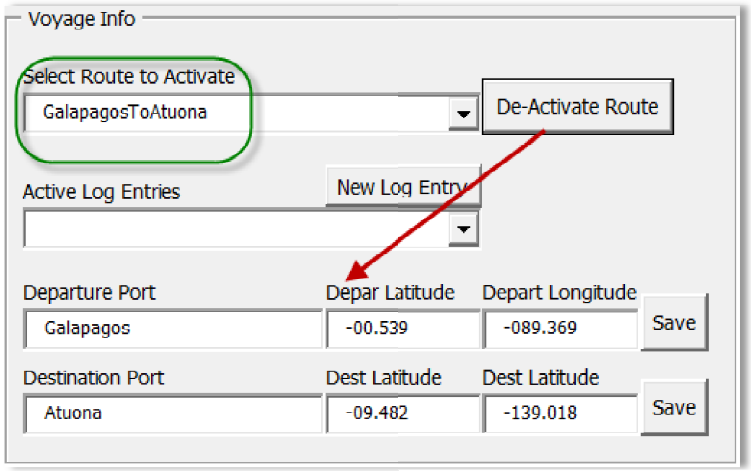


Figure 86, Departure and Destination from a Route

In the case above I have used a previously created route to establish the departure and destination. The creation of routes is described in the Tools Section of this document. Any route in the Ship Log workbook can be selected from the Select Route to Activate drop down list and then click the Activate Route button, which then is changed to the De-Activate Route button. Now the name, latitude and longitude of the departure and destination have been entered into the log.
It is not necessary to use a route to establish the departure and destination. That data can be entered directly into this form and then click the Save button to the right of each position.

The departure and destination are normally entered before the actual start of the voyage. Once the voyage is under way, the initial log entry should be a departure fix, which is normally a known navigation aid (e.g., end of breakwater or sea buoy) that establishes the vessel position at the start of the voyage.

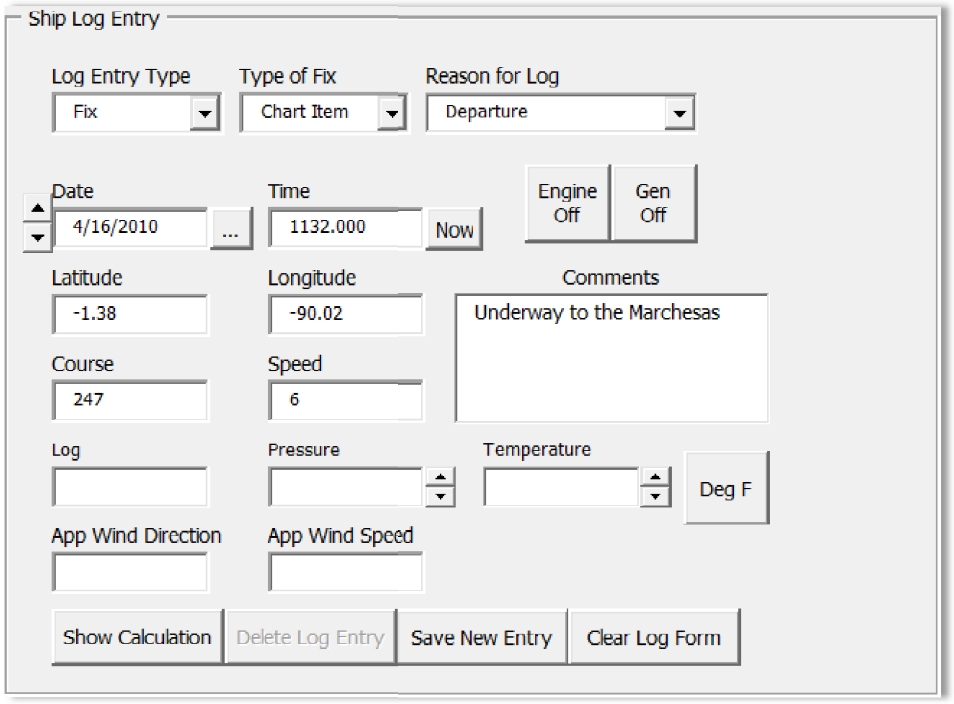


Figure 87, Enter Departure Fix

From the drop-down lists for the "Reason for Log Entery", "Log Entry Type", and "Type of Fix" I have selected, Departure, Fix, Chart Item. These boxes will be discussed more below. Notice in the Ship Data Section I had checked the boxes to Log Engine and Generator Hours. This created two toggle buttons in the Log Entry Section, one each for the engine and generator. When you click on these buttons they will alternate between On and Off states. When the log entry is saved the status of both buttons will be recorded in the log. This will provide the capability to later generate a report on engine and generator usage during the voyage. If you are not interested in recording this usage, unclick the check boxes in the Ship Data section and the buttons will disappear from the Log Entry section.

When I click the Save New Entry button, this departure log entry is saved to the ShipLog workbook. Now the log entry fields in the form display this most recent entry, but the fields are locked. In order to add another entry to the log, I must first specify the type log entry I want to create.

Log Entry Type

There are three drop down lists in the upper portion of the Ship Log Entry section that are used to classify the log entry and define how it is to be used by the program.

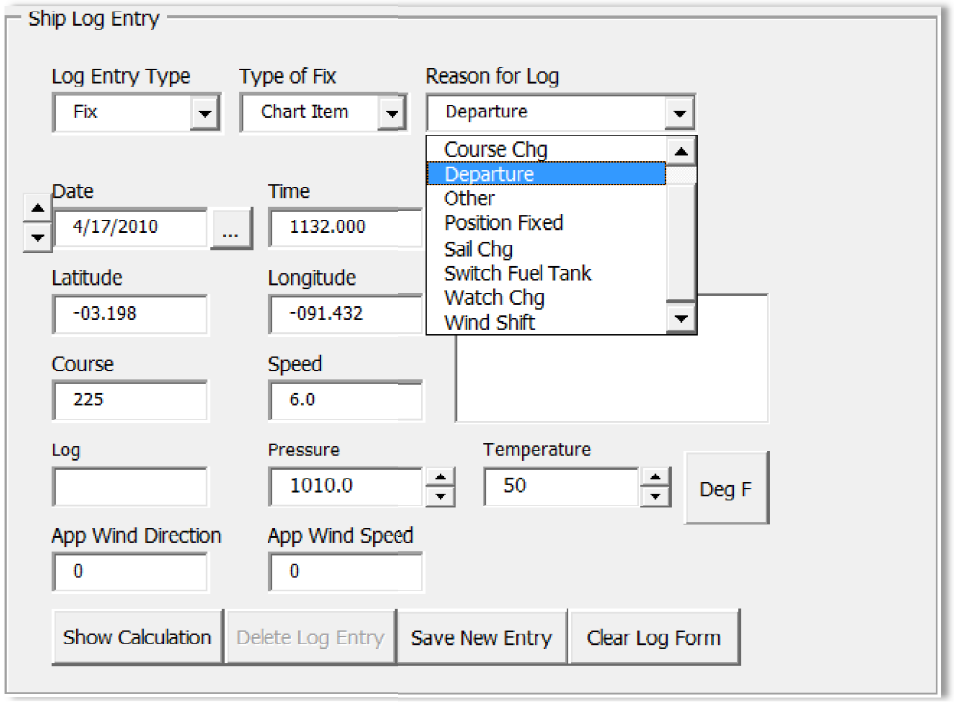


Figure 88, Log Entry Reason

The least important of the selections is the reason for the Log Entry. Currently this selection is not used by the program, but it might in the future be used to generate reports on watches and sail changes. For now it is useful to identify your departure and arrival logs. The rest can be recorded as Other or left blank.

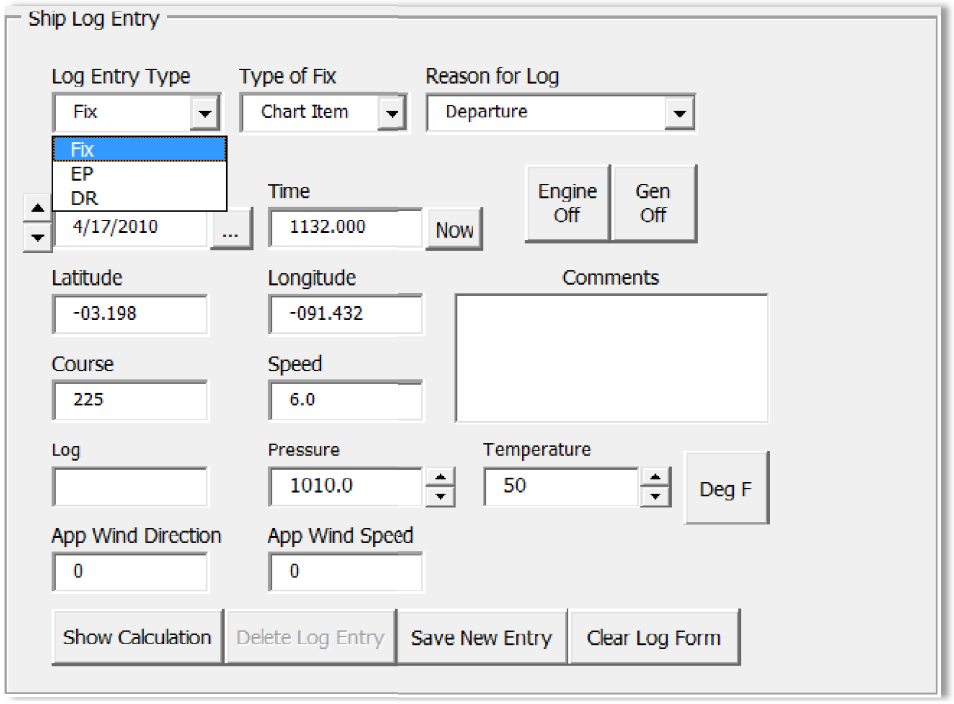


Figure 89, Log Entry Type

The Log Entry Type is the most important of the classifications. This is used to identify that the log is a Fix or a DR record or an Estimated Position (EP). The log entry form is locked until the type of entry is specified from the drop down list. If the log entry is identified as a Fix the application will use this entry as the basis for calculating the Ship Position until another fix is entered into the log. Currently the program does not differentiate between a DR entry and a EP entry. A DR entry does not include any position data, just course and speed and/or cumulative distance from a knotmeter log. The program will calculate a DR position from that data. An EP entry usually would include an estimated position. The program will calculate a position for the same time based on the previous DR and Fix information in the Log. The Navigator can then compare the positions and using his/her judgment, re-classify this entry as a Fix.

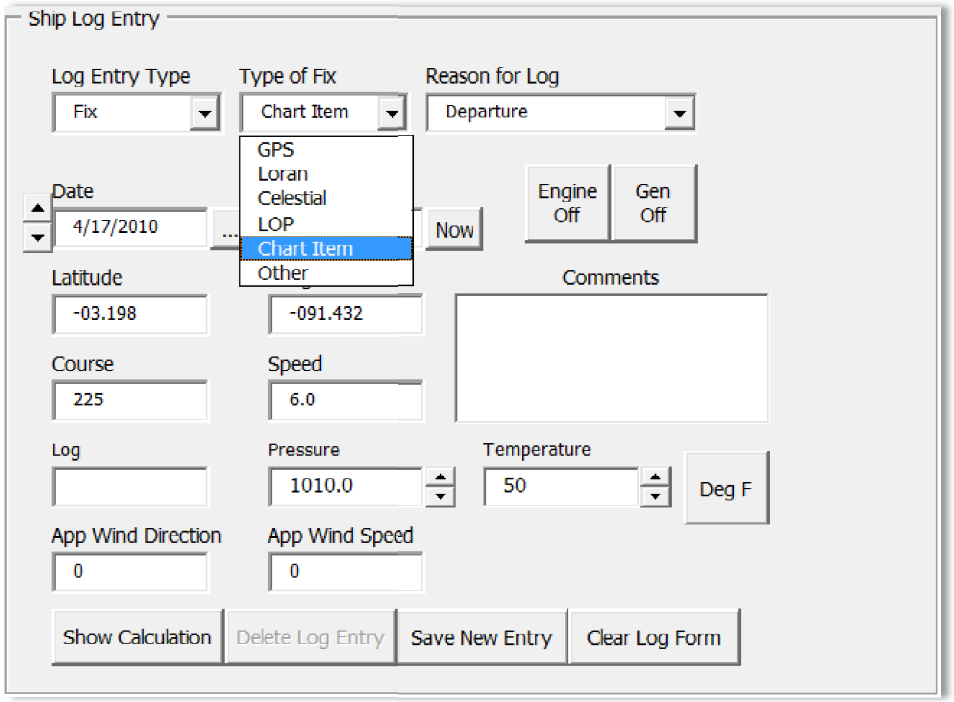


Figure 90, Type of Fix

The Type of Fix selection is also only for documentation purposes. The program does not currently use this information. It just records the selection in the log. This drop down list is only available when the log entry has been designated as a Fix.

Now back to the Log Entry process.

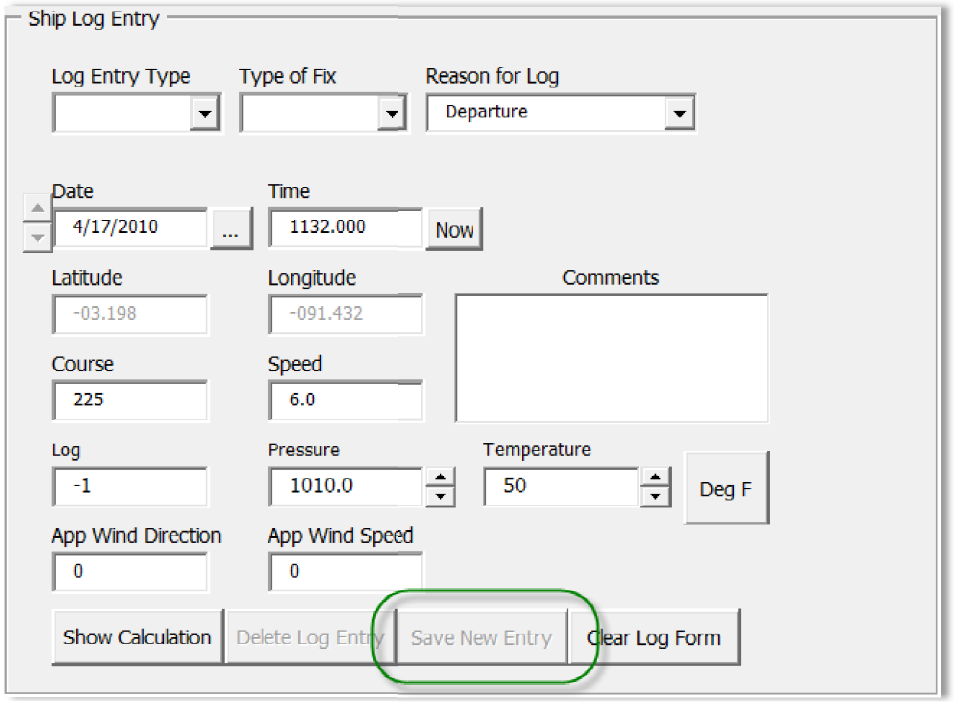


Figure 91, Log Entry Saved

In the screen capture above I have clicked on the "Save New Entry" button (now grayed-out as the data has been saved) and the entry has been recorded in the log. When not used to create a log entry or edit and existing one, the Ship Log Entry section displays the last entry in the log. These fields are set up to be edited for the next log entry (however, locked until the Log Entry Type is selected) so that data that does not change on every entry (e.g., Date of entry, etc.) do not have to be retyped or re-selected. Once you change any fields in the Ship Log Entry frame the "Save New Entry" button will become active. If you click on this button then you will have created a new log entry. If you want to edit a pervious log entry select it from the "Active Log Entries" drop down list at the top of the section as shown below.

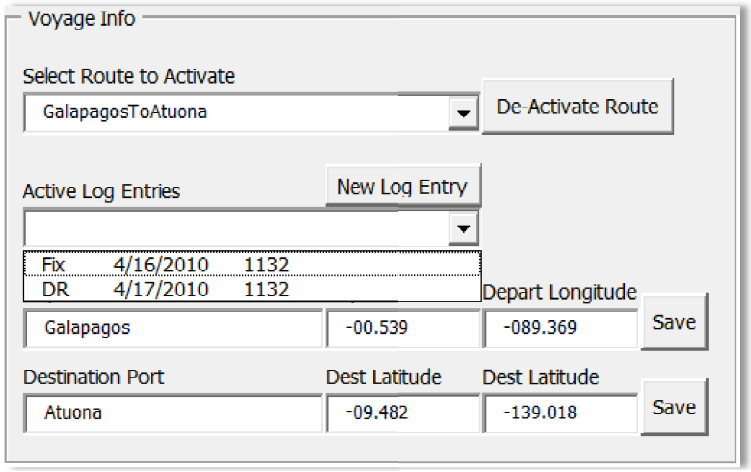


Figure 92, Active Log Entries List

The active log entry list shows the departure Fix and the first DR entry of the voyage.

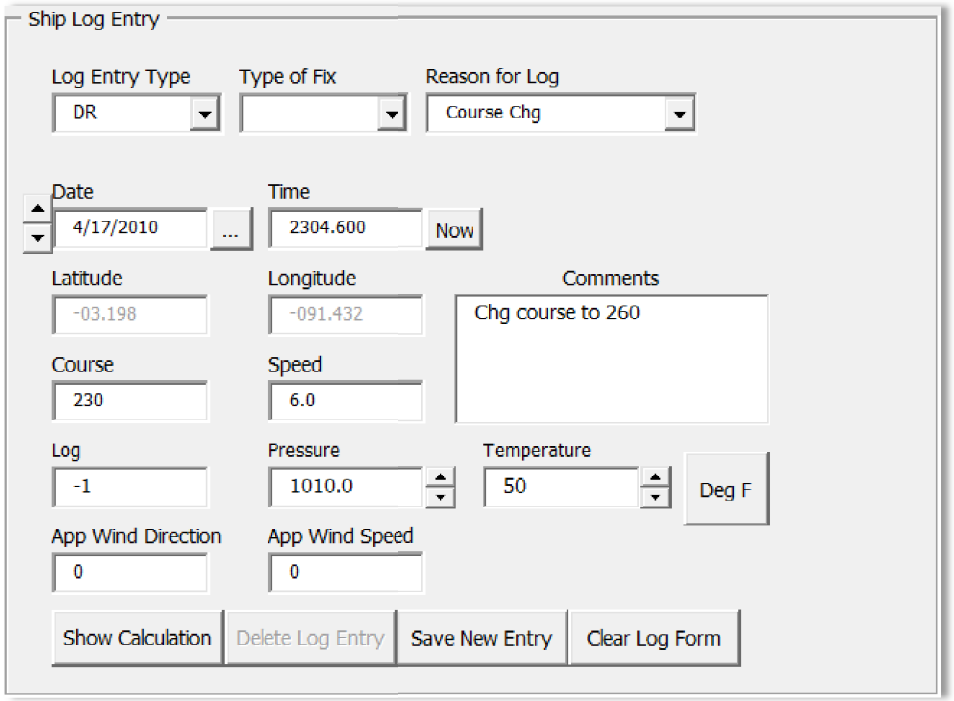


Figure 93, Enter a DR Record

In the screen above a DR log entry for a course change has been entered. Notice the Latitude and Longitude boxes are grayed-out. The program will calculate the DR position based on the course and speed (not using a knot meter log for this voyage) since the previous entry.

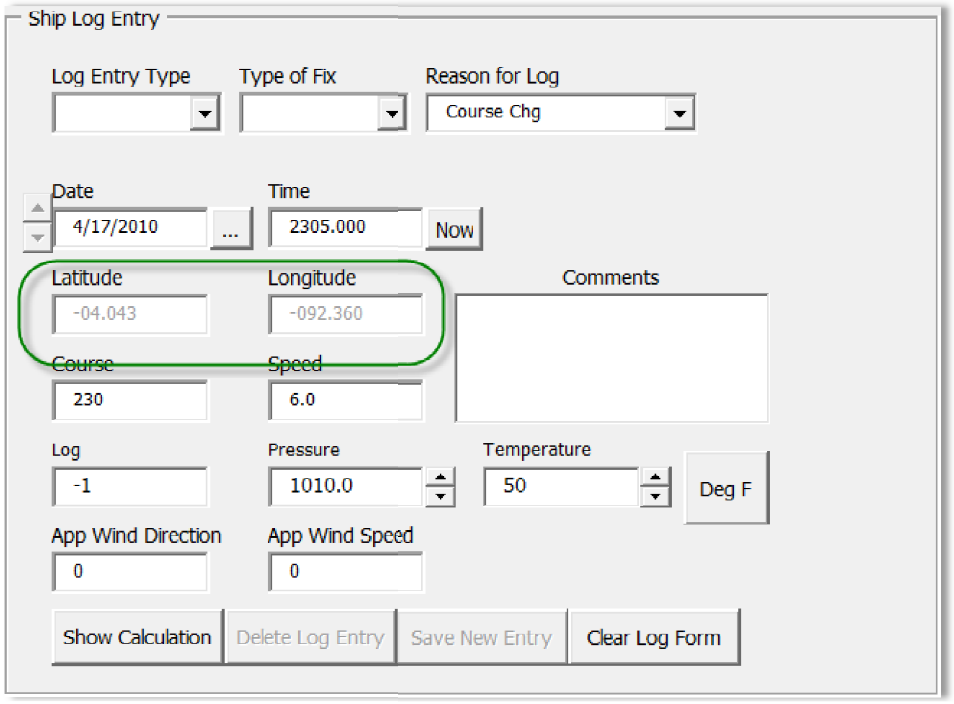


Figure 94, DR Entered Into Log

In the screen above the DR has been entered into the log and the displays shows the calculated position

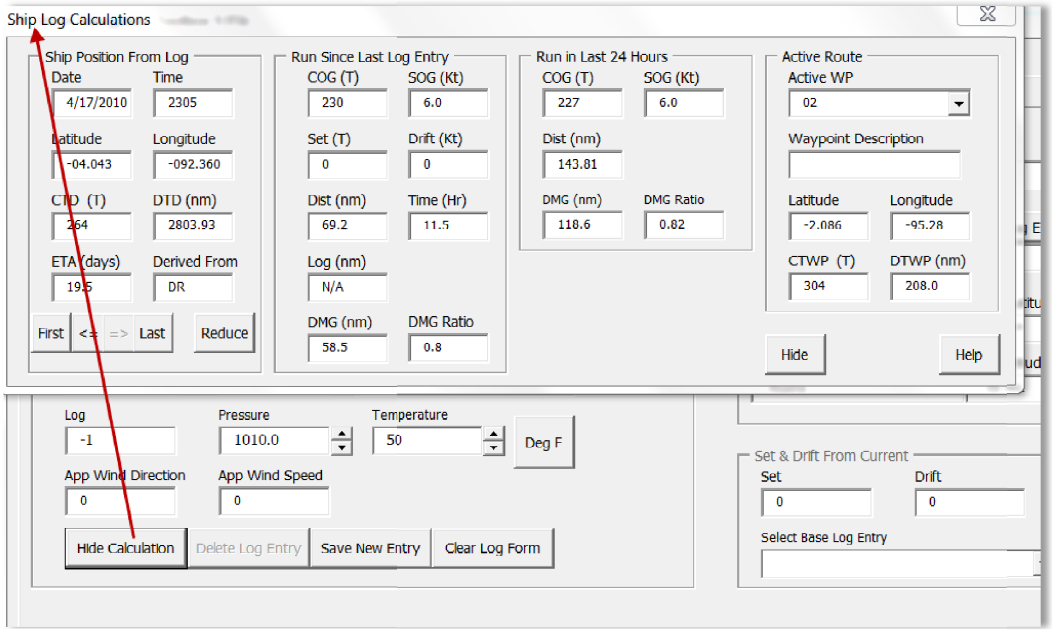


Figure 95, Calculation Form

When the Show Calculation button is clicked the Ship Log Calculations form is display. Now the button is changed to Hide Calculation. Let's take a closer look at the Calculation Form.

