Chapter 11: Utilities

WinFrog's main menu includes a **Utilities** category that provides several tools that can be used to perform various frequently required survey operations. Included in the **Utilities** category are the following options:

Geo/Grid Coordinate Conversion	Use this utility to convert geographical (latitude/longitude) coordinates to grid (Northing/Easting) coordinates and vice versa.
KP/Coordinate Conversion	Use this utility to convert KP (Kilometer Post) values to geographical (latitude/longitude) or grid (Northing/Easting) coordinates and vice versa.
WGS84/Working Datum Transformation	Use this utility to convert WGS84 geographical (latitude/longitude) coordinates to the working datum geographical (latitude/longitude) coordinates and vice versa.
Forward/Inverse Calculation	Use this utility to calculate coordinates of a new point from a fixed point (latitude/longitude or Northing/Easting) by entering range and bearing values. This utility can also be used to calculate true and grid bearing and distance between two coordinates.
LOP/Position Calculation	Use this utility to calculate a position from either geographic slope ranges or acoustic two-way-travel-times (TWTT) from fixed transponder stations currently in the Working Xponder file. If TWTT data is used, you can select between using the Working Velocity file or entering velocity values for each TWTT entered. The calculation can also be performed in reverse, that is, calculate geographic slope ranges and TWTTs from an entered position to fixed transponder stations currently in the Working Xponder file.
Acoustics	Three utilities are available here: 1) Sound Velocity Enter two depths; velocity is calculated

	using the current working velocity file. 2) Digiquartz Depth Enter depth and temperature count and observation time. Select parameters from a Digiquartz equipped COMPATT or enter manually. Depth is calculated using UNESCO formula or given density. 3) Pressure Depth and Sound Velocity Enter pressure or depth and latitude to calculate the other using the UNECSO formula. Specific ocean corrections can also be applied. As well, enter temperature and salinity and sound velocity is calculated using several different formulae. The pressure entered is to be the absolute pressure minus atmospheric pressure. If the depth is entered, the calculated pressure does not include atmospheric pressure.
Map Wizard	Use this utility to create a Blue Marble Map (*.BMM) file for use as a background image in a Graphics window.
Plotter Base Map Wizard	Use this utility for base map configuration when using the Roland DPX-4600 plotter device.
Generate DXF Map	Use this utility to generate a map in the **.DXF** file format.
Generate MGD77 File	Use this utility to generate a file in the **MGD77** format.
Time Conversion	Use this utility to convert PC Time (the number of seconds since 00:00:00.0, Jan. 1, 1970) to ASCII Time (MM:DD:YY HH:MM:SS.S)
Position Averaging	Use this utility to record position information and generate average position and standard deviation values.
Import Bathymetry	Use this utility to convert ASCII x,y,z bathymetry data into a WinFrog formatted soundings database file that can be displayed in the WinFrog Profile window.

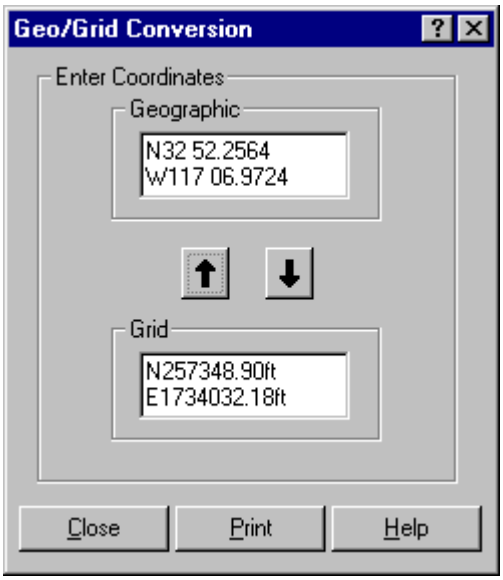
The following sections explain each of these utilities in detail, in the order that they are listed above.

Geo/Grid Conversion

Use this WinFrog utility to convert geographical (latitude/longitude) coordinates to grid (Northing/Easting) coordinates and vice versa.

To Convert Geographic Coordinates to Grid Coordinates

1 From the **Utilities** menu, choose **Geo/Grid Conversion**. The **Geo/Grid Conversion** dialog window displays, as seen below.



2 Highlight the latitude value displayed in the **Geographic** field.

3 Press the **Delete** key on the keyboard.

4 Enter the desired latitude by typing the appropriate letter (**N** for North or **S** for South) followed by the value in the format specified in the main menu item **Configure >Units** (i.e. **dd mm.mmmm** or **ddd mm ss.ss)**.

5 Highlight the longitude value displayed in the **Geographic** field.

6 Press the **Delete** key on the keyboard.

7 Enter the desired longitude by typing the appropriate letter (**E** for East or **W** for West) followed by the value in the format specified in the main menu item **Configure >Units** (i.e. **dd mm.mmmm** or **ddd mm ss.ss)**.

8 Click the "**down**" arrow button to perform the conversion to grid coordinates. The grid coordinates (as configured in **Working Geodetics**) are displayed in the **Grid** field.

Note: if the format of the geographical coordinates entered is not correct, the conversion will produce incorrect grid values. To confirm that the

coordinates are entered in the correct format, click the "**up**" arrow to re-calculate the geographical coordinates from the grid values. The geographical coordinates will not change if the values were entered correctly.

To Convert from Grid Coordinates to Geographic Coordinates

1 From the **Utilities** menu, choose **Geo/Grid Conversion**.

2 Highlight the Northing value displayed in the **Grid** entry window.

3 Press the **Delete** key on the keyboard.

4 Enter the desired Northing by typing **N** followed by the numerical value (as specified in **Configure > Geodetics)**.

5 Highlight the displayed Easting value displayed in the **Grid** entry window.

6 Enter the desired Easting by typing **E** followed by the numerical value (as specified in **Configure > Geodetics)**.

7 Click the "**up**" arrow button to perform the conversion to geographic coordinates. The geographic coordinates are displayed in the **Geographic** field.

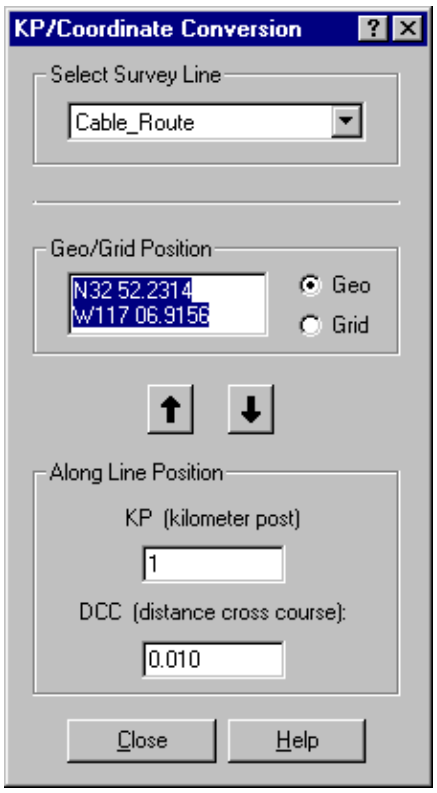
Note: if the format of the grid coordinates entered is not correct, the conversion will produce incorrect geographical values. To confirm that the coordinates are entered in the correct format, click the "**down**" arrow to re-calculate the grid coordinates from the geographical values. The grid coordinates will not change if the values were entered correctly.

KP/Coordinate Conversion

Use this WinFrog utility to convert KP (kilometer post) values to geographical (latitude/longitude) or grid (Northing/Easting) coordinates and vice versa. This utility is used primarily in cable laying operations, where cable positions are referenced using both of these systems.

To Convert KP Values to Geographical/Grid Coordinates

1 From the **Utilities** menu, choose **KP/Coordinate Conversion**. The **KP/Coordinate Conversion** dialog window displays, as seen in the next figure.



2 Select the appropriate survey line from the **Select Survey Line** dropdown menu.

3 Highlight the **KP** (kilometer post) value from the **Along Line Position** window.

4 Press the **Delete** key on the keyboard.

5 Enter the desired **KP** value (in units of Kilometers).

6 Highlight the displayed **DCC** (distance cross course) value.

7 Enter the desired **DCC** value.

Note: this entry is required in units of kilometers, with the appropriate mathematical sign. Positions that are to the port side of the survey line are entered as negative values, while starboard positions are entered as positive.

8 Click the "**up**" arrow button to perform the conversion to geographic/grid coordinates.

Note: if the format of the KP and DCC values entered is not correct, the conversion will produce incorrect geographic/grid coordinate values. To confirm that the coordinates are entered in the correct format, click the "**down**" arrow to re-calculate the KP values from the geographical/grid values. The KP and DCC values will not change if the entries were made correctly.

To Convert Geographical/Grid Coordinates to KP Values

1 From the **Utilities** menu, choose **KP/Coordinate Conversion**. The **KP/Coordinate Conversion** dialog window displays, as seen in the figure above.

2 Select the appropriate survey line from the **Select Survey Line** dropdown menu.

3 Select the appropriate **Geo** or **Grid** button to define how the coordinates will be entered.

4 Highlight the latitude (or Northing) value from the **Geo/Grid Position** window.

5 Press the **Delete** key on the keyboard.

6 Type the desired latitude (or Northing) value.

7 Highlight the longitude (or Easting) value from the **Geo/Grid Position** window.

8 Press the **Delete** key on the keyboard.

9 Type the desired longitude (or Easting) value.

10 Click the "**down**" arrow button to perform the conversion from geographic/grid coordinates to KP/DCC values.

Note: if the format of the geographic/grid coordinate values entered is not correct, the KP and DCC values produced will be incorrect. To confirm that the coordinates are entered in the correct format, click the "**up**" arrow to re-calculate the geographical/grid values from the KP values. The coordinates will not change if the values were entered correctly.

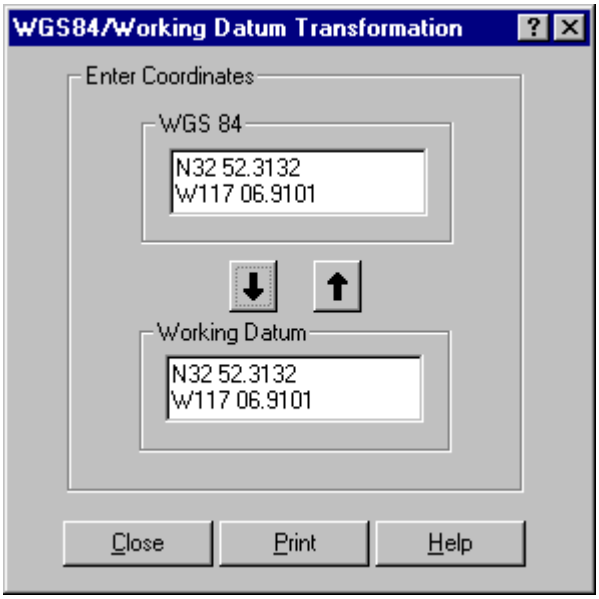
Datum Transformations

Use this utility to convert geographic coordinates between WGS84 and the currently configured working datum. This utility is used most often to convert the WGS84 position displayed on a GPS receiver to coordinates in the working datum and vice versa.

Select the main menu item **Configure > Geodetics** to confirm the working geodetics settings. See the **Configuring Geodetics and Units** chapter for more information on **Geodetics**.

To Convert Coordinates from WGS84 to the Working Datum

1 From the **Utilities** menu, choose **WGS84 Working Datum Transformation**.



2 Highlight the latitude value displayed in the **WGS 84** field.

3 Press the **Delete** key on the keyboard.

4 Enter the desired **WGS 84 Latitude** by typing **N** or **S** followed by the coordinates in the format specified under the main menu item **Configure > Units > Coordinates**.

5 Highlight the longitude value displayed in the **WGS 84** field.

6 Enter the desired **WGS 84** longitude by typing **W** or **E** followed by the coordinates in the format specified under the main menu item **Configure >Units> Coordinates**.

7 Click the "**down**" arrow button to perform the conversion. WinFrog displays the results in the **Working Datum** field.

Note: if the format of the geographic/grid coordinate values entered is not correct, the calculated coordinate values produced will be incorrect. To confirm that the coordinates are entered in the correct format, click the "**up**" arrow to re-calculate the **WGS84** values. The coordinates will not change if the values were entered correctly.

To Convert Working Geodetic Datum Coordinates to WGS84

1. From the **Utilities** menu, choose **WGS84 / Working Datum Transformation**.
2. Highlight the latitude value displayed in the **Working Datum** field.
3. Press the **Delete** key on the keyboard.
4. Enter the desired **Working Datum** latitude by typing **N** or **S** followed by the coordinates in the format specified under the main menu item **Configure > Units > Coordinates**.
5. Highlight the longitude value displayed in the **WGS 84** field.
6. Enter the desired **Working Datum** longitude by typing **W** or **E** followed by the coordinates in the format specified under the main menu item **Configure > Units > Coordinates**.
7. Click the "**up**" arrow button to perform the conversion. WinFrog displays the results in the **WGS 84** field.

   Note: if the format of the geographic/grid coordinate values entered is not correct, the calculated coordinate values produced will be incorrect. To confirm that the coordinates are entered in the correct format, click the "**down**" arrow to re-calculate the **Working Datum** values. The coordinates will not change if the values were entered correctly.

Forward/Inverse Calculations

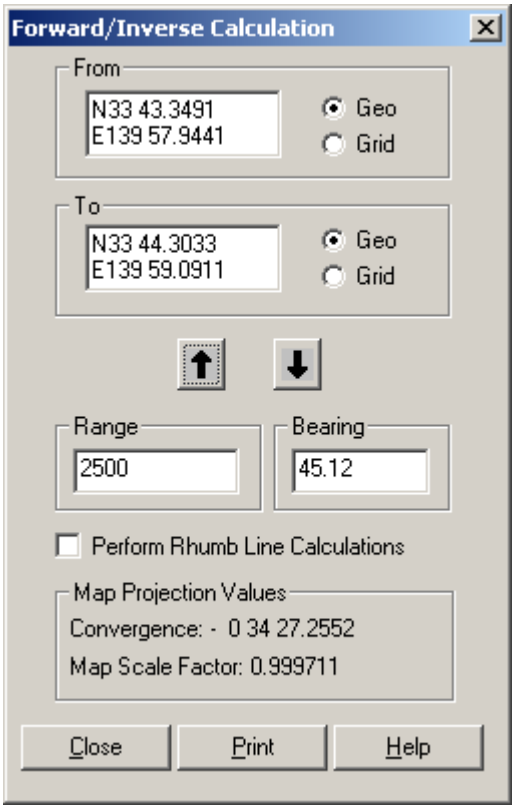
Use this utility to calculate coordinates of a new point from a known point (latitude/longitude or Northing/Easting) by entering **Range** and **Bearing** values. This is known as a **Forward** calculation. This utility can also calculate the **True** and **Grid Bearing** and **Distance** between two known coordinates. This is known as an **Inverse** calculation.

In both cases, the calculation is performed either on the Map Projection Grid or Working Ellipsoid depending upon which coordinate type is selected, **Grid** or **Geo** respectively. The exception to this is if the **Perform Rhumb Line Calculations** option is selected, in which case the Inverse or Forward calculation is performed using geographic coordinates and Rhumb Line algorithms. Note that these Rhumb Line calculations are independent of the current Working Map

Projection but are performed based on the current Working Ellipsoid.

To Calculate the Range and Bearing from One Known Point to Another Known Point

1 From the Utilities menu, choose Forward/Inverse Calculation.



2 In the **From** area of the **Forward/Inverse Calculation** dialog box, select either the **Geo** or **Grid** radio button, depending on which calculation method is to be used.

Note: there can be a significant difference in the calculated **Bearing** and **Distance** depending on which option (**Grid** or **Geo**) is chosen. When you select the **Grid** button, instructs WinFrog to generate **Grid** bearings and distances, which differ from **True** bearings and distances by varying amounts, depending on the location of the points (see below). Alternatively, select the **Perform Rhumb Line Calculations** checkbox to use Rhumb Line inverse algorithms.

Ensure that the correct coordinate option is selected.

3 Enter the coordinates of the first point into the blank fields of the **From** area.

See Steps **2** through **6** in either of the two procedures described in the **Coordinate Conversions** sections earlier in this chapter.

4 In the **To** dialog box, enter the coordinates of the second point.

5 Click the "**down**" arrow button.

The results of the calculation are displayed in the **Range** and **Bearing** fields at the bottom of the **Forward/Inverse** dialog box. The **Range** will be in the same units configured in the Working Datum Projection. The **Bearing** is in decimal degrees format (i.e. **ddd.dddd)**.

Also displayed are the calculated **Convergence** and the **Map Scale Factor**.

Note: Convergence = Geo or True Bearing - Grid Bearing

Map Scale Factor = Map Projection Distance/True Distance.

To Calculate the Coordinates of a Point by Entering a Range and Bearing from a Known Coordinate

1 From the **Utilities** menu, choose **Forward/Inverse Calculation**.

2 In the **From** area of the **Forward/Inverse Calculation** dialog box, select either the **Geo** or **Grid** radio button.

Note: there can be a significant difference in the calculated point position depending on which option (**Grid** or **Geo**) is chosen. Select the **Grid** button to instruct WinFrog to use **Grid Bearings** and **Distances**, which differ from **True Bearings** and **Distances** by varying amounts, depending on the location of the points. Ensure that the correct coordinate option is selected. Alternatively, select the **Perform Rhumb Line Calculations** checkbox to use Rhumb Line direct algorithms.

3 Enter the coordinates of the first point into the blank fields of the **From** area.

See Steps **2** through **6** in either of the two procedures described in the **Coordinate Conversions** sections earlier in this chapter.

4 Type the **Range** value into the **Range** entry window. Ensure that the correct distance units are entered.

5 Type the **Bearing** value into the **Bearing** entry window. The **Bearing** must be in decimal degrees (i.e. **ddd.dddd** format).

6 Click the "**up**" arrow button.

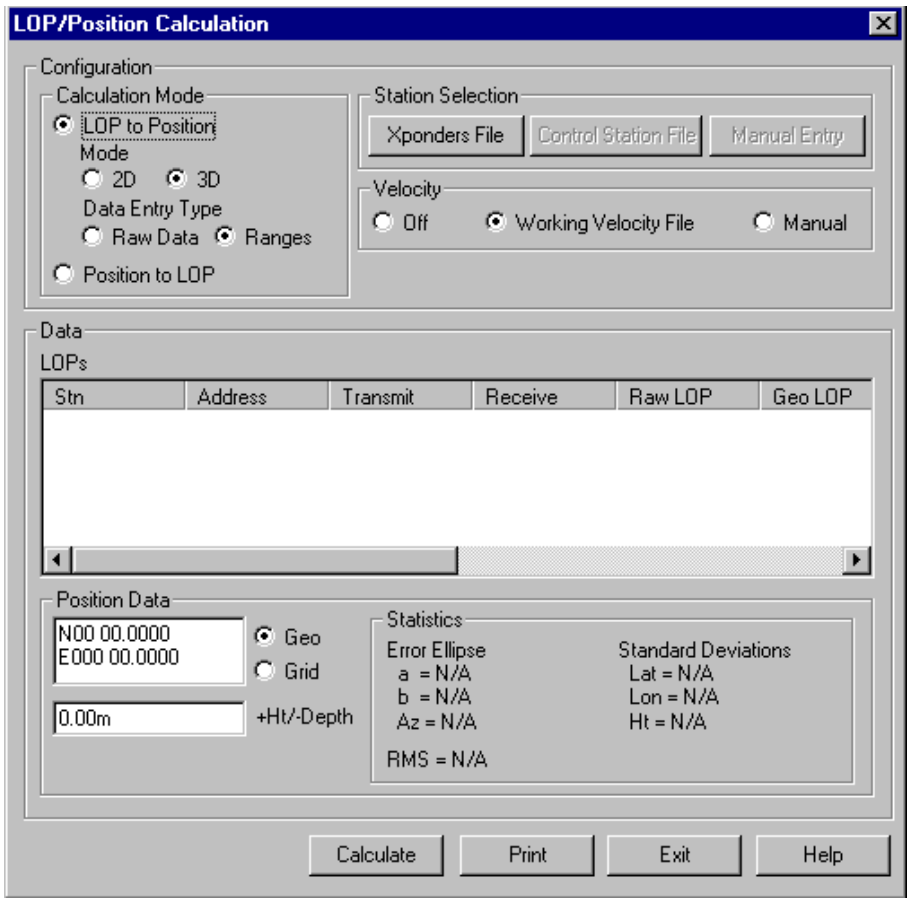
The results of the calculation are displayed in the **To** area as either geo or grid coordinates, depending on the radio button setting.

LOP/Position Calculation

Use this utility to calculate a position from either geographic slope ranges or acoustic two-way-travel-times (TWTT) from fixed transponder stations currently in the Working Xponder file. If TWTT data is used, you can select between using the Working Velocity file or entering velocity values for each TWTT entered. The calculation can also be performed in reverse, that is, calculate geographic slope ranges and TWTTs from an entered position to fixed transponder stations currently in the Working Xponder file.

To Access LOP/Position Calculation

1 From the **Utilities** menu, select **LOP/Position Calculation**. The **LOP/Position Calculation** dialog box displays.



You are able to select what calculation to perform and how to perform it. The options are as follows:

Calculation Mode

LOP to Position — Enter the LOP data and the position is calculated using least squares.

2D or 3D — If you select **2D**, you must enter a height/depth. This value is held fixed and the position is solved for. If you select **3D**, the height/depth and position is solved for.

Raw Data or Ranges — Enter either raw data or geographical slope ranges. In the case of LBL acoustics, the raw data is the TWTT in milliseconds (ms) for a given transponder, including any turn-around-time (TAT) value that has been entered in the Working Xponder file for that transponder. If you select **Ranges**, enter the true slope range for each transponder. If you enter ranges, no velocity information is required to obtain a solution. However, if none is provided, the respective TWTTs are not computed and displayed or printed.

Position to LOP — Enter a position and height/depth, and the geographic slope ranges between this position and each of the selected LOP stations are calculated. If velocity information is available, the respective LOPs are also presented in their associated raw data format.

Station Selection

Xponder File — This provides access to a dialog box (see **Selecting Stations**) where you can select which stations in the Working Xponder file to use for the calculation.

Velocity

This controls the use of velocity data for the calculations. If **Raw Data** is used for an **LOP to Position** calculation, this must be set to either **Working Velocity File** or **Manual** or the calculation will fail. If **Ranges** are used for an **LOP to Position** calculation, this setting is not critical. For a **Position to LOP** calculation, this setting is not critical.

Off — No velocity information is to be used. As a result, no TWTT data can be used for a calculation or calculated from entered or calculated range data.

Working Velocity File — Velocities for each LOP are calculated using the current Working Velocity file.

Manual Velocity data is entered for each LOP (see **Entering LOPs**)

Data

LOPs This list view provides two functions. For **LOP to Position** calculations, it provides you access to each LOP for data entry. For **Position to LOP** calculations, it presents the results.

Stn This lists the name of the station selected for the LOP. This column includes a status indicator in the form of a red or green LED. If the LED is red, the associated LOP has had a problem in the solution, for example, an invalid velocity. The cause of the problem should be investigated. A green LED indicates that the LOP is OK in the calculation.

Address This lists the address of the transponder associated with the LOP station.

Transmit This lists the transmit code of the transponder associated with the LOP Station.

Receive This lists the receive code of the transponder associated with the LOP Station.

Raw LOP This lists the raw data for the LOP (TWTT in the case of LBL acoustics). If the TWTT is not available, for example, if range data is used for a **Position to LOP** calculation and there is no velocity information, the term **N/A** is given.

Geo LOP This lists the true (geographic) slope range.

Grid LOP This lists the reduced grid slope range. Note that though this value is listed, it is not available for entry as a range. Only true (geographic) ranges are entered.

Residual This lists the residual for the associated LOP for an **LOP to Position** calculation. In the case of a **Position to LOP** calculation, the term **N/A** is given since the solution provides the exact range/TWTT between the entered position and the LOP stations.

Accuracy This lists the entered accuracy (standard deviation) for the LOP. This is only valid for an **LOP to Position** calculation, and therefore the term **N/A** is given for **Position to LOP** calculation.

Velocity This lists the velocity used (whether calculated or entered) for the associated LOP plus a status. If the LOP has a red LED, this column should be investigated for the probable cause.

Position Data

Position The position to use for a **Position to LOP** calculation is entered here. For an **LOP to Position** calculation, the resulting position is presented here. Note that the data entry and display can be toggled between geographic (**Geo** option) and map grid (**Grid** option). Note that this affects only the position data entry and display. The entry of range data is geographic regardless of the setting here.

Height/Depth The height/depth to use for a **Position to LOP** calculation is entered here. For an **LOP to Position** calculation, the resulting height/depth is presented here. Note that depths are negative and heights are positive.

Statistics

Statistics is a presentation of the accuracy indicators for an **LOP to Position** calculation only. If a **Position to LOP** calculation is performed, these values will all show **N/A**.

Buttons

Calculate Performs the selected calculation as configured.

Print Prints the results to the printer in a report format. (See **Printing**).

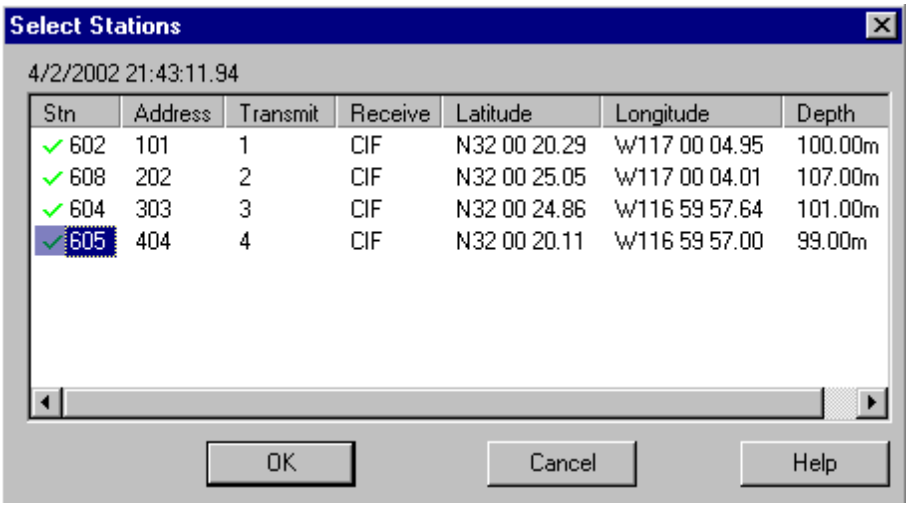
Exit Leaves the utility.

Help Future development. Will provide online help for this utility.

Selecting Stations

Click the **Xponder File** button to present the following dialog box. In it, all the transponders set to LBL Fixed are listed along with the address of the associated

transponder and their position data. The name of the Working Xponder file displayed is given on top of the list view.



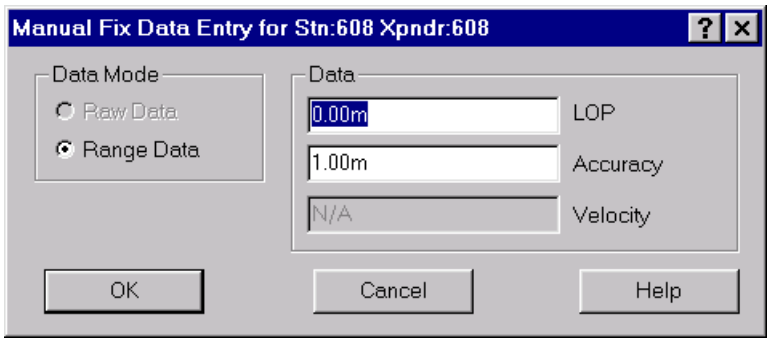
The stations are selected and deselected by double clicking on the name. If the station is selected, a green checkmark is shown next to the name. If the station is not selected, a red X is shown next to the name.

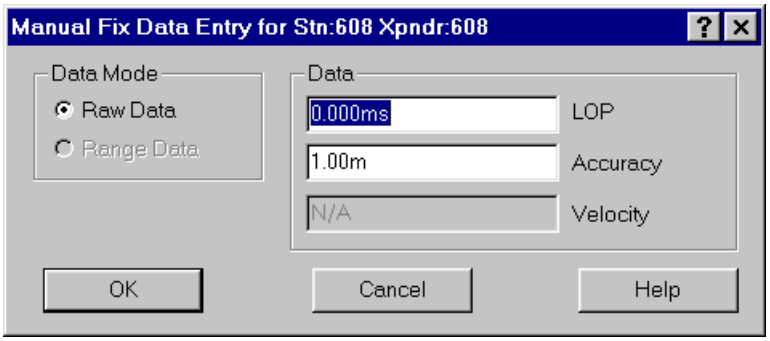
Note: No editing of the station transponder address or position data is possible from this dialog.

Selected stations are listed in the LOP list view in the main dialog.

Entering LOPs

To enter LOP data for an **LOP to Position** calculation, double-click the station name of the associated LOP in the LOP list view in the main dialog. One of the two dialog boxes shown below is then presented, depending upon the data type selected. Note that if **Position to LOP** is selected, nothing happens when you double-click the station name.



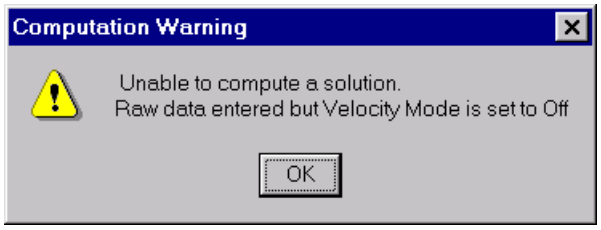


You enter the respective data, either TWTT or a geographic slope range and the accuracy to be associated with the LOP. The data entry type is controlled by the **Data Entry Type: Raw Data or Ranges** setting in the main dialog. This setting is indicated in the **Data Mode** panel. Note that the accuracy entered is a distance unit regardless of data type setting.

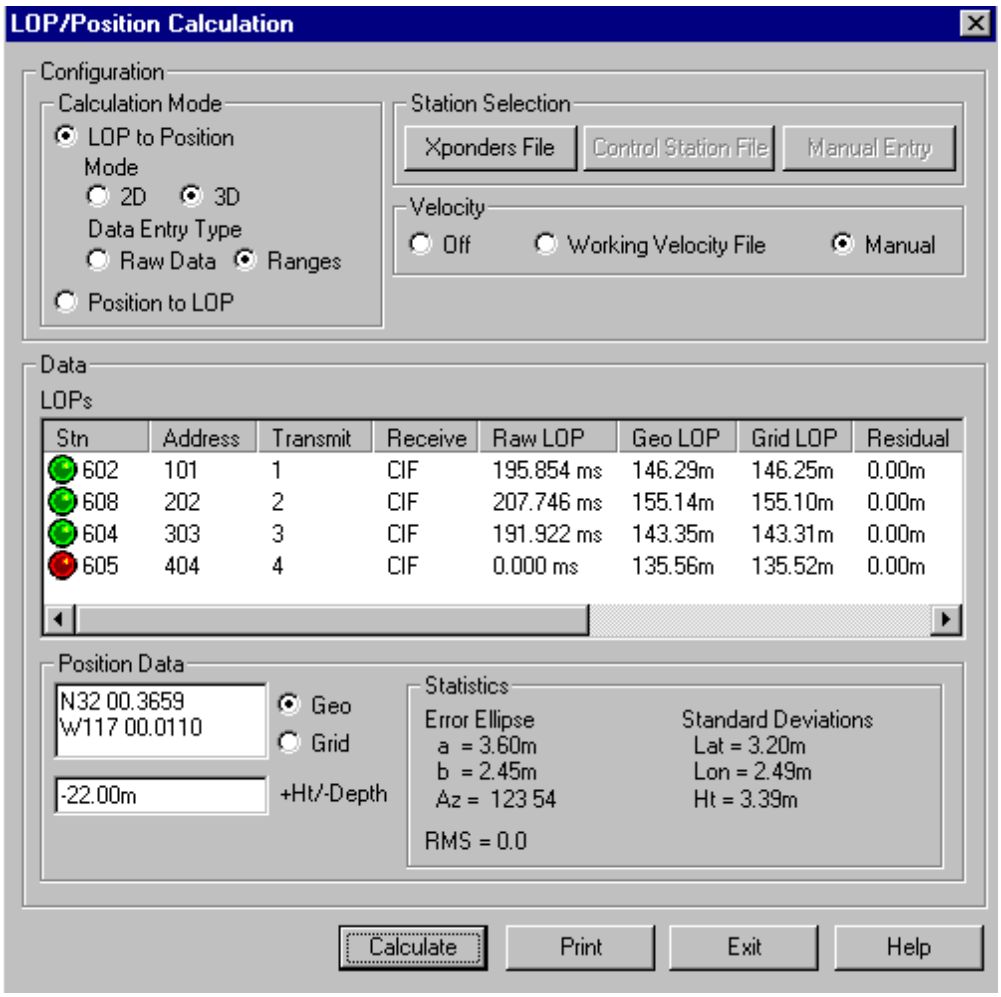
If the velocity option is set to **Manual**, the velocity to be used for the calculation can also be entered, otherwise this entry box displays **N/A** and is disabled.

Performing the Calculation

Once the calculation is configured, click the **Calculation** button to execute the calculation. If a problem is encountered that prevents a solution, a warning is presented as shown below.