Log Data Calculations

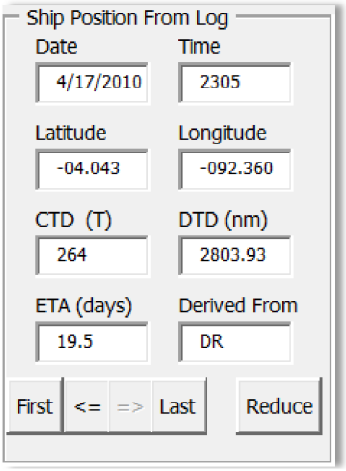


Figure 96, Position from Log

The Ship Log Calculations form has four sections; on the left is the Ship Position From Log section. The program has calculated the ship's position from the current DR log entry at 2305 hours. The source of the position is shown as a DR entry, which means the position has been calculated from the course and speed data entered in this record and is extrapolated from the previous record, which in this case is another DR entry. This section also displays the Course to Destination (CTD) , Distance to Destination (DTD – we've go a long way to go) and Estimated Time of Arrival (ETA) at the destination.

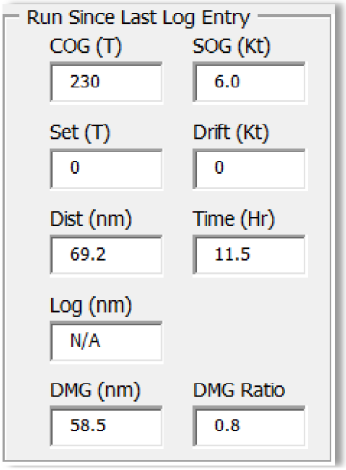


Figure 97, Run Since Last Log Record

The second section from the left of the form shows data calculated for the run since the previous log entry. The Course Over Ground (COG) and Speed Over Ground (SOG) are pretty much the same as the values entered in the DR record, which should be expected as the course and speed values in DR records are treated as if they were COG and SOG. If a current Set and Drift had been entered in the DR record those values would be displayed in the second line of this section, and used in the calculation of the position. On the third line are the distance run and time since the previous Log Entry. This shows that the vessel traveled 69.5 nm since the last record in a 11.5 hours. The form will also displays a Log value if one has been entered. In this case the log is not available. Most vessels have a log recording instrument (e.g., knot meter or GPS) and you may want to record those values in the log. If a log value is entered in a DR entry, and the previous log entry also has a log value, the difference between the two log values will be used as the distance run and the DR position will be calculated from that value, rather than the estimated vessel speed entered in the same record. In general a log value recorded by a knot meter is more reliable than an average speed estimated by the person on watch. So the log value takes precedence over the speed value entered in a DR record.

The Distance Made Good (DMG) and DMG Ratio values have also been calculated. In this case we are 58.5 nm closer to the next waypoint on the route we are following, which provides a DMG ratio of 0.8. A DMG ratio of 1.0 would means we are heading directly for our destination.

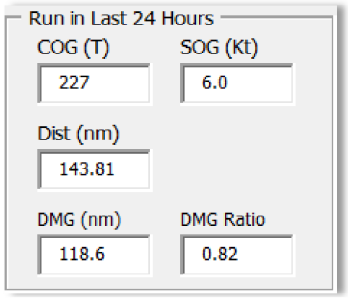


Figure 98, 24 Hour Run

Since the vessel has been underway for more than 24 hours, the Run in Last 24 Hours section displays the distance covered in the last 24 hours.

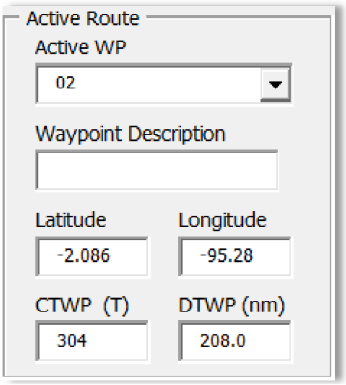


Figure 99, Active Route Section

On the right side of the Calculation form is the Active Route Section. This displays the next waypoint on the route and the course (CTWP) and distance (DTWP) to that waypoint.

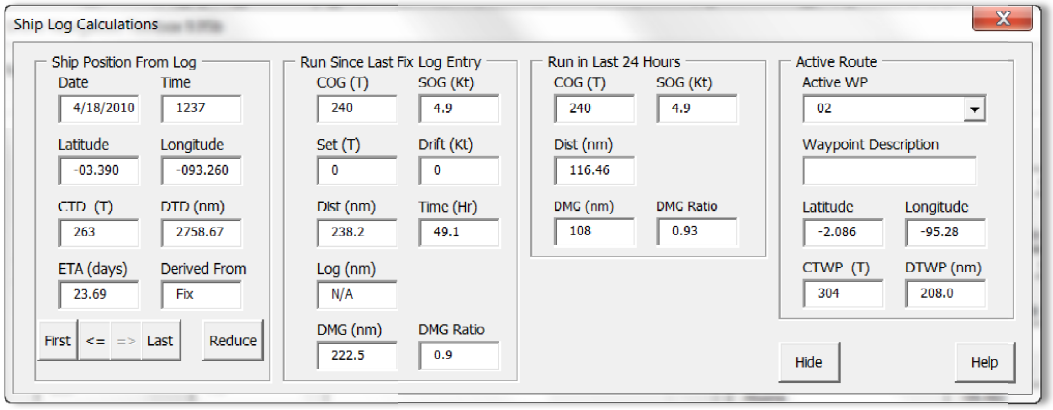


Figure 100, Position Fixed

The following day the navigator was able to obtain a position fix and recorded it in the log as shown in the Calculation form above. Now the second section from the left shows the Run Since Last Fix Log Entry, which was the departure fix. It appears the watches were not doing a good job of estimating the average course and speed for the last 24 hours as the Fix shows the vessel has been averaging less than 5 kts, not the 6 kts recorded in the DR entries.
For more information on the relationship between the various entries in the log go to the How the Ship Log Works section below.

Editing Log Records

One of the values of the Log Calculation form is that it can help identify errors in the Log Entries. I normally maintain a paper log at the navigation desk that I and the other watches fill in as required. Once or twice a day I enter the paper log entries into the program. With each entry I check the calculated values to see if anything is amiss. Sometimes a watch member recorded a value incorrectly or I could have miss-typed it into the program. At any time I can go back and correct any of the records in the log using the "Active Log Entries" drop down list.

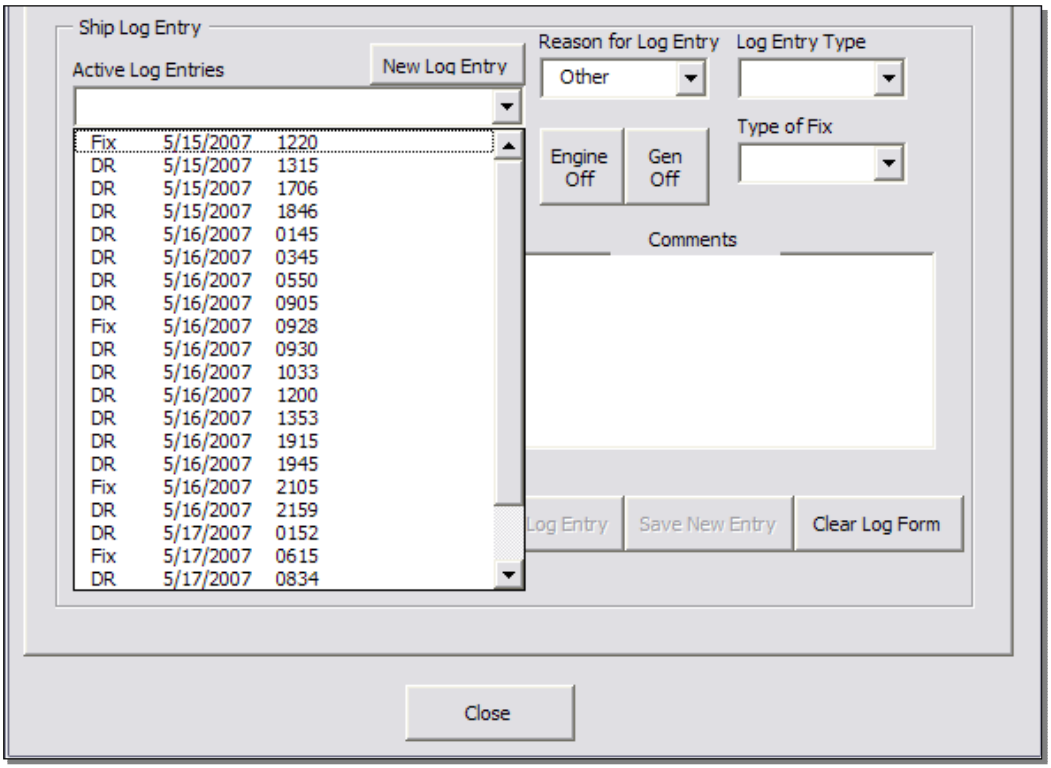


Figure 101, Active Log Entries

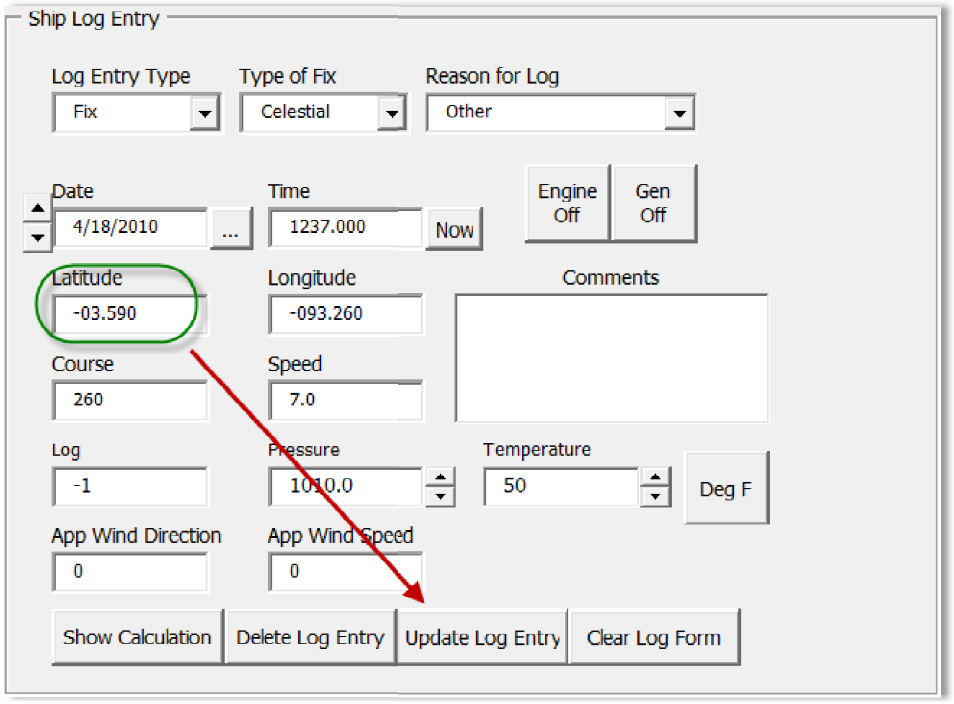


Figure 102, Updating an Existing Log Record

In the screen capture above I have made a correction to the 1237 Fix log record after having selected it from the drop down list. Now the Save New Entry button in the is active and says, "Update Log Entry". When I click on that button the log entry will be updated.

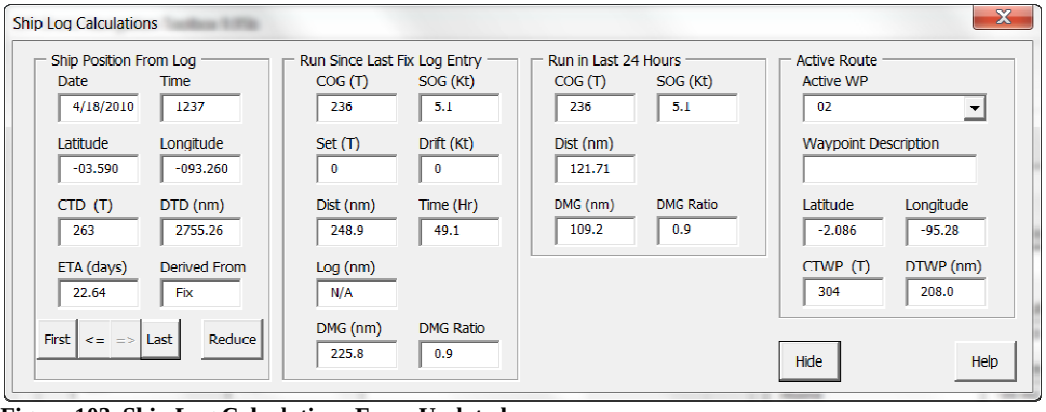


Figure 103, Ship Log Calculations Form Updated

Now the Calculation form has been updated with the corrected Fix.

How the Ship Log Works

The previous sections have described how log entries are entered, edit and displayed. This section will attempt to explain how the log entries are processed and used to generate information on the voyage.

As stated above there are three Log Entry Types:

1. DR (Dead Reckoning) – A DR log entry is used to record an on-board event. The minimum information required for DR entry includes the Date/Time, estimated course steered since the last log record and either the estimated average speed during that period or the current logged distance (normally from a knot meter). With this information the program will calculate the ship's position at the time of the DR entry. The program will not allow the latitude and longitude to be entered as part of a DR entry. Ship's position information can only be entered as part of an EP or Fix record.
2. EP (Estimated Position or Observed Position) – The EP log entry is used to record the Ship's position, but not declare the position as Fixed. The EP log entry is actually ignored by the program. The purpose of the EP entry is to document a possible Ship's position, but one in which the navigator does not have sufficient confidence to use as the basis for future calculation. Should the navigation later gain confidence that the EP position recorded is correct, the record can be edited and declared a Fix. Examples of EP entries are the following:
    a. The Observed Position (OP) derived from a single sight reduction.
    b. A single Line Of Position (LOP).
    c. A position derived from multiple celestial sight reductions that do not provide good correlation.
    d. A position derived from a Chart Item that does not appear to be in the charted location.
3. FIX (Fixed Position) – A Fix log entry is used to record the Ship's position based on valid navigation data. When a Fix log entry is recorded, all subsequent DR position calculations will be based on this entry until a later Fix record is entered into the Log. If a Fix record entered is not the most recent record in the Log (e.g., a Celestial Fix is entered for a time prior to the most recent DR record), all subsequent DR records will be updated based on the just entered Fix record. Therefore a navigator may decide that an EP that was recorded several hours ago is in fact a good fix of the Ship's position. If the navigator changes that EP record to a Fix record all of the subsequent DR records will be updated based on that new Fixed position.

All log data is recorded in the ShipLog worksheet in the active log workbook. There are three sections in the worksheet.

A	B
Ships Log	
Vessel Name:	**Sarah**
Vessel Type:	Sail
Vessel Flag:	USA
Vessel Doc Nr:	613579
Vessel MMSI:	366808930
Vessel Make/Model:	Pearson 424 Ketch
Log Engine Hours:	TRUE
Log Generator Hours:	TRUE
Departure Port:	Madeira
Departure Lat:	32.431
Departure Lon:	-17.104
Destination Port:	Bermuda
Destination Lat:	32.228
Destination Lon:	-64.405
Name of Captain:	John Stevenson
Crew Names:	Bob Calt

Figure 104, Vessel Information Section of ShipLog Worksheet

The vessel information section is shown above. This is the same information entered into the Ship Data page and the Voyage Information Section.

Entered Log Data													
Date	Time	Reason	Type	Fix	Latitude	Longitude	Course (T)	Speed (Kt)	Log	AWD	AWS	Eng On	Gen On	Comments
5/15/2007	1220	Depart	Fix	GPS	32.421	-17.116	300	5.5	1.4	0	0	TRUE	FALSE	
5/15/2007	1315	Chg Cour	DR		0	0	285	4	6.3	0	0	FALSE	FALSE	
5/15/2007	1706	Other	DR		0	0	280	7	32.2	0	0	FALSE	TRUE	
5/15/2007	1846	Other	DR		0	0	270	6.5	44.2	0	0	FALSE	FALSE	
5/16/2007	145	Other	DR		0	0	290	6.8	94	0	0	FALSE	TRUE	
5/16/2007	345	Other	DR		0	0	280	6.5	107.5	0	0	FALSE	FALSE	
5/16/2007	550	Other	DR		0	0	280	6.5	122	0	0	FALSE	FALSE	
5/16/2007	905	Other	DR		0	0	275	6.5	143.7	0	0	FALSE	FALSE	
5/16/2007	928	Other	Fix	Celestial	32.568	-20.005	266	7.2	-1	0	0	FALSE	FALSE	
5/16/2007	930	Other	DR		0	0	266	7.2	145.6	0	0	FALSE	TRUE	
5/16/2007	1033	Other	DR		0	0	270	7	153.5	0	0	FALSE	FALSE	Genset alarm light dimly lit
5/16/2007	1200	Other	DR		0	0	270	7	162.7	0	0	FALSE	TRUE	No problem found with genset
5/16/2007	1353	Other	DR		0	0	265	6	174	0	0	FALSE	FALSE	
5/16/2007	1915	Other	DR		0	0	290	6	206.6	0	0	FALSE	TRUE	Gen off at 1945
5/16/2007	1945	Other	DR		0	0	290	6	-1	0	0	FALSE	FALSE	Gen off at 1945
5/16/2007	2105	Other	DR		0	0	275	5.5	216.7	0	0	FALSE	TRUE	
5/16/2007	2159	Other	DR		0	0	275	5.5	221.7	0	0	FALSE	FALSE	
5/17/2007	152	Other	DR		0	0	285	6.5	242	0	0	FALSE	FALSE	

Figure 105, Entered Log Data Section of the Ship Log Worksheet

To the right of the vessel information section is the Entered Log Data section. This is the data entered into the log by the navigator. The program does not modify this data except when the navigator edits a log entry. This section is a permanent record of the data entered into the log

	Calculated Log Data			
Active Entry	Latitude	Longitude	Course	Speed
	32.421	-17.116		
	32.437	-17.187	284.92552	6.7768028
	32.474	-17.472	280	7
	32.421	-18.025	270	6.5
	33.138	-18.549	290	6.8
	33.005	-19.152	280	6.5
	33.217	-21.382	279.99867	58.608972
	33.342	-24.287	274.99892	44.139159
	32.568	-20.005		
	32.568	-20.008	270	7.5525946
	32.568	-20.102	270	7.5126338
	32.568	-20.212	270	6.3661717
	32.558	-20.348	265.0167	6.112607
	33.069	-21.11	289.99986	6.0474112
	33.079	-21.143	289.80451	5.9029792
	33.085	-21.225	274.97034	5.1939085
	33.089	-21.279	275.03186	5.0672182
	33.142	-21.514	285.01491	5.2680931

Figure 106, Calculated Log Data Section of the ShipLog Worksheet

Further to the right is the Calculated Log Data section. This section contains the values calculated by the program and the Fixed positions entered by the navigator. Since the data in this section is either calculated or copied from the Entered Log Data section, only a minimal amount of data is recorded.

Normally the first log record entered for a voyage will be the departure Fix, but it doesn't have to be a Fix. You may enter a DR or EP record as the first entry just to record the time of anchor up on a departure, then record a departure fix when the ship is abeam of a sea buoy outside of the departure harbor. The program will not display a ship's position in the Ship Log Calculations form until the first position Fix is recorded. That first Fix establishes the initial vessel position and allows the program to begin the maintenance of a DR position.
When the next DR log entry is recorded by the navigator the program will produce a calculated DR position for the time of the entry based on the time between the last two entries, the estimated course steered and either the estimated speed or the value from the recording log on the ship (e.g., the knot meter). If a log value is entered, that will be used to calculate the DR position. If no log value is entered (the form field is blank or a negative value, zero is a valid log entry) then the speed and time between log entries will be used to calculate the DR position.

In general a recoding log on the ship will provide a more accurate distance run than an estimated average speed, so it is recommended that the recoding log be used, in which case it is not necessary to enter the speed. It may still be useful to enter an estimated speed as well as the log value to provide a measure of how accurately the watch or

navigator can estimate the average speed over a period of time. This information can be used to improve those estimates for the time when the log value may not be available. Either a continuously recorded log (e.g., starting at zero when the instrument is installed) or a trip log (starting at zero on departure) can be used, but it is important to be consistent in using only one or the other.

After several hours or days from the initial departure fix, the navigator may have the opportunity fix the Ship's Position and will enter that position data into the log as a Fix. A Fix log entry creates a discontinuity in the Log. The most recent position data before the Fix was derived from the data in a DR entry. Therefore the information in the Run Since Last Log Entry section would be meaningless, possibly showing a boat speed of over 20 kts. Instead the information displayed is the run from the Last Fix Log Entry.

Tools Page

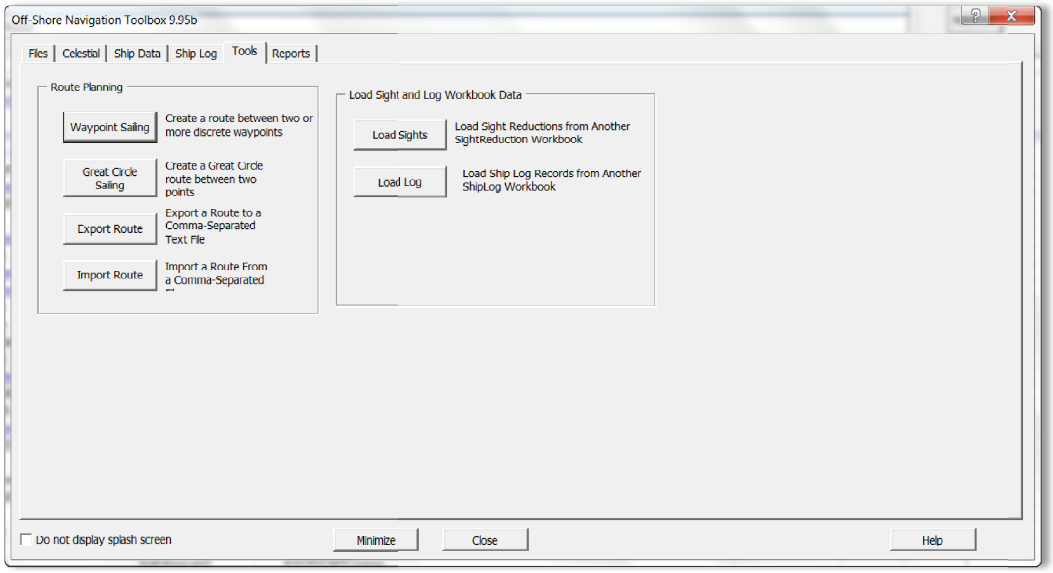


Figure 107, The Navigation Tools Page

With version 9.6 the Tools Page has been added to the form. With version 9.95 there are two Toolsets on the page.