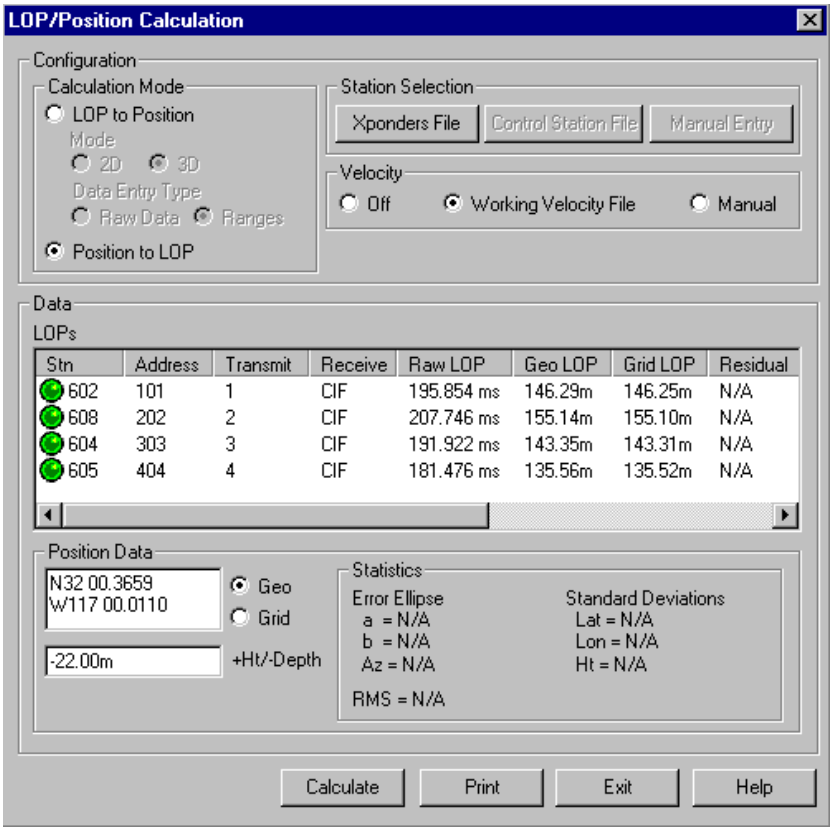


If the solution is successful, the results are presented in the main dialog. An example of a successful **LOP to Position** calculation is shown below.



The results shown above also illustrate the warning given by the red LED for station 605 due to an invalid velocity entered with the velocity mode set to **Manual**.

The following dialog box shows the results of a successful **Position to LOP** calculation.



Printing

Clicking the **Print** button will provide a report formatted printout. A sample report is shown below.

LOP to Position Calculation

Calculation Type: LOP to Position
Calculation: Mode: 3 Dimensional
Data Input Type: Raw Data

Velocity Mode: File (Vel_01.vel)

Position: N44 51.2514 N4966899.66m
(Solved) W063 32.9530 E456603.67m
H -35.70m

Statistics: Error Ellipse
Semi-major a: 2.03m
Semi-minor b: 1.60m
Orientation: 66 56

Standard Deviations
Lat Std Dev: 1.59m
Lon Std Dev: 1.32m
Ht Std Dev: 6.92m

RMS: 0.000

Data:

Stn Name	Address	Raw Data	Geo Slope Range	Grid Slope Range	Residual	Accuracy	Velocity
C101	101	405.609 ms	302.33m	302.22m	0.00m	1.00m	1490.74m/s
C202	202	367.285 ms	273.76m	273.66m	0.00m	1.00m	1490.73m/s
C303	303	405.637 ms	302.35m	302.24m	0.00m	1.00m	1490.73m/s
C404	404	484.590 ms	361.19m	361.06m	0.00m	1.00m	1490.72m/s

Saving of the Configuration

The configuration for the LOP to/from Position utility is read from the **winfrog.ini** file when the utility is accessed. Upon exiting the utility, the current configuration is saved to the **winfrog.ini** file. This facilitates repeated calculations with similar setups.

Acoustic Utilities

Use this utility to compute sound velocity from the working velocity profile or given depth or pressure, temperature and salinity. Also convert between depth and pressure.

Velocity Tab

Enter the depths between which you want to calculate the velocity. The calculation uses the data in the working velocity file. If a working velocity file is not selected, a message indicating this will be displayed. The formula used to compute the velocity is the same as used to compute the velocity for all LBL work. This is the harmonic mean as described by Christian de Moustier, Lecture Notes 16, Sound Refraction in the Water Column in Clarke, de Moustier, Mayer, and Wells, Lecture Notes for Multibeam Training Course, No 26, 2001. Scripps Institute of Oceanography, pp. 2 - 4.

Depth tab

Enter the pressure and temperature count and the observation time in seconds, usually 1 or 9 seconds. The Digiquartz coefficients may be manually entered or obtained from a Digiquartz equipped COMPATT found in the working transponder file. Manually entered coefficients are retained after the utility is closed, but not if WinFrog is shut down. You cannot change a COMPATT's coefficients or any other values assigned to a COMPATT from this dialog. The atmospheric pressure entered is subtracted from the calculated pressure before the depth is calculated. If the Average Density method is selected for depth calculation the following formula is used:

D = (pressure – atmospheric pressure)/water density.

The UNESCO selection uses the international equation of state for seawater (EOS-80). This is described by Fofonoff, N.P. and Millard, R.C., Algorithms for computation of fundamental properties of seawater, UNESCO technical papers in marine science No. 44 (1983)

Sound Velocity, Pressure, and Density tab

This dialog will convert depth to pressure or pressure to depth depending on

which one you enter. The formula used to convert pressure to depth is the UNESCO formula as described above. The formula used to convert depth to pressure is from Leroy, C.C. and Parthiot, F., Depth-pressure relationships in oceans and seas, Journal of Acoustical Society of America 103(3), (March 1998). The corrections to either of the calculated values are also from the Leroy and Parthiot paper. The pressure entered is to be the absolute pressure minus atmospheric pressure, i.e., pressure just due to the water. If the depth is entered, the calculated pressure does not include atmospheric pressure.

Two sound velocity formulae (Del Grosso and Chen-Millero) have been included with recalculated coefficients by Wong and Zhu 1995 following the adoption of the International Temperature Scale 1990. Technical Guides – Speed of Sound in Seawater, National Physics laboratory. For those formulae requiring pressure in kg/m^3 (Wilson and both Del Grosso), this value is obtained by applying the calculated gravity at the given latitude regardless if the pressure is entered or calculated.

Density is calculated using the formula found in the UNESCO paper mentioned above.

Map Wizard

Use this utility to create a Blue Marble Map (*.BMM) file for use as a background image in a graphics window.

The BMM map can be composed of many different layers each of a different map type. Currently, the BMM file supports the following vector and raster file types. The supported vector file types are DXF, DWG, SHP, MIF, DGN, and BML. The supported raster file types are JPG, BMP, TIF and GEOTIFF. Note that all layers added to a BMM file must have been created in the same coordinate system and using the same units. When importing a BMM file into WinFrog, the geodetic and unit settings of WinFrog must agree with the system the layer files were created in.

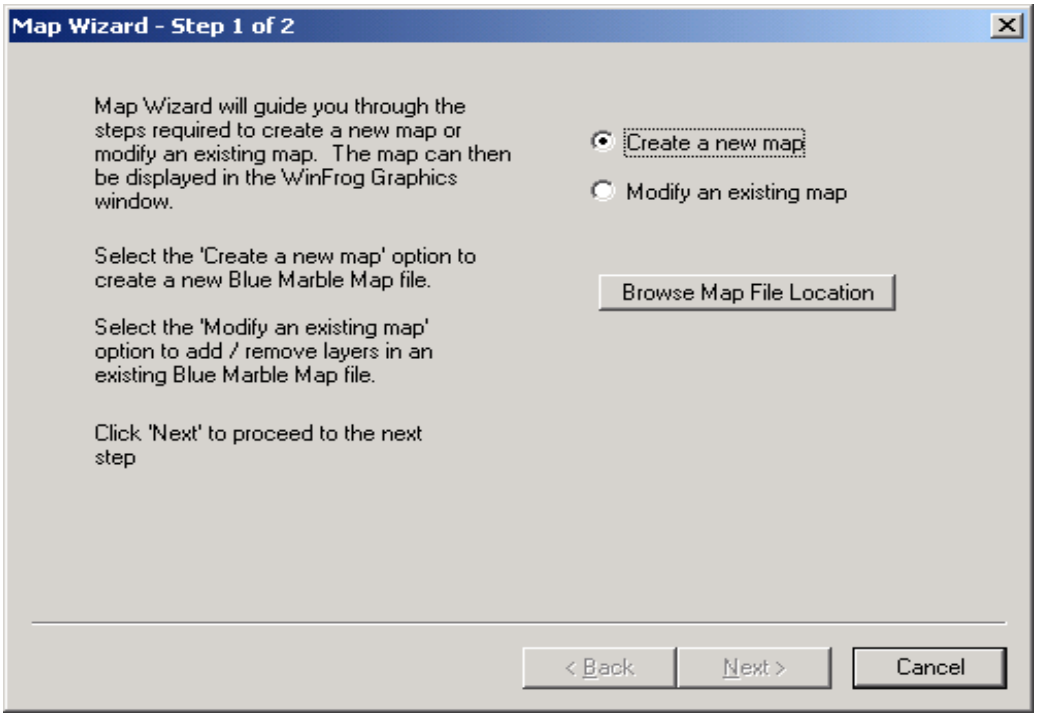
Depending on the file format used, some layers and feature types may not be fully supported by the Blue Marble library. It is important to verify the integrity and completeness of the imported file when displayed in the Graphics window. If features are the same color as the background color, they will be masked and will not be visible.

To Create a BMM map file

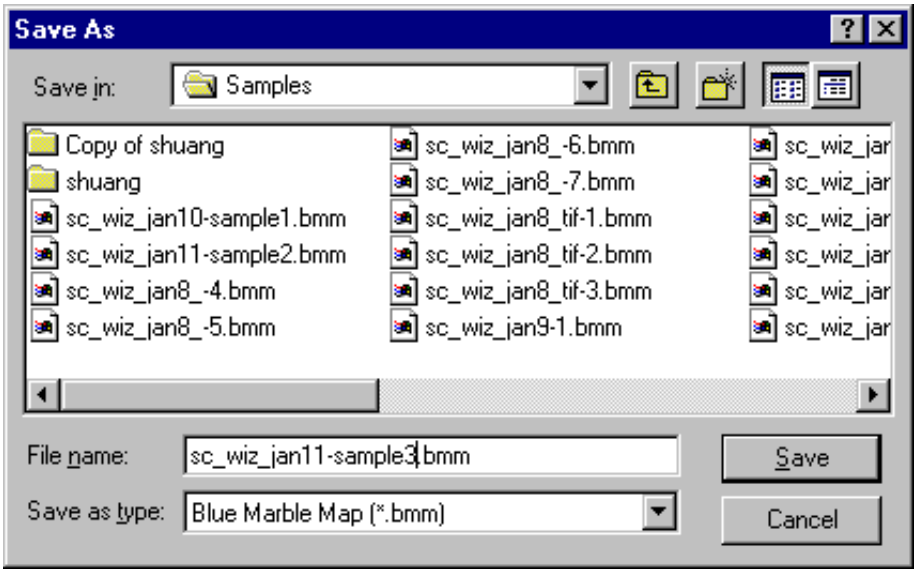
From the **Utilities** menu, choose Map Wizard. A map wizard will be launched that will take you through the process of creating a new map or adding to an existing map.

Create a new map:

1 Select the **Create a new map** radio button.

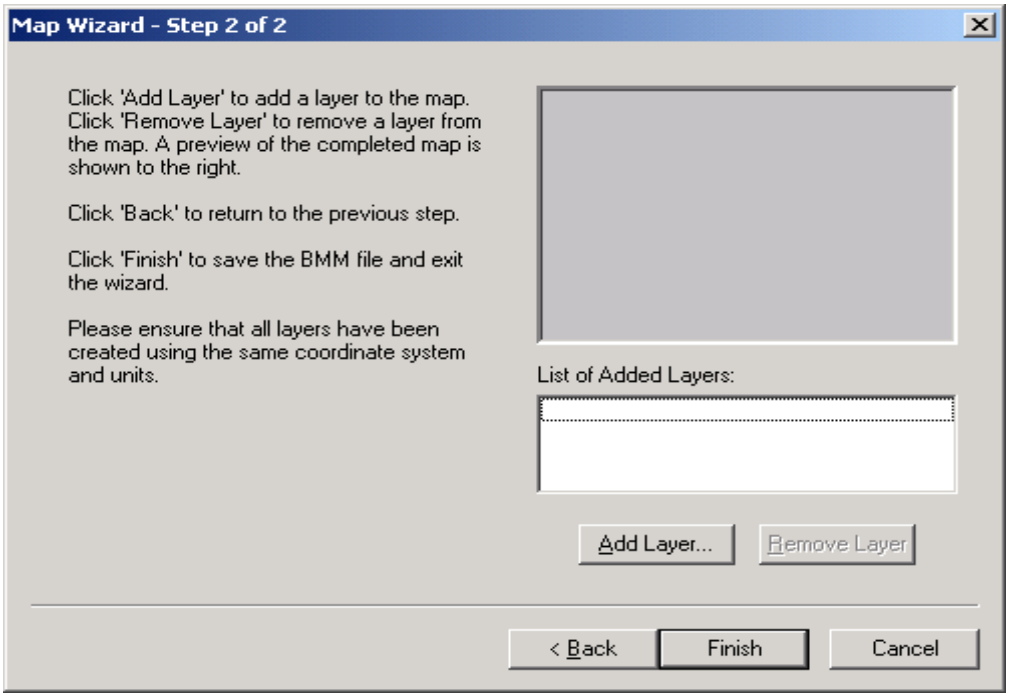


2 Click the **Browse Map File Location** button to launch a file create dialog.

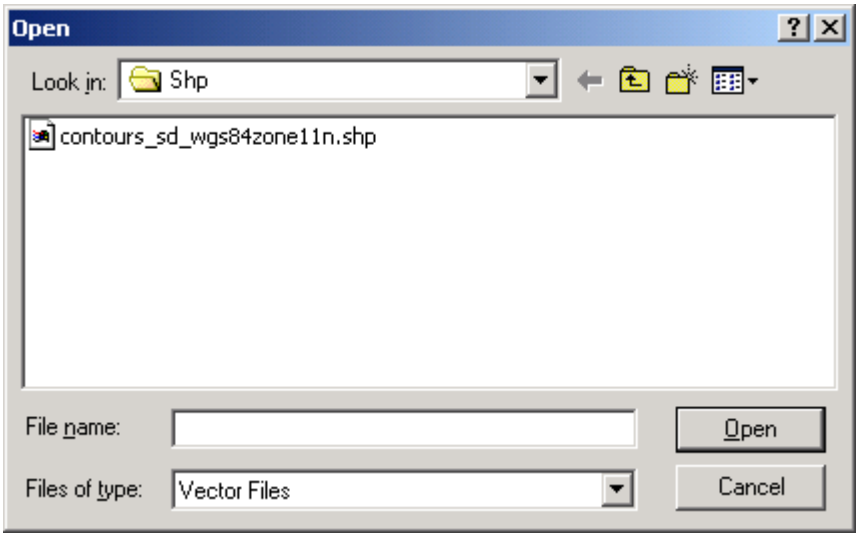


3 Once your file has been created, the name and path of the file is displayed below the button in the wizard.

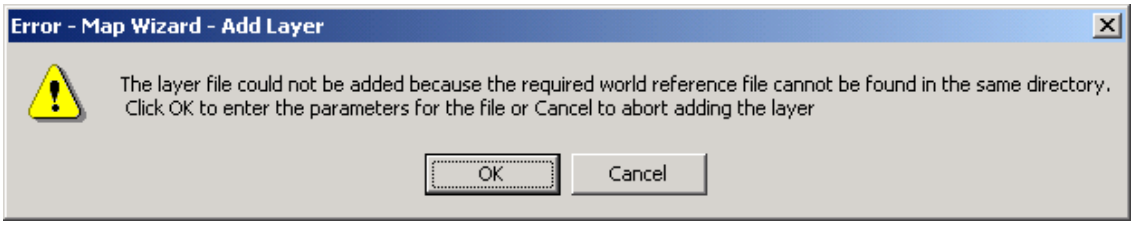
4 Click **Next** on **Map Wizard - Step 1 of 2** to proceed to step 2 of the wizard where the layers of the BMM file are added and removed.



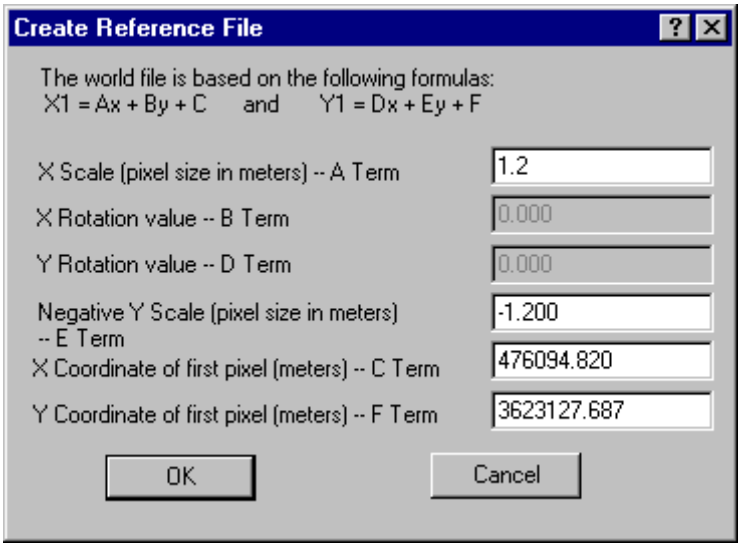
5 To add a layer, click **Add Layer**. This will open a standard **File Open** dialog in which to select the layer to add to the BMM map file. Click OK when the file has been chosen.



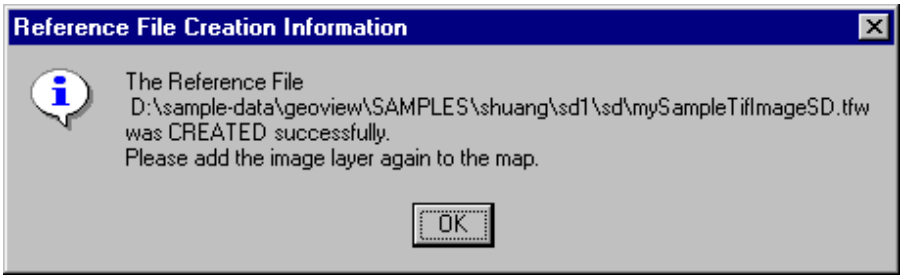
If the layer that is being added is an image such as a .TIF file and there is no .TIF reference file, then an error message, as shown below, is displayed to inform you of the corrective action to take. Otherwise, skip to step 6.



a) Clicking **OK** will launch the **Create Reference File** dialog in which you can enter the reference parameters for the image file. Enter the pixel size in meters for the X (Easting) and Y (Northing) dimensions of the image as well as the X and Y coordinates of the first pixel (topmost left) of the image. Click **OK** to complete the operation. Click **Cancel** to cancel adding the layer.



You will be informed of the result of the Reference File creation process as displayed below.



b) Click **OK** to return to the **Map Wizard** dialog box where you must select the layer again – return to the start of step 5.

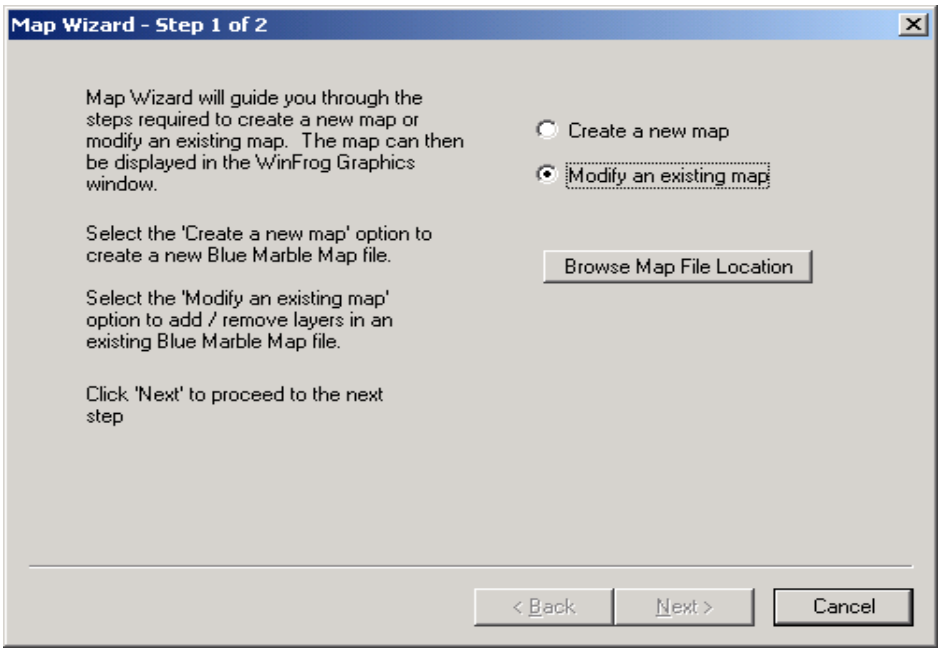
6 You will be presented with a preview of the composite map showing all added layers in the top right of the dialog. To add another layer repeat step 5.

7 To remove a layer, select any layer in the list on the right of the dialog and click **Remove Layer**. The preview window will be updated accordingly.

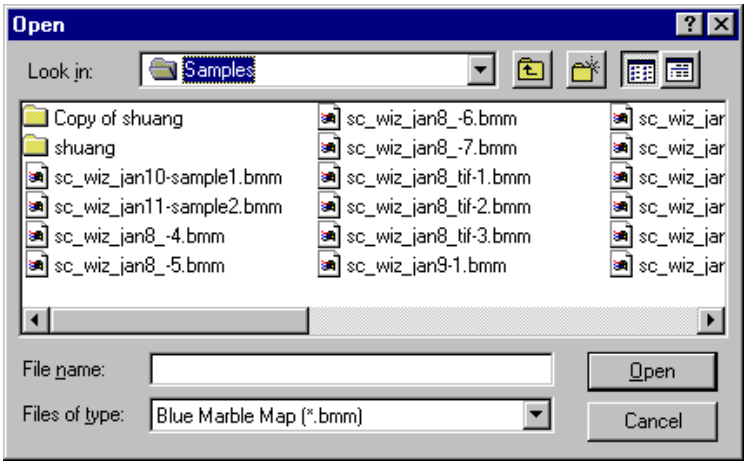
8 Once all the layers have been added and removed, click **Finish** to save the BMM file and exit the wizard.

Modify an existing map:

1 Select the **Modify an existing map** radio button.



2 Select the **Browse Map File Location** button to launch a file open dialog and select the file.



3 Click **Next** on **Map Wizard - Step 1 of 2** to proceed to step 2 of the wizard.

4 At **Map Wizard - Step 2 of 2,** the layers of the BMM file are added and removed. See steps 5 – 7 in the Create a new map section above to complete these procedures.

5 Click **Finish** to save and update the BMM file and complete the map wizard.

Plotter Base Map Wizard

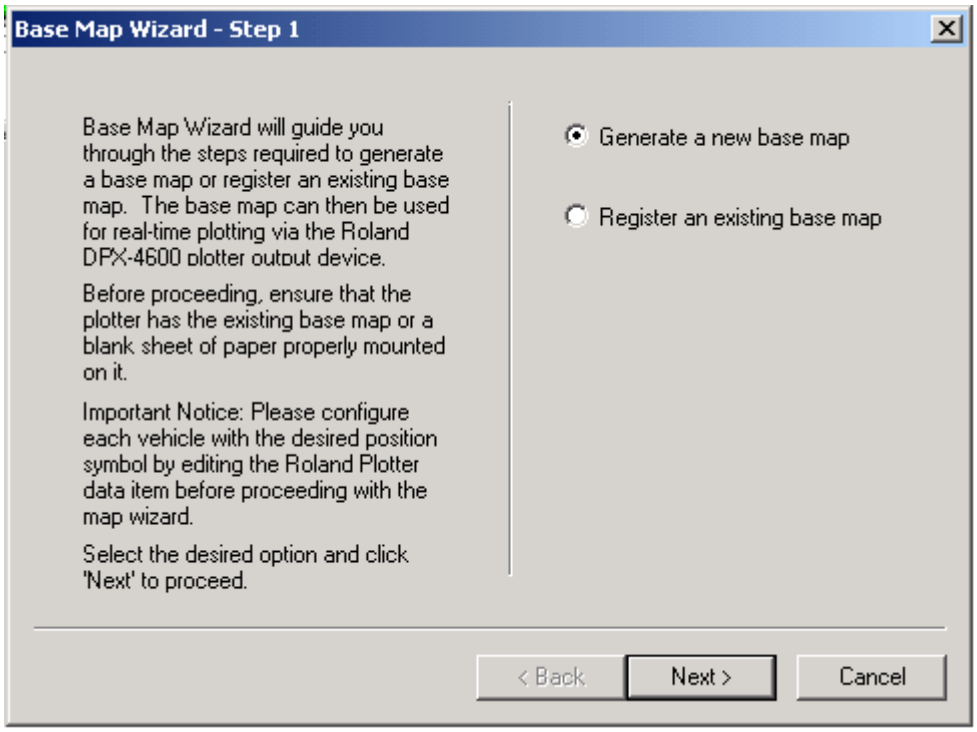
Use this utility for base map configuration when using the Roland DPX-4600 plotter device. Once the device has been connected to the computer and has been configured as described below, you can either register an existing map for real time data plotting or define scale, orientation and offsets for plotting on a blank sheet of paper. Both of these activities are supported through the use of this setup wizard tool.

To Add The Plotter to WinFrog

The plotter device is added in the same way as any other device – through the I/O Devices window. Right-click in the upper pane and select Add Device. The Roland DPX-4600 plotter can be found in the OUTPUT category. Select the device and click OK. Refer to the Roland DPX-4600 device document for details on installation and configuration.

To Generate a New Base Map

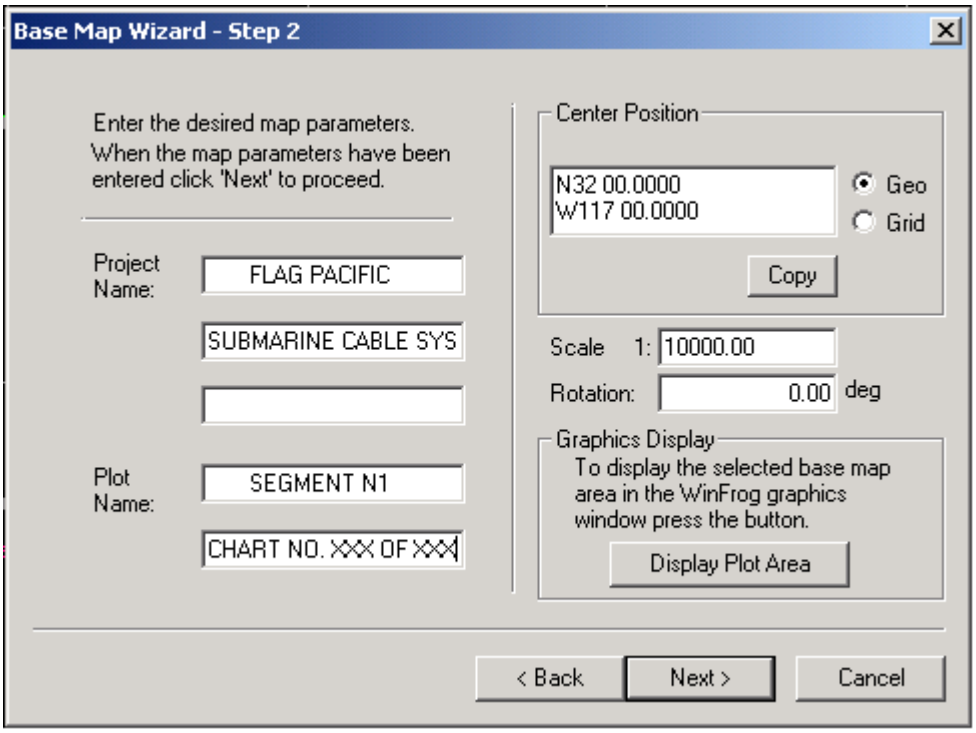
1 From the **Utilities** menu, choose **Plotter Base Map Wizard**.



Note the advisory notice stating that the base map or blank sheet should already be properly mounted on the plotter. It is also important to note that, when generating a new map with a standard legend, the desired position symbols for each vehicle have to be configured before proceeding with the

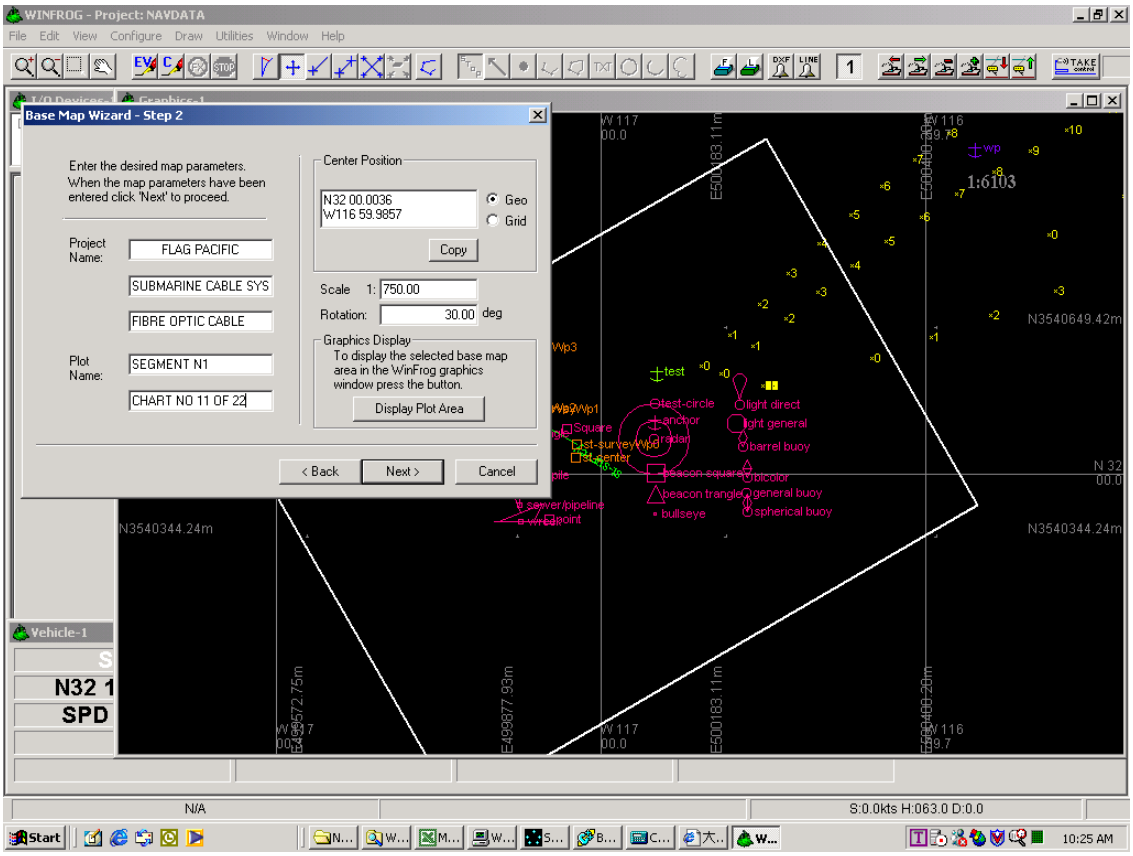
map wizard. This is because the position symbols will be plotted on the standard legend as the vehicle track symbol. The position symbol is configured by editing the ROLAND PLOTTER data item for each vehicle. Refer to the Roland DPX-4600 device document for details.

2 Select the **Generate a new base map** radio button and click **Next**.

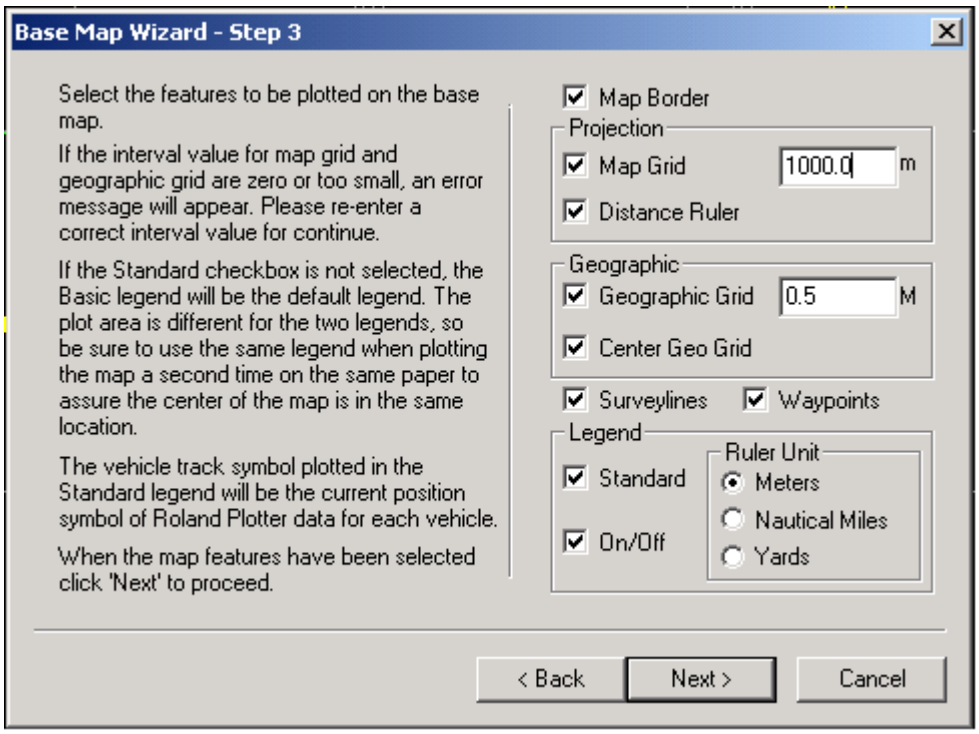


3 Enter the desired map/chart parameters in Step 2.

Project Name	This will be plotted as the title of the map/chart in the legend.
Plot Name	This will be plotted as the name of the map/chart in the legend.
Center Position	the world coordinates of the center of the plot
Scale	the scale of the plot
Rotation	any rotation angle between the world coordinate system and the plotter coordinate system
Display Plot Area	The selected base map/chart area can be displayed in the Graphics window to check the plot area. Click this button to display the outline of the plot area in the Graphics window. The outline is a frame of white lines. Adjust the entered map parameters for plotting the desired map/chart. The following screen shot is a sample.