1. Route Planning. This toolset includes the creation and editing of Waypoint and Great Circle Routes and the importing and exporting of routes.
2. Load Sight and Log Workbook Data. This toolset provides utilities that will extract sight reductions and Ship Log entries from existing workbooks into the active workbooks.

Additional toolsets planned

- Ship Log Toolset: Perform Analysis of the log for a completed passage. Convert a log into a route. Update and maintain ship performance data based on log records.
- Navigation Toolset: Set of functions to calculate various navigation data, such as distance off, safe heading, etc.

Waypoint Route Planning

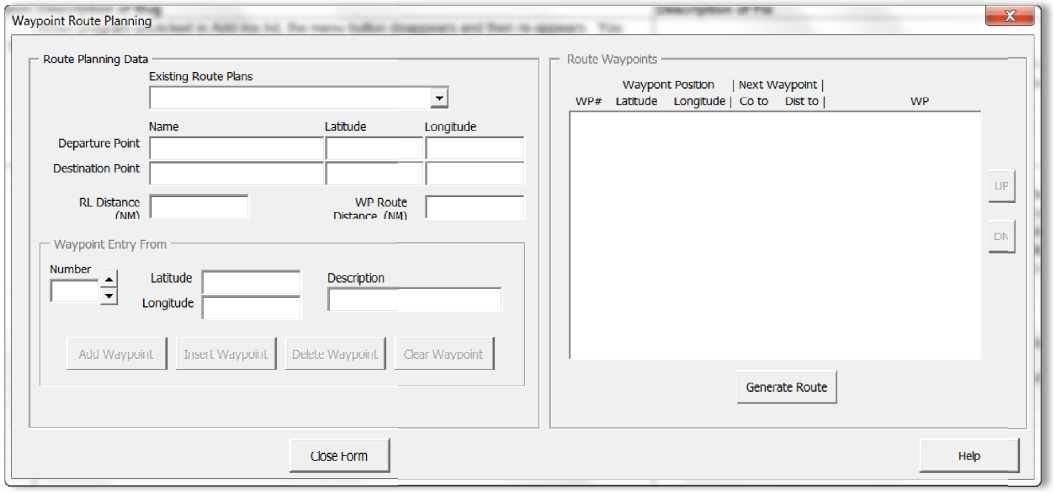


Figure 108, The Waypoint Route Planning Form

When I click on the Waypoint Sailing button on the Tools page the Waypoint Route Planning Form appears. This form is used to generate a route based on Navigator supplied waypoints or to edit an existing route in the Ship Log workbook.

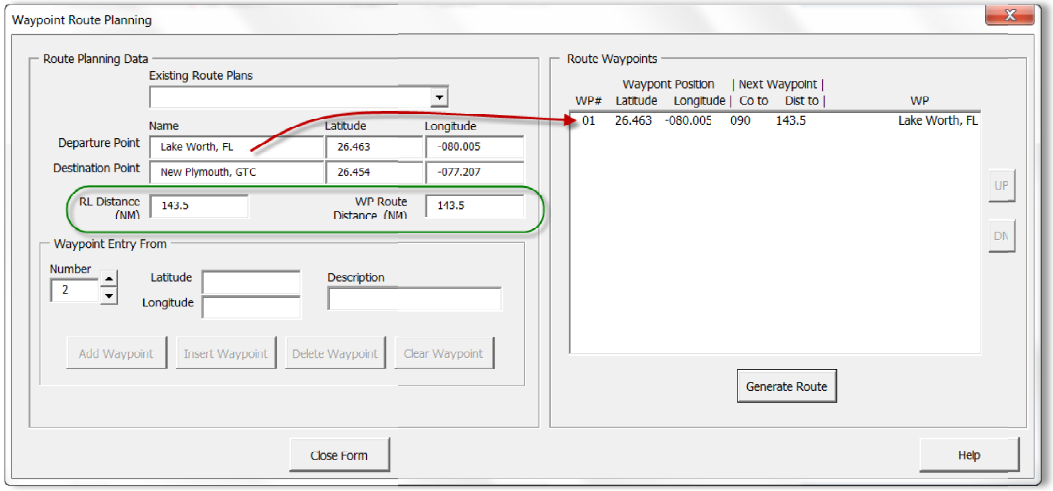


Figure 109, Entering the Departure and Destination Points

The first step is creating a Waypoint Route is to enter the departure and destination data. In this case I am creating a route from Lake Worth, Fl to New Plymouth, Green Turtle Cay, The Bahamas. Once I have entered the latitude and longitude of the two points the form generates the first waypoint for this route – the departure point. The Rhumb Line distance from the departure to the destination is calculated and displayed in the RL Distance box. The WP Route Distance box displays the cumulative distance along the

route waypoints. At this point the RL and WP distances are the same as I haven't entered any intermediate waypoints.

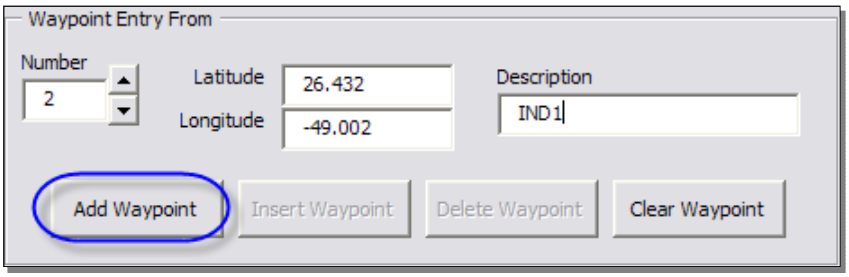


Figure 110, Entering Intermediate Waypoint

In the figure above, I have entered the first intermediate waypoint data. The departure point is waypoint number 1, so this will be waypoint number 2. I've entered the latitude and longitude for this waypoint, and that is all that is required, but it often helpful to give a name or description to each waypoint. In this case I've used the waypoint name from the Dodge Cruising Guide to the Abacos, from where I am copying this route. When I click the Add Waypoint button, this waypoint will be added to the route.

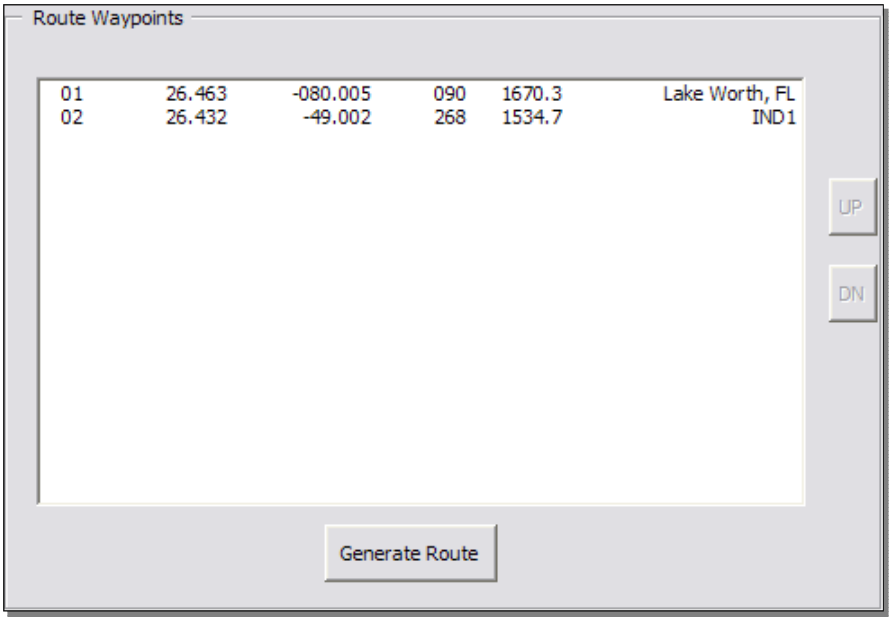


Figure 111, Route Waypoint List

Now there is a second waypoint in the route list.

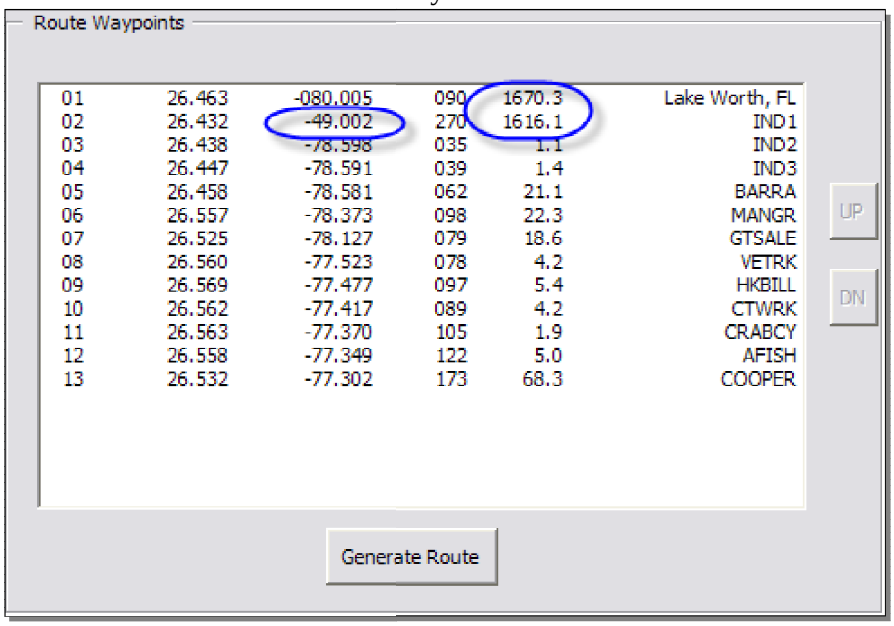


Figure 112, Invalid Longitude

In the figure above I have entered the complete list of waypoints for this route, but I miss-typed the longitude on the second waypoint. On each entry in the list the course and distance to the next waypoint are displayed. This is one way to identify typos in the waypoints. The distance from the departure to the 2nd waypoint is 1670nm and the distance from the 2nd waypoint to the 3rd is 1616 nm. That's long way to get from Florida to the Bahamas. I need to correct this entry.

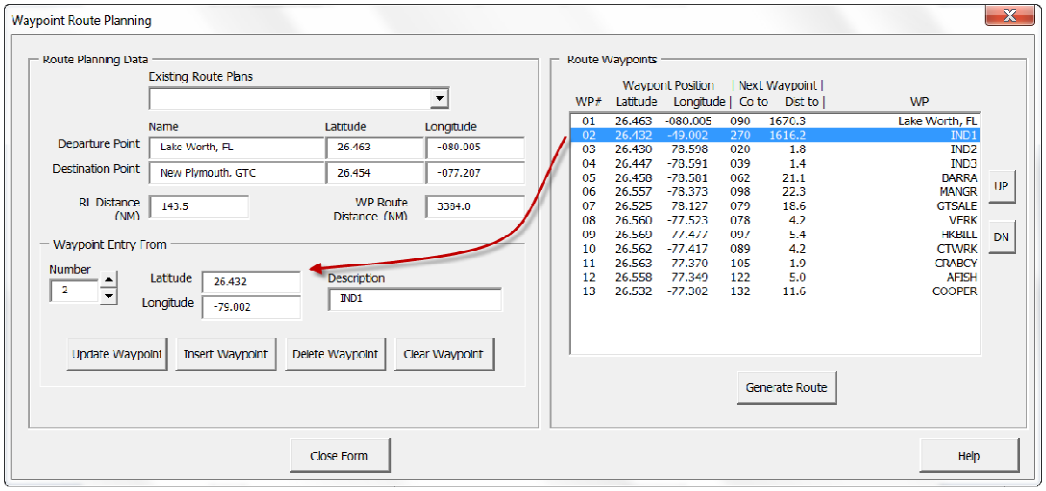


Figure 113, Correcting a Waypoint

To correct this waypoint I first select it in the list and the waypoint data is displayed in the Waypoint Entry Section. I have corrected the latitude from 49 W to 79W.

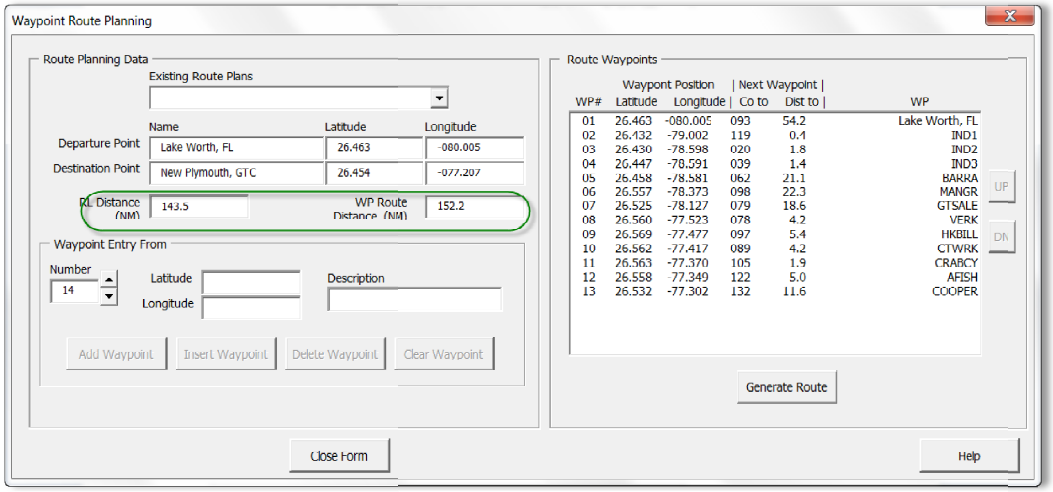


Figure 114, Waypoint Corrected

When I clicked the Update Waypoint button the 2nd waypoint now has a correct value and the distances between waypoints are reasonable. Now the WP Route Distance box shows the cumulative distance along the route to be 151.8 nm, nearly 8 nm longer than the rhumb line distance.

Below the waypoint list is the Generate Route button. We have entered a complete route into the form, but it has not been saved. The Generate Route button will save the route in the active ShipLog workbook and create a graph of the waypoints.

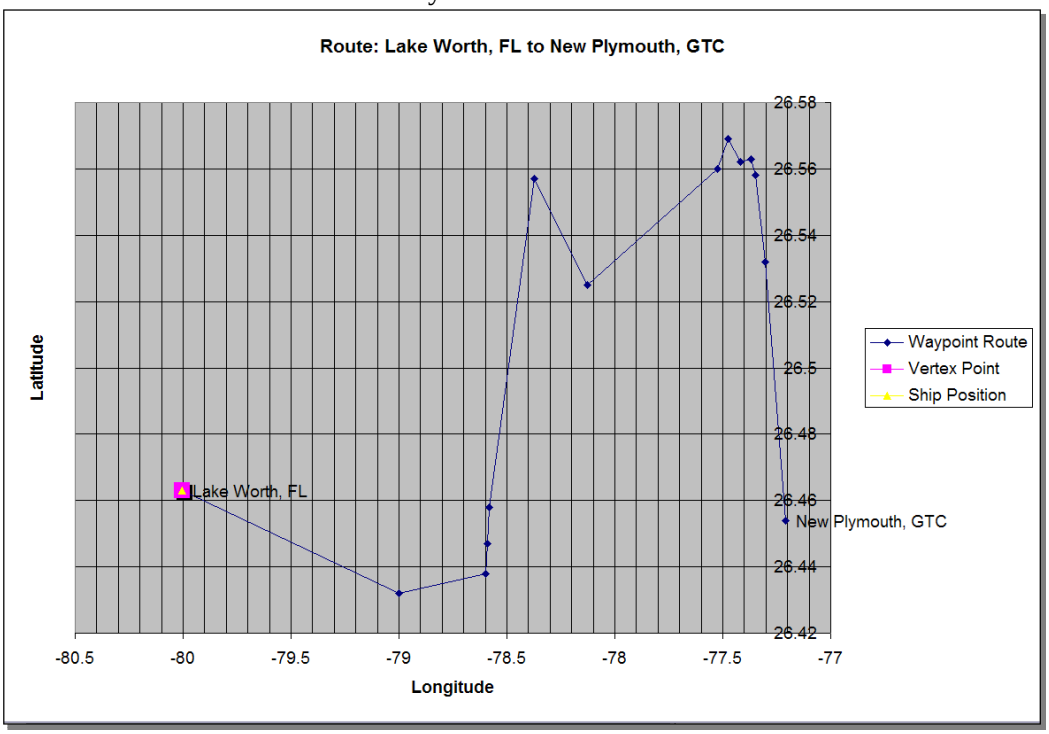


Figure 115, Graph of Waypoint Route

This is an XY plot of the waypoint values. It is not a map projection (e.g., Mercator) so the vertical and horizontal distances between points has no correlation to actual distances between points. The value of this graph is to double check the route waypoints.

There are also two other points displayed on the graph.

1. Vertex Point: This is relevant only to a Great Circle route. For a waypoint route the program places the vertex at the departure point just to get it out of the way.
2. Ship Position – When the route has been activated by the ShipLog (see below) the positions recorded in the Ship Log will also be displayed on the graph. Since this graph was created by the route planning tool, there is no valid ship position, so the program once more places that point at the departure to get it out of the way.

Great Circle Route Planning

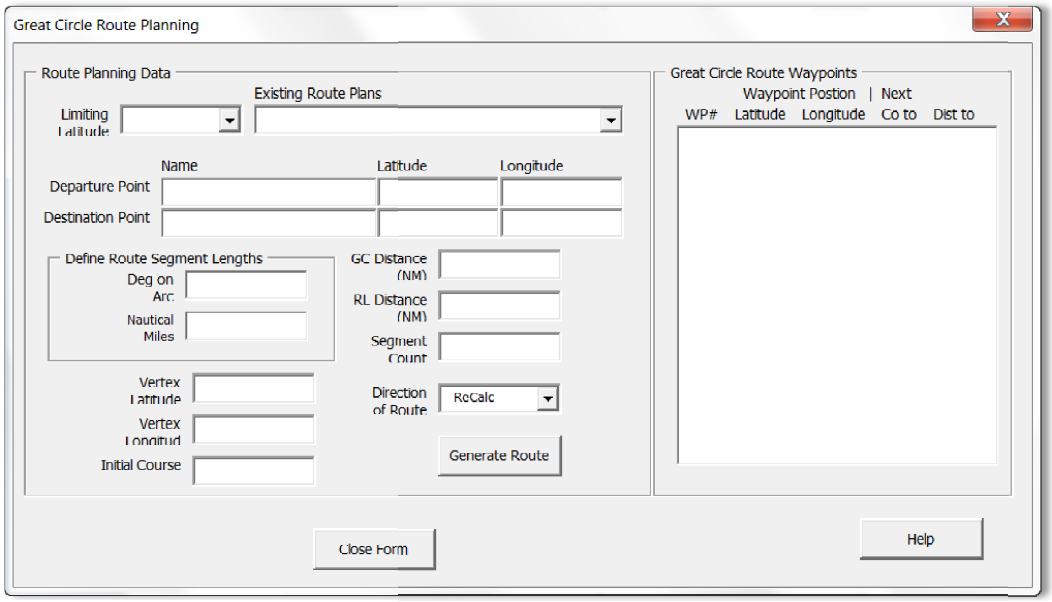


Figure 116, The Great Circle Route Planning Form

Clicking the Great Circle Sailing button on the Tools page brings up the Great Circle Route Planning form, which looks very similar to the Waypoint Route Planning form. The difference here is that the program will calculate the waypoints based on the departure and destination data entered.

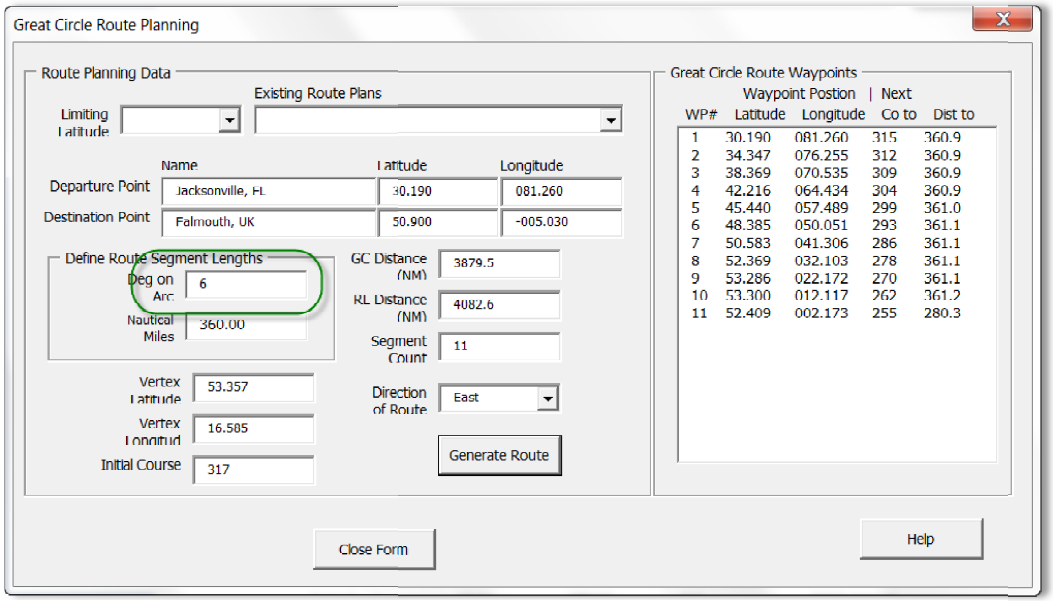


Figure 117, Great Circle Route Created

In the figure above I have specified a departure from Jacksonville, FL and destination of Falmouth, UK. In the Define Route Segment Lengths section I enter a segment length of 6° of arc along the great circle. This is the default value. The Nautical Miles box shows this equates to 360 nm. I could have entered the segment length in nautical miles and the Degrees on Arc value would have been calculated from that value. Since a Great Circle follows an arc whose center is the center of the earth, it is makes more sense to define the segments in degrees rather than nm.