4 Once the map parameters have been entered, click **Next** to proceed to Step 3 of the wizard.

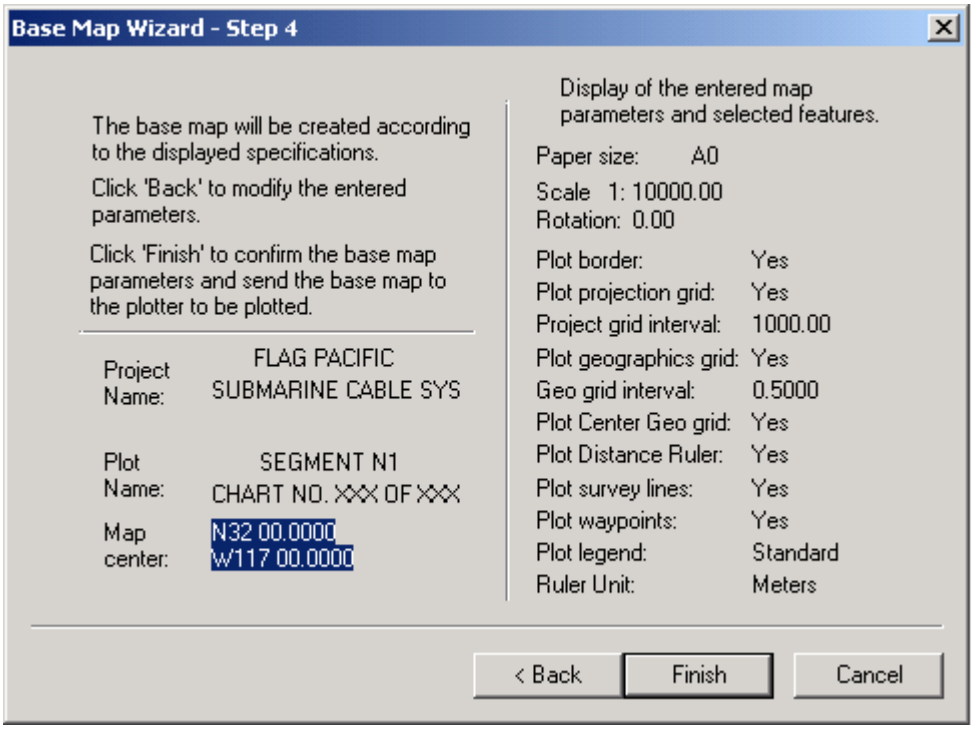


5 Select various additional items to be plotted along with the vessel position.

Map Border	Plots a map/chart border with a thin frame.
Map Grid	Plots projection grid at the given interval with the unit of meters.
Distance Ruler	Plots a scale drawn on the chart in the plot area along the left side of the map/chart reading distances in meters.
Geographic Grid	Plots graticule grid at the given interval with the unit of minutes.
Center Geo Grid	Plots a graticule drawn at the centermost Latitude line and Longitude line. Plots 9 tics between each Latitude/Longitude line for 10 spaces.
Survey Lines	Plots survey lines that are in the chosen working file.
Waypoints	Plots waypoints that are in the chosen working file.
Legend Group	
Standard	Plots a standard legend on the right side of map/chart. If the Standard checkbox is not selected, the Basic legend will be the default legend. The Standard Legend contains the Project Name, Plot Name, Vehicle Name, Geodetic

	System, Scale, Rotation, Vehicle Track and Corner Data for register. The Basic Legend contains the Custom Input Lines, Geodetic System, Scale, Rotation, Created time stamp and Corner Data for registration. **Note**: The plot area is different for the two legends, so be sure to use the same legend when plotting the map a second time on the same paper to ensure the center of the map is in the same location. **Note**: When you click the Standard checkbox to select this legend, or deselect it for the Basic legend, the display of the base map area in the Graphics window (white frame) will resize to show the different plot areas.
On/Off	Plots the legend if the checkbox is checked, otherwise does not plot a legend.
Ruler Units	The scale in the standard legend of the map/chart can be selected in meters, nautical miles and yards.

6 Once the features to be plotted have been chosen, click **Next** to proceed to Step 4 of the wizard.



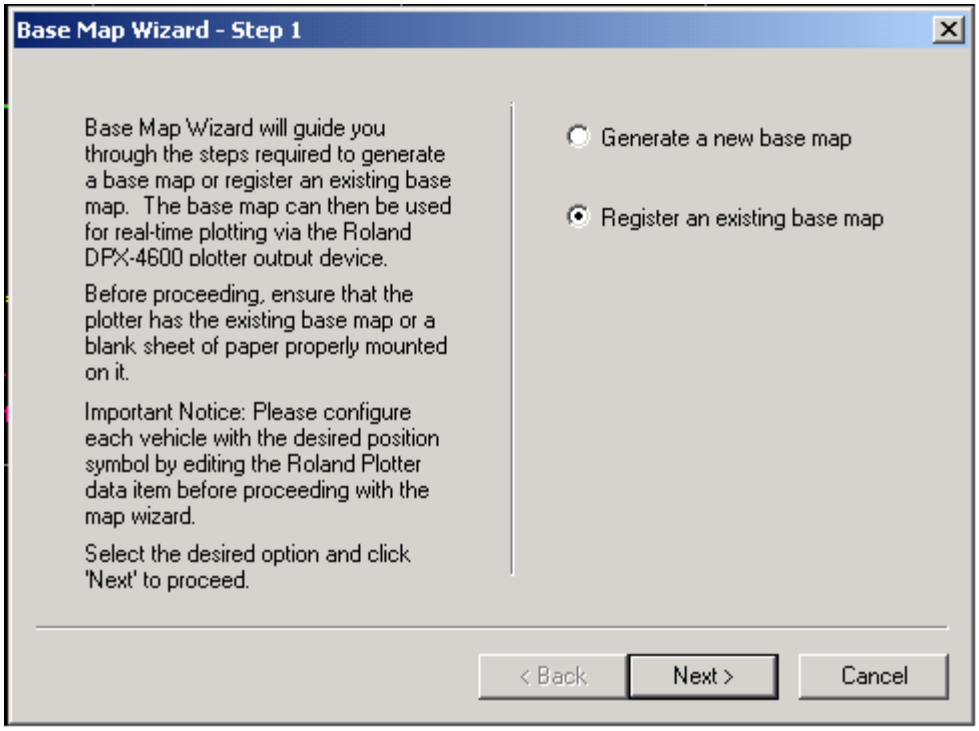
7 Review the summary of the entered transformation parameters. If any changes are needed at this point, click the **Back** button to access the appropriate page and edit the values. When satisfactory, click **Finish** and the new data will be sent to the plotter.

Once the plotter has been set up in this manner, a base map/chart will be plotted out. The options for the background will be plotted on the blank sheet of paper as the new map. For example, if the Border, Map Grid, Survey Lines and Waypoints are selected, those items will be plotted on the paper after the Finish button is clicked.

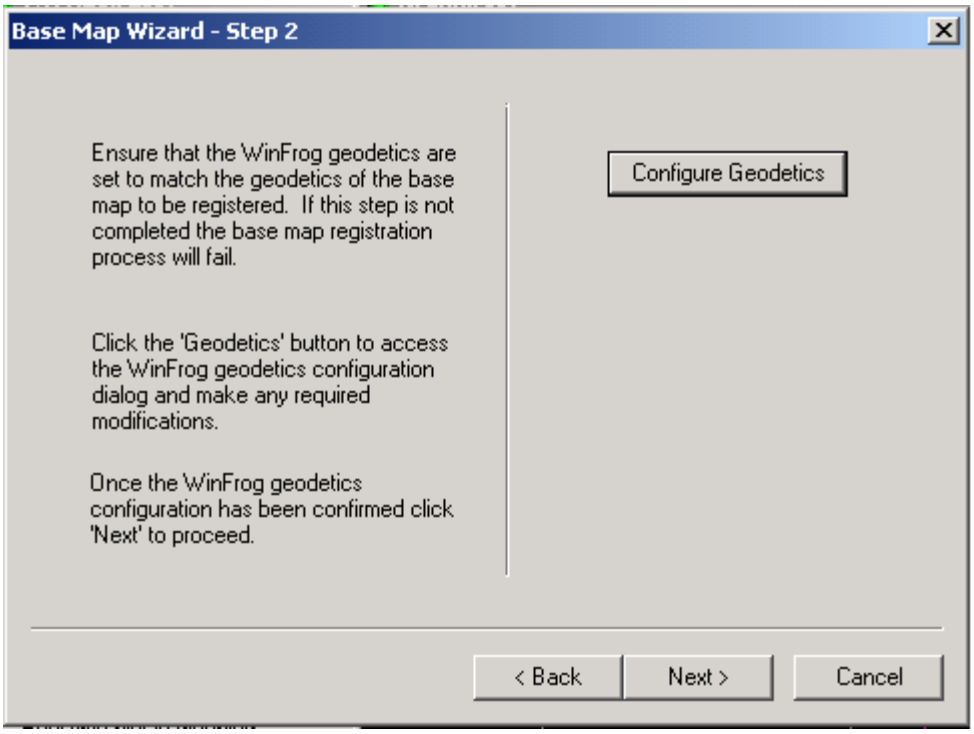
After the map/chart is plotted, and the Real Time plotting mode is enabled, the positions for selected vehicles will be sent to the plotter at the interval defined by the trigger event and other real time plotting options. Refer to the Roland DPX-4600 device document for details.

To Register an Existing Map and Plot to it in Real Time

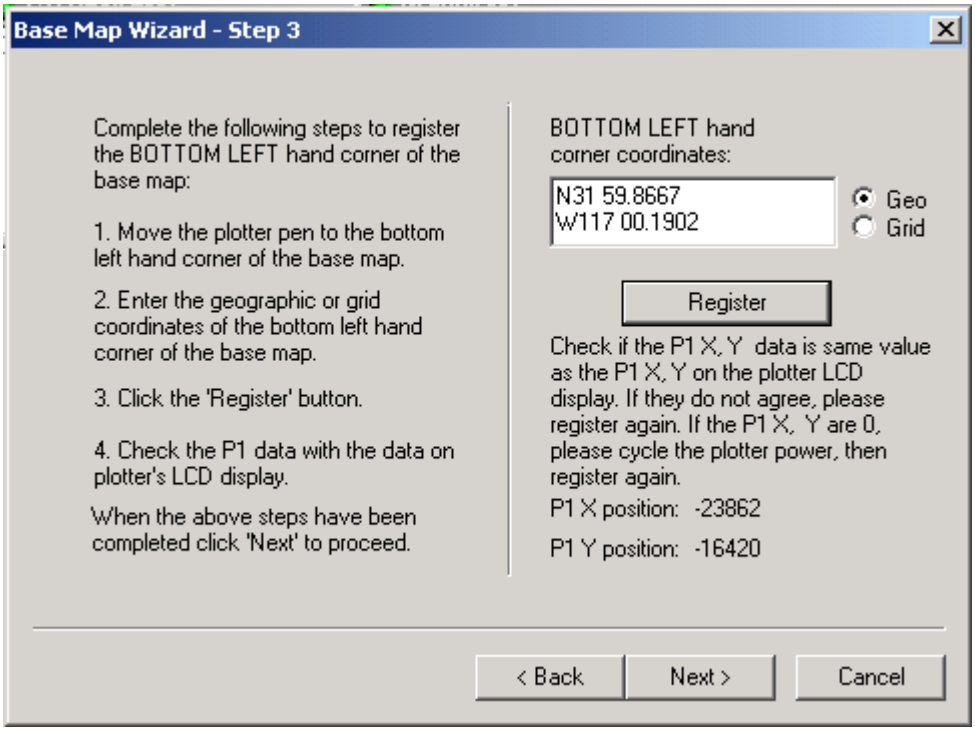
If it is desired to plot the multiple vessel positions and other data on an existing base map or chart, then the map must be registered first in order to define the transformation parameters between the plotter coordinate system and the world coordinate system.



1 Select the **Register an existing base map** radio button at Step 1 of the wizard. Click **Next** to proceed.



2 Choose the geodetic system that the base map is in. It is vital that the base map geodetics match those in WinFrog – this dialog allows you to change the WinFrog settings if required. Click **Next** to proceed.



3 At Step 3 you need to define two known positions in order to perform the registration. For a drawn base map/chart, the left bottom and right top

corner data is on the legend. By following the instructions on the left of the wizard page, the real world and plotter coordinates of the bottom left corner of the plot are recorded.

Follow the following steps to operate the plotter for registration:

a) Press the FAST button on the plotter LCD display. The plotter will grab the pen No. 1.

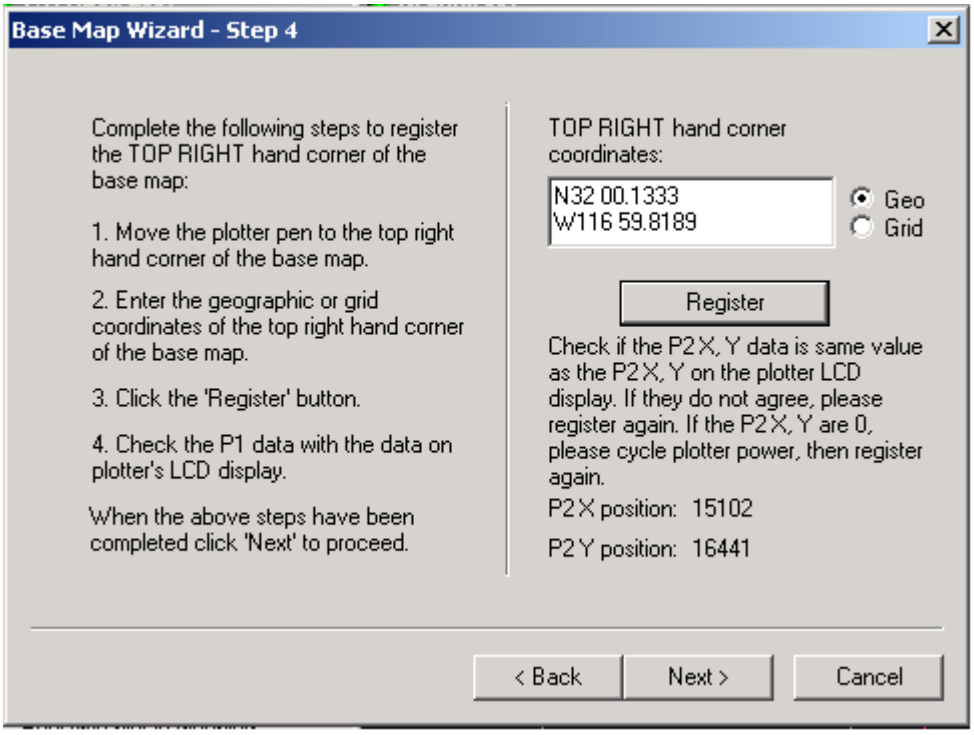
b) Press FAST and => or <= keys to move the plotter pen to the Left Bottom hand corner.

c) Press the Pen Down menu on the LCD display to check that the pen is on the top of the point, and then press Pen Up.

d) Click the Register button on the Base Map Wizard.

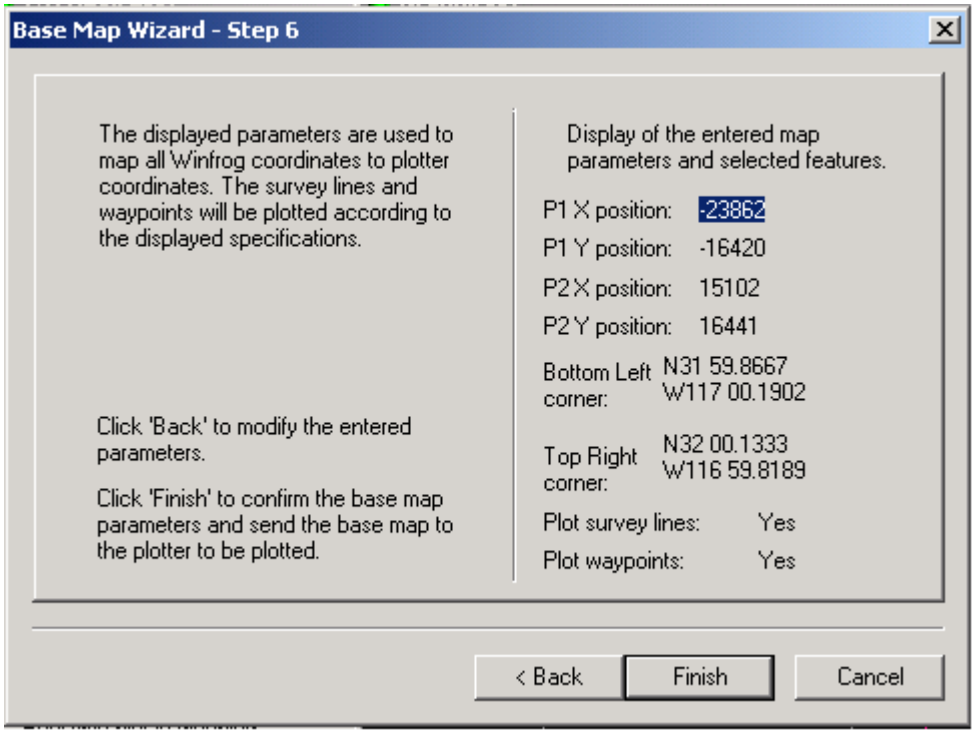
e) Check that the P1X and P1Y position agrees with the data on the plotter LCD display.

4 Click Next to proceed to Step 4 where you need to follow the same steps for the upper right corner of the map/chart – the only difference is to check that the P2X and P2Y positions agree with the data on the plotter LCD display. In this way, a two-dimensional similarity transformation is computed between the plotter and real world coordinates.



5 Click **Next** to continue to Step 5.

6 In addition to the vessel position, it is possible to plot survey lines and waypoints at Step 5. If these are desired, select the appropriate checkboxes and click **Next** to continue.



7 Review the summary of the entered data. Corrections can be made by using the **Back** button. If the P1 and P2 data is zero, an error message will appear

and you will need to go back and register again before continuing. When satisfactory, click **Finish** and survey lines and/or waypoints will be sent to the plotter, if you made those selections.

After the map/chart is registered, enable the Real Time plotting mode and the positions for selected vehicles will be sent to the plotter at the interval defined by the trigger event and other real time plotting options. Refer to the Roland DPX-4600 device document for details.

Generate DXF Map

Use this utility to generate a map in the form of a **.DXF (Drawing Exchange Format)** file.

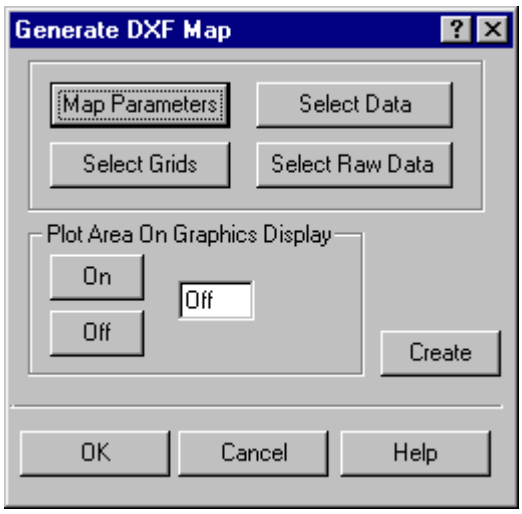
This map can include the contents of the **Working Picture**, **Survey Line**, **Waypoint**, and **Data** files, all of which are referenced using the current WinFrog geodetic configuration. Other options include **Borders**, a **Bar Scale**, and **Grid Lines**. You can also control the **Size**, **Scale**, and **Rotation** of the final product.

The **.DXF** file can then be imported into programs, such as AutoCAD, MicroStation, or other CAD or mapping packages.

This section discusses all steps required to create a **.DXF** file using WinFrog, starting with a brief overview of the procedures required.

To Create a .DXF Format Map

1. Open a **Graphics** window if one is not already open.
2. Center and zoom the **Graphics** window so that it displays the area to be exported.
3. From the **Utilities** menu, choose **Generate DXF Map**. The **Generate DXF Map** dialog box is the main dialog box for configuring and creating a **.DXF** map in WinFrog. This dialog box provides access to four other dialog boxes that provide the actual configuration tools.



4 In the **Plot Area On Graphics Display** area of the **DXF Output** dialog box, click the **On** button.

5 Click the **Map Parameters** button to open the **Map Parameters** dialog box.

6 Configure the parameters in the **Map Parameters** dialog box.

See the **Map Parameters Dialog Box** section later in this chapter for details concerning configuring these parameters.

7 Click the **Select Grids** button to open the **Select Grids** dialog box.

8 Configure the parameters in the **Select Grids** dialog box.

See the **Select Grids Dialog Box** section later in this chapter for details concerning configuring these parameters.

9 Click the **Select Data** button to open the **Select Data** dialog box.

10 Configure the parameters in the **Select Data** dialog box.

See the **Select Data Dialog Box** section later in this chapter for details concerning configuring these parameters.

11 Click the **Select Raw Data** button to open the **Select Raw Data** dialog box.

12 Configure the parameters in the **Select Raw Data** dialog box.

See the **Select Raw Data** section below for details concerning configuring these parameters.

13 Click the **Create** button to build the **.DXF** file.

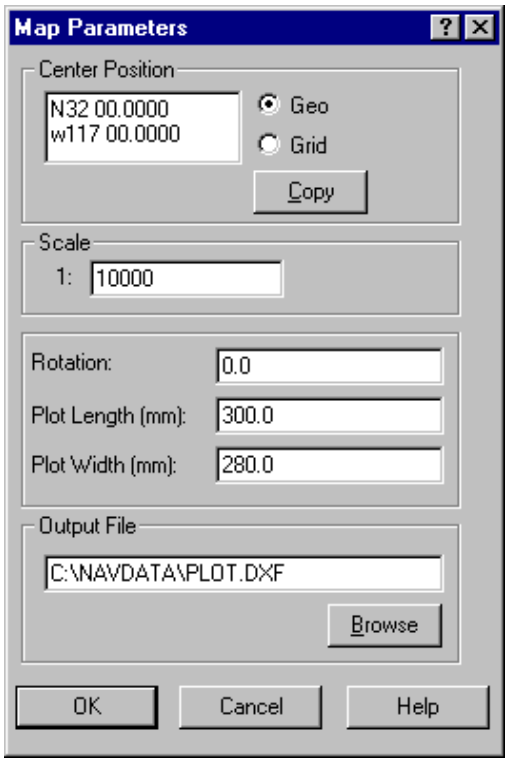
If the file already exists, WinFrog asks if the file is to be overwritten.

OK	overwrites the existing file
Cancel	returns to the **Generate DXF Map** dialog box

The following sections detail each of the above mentioned dialog boxes.

Map Parameters Dialog Box

Click the **Map Parameters** button in the **Generate DXF Map** dialog box to open the **Map Parameters** dialog box.



The following parameters are set within the **Map Parameters** dialog box:

Center Position

entry field	the **Center Position** coordinates of the map display in this field
Geo radio button	indicates that values in entry field are in latitude and longitude
Grid radio button	indicates that values in entry field are in Northing and Easting
Copy button	copies the coordinates displayed in the WinFrog Position Display toolbar into the entry field.

Scale

entry field	Enter the **Scale Factor** for the map (representing the scale of **Drawing Units** to **Ground Units**).

Rotation

Rotation field	Enter the rotation angle of the plot in degrees (**dd.dddd**), as measured clockwise from North.
Plot Length (mm)	Enter the length of the plot in millimeters.
Plot Width (mm)	Enter the width of the plot in millimeters.

Output File

entry field	Enter a name for the new .DXF file along with a directory path.
Browse button	use this typical Windows™ navigation dialog box to select a file name and directory.

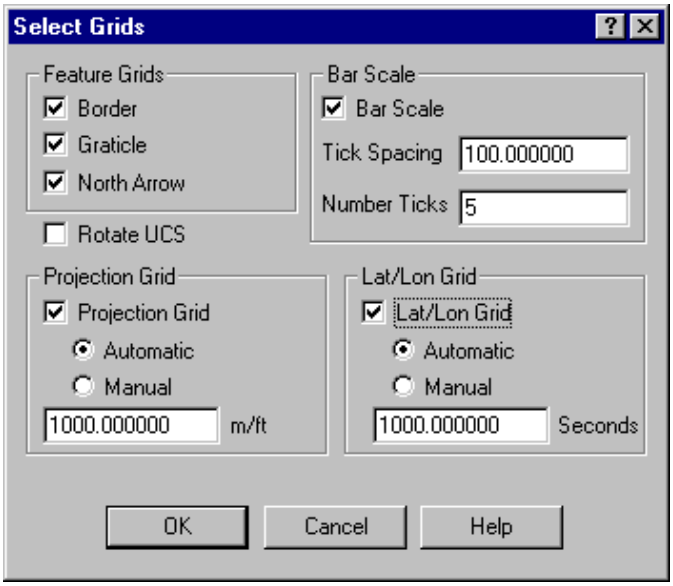
Click **OK** to return to the **Generate DXF Map** dialog box.

A blue box outlining the area to be exported appears in the **Graphics** window.

Select Grids Dialog Box

WinFrog can be configured to generate three types of grid lines in a **.DXF** map. These parameters (as well as some other line options) are configured using the **Select Grids** dialog box.

Click the **Select Grids** button in the **Generate DXF Map** dialog box to open the **Select Grids** dialog box.



The following parameters are set using the **Select Grids** dialog box:

Feature Grids

Border checkbox	Check this to enable the plotting of a border outlining the plot area.
Graticle checkbox	Check this to enable the plotting of a grid "cross" in the center of the map.
North Arrow checkbox	Check this to enable the plotting of a North arrow.

Bar Scale

Bar Scale box	Check this to enable the plotting of a bar scale.
Tick Spacing field	Enter the distance between adjacent ticks. Units used are as per the **Working Geodetic** units.
Number Ticks field	Enter the number of ticks to be displayed.
Rotate UCS box	Enable this option to create a map with a rotated UCS (User Coordinate System) so that the **X** direction corresponds to North and the **Y** direction corresponds to East. This option is used to compensate for those CAD systems that utilize this mathematical coordinate system as opposed to the survey convention.

Projection Grid

Projection Grid box	Check this option to generate small "crosses" on the map that mark the intersection of projection grid lines.
Automatic radio button	Select this option to have WinFrog define the projection grid line spacing.
Manual radio button	Select this option to have WinFrog use the value entered in the **m/ft** field immediately below to define the projection grid spacing.
m/ft field	Enter a value to define the ground distance in meters or feet between projection grid ticks.

Lat/Lon Grid

Lat/Lon Grid check box	Check this option to generate a set of lines on the map with marked latitude and longitude values.
Automatic radio button	Select this option to have WinFrog define the spacing of the lines of latitude and longitude.
Manual radio button	Select this option to have WinFrog use the latitude and longitude spacing value immediately below.
Seconds field	Enter a value (in seconds) to define the number of **seconds** of latitude or longitude between lat/long grid lines.

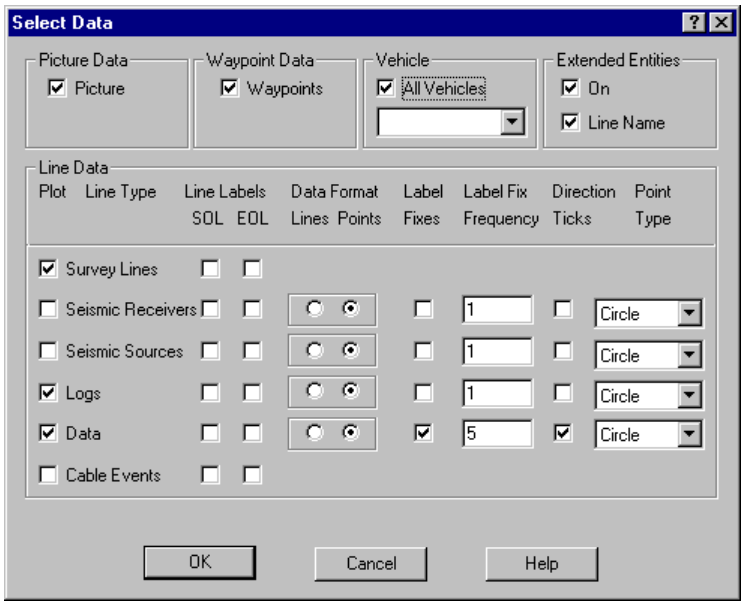
Click **OK** to save the changes and return to the **Generate DXF Map** dialog box.

Select Data Dialog Box

WinFrog can be configured to include the contents of several different types of WinFrog working files in the DXF map. These parameters are configured using the **Select Data** dialog box.

You can choose from the following list of **Working File** types: **Picture**, **Waypoint**, **Survey Lines**, **Seismic Receivers**, **Seismic Sources**, **Logs**, **Data**, and **Cable Events**. You also have various options that determine how the information is displayed in the DXF map.

Click the **Select Data** button in the **Generate DXF Map** dialog box to open the **Select Data** dialog box.



The following parameters are set in the **Select Data** dialog box:

Picture Data

Picture box — Check this option include the contents of the **Working Picture** (**.pic**) file on the .DXF map.

Waypoint Data

Waypoints box — Check this option include the contents of the **Working Waypoints** (**.wpt**) file on the .DXF map.

Vehicle

All Vehicles box — Check this option to have all vehicles included.

dropdown menu — Use this option to enable the plotting of one, individual vehicle.

Extended Entities

On box — Check this option to have the DXF map include "**Extended Entities**." Currently, **Line Name** is the only extended entity available.

Line Name box — Check this option to include the line name on the DXF map.

Line Data

Check the box to the left of the appropriate option to plot data from the following list of **Working Files**: **Survey Lines (.PTS)**, **Seismic Receivers (.ALL)**, **Seismic Sources (.ASC)**, **Logs (.LOG)**, **Data (.ALG)**, and **Cable Events(.CET)**.

The following options can be included for any of the mentioned **Working Files**:

Line Labels - SOL box	If checked, WinFrog creates a label with the survey line name at the start of each data set.
Line Labels -EOL box	If selected, WinFrog creates a label with the survey line name at the end of each data set.

The following options can be included for **Working Seismic Receivers**, **Seismic Sources**, **Logs**, and **Data** files:

Data Format - Lines	Select this radio button to connect adjacent data points to create a line.
Data Format - Points	Select this radio button to not connect adjacent data points into a line, instead plotting each point individually.
Label Fixes box	Check this box to enable the plotting of labels for each of the fixes (events) within the data files. The value of the label is equal to the event number as shown within WinFrog.
Label Fix Frequency field	This parameter sets how often event labels are plotted. If the **Label Fix Frequency** is set to 1, every event is labeled. If it is greater than one, WinFrog only labels every **n**th fix, where **n** is the value entered.
Direction Ticks box	This option is dependent upon the **Data Format** radio buttons. If you select the **Data Format Points** radio button, check this option to plot "ticks" that point in the direction of travel along a line. The ticks are not created if the **Data Format - Lines** radio button is selected.
Point Type menu	If the **Data Format - Points** radio button is selected, there are four different types of point markers that can be chosen from this dropdown menu: **Circle**, **Square**, **Triangle**, or **Point**.

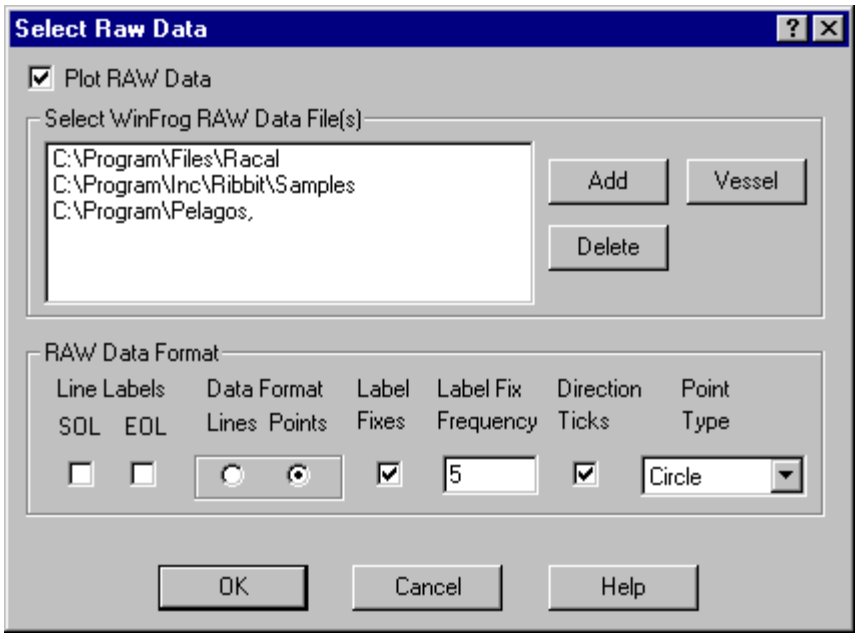
Click **OK** to return to the **Generate DXF Map** dialog box.

Select RAW Data Dialog Box

WinFrog can also be configured to include positional data from WinFrog **Raw** (**.raw**) files in the .DXF map. These parameters are configured in the **Select RAW Data** dialog box.

To Plot Raw Positional Data in the DXF Map

1 In the **Generate DXF Map** dialog box, click the **Select Raw Data** button.



2 Select the **Plot RAW Data** option at the top of the **Select RAW Data** dialog box.

3 Click the **Add** button.

4 Navigate to the desired directory.

5 Select the desired file(s) from the list of **.RAW** files.

6 Click **Open**.

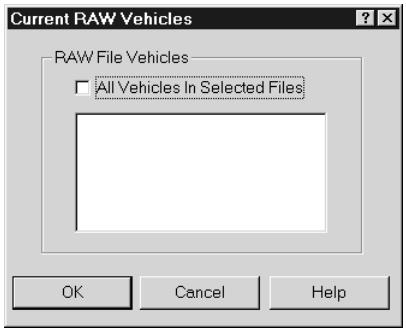
7 Click **OK.**

The file is displayed in the **Select WinFrog RAW Data File(s)** list in the **Select RAW Files to Plot** dialog box.

8 Repeat steps **3** through **7** to add more raw files.

Note: to remove a raw file from this list, select it and click the **Delete** button.

9 When all desired files are listed in the **Select WinFrog RAW Data File(s)** list, click the **Vessel** button.



From the **Current RAW Vehicles** dialog box, WinFrog can be configured to export raw data from all vehicles or individual vehicles:

10 To select all vehicles, check the **All Vehicles In Selected Files** box.

11 To select individual vehicles, select the desired vehicles from the list in the white field.

Note: make sure that the **All Vehicles In Selected Files** box is not checked or all vehicles will be used.