The reason for segmenting the route is that for a ship to follow a great circle precisely would require a constant changing of heading. This is not practical on a yacht, so the great circle is broken up into segment that can be transited using Mercator sailings. That is the great circle is a series of rhumb line course. In this case the route requires a change of heading every 360 nm.

Once the segment length has been defined, the program will calculate the latitude and longitude of the start of each segment. The waypoint list shows this waypoint data plus the course and distance to the next waypoint.

Below the waypoint list is the Generate Route button, which performs the same function as the Generate Route button in the Waypoint Route form. This buttons saves the route data to active ShipLog workbook

Activate a Route

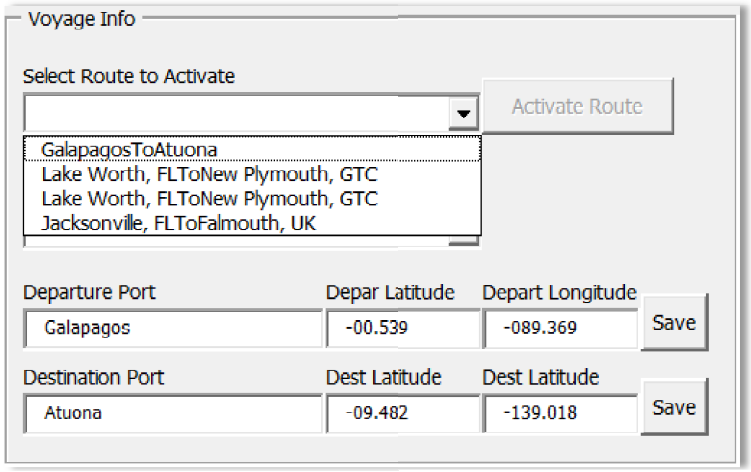


Figure 118, Selecting a Route in the ShipLog form

Routes can be activated in the ShipLog form and used in conjunction with the Ship Log entries in the navigation of the vessel. First a route must be activated. In the Ship Log Entry section there is a drop down list of the routes that have been created. In the figure above the list includes the way point and Great Circle routes previously created.

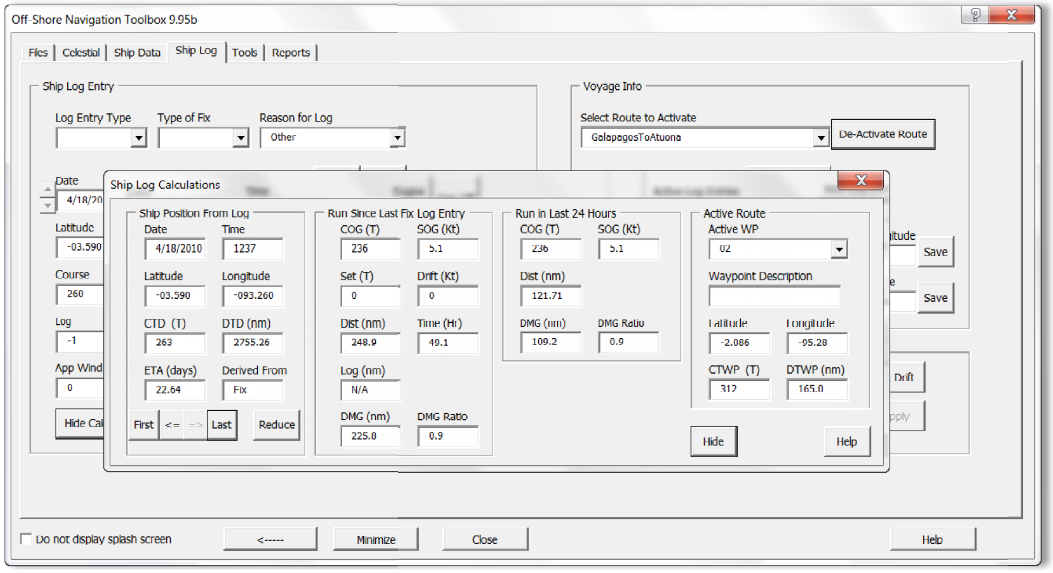


Figure 119, Activated Route in Ship Log form

I have selected that route and clicked on the Activate Route button (which says De-Activate Route). When a route has been activated the drop down list of routes is locked and can only be unlocked by clicking on the De-Activate Route button.

The route activation does two things:

1. The Departure and Destination Ports in the Ship Data section now contain the departure and destination points from the route.
2. The Active Route section now appears in the Ship Log Calculations form

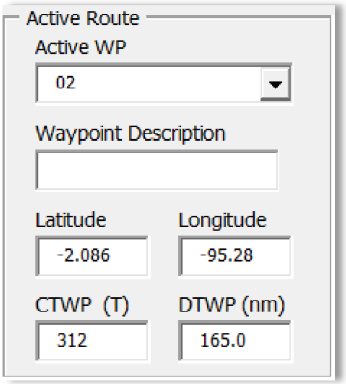


Figure 120, Active Route Section

When the route is first activated the Active Route section displays the first waypoint in the route, which is our departure point. As the ship's position recorded in the log advances past the a waypoint, this section is updated to the next waypoint. In this case the vessel has passed the departure point and the active waypoint is number 2.

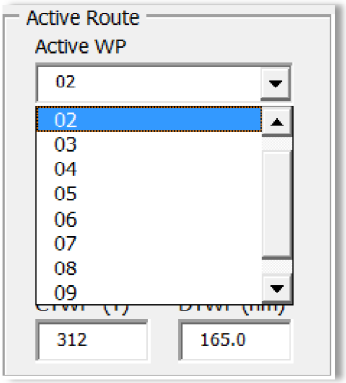


Figure 121, Waypoint List

The Active WP list contains all of the waypoints in the route

Great circle routes can also be activated in the Ship Log in the same manner as waypoint routes.

Export Route

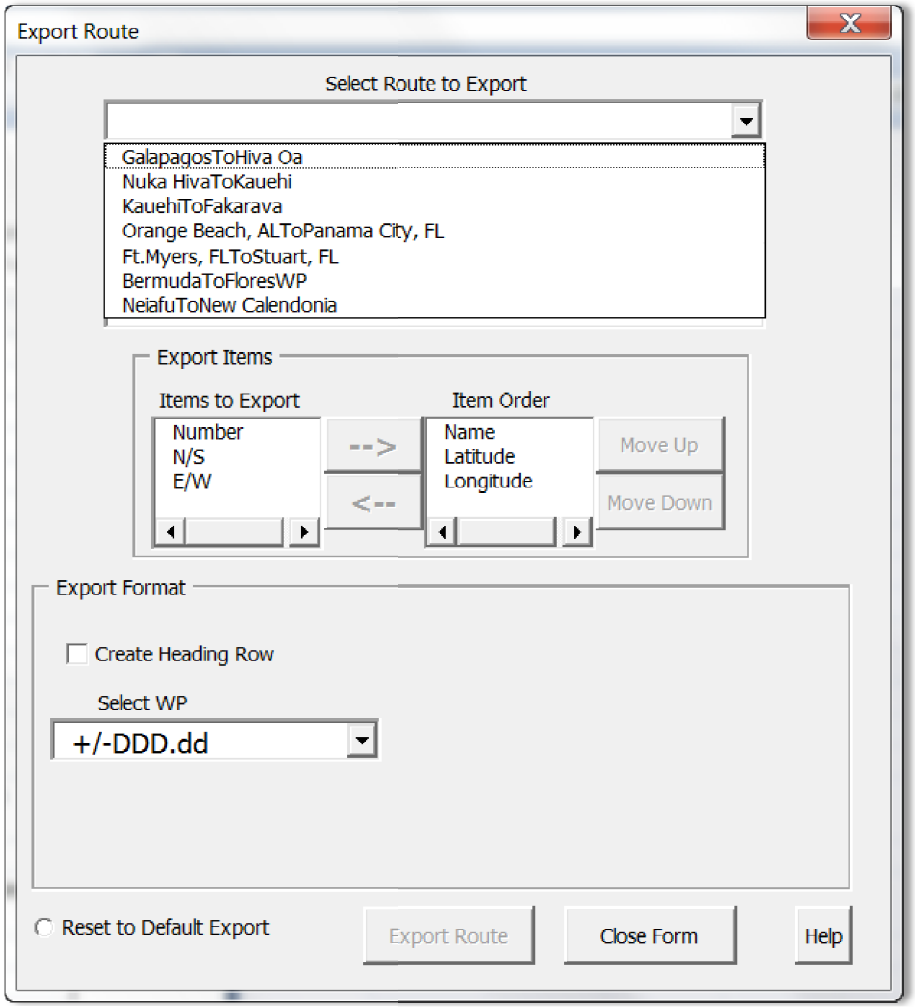


Figure 122, The Export Route form

Clicking on the Export Route button on the Tools page will activate the Export Route form shown above. At the top of the form is a drop-down list of all routes (Waypoint and Great Circle) in the active Ship Log workbook.

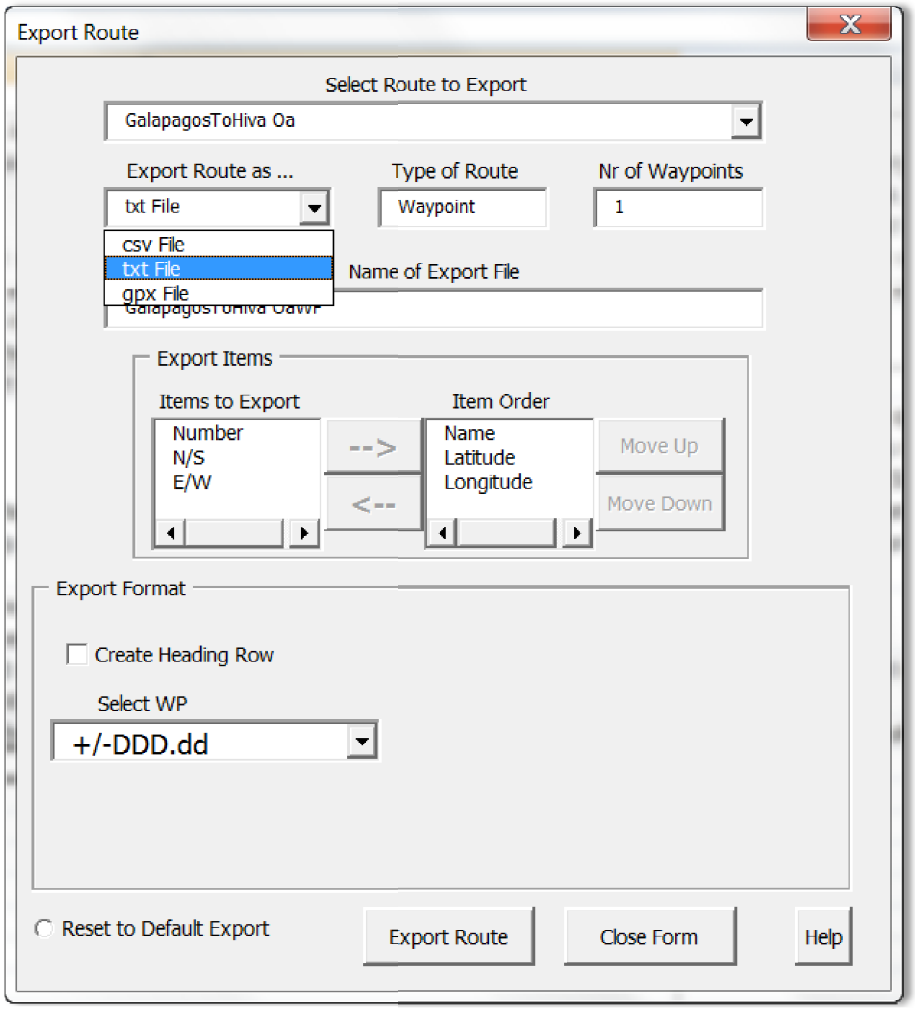


Figure 123, Route to Export

I have selected the route from the Galapagos to Hiva Oa in the Marchesas as the route to export. There are three formats available for the export file, CSV, Text and GPX. The CSV and Text files are the same format just a different type in the file name (*.csv or *.txt). GPX (*.gpx) is a standardized file format that can be imported by most current chart plotting software and systems. The choice of format should be driven by the target system that will import the route. If the route is being saved for later use by this program, then any of the formats can be used.

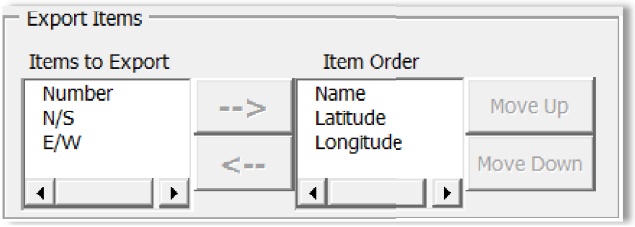


Figure 124, Define the Export Record

In the center of the form is the Export Items section, which is used to define the contents of each exported record (waypoint). The default is the name, latitude and longitude of each waypoint in that order. The order can be changed by selecting an Item and then use the Move Up and Move Down buttons to position that item in the record. On the left is a list of additional waypoint items that can be added to the export record. The contents of the Export Record should be established based on the requirements of the target system that will import the route. Some systems want a record or waypoint number in addition to or in place of a name. If so the Number item can be selected and → button clicked to move that item into the export order list as shown below.

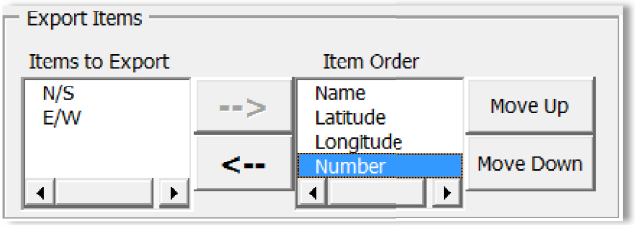


Figure 125, Number Added to Items in the Export Record

The Number Item has been added to the record, but is the last item. It should be the first item in the record, so I can use the Move Up button for that purpose.

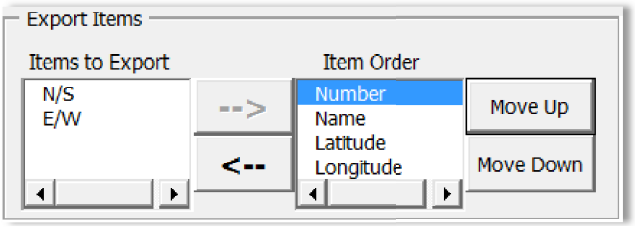


Figure 126, Record Item Order Changed

Now the Number is the first Item in the Export Record.
Normally the latitude and longitude are exported as just numbers with a positive number for north latitude and east longitude and a negative number for south latitude and west longitude. Some chart plotting systems require the N/S and E/W designations rather than positive and negative. Those designations can be added to the record from the Items to Export list.

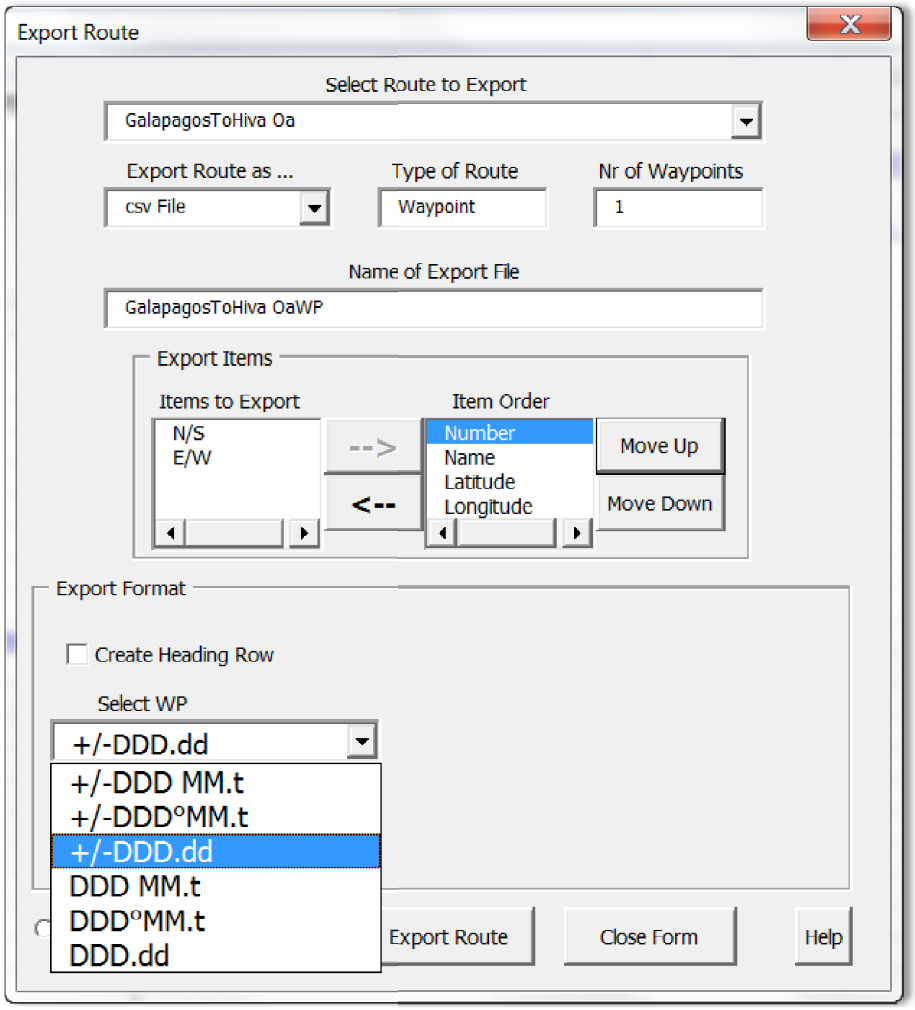


Figure 127, The Export Format Section

In the Export Format section the format to the latitude and longitude values are specified. The default is degrees and decimal degrees (DDD.dd). This is the format that can be imported into most chart plotting systems. The other options are degrees, minutes and decimal minutes (DDD MM.t) separated by either the degree symbol (°) or a space. Each of the format options can be specified with or without a positive or negative sign. If the export record will contain the N/S and E/W items, then the format without the sign values should be specified.

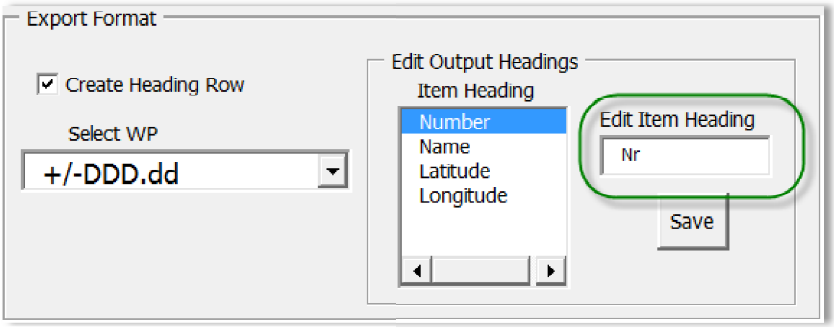


Figure 128, Adding a Heading to the Export Route

If a Heading is required by the target system it can be added by checking the Create Heading Row box. Then the Edit Output Headings section if visible. Unless changed, the program will generate a heading record with the Item names from the Export Items section. However these headings can be changed in this section. In the screen above I have selected the Number Item and in the Edit Item Heading box have type Nr, which is what the target system requires. When I click the Save button the Heading record will be updated use Nr instead of Number.

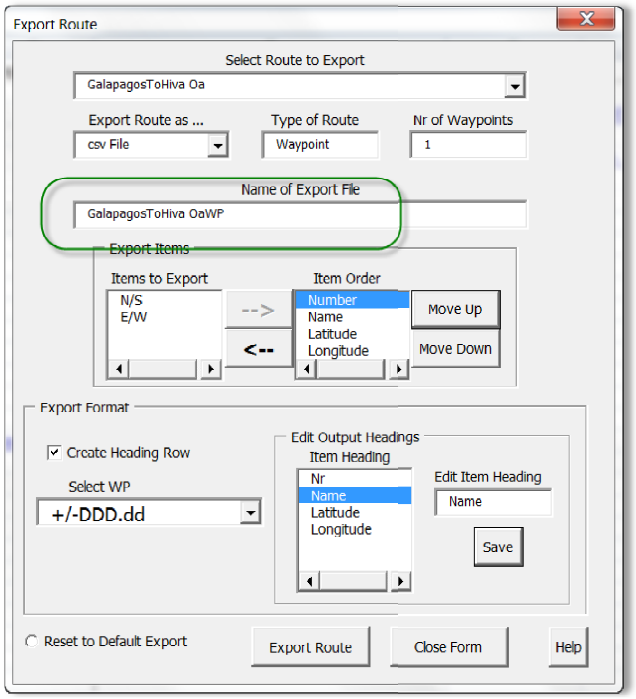


Figure 129, Ready to Export

Now the route is ready to be exported, but before clicking the Export Route button I need to review the name of the export file that will be generated. The program generates a default name based on the name of the route. I can edit this name to any valid file name.

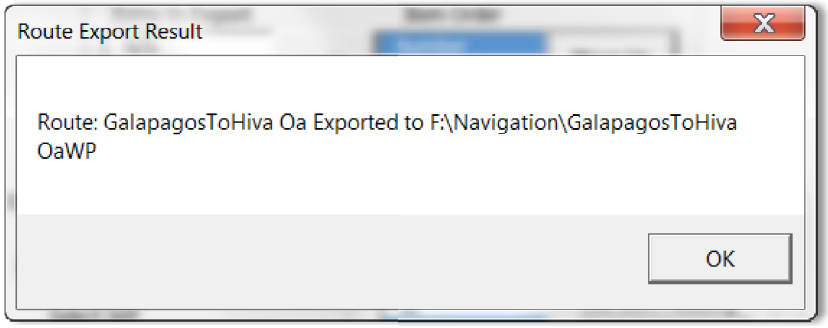


Figure 130, Route Export Complete

I am satisfied with the program generated name and I clicked the Export Route button. The message box shown above tells me the export is complete.

```
"Nr","Name","Latitude","Longitude"
1,"Galapagos",-.883333333333333,-89.6
2,"Hiva Oa",-9.83333333333333,-139
```

Figure 131, Contents of the CSV File

I can open the CSV file created and see the contents as shown above.

```
<?xml version="1.0"?>
<gpx version="1.1" creator="OffShoreNavigationVBA, version
9.95b">
      <rte>
            <name>GalapagosToHiva Oa
            </name>
            <rtept lat="-0.883333333333333" lon="-89.6">
                  <name>Galapagos</name>
                  <type>WPT</type>
            </rtept>
            <rtept lat="-9.83333333333333" lon="-139">
                  <name>Hiva Oa</name>
                  <type>WPT</type>
            </rtept>
      </rte>
</gpx>
```

Figure 132, Contents of GPX file

If I had chosen to export the route in a GPX file, the contents would be as shown above.

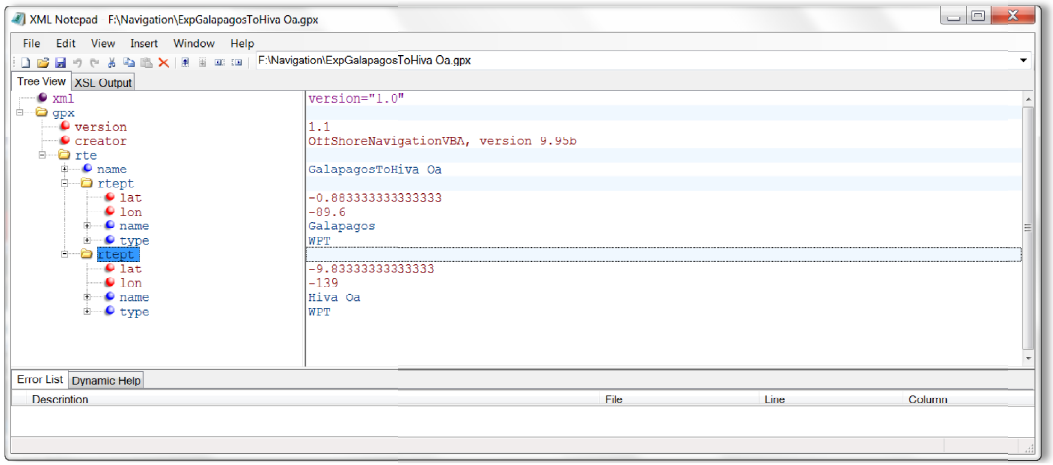


Figure 133, GPX File Displayed by XML Notepad

I can also load this file in an XML-capable editor, such as XML Notepad shown above, to display the XML tree-structure of a GPX file. This type of editor is valuable to insure the export file was generated in a valid xml/gpx format before attempting to import the file into a different system.

Import Route

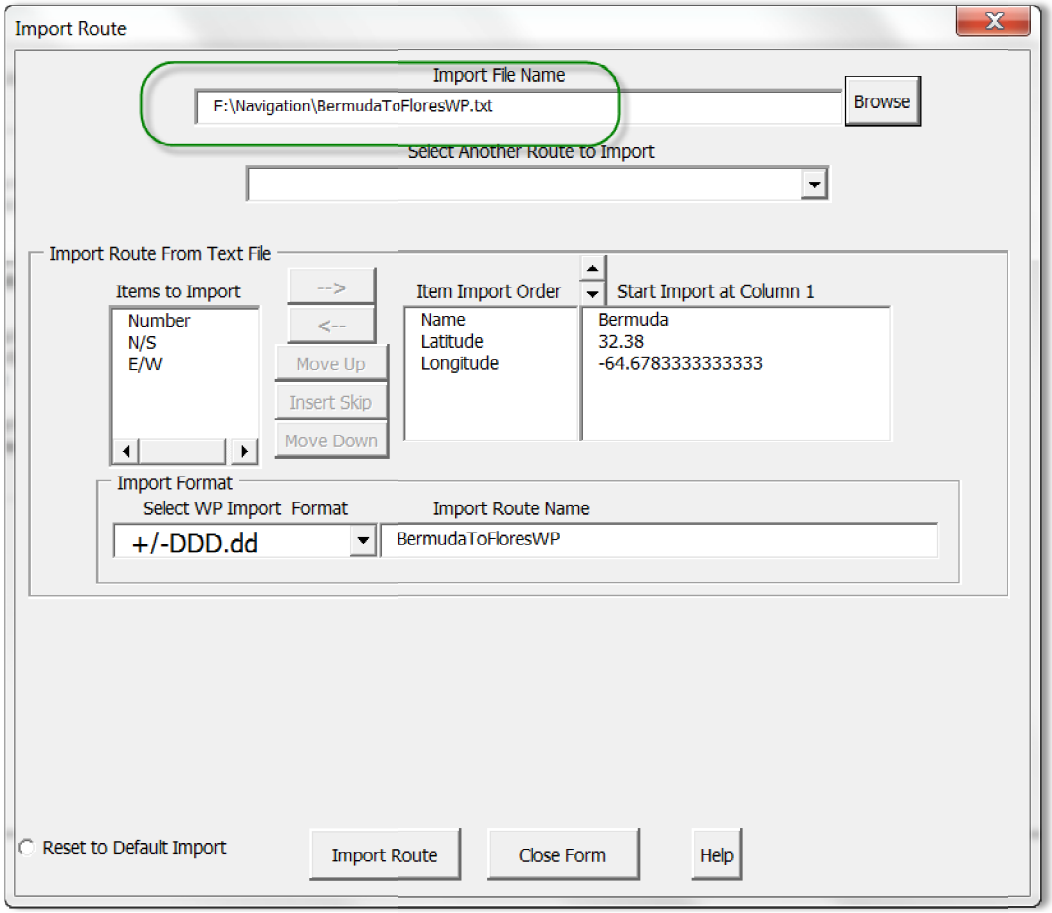


Figure 134, Import Route form

When the Import Route button on the Tools page is clicked, the Import Route form is displayed. At the top of the form is a text box for the path and name of the file to be imported as a route. Use the Browse button to open the route file to import, as shown below.

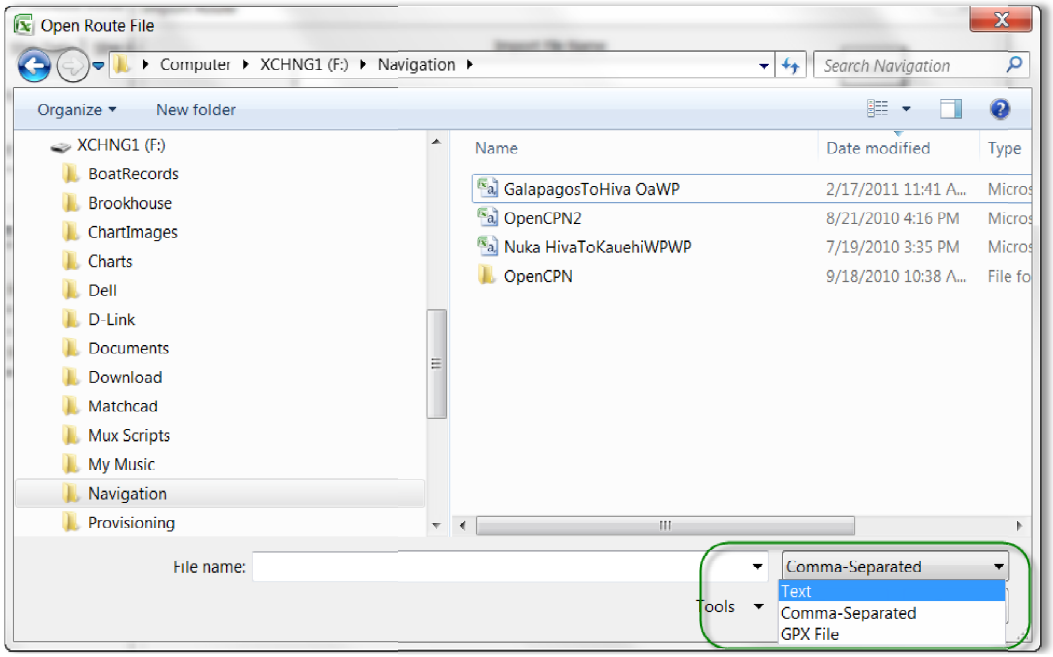


Figure 135, Opening the Route File to Import

The Import Route form can import route files in Comma-Separated (*.csv), Text (*.txt) and GPX (*.gpx) formats.

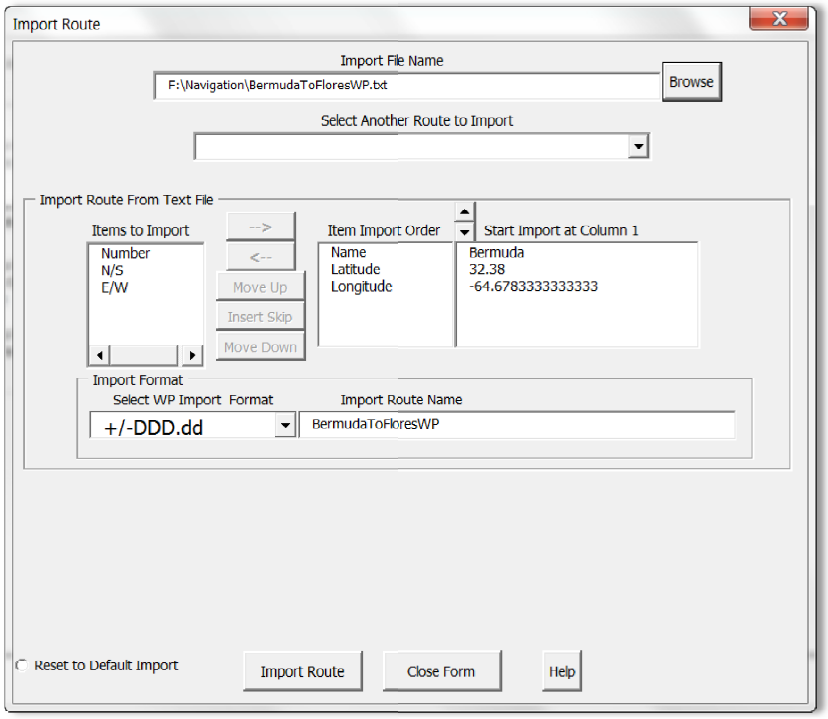


Figure 136, File to be Imported as a Route

In the screen above I have used the Browse button to select a CSV file that contains the route from Bermuda to the island of Flores in the Azores. Some route files contain a header as the first record in the file to identify the order and content of the fields in each record. Others have no header record and the content of the fields will have to be defined in this form. In this example the file does not have headers and the contents of the first waypoint in the file is displayed. This file appears to conform to the default import record format of a name, latitude and longitude. See below how to import files whose records do not match the default.
Since the record appears to conform to the default record I can just click the Import Route button to load this route into the ShipLog workbook.

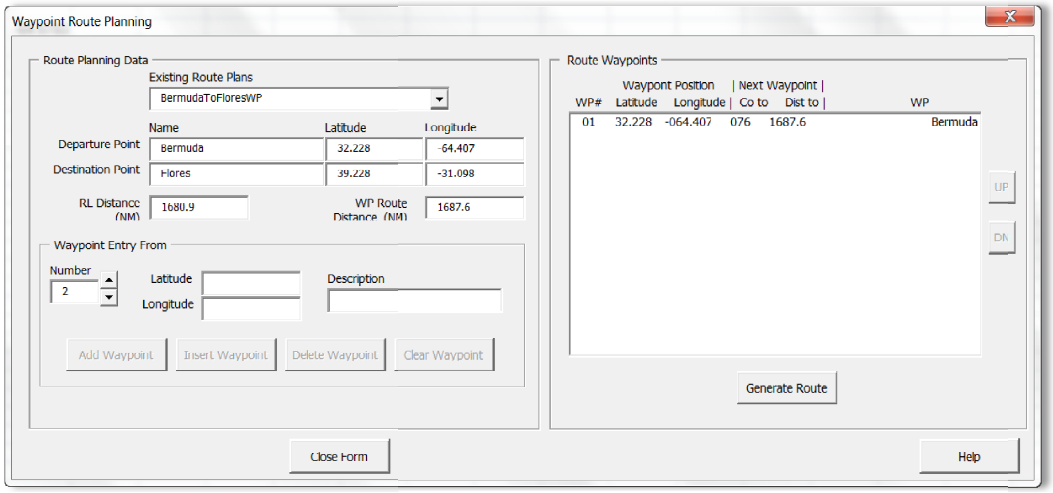


Figure 137, The Imported Route

Then I closed the Import Route form and opened the Waypoint Route form. The imported route is displayed. This is a simple rhumb line route from Bermuda to Flores with only the departure and destination as waypoints.

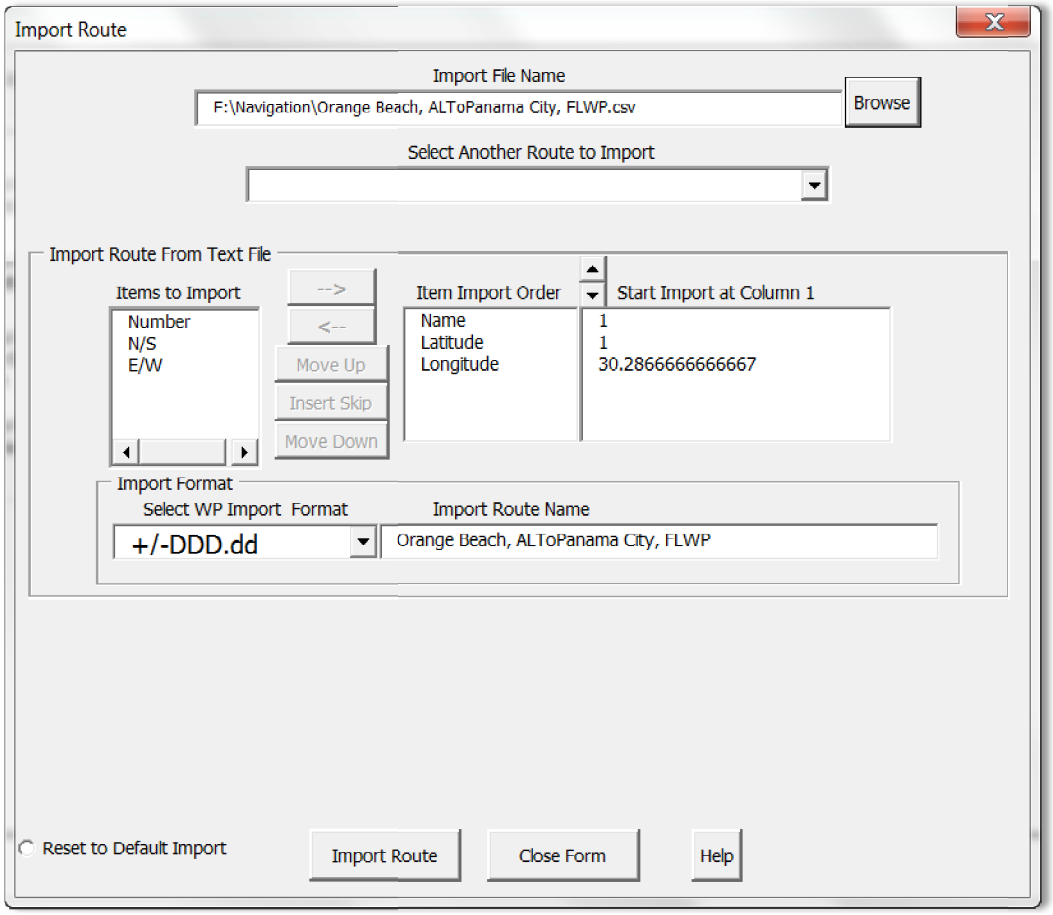


Figure 138, Import Route File That Does not Match the Default Record

If the file to be imported does not conform to the default record format, some experimentation with the Items to Import list may be required. In the screen above I have opened such a file and the form displays the contents of the first 3 items or columns in that file. They clearly do not align with the Item Import Order list, so some experimentation is required.

The first two items are both have the value of 1. I'm going to assume the first item is waypoint number and the second is just a duplicate of that number and I will skip the second item.

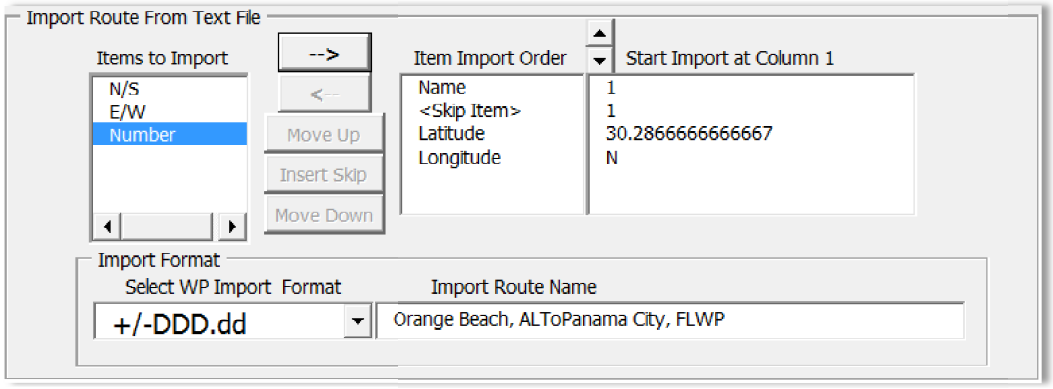


Figure 139, Skip and Item in the File

To do this I clicked on the Insert Skip button which inserted the <Skip Item> into the Item Import Oder list. I then used the Move Up button to position this item opposite the second column in file. Now I have defined an import record of 4 columns and the next or 4th column in the file has been added to the list. This column has a value of N, which does not match the Item Order of Longitude. It appears this route file uses N/S and E/W designators for the latitude and longitude. Therefore I need to add those labels from the Items to Import list to the Item Import Order list.

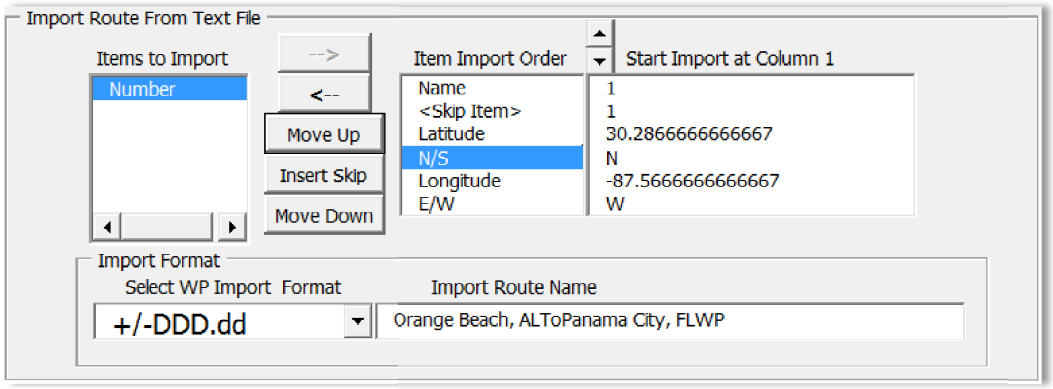


Figure 140, N/S and E/W Added to Import Order

I have added those designators to the Import Order and adjusted their position so they match columns in the data from the file. Everything looks OK, but maybe there are more than the six columns shown in the import file record.

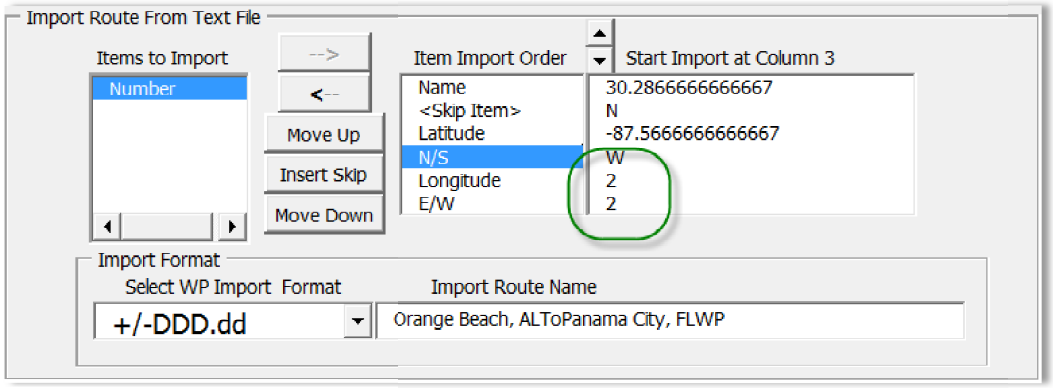


Figure 141, Checking the Next Few Columns

A quick way to check the next few columns of the import file is to click the spin button above the list to increment the starting column of the displayed record. This shows that the next two columns appear to be the same duplicating record number at the start of the record. So it looks like I've properly defined the record and after using the spin button to move the starting column back to 1, I can click the Import Route button.

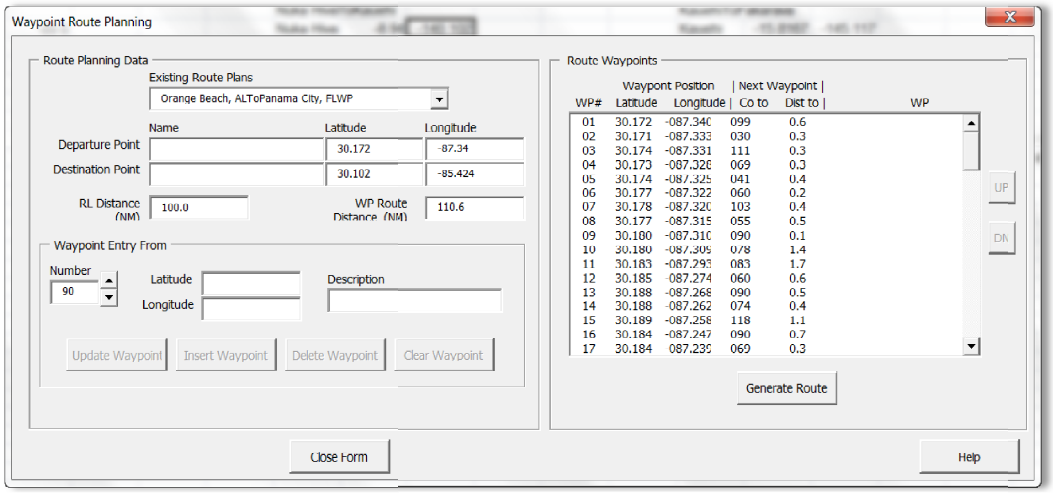


Figure 142, Imported Route

Now I can go to the Waypoint Route form and display the contents of the imported route. Notice that the names of the Departure and Destination are not filled in. The file imported did not have any names associated with the waypoint records, only numbers.

Loading Sight Reduction and Ship Log Data

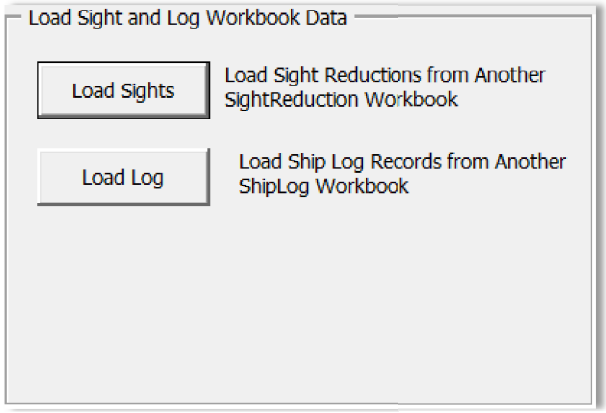


Figure 143, Load Sight and Log Workbook Data Section

There are currently two tools in this section of the Tools page.