12 Click **OK** to return to the **Select RAW Data** dialog box.

13 Configure the parameters in the **RAW Data Format** area:

Line Labels SOL box	Check this option to have WinFrog plot the line name at the start of each line.
Line Labels EOL box	Check this option to have WinFrog plot the line name at the end of each line.
Data Format - Lines	Select this radio button to connect adjacent points into a line.
Data Format - Points	Select this radio button to not connect adjacent points into a line, instead plotting them individually.
Label Fixes box	Check this option to label the fixes (events) within the raw file. The value of the label is equal to the event number as saved in the raw file.
Label Fix Frequency field	Sets this to determine how often event labels are plotted. If the **Label Fix Frequency** is set to 1, every event is labeled. If it is greater than one, WinFrog only labels every **n**th fix, where **n** is the value entered.
Direction Ticks box	If you select the **Data Format - Points** radio button, WinFrog can create ticks that point in the direction of travel along a line. If you select the **Data Format Lines** radio button,

	the direction ticks are overwritten by the line.
Point Type menu	If the **Data Format - Points** radio button is selected, there are four different types of point markers that can be chosen from this dropdown menu: **Circle**, **Square**, **Triangle**, or **Point**.

Click **OK** to return to the **Generate DXF Map** dialog box.

Generate MGD77 File

The **Generate MGD77 File** utility allows you to combine client created and supplied magnetometer and bathymetry data files with raw format WinFrog data into a single ASCII file. This utility can then convert that merged file into a file in **MGD77** format.

The three types of data that can be merged are magnetics (**.CSV**), bathymetry (**.DEP**), and raw WinFrog (**.RAW**) files. These three files are merged into a **.ROD** file that is then converted to an **.MGD** file. WinFrog generates the **MGD77** format as defined by **The Marine Geophysical Data Exchange Format - MGD77**. This document can be found on the internet at the following site:
ftp://ftp.ngdc.noaa.gov/MGG/geodas/docs/mgd77.txt

File Formats

The **Magnetics** file contains **Julian Day**, **Time (hhmmss)**, **Magnetic Value**, and **Event Number** data in a single, comma-separated string (i.e. **343,100834,32,12**).

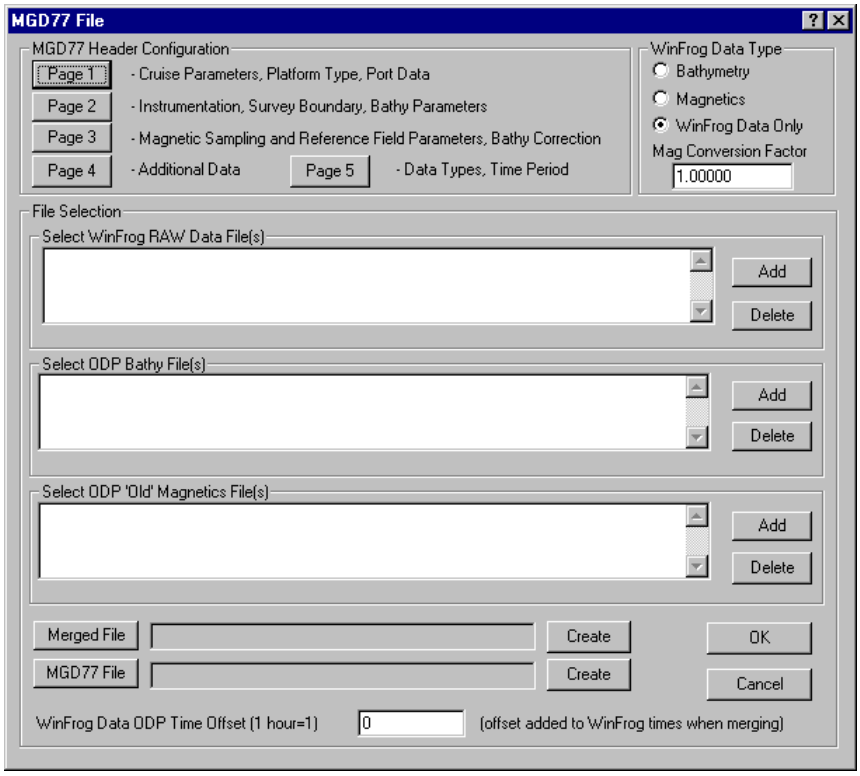
The **Bathymetry** file contains **Year**, **Julian Day**, **Hours (hh)**, **minutes (mm)**, **seconds (ss)**, and **Depth** (i.e. **1994,343,10,08,34,10.1**).

The WinFrog **.raw** file must contain **Type 351** records. See the **WinFrog File Formats** appendix of this manual for details.

The MGD77 format consists of two parts: a header section and a data section. The header section contains information about the content and structure of the geophysical data as well as other general information. WinFrog allows you to enter the header information using five dialog boxes.

To Create an MGD77 Format File

1 From the **Utilities** menu, choose **Generate MGD77 File**.



2 Configure the **Header Information** using the **Page 1** through **Page 5** buttons at the top of the **MGD77 File** dialog box.

See the **Header Page Buttons** section below.

3 In the **WinFrog Data Type** area of the **MGD77 File Utility** dialog box, select one of the three radio buttons to define the type of data recorded in a WinFrog **.raw** file:

Bathymetry	these are files created offline by user
Magnetics	these are files created offline by user
WinFrog Data Only	no data other than WinFrog data

If navigation data is the only data type in the WinFrog **.raw** data file, you can include bathymetry data files (*.**dep**) and magnetics data files (*.**csv**) from other sources.

4 Enter the **Mag Conversion Factor**.

This is a scale factor that is multiplied by bathymetry and depths during the file creation.

5 In the **File Selection** area of the **MGD77 File Utility** dialog box, click the **Add** button next to the type of file you wish to add.

6 Navigate to the desired directory.

7 Select the desired files from the available **Raw WinFrog Data Files**, **ODP Bathy Files**, or **ODP Magnetics Files**.

8 Click **Open**.

9 Click **OK**.

Note: if WinFrog does not show the file in the respective list , this indicates that the file has no usable data.

10 Repeat steps **5** through **9** to add more files.

Note: to remove files from any of the three lists, select them and click the relevant **Delete** button.

11 Enter a value in the **WinFrog ODP Time Offset (1 hour=1)** field.

This is a time bias that is added to WinFrog times so that they correspond with **ODP** times. More information about this parameter can be found in the **WinFrog Data ODP Time Offset** section below.

12 Either enter the path and file name in the **Merged File** field. Or,

12a Click the **Merged File** button.

12b Navigate to the desired directory.

12c Select the desired file.

12d Click **Open**.

12e Click **OK**.

13 Click the **Create** button (immediately to the right of the **Merged File** field) to perform the merge and create a new file.

14 Either enter the path and file name in the **MGD77 File** field. Or,

14a Click the **MGD77 File** button.

14b Navigate to the desired directory.

14c Select the merged file.

14d Click **Open**.

14e Click **OK**.

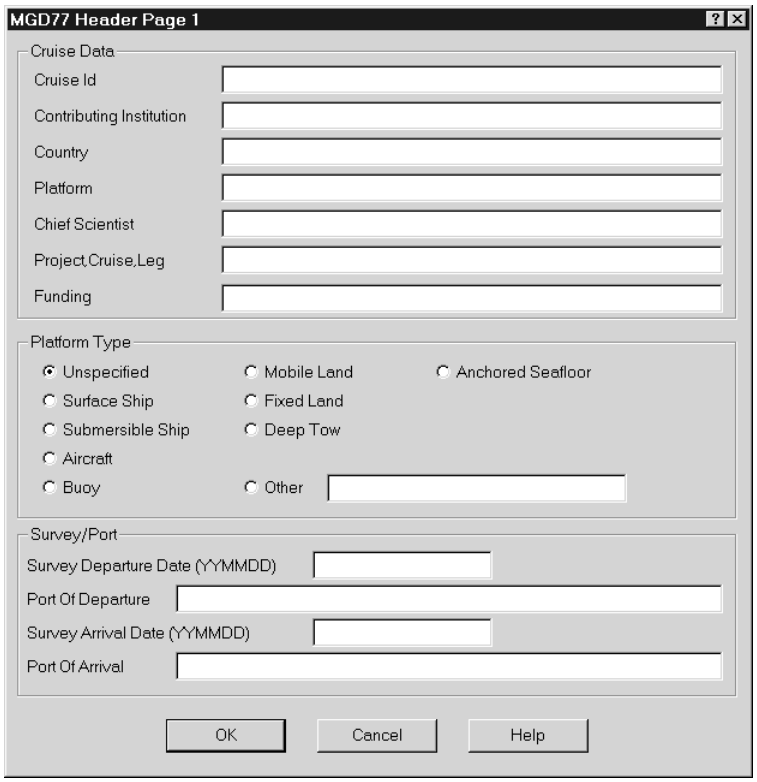
15 Click the **Create** button (immediately to the right of the **MGD77 File** field) to perform the export.

Header Page Buttons

Each of the **Page 1** through **5** buttons at the top of the **MGD77 File Utility** dialog box leads to a unique dialog box. The information in each of these dialog boxes needs to be entered in order to configure the header in the proper **MGD77** format.

Page 1

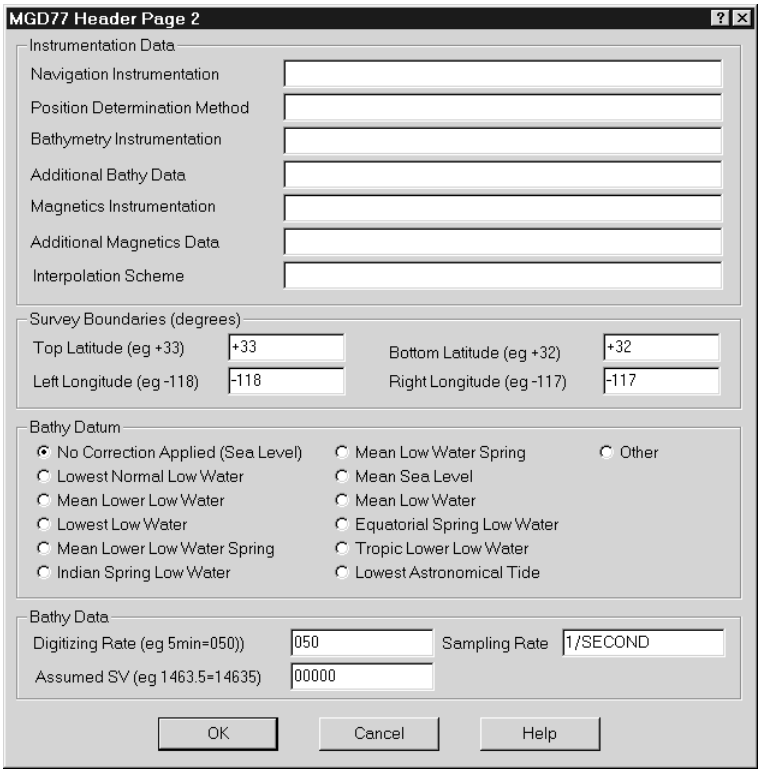
The **Header Page 1** dialog box includes **Cruise Parameters**, **Platform Type**, and **Survey/Port Data**. Highlight the appropriate fields and enter the necessary data.



Page 2

The **Header Page 2** dialog box includes with **Instrumentation**, **Survey Boundary**, and **Bathy Parameters**.

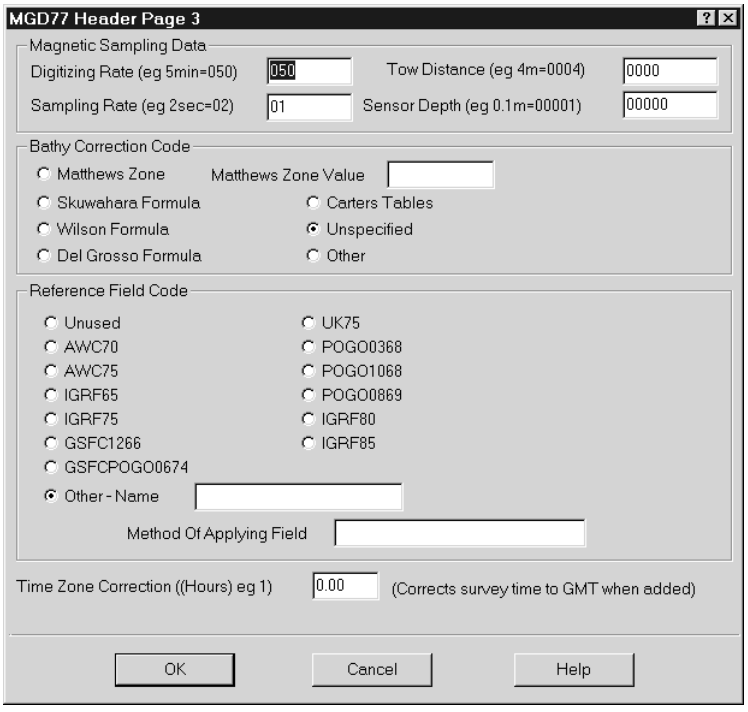
Highlight the appropriate field and enter the necessary data.



Page 3

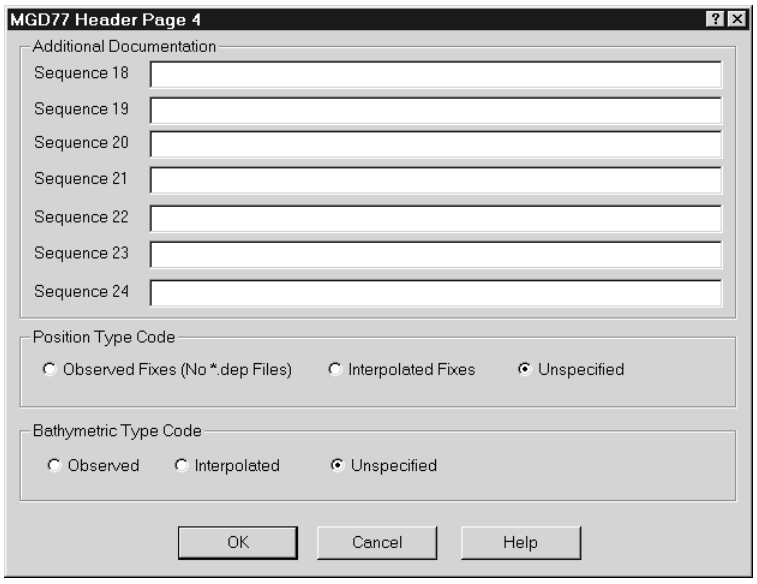
The **Header Page 3** dialog box is concerned with **Magnetic Sampling and Reference Field Parameters**, and **Bathy Correction.**

Highlight the appropriate field and enter the necessary data.



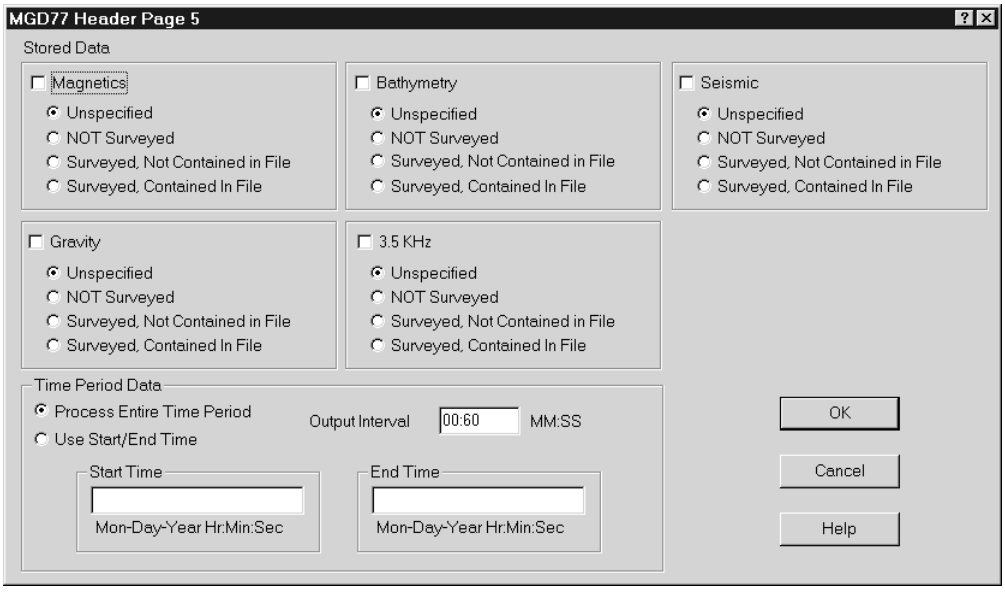
Page 4

The **Header Page 4** dialog box is concerned with any additional data. Highlight the appropriate field and enter the necessary data.



Page 5

The **Header Page 5** dialog box is concerned with **Data Types** and **Time Period**. Highlight the appropriate field and enter the necessary data. For more information refer to the **Time Period Data** section below.



To finish preparing WinFrog for data merging and file export in the MGD77 format, continue with step **3** of the **To Create a Merged Export File in MGD77 Format** section earlier in this chapter.