1. Load Sights. This tool will extract sights from another SightReduction workbook and add them the active workbook.
2. Load Log. This tool will extract Ship Log entries from an existing ShipLog workbook and add them to the active workbook.

The principal use for this toolset is load a workbook generated by an earlier version of the program. It is not 100% that these tools will load the old workbooks, but they will give it a try. If they fail to load a workbook, please notify me so I can try to fix the problem.

One other use for the tools can be for a multiple leg voyage, where the navigator wants to save the workbooks for each leg, while maintaining a complete pair of workbooks for the entire voyage. At end of the each leg the navigator would create new workbooks for the next leg, saving the workbooks for the earlier legs. At the end of the voyage the navigator would create a new set of workbooks and load the workbooks from each leg into the new set. That would provide one complete pair of workbooks with all sight and log data for the voyage and still have the workbooks for the individual legs.

Load Sight Reduction Workbook

To load the data from another SightReduction workbook into the active workbook, click on the Load Sights button.

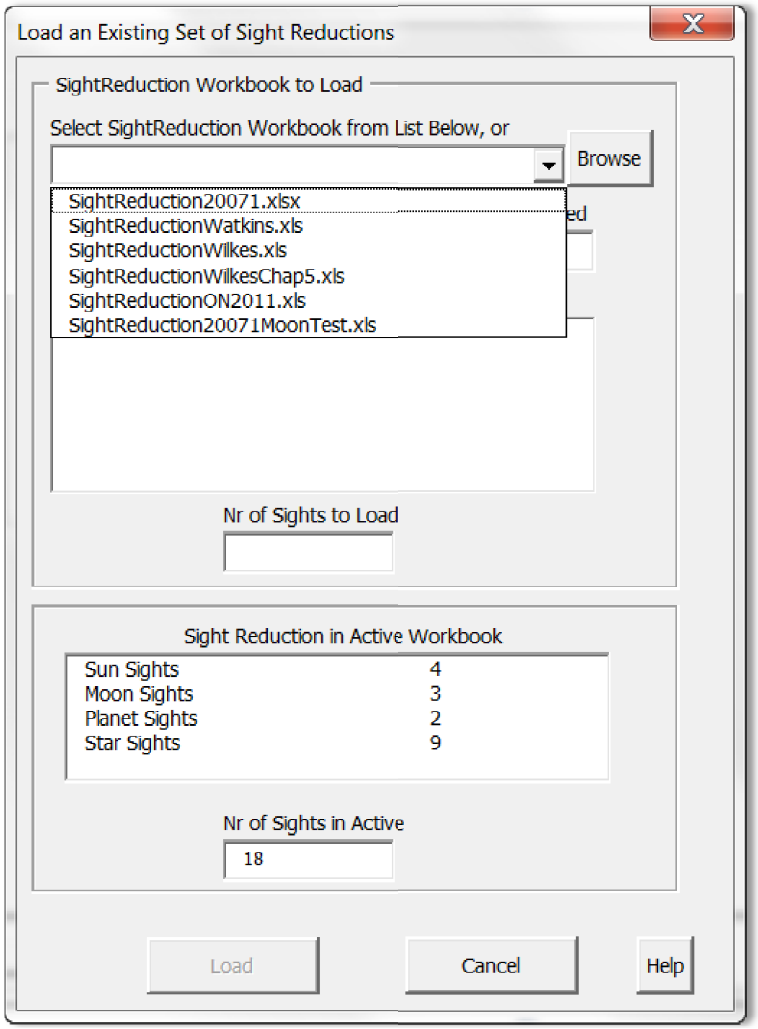


Figure 144, The Load Sights form

This activates the Load Sights form as shown above. At the bottom of the form the number and type of sight reductions in the active workbook are displayed. At the top of the form is a drop down list of the other SightReduction workbooks stored in the same folder as the active one. There is also a Browse button to allow the selection of a workbook not in the active folder or one not saved with "SightReduction" as the first part of the file name.

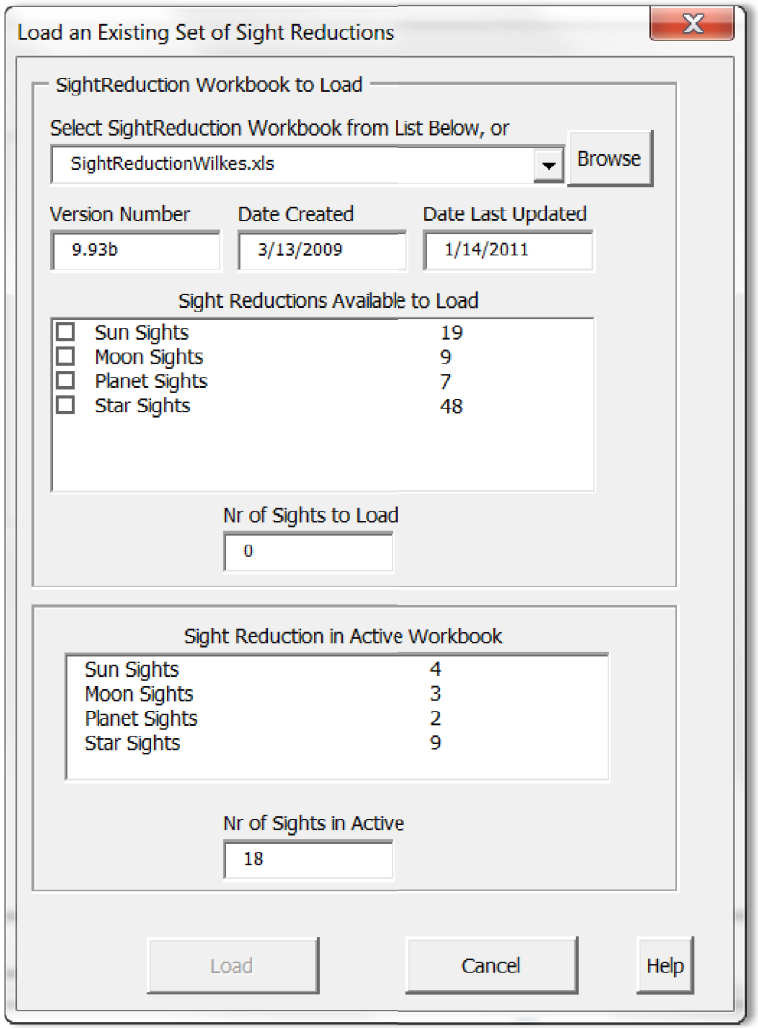


Figure 145, SightReduction workbook to load

In the screen above I have selected the SightReductionWilkes.xls workbook as the one from which I want to load sight reductions. Now the center section of the form displays the number of each type of sight available in this workbook. There is a checkbox next to each type of sight. Checkboxes are used to select which type of sight to load from the workbook. It is not possible to select individual sights of a given type. You load all of a given type of sight or none of that type.

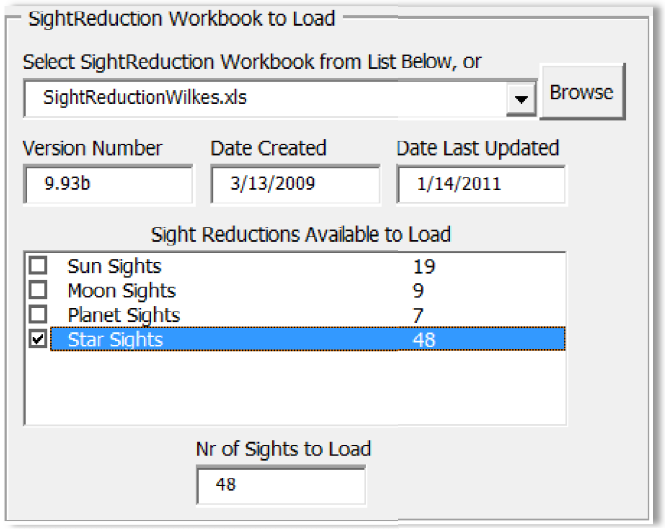


Figure 146, Star Sights Selected

In this case I have selected the 48 star sights in the workbook to load into the active workbook.

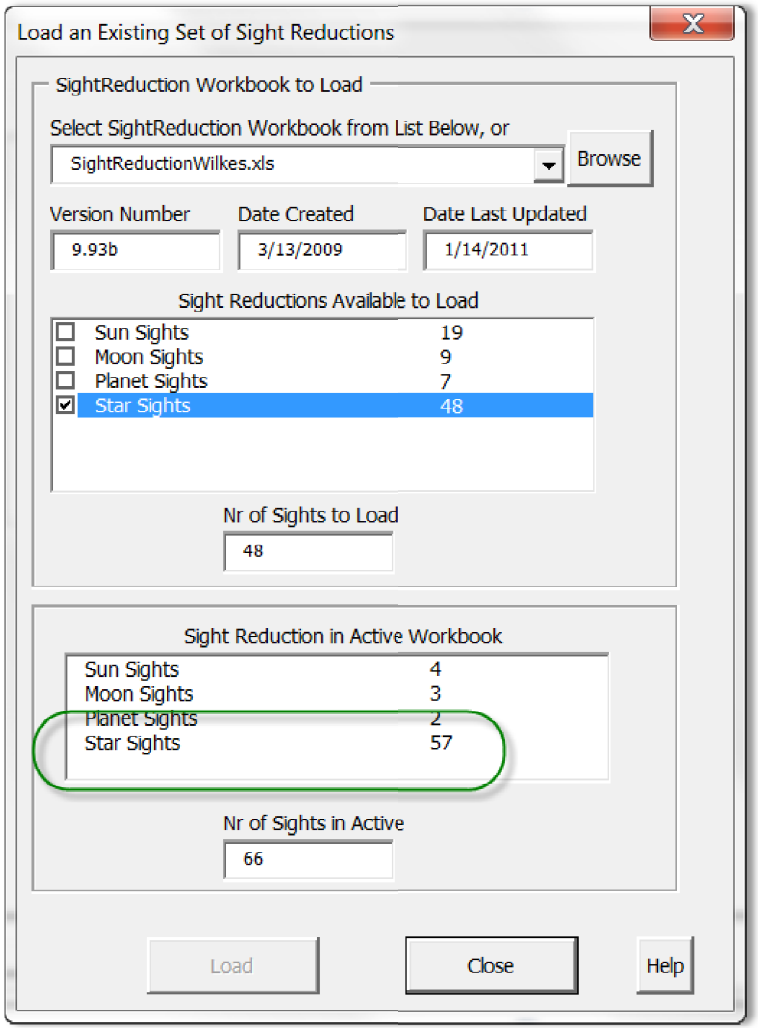


Figure 147, Star Sights Loaded

I clicked the Load button and now there are 57 star sight reductions in the active workbook, up from 9.

Load Ship Log Workbook

When the Load Log tool button is clicked the Load an Existing Ship Log form is activated as shown below.

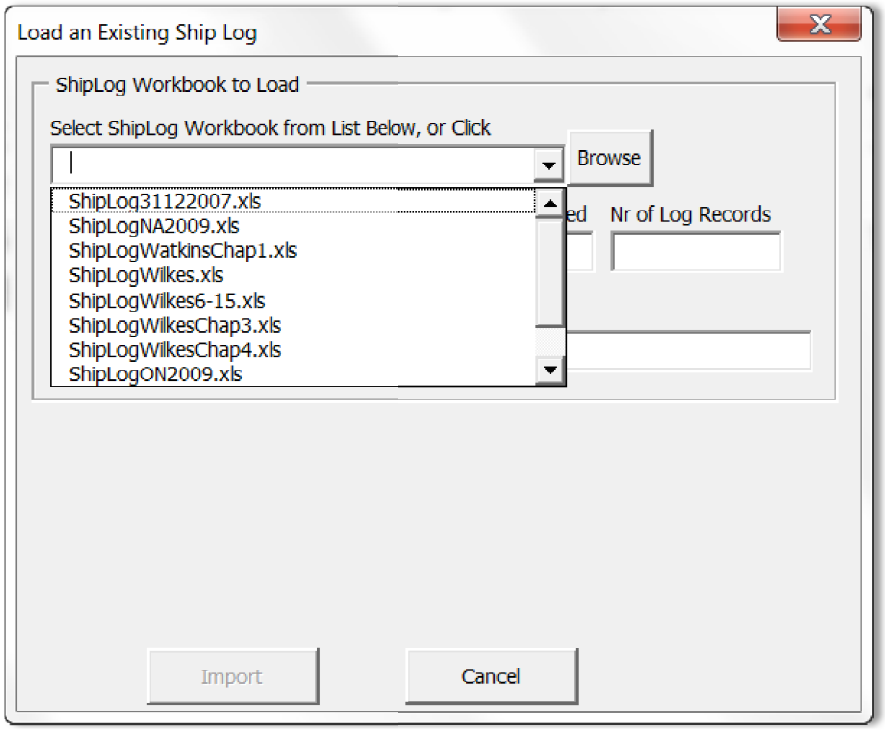


Figure 148, Load Ship Log Form

The Load Log tool can be used to load the contents of one Ship Log workbook into another. This can be done to make a duplicate copy of a ShipLog workbook or merge the contents of two ShipLog workbooks into one. This is more than just a copy process. The Tool should handle differences between program versions that may have added, modified or removed columns from the Ship Log worksheet.
If the active workbook contains one or more log entries the warning message shown below will be displayed.

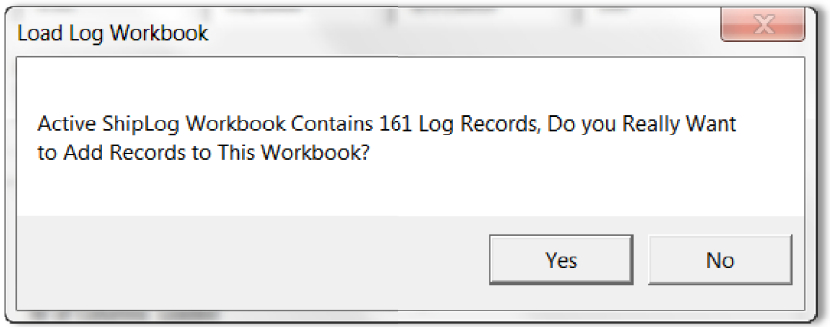


Figure 149, Warning that the Active Workbook is Not a Blank Workbook

If the No button is clicked in response to this message, the Load Ship Log form will close. If the Yes button is clicked, the program proceeds to the selection of the ShipLog workbook to be loaded.

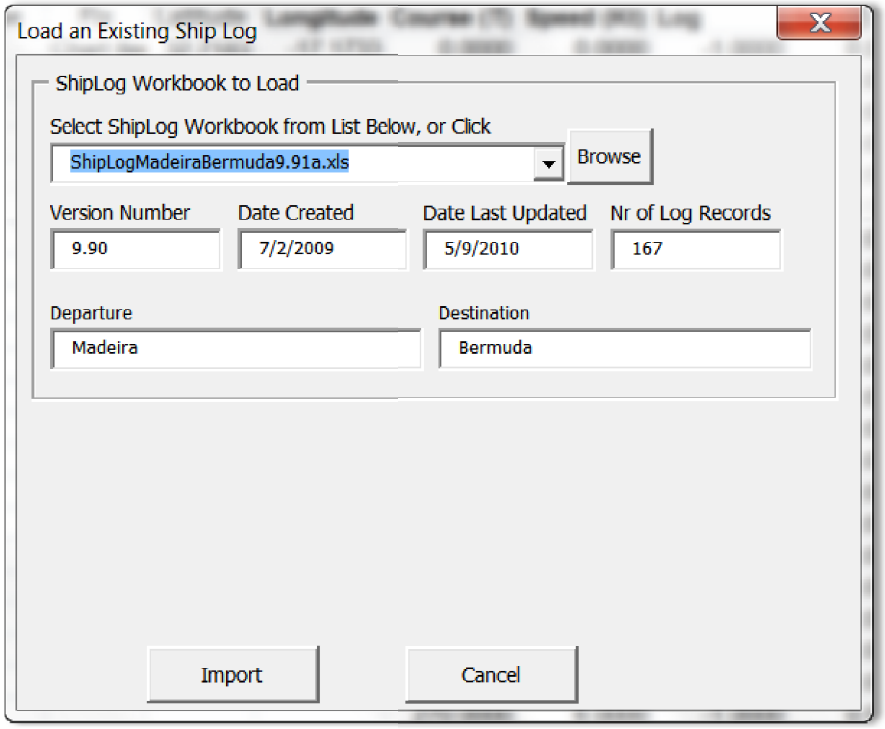


Figure 150, Workbook to Load is Selected

I have selected the ShipLog workbook that contains the log entries for the voyage from Madeira to Bermuda. This workbook has 167 entries. When I click the Import button those log entries will added to those in the active ShipLog workbook.

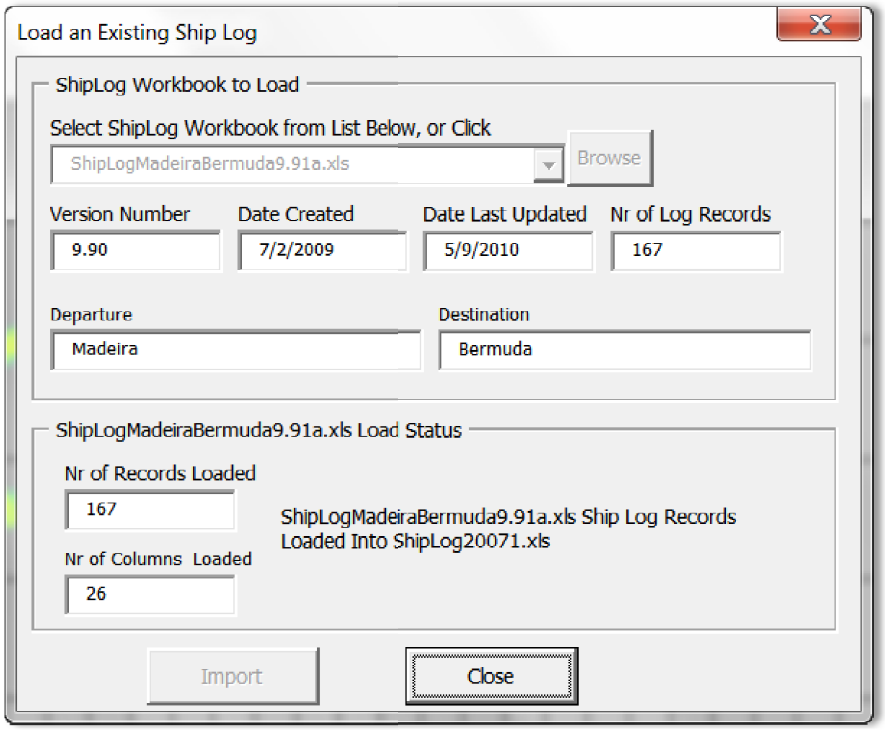


Figure 151, Log Records Loaded into Workbook

The screen above shows that 167 log entries have been loaded into the active workbook. The number of Columns Loaded is a check on the load process. If this number is zero or less than 26 not all, if any, of the log records were successfully loaded into the active workbook. This is a program bug, most likely due to differences in the ShipLog worksheet between program versions that I have not accounted for and should be reported as a bug. When I have sufficient confidence in the Load Log code, I may remove this text box.

Reports Page

The Reports Page will provide a number of reports or printouts of navigation information. Currently (version 9.95) the only reports available are the Nautical Almanac report and the Print Ship Log report.

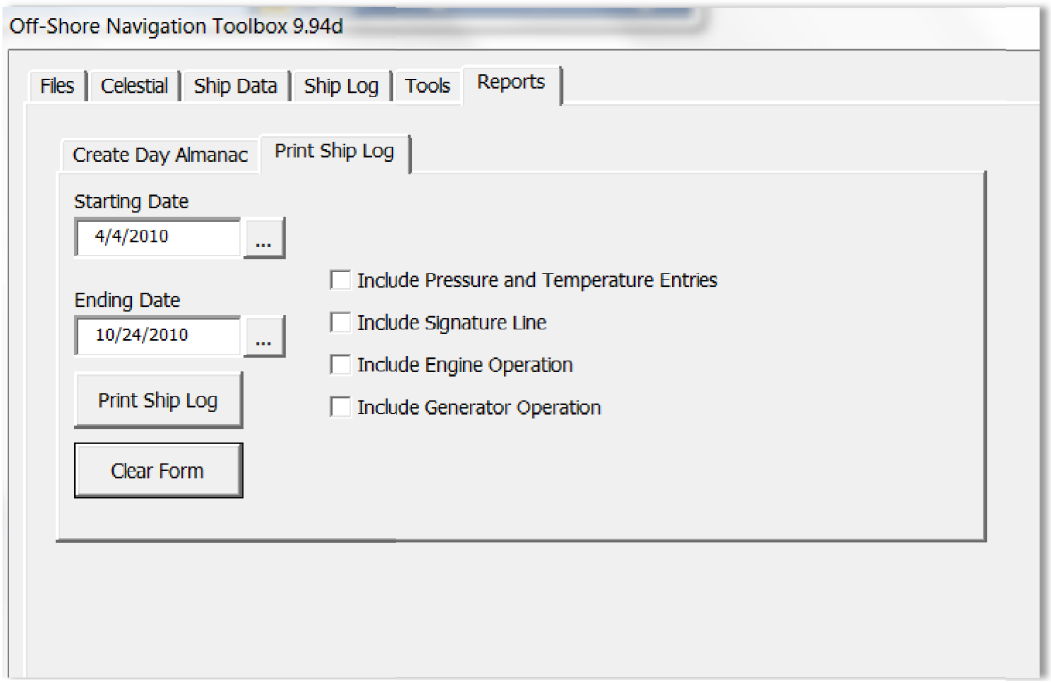


Figure 152: The Reports Page

Nautical Almanac Day Report

The Nautical Almanac Day Report generates most of the information provided on the daily pages of the Nautical Almanac produced jointly by the UK Hydrographic Office and the Naval Observatory. This report generates a printout of the GHA and DEC of the Sun, Venus, Mars, Jupiter and Saturn for each hour in the date range specified for the report. In addition the report contains the GHA of Aries and the SHA and DEC for the selected stars.

Note this page also documents the limits on the size of this report. The current limit (version 9.52 or later) is one year. There is a physical limit of 2,321 days dictated by the maximum number of rows in a MS Excel 2003 worksheet. The effective limit is the amount of computer time you want to dedicate to this function. More than a few days can require many minutes of compute time, even on a powerful system. An entire year could take many hours of compute time.

To create the report, first select the date range for the report by clicking on the "…" button next to the Starting Date field.

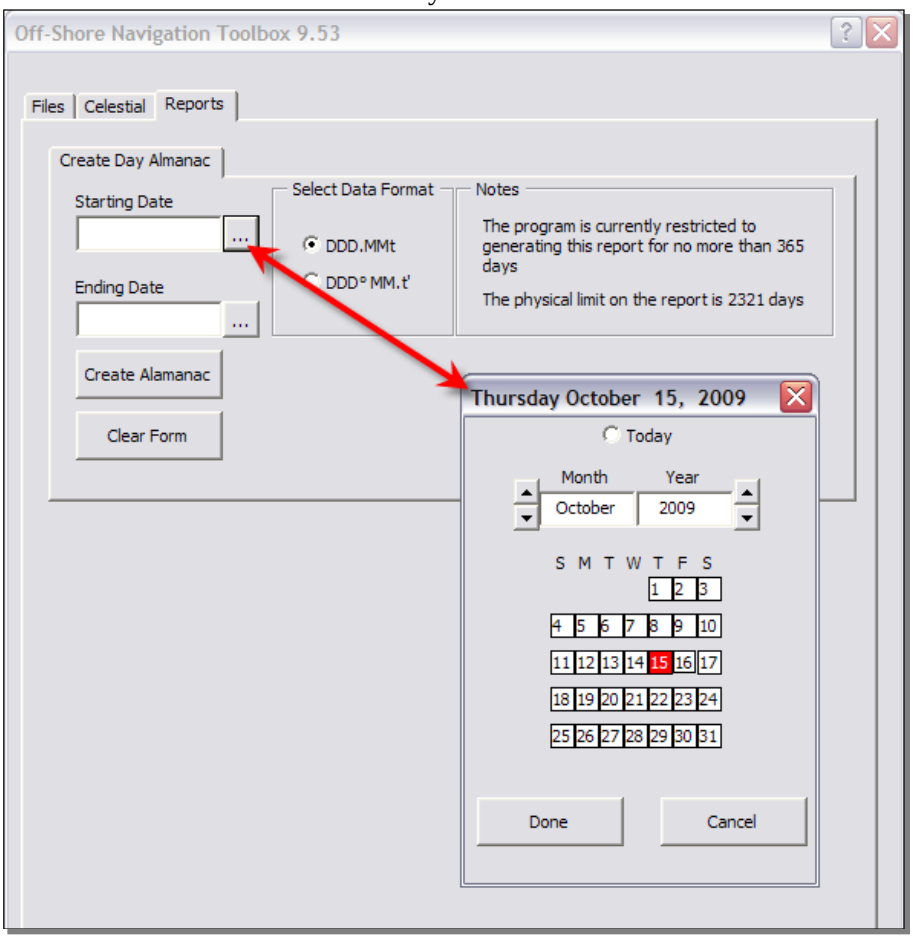


Figure 153: Select the Starting Date

This button opens the calendar window. I have selected Sep 29, 2009 as the starting date for this Almanac Report.

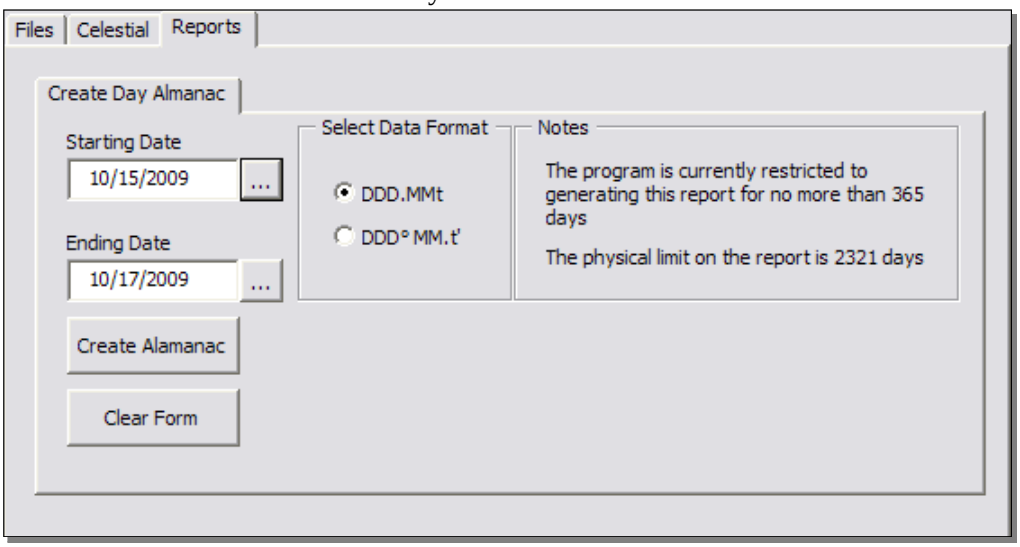


Figure 154: Dates for the Report

When I select the starting date for the report, the program automatically sets the ending date as 2 days later for a 3 day report, similar to the daily pages in the Nautical Almanac. You can change this Ending Date by clicking on the "…" button next to that field. Be aware that generating this report requires a major amount of computation. Just generating the report for 3 days can take nearly a minute on a 1.6 GHz system. The program will allow you generate a report up to one year, but that is not advisable unless you have nothing you want to do on your computer for a couple of hours or more. Generally this application would be used to generate the Almanac daily pages for a limited period of time. For example, it can be used to print the pages for one leg of a voyage that may cover as much as several weeks. Then the Nautical Almanac data would be available in the case of a computer failure, or if you just prefer to do your sight reductions in a traditional manner with table-lookups and not use the computer at all.

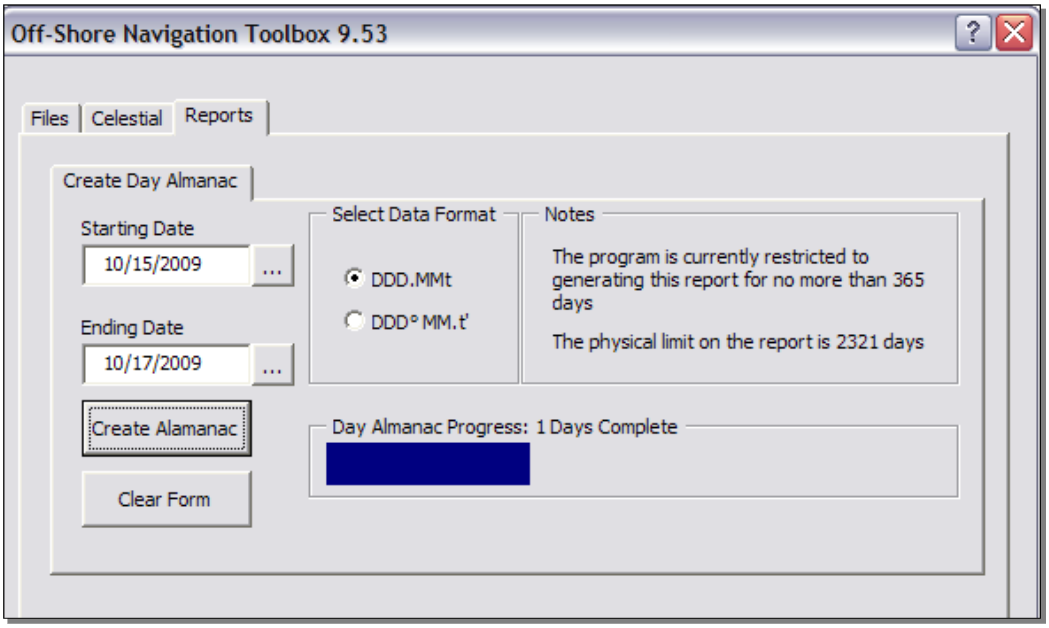
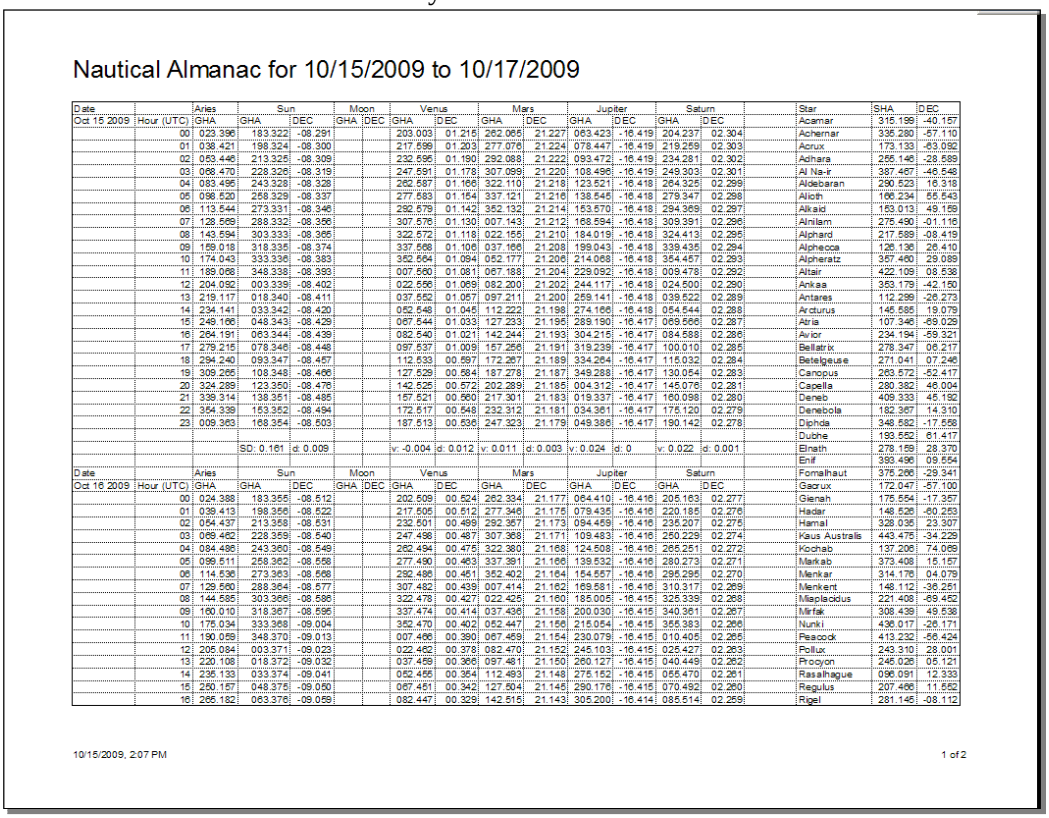


Figure 155, Report Generation in Progress

When I click on the Create Almanac button the report generation process begins. Since this can take a number of seconds, if not a number of minutes, a progress meter is displayed on the form to report progress toward completion.



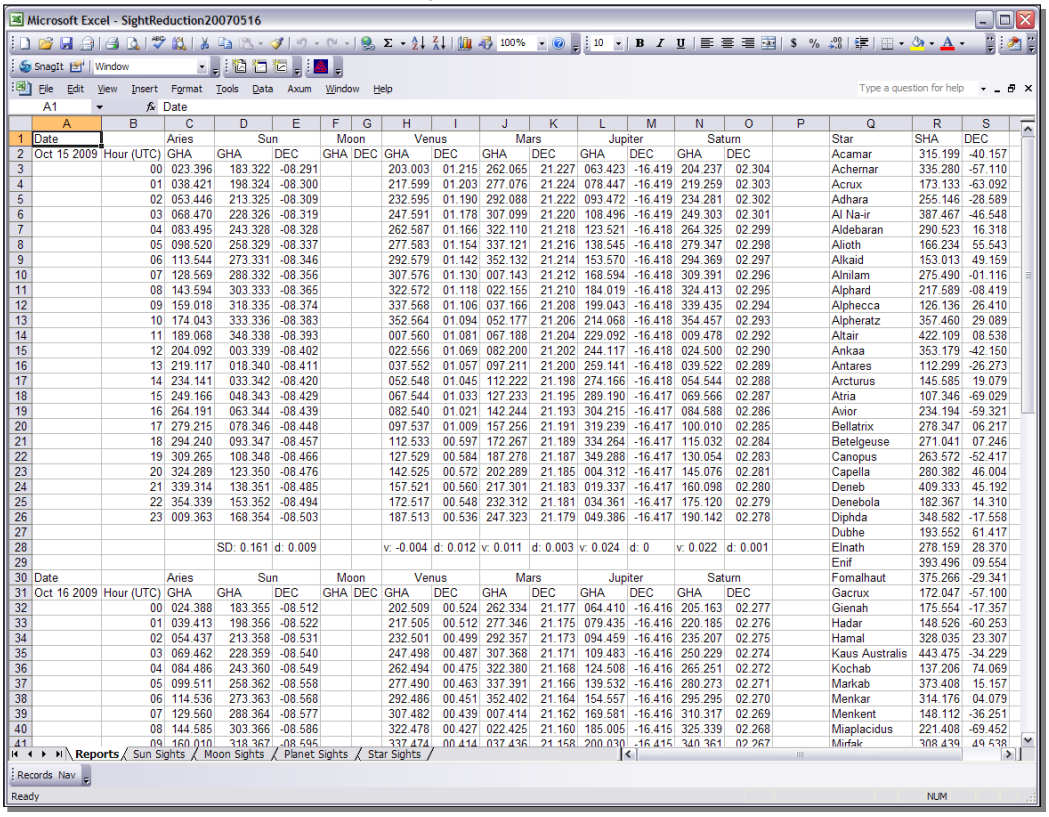
Nautical Almanac for 10/15/2009 to 10/17/2009

Date		Aries	Sun		Moon		Venus		Mars		Jupiter		Saturn			Star	SHA	DEC
Oct 15 2009	Hour (UTC)	GHA	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC		Acamar	315.199	-40.157
	00	023.396	183.322	-08.291			203.003	01.215	262.065	21.227	063.423	-16.419	204.237	02.304		Achernar	335.280	-57.110
	01	038.421	198.324	-08.300			217.599	01.203	277.076	21.224	078.447	-16.419	219.259	02.303		Acrux	173.133	-63.092
	02	053.445	213.325	-08.309			232.196	01.190	292.088	21.222	093.472	-16.419	234.281	02.302		Adhara	255.146	-28.589
	03	068.470	228.326	-08.319			247.591	01.178	307.099	21.220	108.496	-16.419	249.303	02.301		Al Na-ir	387.457	-46.548
	04	083.495	243.328	-08.328			262.587	01.166	322.110	21.218	123.521	-16.418	264.325	02.299		Aldebaran	290.523	16.318
	05	098.520	258.329	-08.337			277.583	01.154	337.121	21.216	138.545	-16.418	279.347	02.298		Alioth	166.234	55.843
	06	113.544	273.331	-08.346			292.579	01.142	352.132	21.214	153.570	-16.418	294.369	02.297		Alkaid	153.013	49.159
	07	128.569	288.332	-08.356			307.576	01.130	007.143	21.212	168.594	-16.418	309.391	02.296		Alnilam	275.490	-01.116
	08	143.594	303.333	-08.365			322.572	01.118	022.155	21.210	184.019	-16.418	324.413	02.295		Alphard	217.589	-08.419
	09	159.018	318.335	-08.374			337.568	01.106	037.166	21.208	199.043	-16.418	339.435	02.294		Alphecca	126.136	26.410
	10	174.043	333.336	-08.383			352.564	01.094	052.177	21.206	214.068	-16.418	354.457	02.293		Alpheratz	357.460	29.089
	11	189.068	348.338	-08.393			007.560	01.081	067.188	21.204	229.092	-16.418	009.478	02.292		Altair	422.109	08.838
	12	204.092	003.339	-08.402			022.556	01.069	082.200	21.202	244.117	-16.418	024.500	02.290		Ankaa	353.179	-42.150
	13	219.117	018.340	-08.411			037.552	01.057	097.211	21.200	259.141	-16.418	039.522	02.289		Antares	112.299	-26.273
	14	234.141	033.342	-08.420			052.548	01.045	112.222	21.198	274.166	-16.418	054.544	02.288		Arcturus	146.585	19.079
	15	249.166	048.343	-08.429			067.544	01.033	127.233	21.195	289.190	-16.417	069.566	02.287		Atria	107.346	-69.029
	16	264.191	063.344	-08.439			082.540	01.021	142.244	21.193	304.215	-16.417	084.588	02.286		Avior	234.194	-59.321
	17	279.215	078.346	-08.448			097.537	01.009	157.256	21.191	319.239	-16.417	100.010	02.285		Bellatrix	278.347	06.217
	18	294.240	093.347	-08.457			112.533	00.597	172.267	21.189	334.264	-16.417	115.032	02.284		Betelgeuse	271.041	07.246
	19	309.265	108.348	-08.466			127.529	00.584	187.278	21.187	349.288	-16.417	130.054	02.283		Canopus	263.572	-52.417
	20	324.289	123.350	-08.476			142.525	00.572	202.289	21.185	004.312	-16.417	145.076	02.281		Capella	280.382	46.004
	21	339.314	138.351	-08.485			157.521	00.560	217.301	21.183	019.337	-16.417	160.098	02.280		Deneb	49.333	45.192
	22	354.338	153.352	-08.494			172.517	00.548	232.312	21.181	034.361	-16.417	175.120	02.279		Denebola	182.367	14.310
	23	009.363	168.354	-08.503			187.513	00.536	247.323	21.179	049.386	-16.417	190.142	02.278		Diphda	348.582	-17.558
																Dubhe	193.552	61.417
			SD: 0.161	d: 0.009			v: -0.004	d: 0.012	v: 0.011	d: 0.003	v: 0.024	d: 0	v: 0.022	d: 0.001		Elnath	278.159	28.370
																Eltanin	90.796	51.489
Date		Aries	Sun		Moon		Venus		Mars		Jupiter		Saturn			Enif	33.746	09.954
Oct 16 2009	Hour (UTC)	GHA	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC		Fomalhaut	15.266	-29.341
	00	024.388	183.355	-08.512			202.509	00.524	262.334	21.177	064.410	-16.416	205.163	02.277		Gacrux	172.047	-57.100
	01	039.413	198.356	-08.522			217.505	00.512	277.346	21.175	079.435	-16.416	220.185	02.276		Gienah	175.554	-17.357
	02	054.437	213.358	-08.531			232.501	00.499	292.357	21.173	094.459	-16.416	235.207	02.275		Hadar	148.526	-60.253
	03	069.462	228.359	-08.540			247.496	00.487	307.368	21.171	109.483	-16.416	250.229	02.274		Hamal	328.036	23.307
	04	084.486	243.360	-08.549			262.494	00.475	322.380	21.168	124.508	-16.416	265.251	02.272		Kaus Australis	443.475	-34.229
	05	099.511	258.362	-08.558			277.490	00.463	337.391	21.166	139.532	-16.416	280.273	02.271		Kochab	137.206	74.089
	06	114.536	273.363	-08.568			292.486	00.451	352.402	21.164	154.557	-16.416	295.295	02.270		Markab	373.408	15.157
	07	129.560	288.364	-08.577			307.482	00.439	007.414	21.162	169.581	-16.416	310.317	02.269		Menkent	148.112	-36.251
	08	144.585	303.366	-08.586			322.478	00.427	022.425	21.160	185.005	-16.415	325.339	02.268		Miaplacidus	221.408	-69.452
	09	160.010	318.367	-08.595			337.474	00.414	037.436	21.158	200.030	-16.415	340.361	02.267		Mirfak	308.439	49.538
	10	175.034	333.368	-09.004			352.470	00.402	052.447	21.156	215.054	-16.415	355.383	02.266		Nunki	436.017	-26.171
	11	190.059	348.370	-09.013			007.466	00.390	067.459	21.154	230.079	-16.415	010.405	02.265		Peacock	413.232	-56.424
	12	205.084	003.371	-09.023			022.462	00.378	082.470	21.152	245.103	-16.415	025.427	02.263		Pollux	243.310	28.001
	13	220.108	018.372	-09.032			037.459	00.366	097.481	21.150	260.127	-16.415	040.449	02.262		Procyon	245.026	05.121
	14	235.133	033.374	-09.041			052.455	00.354	112.493	21.148	275.152	-16.415	055.470	02.261		Rasalhague	096.091	12.333
	15	250.157	048.375	-09.050			067.451	00.342	127.504	21.145	290.176	-16.415	070.492	02.260		Regulus	207.466	11.552
	16	265.182	063.376	-09.059			082.447	00.329	142.515	21.143	305.200	-16.414	085.514	02.259		Rigel	281.145	-08.112

10/15/2009, 2:07 PM 1 of 2

Figure 156: Print Preview of the Nautical Almanac Report

In the Figure above the report has been generated and displayed in MS Excel Print Preview format. If this is the report you want you can print it to paper or to a PDF file (if you have the necessary software).
This report is stored in the Reports worksheet of the active SightReduction Workbook.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Date		Aries	Sun		Moon		Venus		Mars		Jupiter		Saturn			Star	SHA	DEC
2	Oct 15 2009	Hour (UTC)	GHA	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC		Acamar	315.199	-40.157
3		00	023.396	183.322	-08.291			203.003	01.215	262.065	21.227	063.423	-16.419	204.237	02.304		Achernar	335.280	-57.110
4		01	038.421	198.324	-08.300			217.599	01.203	277.076	21.224	078.447	-16.419	219.259	02.303		Acrux	173.133	-63.092
5		02	053.446	213.325	-08.309			232.595	01.190	292.088	21.222	093.472	-16.419	234.281	02.302		Adhara	255.146	-28.589
6		03	068.470	228.326	-08.319			247.591	01.178	307.099	21.220	108.496	-16.419	249.303	02.301		Al Na-ir	387.467	-46.548
7		04	083.495	243.328	-08.328			262.587	01.166	322.110	21.218	123.521	-16.418	264.325	02.299		Aldebaran	290.523	16.318
8		05	098.520	258.329	-08.337			277.583	01.154	337.121	21.216	138.545	-16.418	279.347	02.298		Alioth	166.234	55.543
9		06	113.544	273.331	-08.346			292.579	01.142	352.132	21.214	153.570	-16.418	294.369	02.297		Alkaid	153.013	49.159
10		07	128.569	288.332	-08.356			307.576	01.130	007.143	21.212	168.594	-16.418	309.391	02.296		Alnilam	275.490	-01.116
11		08	143.594	303.333	-08.365			322.572	01.118	022.155	21.210	184.019	-16.418	324.413	02.295		Alphard	217.589	-08.419
12		09	159.018	318.335	-08.374			337.568	01.106	037.166	21.208	199.043	-16.418	339.435	02.294		Alphecca	126.136	26.410
13		10	174.043	333.336	-08.383			352.564	01.094	052.177	21.206	214.068	-16.418	354.457	02.293		Alpheratz	357.460	29.089
14		11	189.068	348.338	-08.393			007.560	01.081	067.188	21.204	229.092	-16.418	009.478	02.292		Altair	422.109	08.538
15		12	204.092	003.339	-08.402			022.556	01.069	082.200	21.202	244.117	-16.418	024.500	02.290		Ankaa	353.179	-42.150
16		13	219.117	018.340	-08.411			037.552	01.057	097.211	21.200	259.141	-16.418	039.522	02.289		Antares	112.299	-26.273
17		14	234.141	033.342	-08.420			052.548	01.045	112.222	21.198	274.166	-16.418	054.544	02.288		Arcturus	145.585	19.079
18		15	249.166	048.343	-08.429			067.544	01.033	127.233	21.195	289.190	-16.417	069.566	02.287		Atria	107.346	-69.029
19		16	264.191	063.344	-08.439			082.540	01.021	142.244	21.193	304.215	-16.417	084.588	02.286		Avior	234.194	-59.321
20		17	279.215	078.346	-08.448			097.537	01.009	157.256	21.191	319.239	-16.417	100.010	02.285		Bellatrix	278.347	06.217
21		18	294.240	093.347	-08.457			112.533	00.597	172.267	21.189	334.264	-16.417	115.032	02.284		Betelgeuse	271.041	07.246
22		19	309.265	108.348	-08.466			127.529	00.584	187.278	21.187	349.288	-16.417	130.054	02.283		Canopus	263.572	-52.417
23		20	324.289	123.350	-08.476			142.525	00.572	202.289	21.185	004.312	-16.417	145.076	02.281		Capella	280.382	46.004
24		21	339.314	138.351	-08.485			157.521	00.560	217.301	21.183	019.337	-16.417	160.098	02.280		Deneb	409.333	45.192
25		22	354.339	153.352	-08.494			172.517	00.548	232.312	21.181	034.361	-16.417	175.120	02.279		Denebola	182.367	14.310
26		23	009.363	168.354	-08.503			187.513	00.536	247.323	21.179	049.386	-16.417	190.142	02.278		Diphda	348.582	-17.558
27																	Dubhe	193.552	61.417
28				SD: 0.161	d: 0.009			v: -0.004	d: 0.012	v: 0.011	d: 0.003	v: 0.024	d: 0	v: 0.022	d: 0.001		Elnath	278.159	28.370
29																	Enif	393.496	09.554
30	Date		Aries	Sun		Moon		Venus		Mars		Jupiter		Saturn			Fomalhaut	375.266	-29.341
31	Oct 16 2009	Hour (UTC)	GHA	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC	GHA	DEC		Gacrux	172.047	-57.100
32		00	024.388	183.355	-08.512			202.509	00.524	262.334	21.177	064.410	-16.416	205.163	02.277		Gienah	175.554	-17.357
33		01	039.413	198.356	-08.522			217.505	00.512	277.346	21.175	079.435	-16.416	220.185	02.276		Hadar	148.526	-60.253
34		02	054.437	213.358	-08.531			232.501	00.499	292.357	21.173	094.459	-16.416	235.207	02.275		Hamal	328.035	23.307
35		03	069.462	228.359	-08.540			247.498	00.487	307.368	21.171	109.483	-16.416	250.229	02.274		Kaus Australis	443.475	-34.229
36		04	084.486	243.360	-08.549			262.494	00.475	322.380	21.168	124.508	-16.416	265.251	02.272		Kochab	137.206	74.069
37		05	099.511	258.362	-08.558			277.490	00.463	337.391	21.166	139.532	-16.416	280.273	02.271		Markab	373.408	15.157
38		06	114.536	273.363	-08.568			292.486	00.451	352.402	21.164	154.557	-16.416	295.295	02.270		Menkar	314.176	04.079
39		07	129.560	288.364	-08.577			307.482	00.439	007.414	21.162	169.581	-16.416	310.317	02.269		Menkent	148.112	-36.251
40		08	144.585	303.366	-08.586			322.478	00.427	022.425	21.160	185.005	-16.415	325.339	02.268		Miaplacidus	221.408	-69.452
41		09	160.010	318.367	-08.595			337.474	00.414	037.436	21.158	200.030	-16.415	340.361	02.267		Mirfak	308.439	49.638

Figure 157: The Reports Worksheet

So you can save the report and print it at a later time without having to re-do all of the computations.

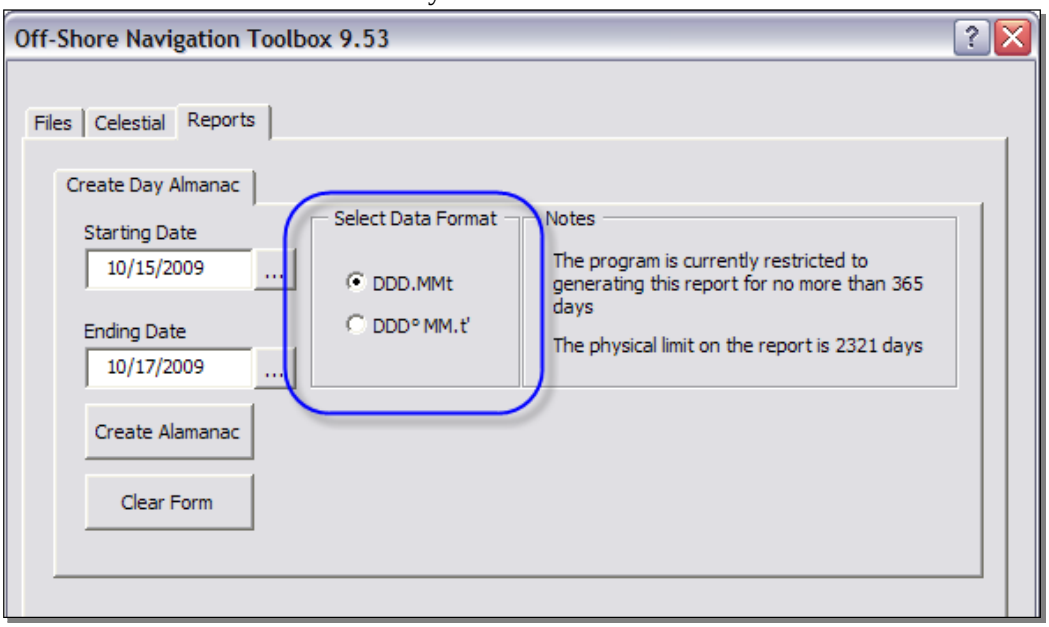


Figure 158: Almanac Format Selection

In the center of the Create Day Almanac sub-page are two radio buttons that allow you to select the format of the values in the Almanac report. The default is the standard data format described in the Data Formats section at the beginning of this document. The second option is print the GHA, SHA and DEC values in a format much closer to that in the Nautical Almanac.

Date		Aries	Sun	
Oct 15 2009	Hour (UTC)	GHA	GHA	DEC
	00	23° 39.6'	183° 32.2'	-8° 29.1'
	01	38° 42.1'	198° 32.4'	-8° 30.0'
	02	53° 44.6'	213° 32.5'	-8° 30.9'
	03	68° 47.0'	228° 32.6'	-8° 31.9'
	04	83° 49.5'	243° 32.8'	-8° 32.8'
	05	98° 52.0'	258° 32.9'	-8° 33.7'
	06	113° 54.4'	273° 33.1'	-8° 34.6'
	07	128° 56.9'	288° 33.2'	-8° 35.6'
	08	143° 59.4'	303° 33.3'	-8° 36.5'
	09	159° 01.8'	318° 33.5'	-8° 37.4'
	10	174° 04.3'	333° 33.6'	-8° 38.3'
	11	189° 06.8'	348° 33.8'	-8° 39.3'
	12	204° 09.2'	3° 33.9'	-8° 40.2'
	13	219° 11.7'	18° 34.0'	-8° 41.1'
	14	234° 14.1'	33° 34.2'	-8° 42.0'
	15	249° 16.6'	48° 34.3'	-8° 42.9'
	16	264° 19.1'	63° 34.4'	-8° 43.9'
	17	279° 21.5'	78° 34.6'	-8° 44.8'
	18	294° 24.0'	93° 34.7'	-8° 45.7'
	19	309° 26.5'	108° 34.8'	-8° 46.6'
	20	324° 28.9'	123° 35.0'	-8° 47.6'
	21	339° 31.4'	138° 35.1'	-8° 48.5'
	22	354° 33.9'	153° 35.2'	-8° 49.4'
	23	9° 36.3'	168° 35.4'	-8° 50.3'
			SD: 0° 16.1'	d: 0° 00.9'

Figure 159: Alternate Data Format
The screen capture above shows the alternate data format.

Because the report is stored in the SightReduction workbook, there must be an active workbook open.

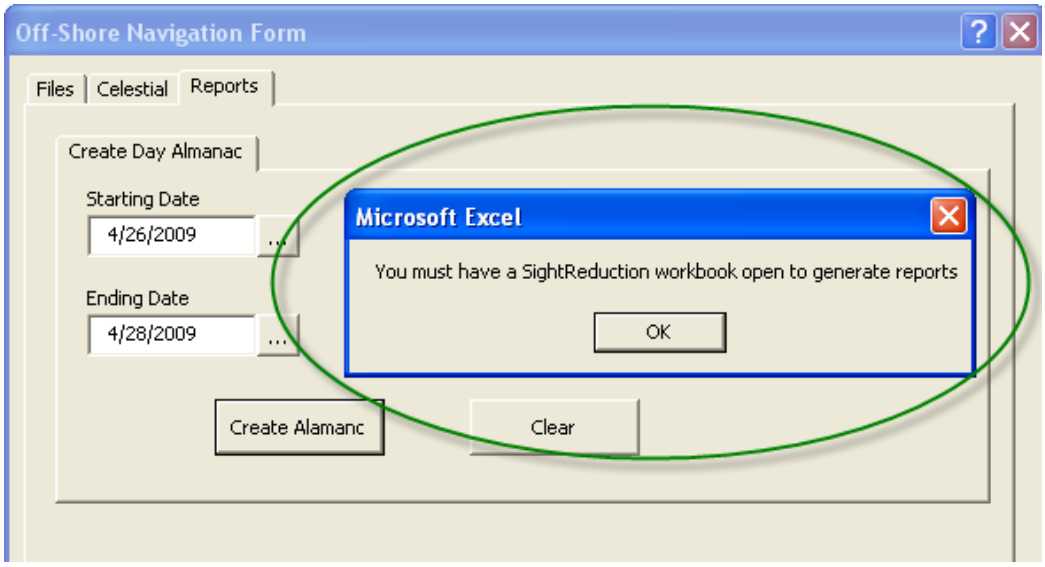


Figure 160: Error Message if SightReduction workbook not Open

If not you will get an error message and no report will be generated.

Ship Log Report

The Ship Log report creates a listing of the entries in the Ship Log.

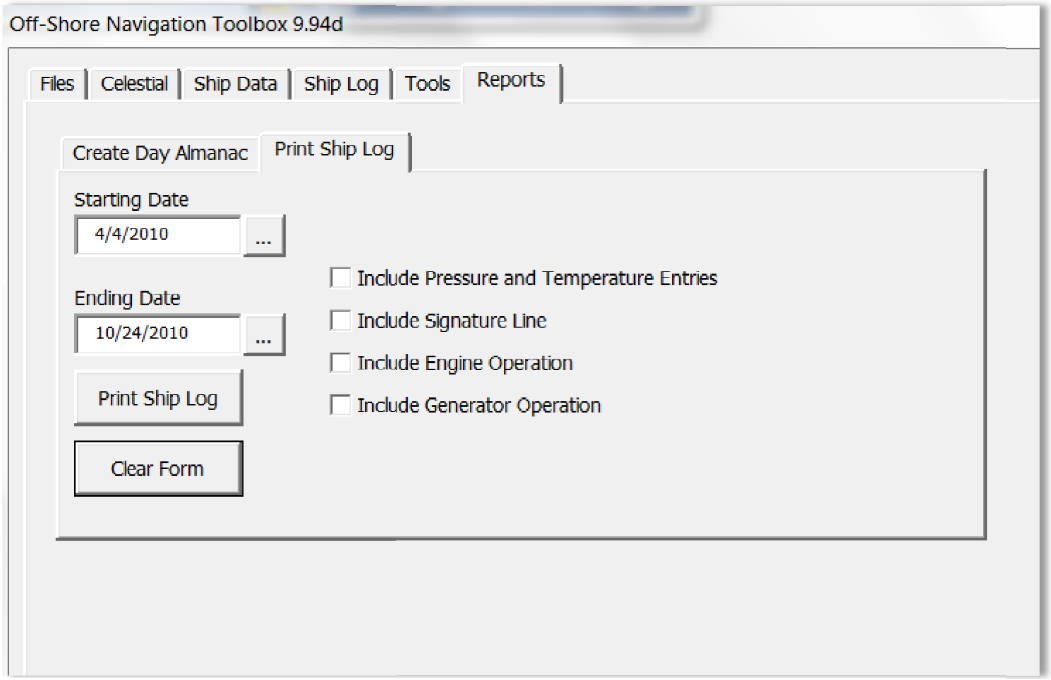


Figure 161, The Ship Log Report

The Ship Log can be printed for any date range covered by the log and there are several options for including or excluding some information. When the Print Ship Log tab is clicked the starting and ending dates of the Ship Log are filled. These dates can be changed by clicking on the "…" buttons next to each date.
There are for options for the report.

- Include Pressure and Temperature Entries. If pressure and temperature values have been enter with the log entries checking this box will include those values in the printout. If these values have not been entered leaving this box unchecked will remove those columns from the report
- Include Signature Line. If this printout will be used as a formal document a signature on each page of the report may be required.
- Include Engine Operation. If the running hours of the engine have been recorded in the Log checking this option will include those hours in the report.
- Include Generator Operation. Same as for the Engine, checking this option will include the Generator hours in the report.

Vessel Name: Whoosh
Documentation Number: (USA)

Ship Log Entries From 4/4/2010 to 10/24/2010

OffShoreNavigationVBA, version: 9.94d
ShipLogWhoosh.xls

Date	Time (UTC)	Type of Entry	Latitude	Longitude	Course (T)	Speed (Kts)	Ship Log	Pressure (MB)	Temperature (C)	Comments	Engine	Generator
4/4/2010	19:21	Fix	0° 53.9'S	89° 36.9'W	0	0	NA	1010	10.008		OFF	OFF
16/04/2010	11:32	Fix	1° 38.0'S	90° 02.0'W	247	0.6	NA	1007	10.008		OFF	OFF
17/04/2010	13:46	Fix	2° 43.0'S	91° 07.0'W	223	7.2	NA	1007	10.008		OFF	OFF
18/04/2010	12:37	Fix	3° 39.0'S	93° 26.0'W	258	6.9	NA	1008	10.008		OFF	OFF
20/04/2010	13:00	Fix	4° 54.0'S	99° 32.0'W	268	7.9	NA	1010	10.008		OFF	OFF
21/04/2010	13:24	Fix	5° 21.0'S	102° 45.0'W	254	7.4	NA	1010	10.008		OFF	OFF
22/04/2010	14:12	Fix	5° 57.0'S	105° 45.0'W	257	7	NA	1009	10.008		OFF	OFF
23/04/2010	15:01	Fix	6° 30.0'S	108° 37.0'W	269	7	NA	1011	10.008		OFF	OFF
24/04/2010	14:02	Fix	6° 56.0'S	111° 18.0'W	271	7.1	NA	1011	10.008		OFF	OFF
25/04/2010	14:07	Fix	7° 18.0'S	113° 57.0'W	251	6.1	NA	1011	10.008		OFF	OFF
26/04/2010	15:19	Fix	7° 37.0'S	116° 35.0'W	267	5.5	NA	1011	10.008		OFF	OFF
27/04/2010	13:58	Fix	8° 00.0'S	118° 41.0'W	251	6.2	NA	1011	10.008		OFF	OFF
28/04/2010	13:49	Fix	8° 20.0'S	121° 00.0'W	271	5	NA	1011	10.008		OFF	OFF
29/04/2010	15:08	Fix	8° 46.0'S	123° 29.0'W	269	5.5	NA	1011	10.008		OFF	OFF
30/04/2010	12:37	Fix	8° 50.0'S	125° 34.0'W	267	6.2	NA	1011	10.008	Beautiful nites and full moon ... but lite winds make 5 kts. look quick	OFF	OFF
1/5/2010	13:05	Fix	9° 05.0'S	128° 04.0'W	281	6	NA	1011	10.008		OFF	OFF
2/5/2010	13:28	Fix	9° 27.0'S	130° 19.0'W	258	5.6	NA	1011	10.008	Just cracked 500 nm to go. Boat & crew doing well	OFF	OFF
3/5/2010	13:30	Fix	9° 44.0'S	132° 17.0'W	258	3	NA	1011	10.008		OFF	OFF
4/5/2010	14:50	Fix	9° 49.0'S	134° 20.0'W	269	5.5	NA	1010	10.008		OFF	OFF
5/5/2010	14:09	Fix	9° 52.0'S	136° 36.0'W	262	5.7	NA	1010	10.008		OFF	OFF
6/5/2010	20:16	Fix	9° 48.2'S	139° 01.8'W	262	5.7	NA	1010	10.008		OFF	OFF
13/05/2010	16:47	Fix	9° 54.5'S	139° 06.3'W	0	0	NA	1010	10.008	Gorgeous setting, white sand palm-fringed beach; what color blue IS THAT?!	OFF	OFF
15/05/2010	19:25	Fix	9° 21.0'S	140° 06.0'W	0	0	NA	1010	10.008	Anchored off Hakahatau's small village on Ua Pou	OFF	OFF
16/05/2010	3:20	Fix	8° 56.7'S	140° 09.8'W	0	0	NA	1010	10.008	Shifted to Daniel's Bay on Nuka Hiva; paradise! No surge...and what a view!	OFF	OFF
20/05/2010	1:33	Fix	8° 55.0'S	140° 06.1'W	0	0	NA	1010	10.008	Getting veggies baguettes before departing for the "Toots" (Tuamotos)	OFF	OFF
22/05/2010	15:39	Fix	8° 55.0'S	140° 06.1'W	0	0	NA	1010	10.008	Departing for the Tuamotus; ETA Wednesday morning	OFF	OFF
23/05/2010	16:06	Fix	10° 41.0'S	141° 23.0'W	219	6.1	NA	1010	10.008	Enroute Kauehi - we think - but with a weather system on the way...	OFF	OFF
24/05/2010	15:53	Fix	11° 58.0'S	142° 21.0'W	220	3	NA	1010	10.008	Enroute Kauehi but have lost most of our wind. ETA Wed or Thurs;	OFF	OFF
25/05/2010	17:03	Fix	14° 00.0S	143° 56.0'W	218	5.6	NA	1010	10.008	Enroute Kauehi & wind has filled in; arrival expected Wed a.m.;	OFF	OFF
26/05/2010	21:44	Fix	15° 49.6'S	145° 07.2'W	0	0	NA	1010	10.008	Arrived village on Kauehi Wed a.m. after surviving first atoll pass	OFF	OFF
30/05/2010	15:50	Fix	15° 49.6'S	145° 07.2'W	0	0	NA	1010	10.008	Happy Mother's Day to all you mothers... and even celebrated here;	OFF	OFF
31/05/2010	1:13	Fix	15° 49.6'S	145° 07.2'W	0	0	NA	1010	10.008	Departing Monday dawn for Fakarava Atoll - a day hop;	OFF	OFF
31/05/2010	16:39	Fix	15° 49.6'S	145° 07.2'W	0	0	NA	1010	10.008	One more day berfore departing for Fakarava Atoll;	OFF	OFF
1/6/2010	17:02	Fix	15° 49.6'S	145° 07.2'W	0	0	NA	1010	10.008	Still at Kauehi due to a massive lightning storm followed by	OFF	OFF
3/6/2010	15:21	Fix	16° 03.0'S	145° 37.0'W	0	0	NA	1010	10.008	Anchored off main village on Fakarava as weather settles down;	OFF	OFF
5/6/2010	1:45	Fix	16° 03.6'S	145° 37.3'W	0	0	NA	1010	10.008		OFF	OFF
8/6/2010	19:01	Fix	15° 48.2'S	146° 09.1'W	0	0	NA	1010	10.008	Remaining at Toau in the absence of E'ly Trades for many days now...;	OFF	OFF
12/6/2010	16:43	Fix	16° 43.6'S	147° 59.0'W	0	0	NA	1010	10.008	Underway for Pape'ete, Tahiti - ETA Sunday morning	OFF	OFF
13/06/2010	20:21	Fix	17° 32.4'S	149° 34.2'W	0	0	NA	1010	10.008	Berthed right on the waterfront of downtown Pape'ete, Tahiti -- Wow!;	OFF	OFF
19/06/2010	23:08	Fix	17° 29.0'S	149° 51.0'W	0	0	NA	1010	10.008	Anchored amidst the gaggle of Pacific Puddle Jumper rally boats;	OFF	OFF
20/06/2010	23:06	Fix	17° 34.0'S	149° 37.0'W	0	0	NA	1010	10.008	Fun's over for now; back to logistics and boat work in/near Pape'ete;	OFF	OFF
24/06/2010	15:50	Fix	17° 29.4'S	149° 51.2'W	0	0	NA	1010	10.008	Anchored amidst the gaggle of Pacific Puddle Jumper rally boats;	OFF	OFF
6/7/2010	19:34	Fix	17° 29.5'S	149° 51.1'W	0	0	NA	1010	10.008	On the way to Huahine...but via gorgeous Moorea, one more time;	OFF	OFF
7/7/2010	21:06	Fix	16° 45.0'S	150° 57.0'W	0	0	NA	1010	10.008	Departed Tahiti for Huahine & the Leewards; torn main next	OFF	OFF
8/7/2010	2:49	Fix	16° 45.8'S	150° 57.6'W	0	0	NA	1010	10.008	Departed Tahiti for Huahine the Leewards; torn main next job aboard;	OFF	OFF
14/07/2010	1:52	Fix	16° 43.0'S	151° 29.0'W	0	0	NA	1010	10.008	Boisterous sail to Raiatea after which we had to go hide from	OFF	OFF
14/07/2010	2:45	Fix	16° 43.9'S	151° 29.4'W	0	0	NA	1010	10.008	Boisterous sail to Raiatea after which we had to go hide from the wind	OFF	OFF
17/07/2010	0:03	Fix	16° 38.0'S	151° 29.0'W	0	0	NA	1010	10.008	Escaped 3 days of rain, fog & wind bullets; now enjoying Tahaa;	OFF	OFF
19/07/2010	18:46	Fix	16° 38.1'S	151° 29.3'W	0	0	NA	1010	10.008	Escaped 3 days of rain, fog wind bullets; now enjoying Taha'a	OFF	OFF
21/07/2010	16:38	Fix	16° 43.6'S	151° 26.8'W	0	0	NA	1010	10.008	Med moored in Uturoa's marina, prepping for the jump to Suwarrow	OFF	OFF
25/07/2010	3:01	Fix	16° 40.0'S	152° 14.0'W	0	0	NA	1010	10.008		OFF	OFF
25/07/2010	15:49	Fix	16° 16.0'S	153° 21.0'W	291	6.3	NA	1010	10.008		OFF	OFF
30/07/2010	23:29	Fix	13° 14.0'S	163° 06.0'W	291	6.3	NA	1010	10.008	Tedious, slow & uncomfortable...but now anchored in Beautiful	OFF	OFF
31/07/2010	20:57	Fix	13° 14.9'S	163° 06.5'W	0	0	NA	1010	10.000	Tedious, slow uncomfortable...but now anchored in Beautiful Suwarrow	OFF	OFF

Signature and Date:

2/14/2011, 4:26 PM
Page 1 of 2

Figure 162, Ship Log Printout

When the Print Ship Log button is clicked the specified contents of the log are displayed in Excel Print Preview as shown above.