Time Period Data

The time period data are configured in the **MGD77 Header Page 5** dialog box. This parameter allows you to select an interval within which the data records will be merged and the MGD77 file created. If the **Process Entire Time Period** radio button is selected in the **Time Period Data** area, data are output for the entire time period covered by the WinFrog files. If a time period is entered in the **Output Interval** field in the **Time Period Data** area and the **Use Start Time/End Time** radio button is selected in the **Time Period Data** area, only data within this time period are output.

WinFrog Data ODP Time Offset

The **Data ODP Time Offset** is the time (in hours) that is added during the file merge to the WinFrog time to match the time to the ODP file time. For example, if the ODP files were recorded in GMT and the WinFrog files were recorded in PST (which is 8 hours behind), the value **8** would be entered here. The value entered in the **Time Zone Correction ((Hours) eg 1)** field at the bottom of the **MGD77 Header Page 3** dialog box is therefore the offset from the ODP file time to GMT.

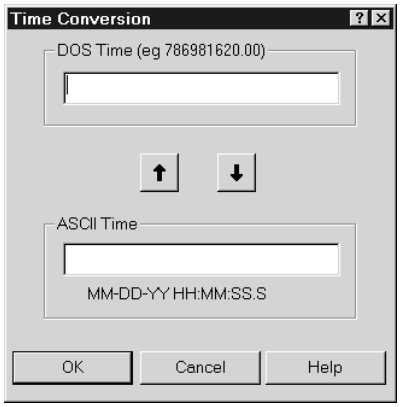
Time Conversion

Use this utility to convert between **DOS** time and **ASCII** time. **DOS** time is defined as the number of seconds since midnight, January 1, 1970. **ASCII** time is in the form **mm-dd-yy hh:mm:ss.s**.

WinFrog **.raw** files contain **DOS** time in each record, whereas **Automatic** and **Manual Event** data files contain **ASCII** time. This utility is often used to relate **.raw** data records to **Automatic Events** for data processing efforts.

To Convert DOS Time to ASCII Time

1 From the **Utilities** menu, choose **Time Conversion**.



2 Enter the **DOS** time into the **DOS Time** field. This must be entered in seconds.

3 Click the "**down**" arrow button.

The result of the conversion is displayed in the **ASCII Time** field.

To Convert ASCII Time to DOS Time:

1 From the **Utilities** menu, choose **Time Conversion**.

2 Enter the **ASCII** time into the **ASCII Time** field. It must be in the form **mm-dd-yy hh:mm:ss.s**.

3 Click the "**up**" arrow button.

The result of the conversion is displayed in the **DOS Time** field.

Note: if an invalid ASCII time is entered, WinFrog displays **0.0** in the **DOS Time** field. To confirm that the correct ASCII time format was entered, click the "**down**" arrow button. The ASCII time value will not change if the conversion is correct.

Position Averaging

This WinFrog utility provides the ability to configure time-based recording of a vehicle's **Tracked Offset** position into an **.aep** file. The contents of this file are then used and displayed in a **Position Averaging and Editing** dialog box. This dialog box provides you with the following information:

- Mean Position
- Mean Height
- Mean Depth
- Mean Heading (True and Grid)
- Standard Deviations of the above Means
- Mean Line Tracking data (KP, EOL, Offline)
- Mean Waypoint Tracking data (Range, Bearing)

Also displayed is a graphical plot of the scatter of the collected data, a spreadsheet of all recorded **Observations**, along with the calculated **Residuals** of each observation and a **Used/Not Used** status. Using the spreadsheet, you can manually look through all recorded data and residuals, then specify to include/remove observations from the final **Mean Position** calculations as you wish. The final **Mean Position** can then be saved to the **Working Log** (**.log**) file. The **.aep** file can also be saved with all edits in tact.

The following sections detail all features and functions of the **Position Averaging and Editing Utility**.

To Record Vehicle Positions into an .aep File

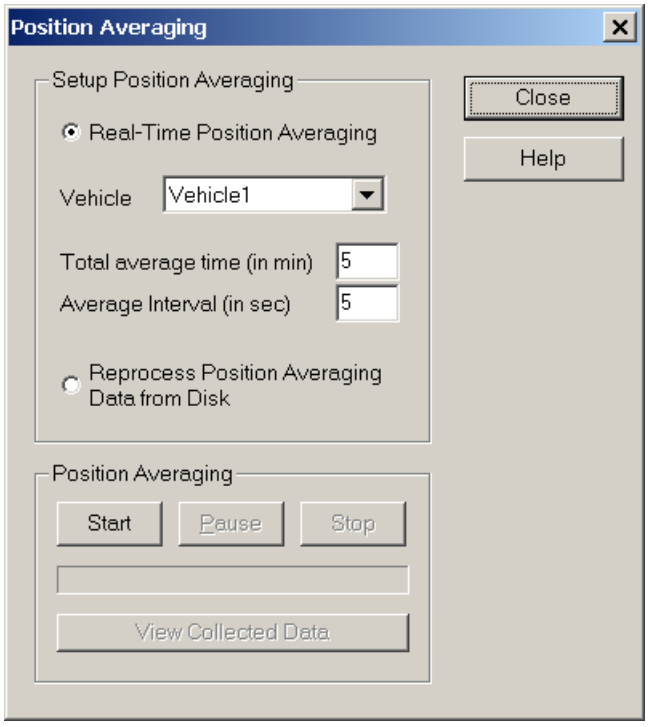
As mentioned above, you can configure the **Position Averaging** utility to record real-time positions of any WinFrog vehicle. It is important to remember that the position recorded is the chosen vehicle's **Tracked Offset** position and that **Tracked Offset** positions are filtered positions referring to the **Working Geodetic Datum**. You should confirm all configuration settings before any data recording is initiated.

Also, because the **Position Averaging** utility calculates mean survey line and waypoint tracking information, ensure that the correct survey line and waypoint are being tracked.

If an **.aep** file has already been recorded, skip ahead to the next section titled **To Load and View Average Position Data**.

To Record an .aep File

1 From the **Utilities** menu, select **Position Averaging**. The **Position Averaging** dialog box displays. This is a modeless dialog and therefore it is not necessary to close it in order to access other WinFrog windows and options. As a result, the data collection can be configured and executed without impeding normal WinFrog operation. It is important to note that the data collection will abort if this dialog is closed while collecting data. If the dialog is closed, you are prompted with this and given the option to return to the dialog so that the data collection may continue.



2 In the **Setup Position Averaging** portion of this window, ensure that the **Real-Time Position Averaging** radio button is selected.

3 Select the appropriate vehicle from the dropdown menu.

4 Enter a **Total average time** (in minutes) in the provided entry window.

5 Enter an **Average Interval** (in seconds) in the provided entry window. This defines the time interval between positions recorded in the **.aep** file.

6 Select the **Start** button at the bottom of the window. The "time increment bar" below the **Start** button will fill with blue bar sections as the data recording session is completed.

Note: if you have configured a long session (i.e. a large **Total average time**), the time increment bar will be slow to fill up. You may also notice that the first bar will not be drawn immediately, making you question whether data recording is occurring at all. You may have to wait up to 1 minute before the first bar is drawn.

7 If you wish to pause the data collection at any time you can click the **Pause** button. This button then changes to **Resume,** which can be clicked to continue collection. Alternatively, you may also click the **Stop** button, which will cause data collection to finish and the **View Collected Data** button to become enabled.

8 Once the specified **Total average time** has passed, the "time increment bar" will clear itself and the **View Collected Data** button will be enabled.

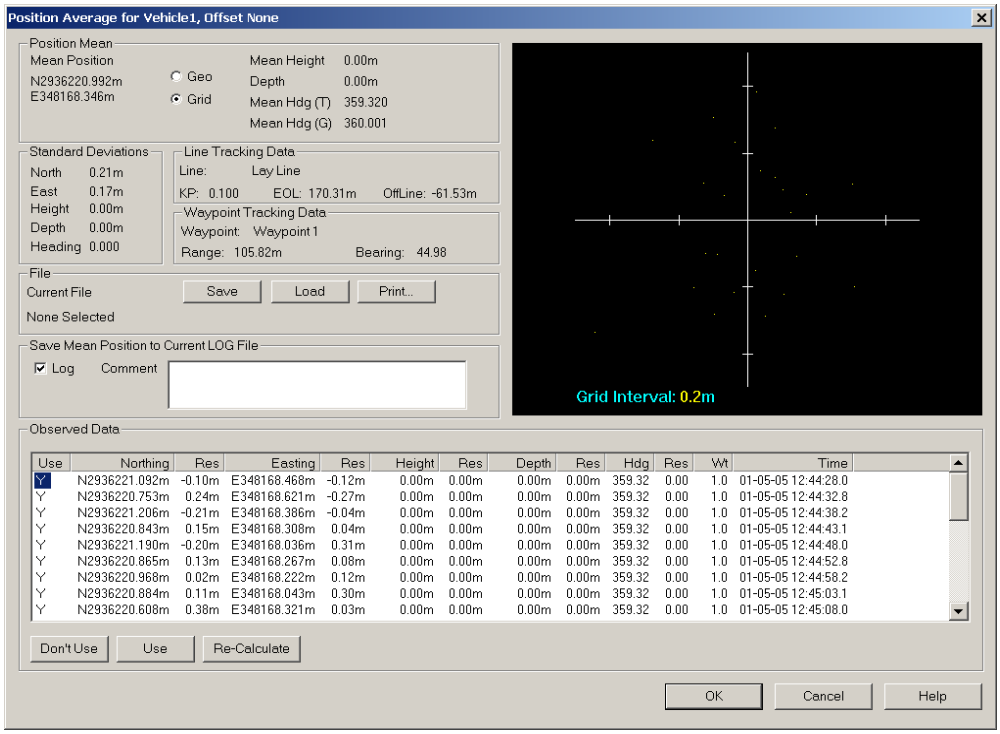
To Load and View Average Position Data

If you have just recorded **Average Position** data using steps **1** through **8** above, click the **View Collected Data** button in the **Position Averaging** dialog box and skip ahead to step **3** below.

1 You can load a previously recorded **.aep** file for review and editing of a vehicle's average position data. From the **Position Averaging** dialog box, select the **Reprocess Position Averaging Data from Disk** radio button.

2 Click the **Load** button.(Note: this is the same button that was previously labeled **Start**). Browse to the appropriate directory and select the desired **.aep** file.

3 The **Position Averaging and Editing** dialog box now appears, as seen below.



4 The **Position Mean** portion of this window displays the **Mean Position**, as well as **Mean Height, Mean Depth** and **Mean Heading (True and Grid)** information.

5 The **Standard Deviations** portion of this window displays the calculated **Standard Deviations** for the **Mean Position**, **Mean Height**, **Mean Depth** and **Mean Heading** information.

6 The **Line Tracking Data** portion of this window displays the **Name** of the **Tracked Survey Line** and the calculated **Average KP (Kilometer Post)**, **EOL (End of Line)**, and **Offline** distances.

7 The **Waypoint Tracking Data** portion of this window displays the **Name** of the **Tracked Waypoint** and the calculated **Average Range** and **Bearing** to the **Tracked Waypoint**.

8 The **scatter plot** is a graphical display of the distribution of the used positions centered on the mean position. The axes are automatically scaled to encompass all used data.

9 The **Observed Data** portion of this window displays the following information, as found from left to right.

Use	**Y** - indicates that this observation is used in the mean calculations **N** - indicates that this observation is **not** used in the mean calculations

Note: see the section immediately below for more information on the **Used** status.

Northing	the **Grid Northing** of this observation
res	the residual of this **Northing observation** (i.e. the difference between this observation and the calculated **Mean Northing**)
Easting	the **Grid Easting** of this observation
res	the residual of this **Easting observation**. (i.e. the difference between this observation and the calculated **Mean Easting**)
Height	the **Height** of this observation
res	the residual of this **Height observation** (i.e. the difference between this observation and the calculated **Mean Height**)
Depth	the **Depth** of this observation
res	the residual of this **Depth observation**. (i.e. the difference between this observation and the calculated **Mean Depth**)
Hdg	the **Heading** of this observation
res	the residual of this **Heading observation**. (i.e. the difference between this observation and the calculated **Mean Heading**)
Wt	the **relative weighting** accuracy value of this observation
Time	the date and time of this observation (mm-dd-yy hh:mm:ss.ss)

To Edit and Re-Calculate Average Position Data

This section details the steps required to modify the results of a position averaging (.aep) file. The editing of data should only be undertaken by qualified personnel who understand the repercussions of their actions. By default, WinFrog uses **all** observations in its calculation of **Mean** values. If the **.aep** file results have been questionably altered (i.e. points have been removed that perhaps should be included), simply return all observation data to the solution to "undo" any modifications.

1 The **only** way to modify the results in the **Position Averaging** window is to remove points from the **mean calculations**. This is typically based on the residual value for that observation. A high residual value suggests that this observation does not agree with the other observations used to calculate the mean value.

   To remove an observation, select the desired row (highlighting that row) and click the **Don't Use** button. (You can also use the **Shift** [continuous] or **Ctrl** [discontinuous] keys to select multiple rows). Note: the **Used** status now changes to **N**.

This removes the observation from **all** mean calculations, i.e., you cannot remove only one part of an observation (such as a **Depth** or **Easting** that has a high residual).

2 Click the **Re-Calculate** button to initiate the re-calculation of the **Mean** values, using only those points whose **Used** status is **Y** (yes). **Note:** all of the results shown in the upper parts of the **Position Averaging** window will now change to reflect the new calculations.

3 Observations can be re-instated into the calculation data by simply highlighting the desired row and clicking the **Use** button. (That observation's **Used** status changes back to **Y**). The **Re-Calculate** button must be clicked again to utilize the values in the actual **Mean** calculations.

To Print and Save Average Position Data

Once **Mean** and **Standard Deviation** values have been obtained, you can print the results and also save the information to file.

1 To **Print** the **.aep** file (including both **Observations** and **Results**) in its current state, click the **Print...** button in the top right corner of the dialog window.

2 To save the **Mean Position** to the **Working Logs (.log)** file, check the **log** box and enter a **comment**. When **OK** is clicked to close the **Position Averaging and Editing** window, this **Comment** and **Position** are written to the **Working Log (.log)** file.

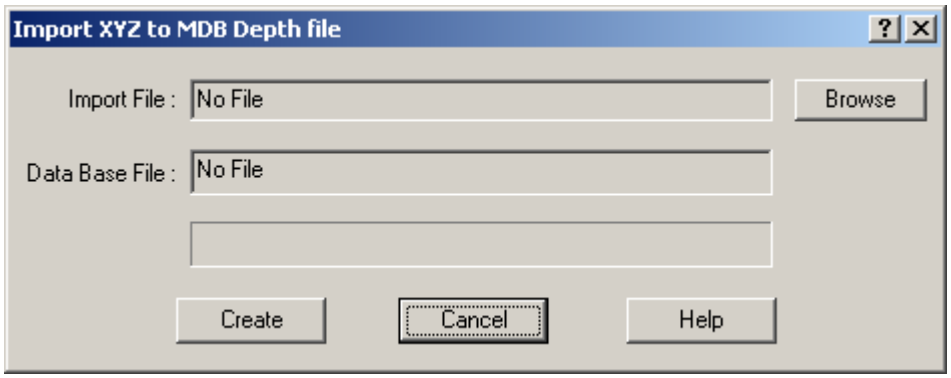
3 To save the **.aep** file to disk, click the **Save** button (in the top right corner of the **Position Averaging and Editing** window), to bring up the **Select Position File** dialog box. Enter the **name** and browse to specify the location where the new **.aep** file will be created. Click **Save** to create this file and return to the **Position Averaging and Editing** dialog box.

Import Bathymetry

This WinFrog utility provides the ability to convert bathymetry in an ASCII x,y,z formatted file into a WinFrog soundings database file that can be displayed in the WinFrog Profile window.

The ASCII file to be imported is a simple format consisting of a header block and comma-delimited data records. It is important that the header block is completed with relevant survey information, and in particular, care should be taken to enter the correct information for Datum Name, Ellipsoid Name, General and Specific Projection Names, and Units. The ASCII file format is described below.

To import bathymetry data from an ASCII file, select **Utilities > Import Bathymetry**. This will open the Import File dialog shown below.



Browse for the ASCII import file. When this file is selected, the Data Base File will be set to the same name and directory as the ASCII import file with an .mdb extension. Click **Create** to build the database file. If the database file already exists, a warning is displayed with the option to overwrite the existing file or not. If no is selected, a new name for the database can be entered.

The file header is checked to ensure that the geodesy is compatible with that configured for the current project. The ASCII data bathymetry file header format is specified below. A message displays with information on the status of the import operation when the MDB file import is completed. Upon successful importation, the MDB file can then be loaded for display in the Profile window.

ASCII Bathymetry Header Format (with example data)

* Winfrog uses the header to check the geodesy and units
* Recognized units
* meters (m)
* feet (ft) = .3048 m;
* US survey feet (ft) = (12./39.37)m
* fathoms (fm) = (.3048*6)m
* Imperial Feet = .3047994718 m

H,Date, 10/10/00,
H,Company Name, Racal NCS,
H,Project Number, 2236,
H,Project Description, TLP Installation - Phase 1,
H,Survey Area, Green Canyon 237,
H,Client, McDermott,
H,Party Chief, Travis John,
H,Vessel, Seaway Rover,
H,Line Name, 1,

H,Ellipse Name, Clarke 1866,
H,Datum Name, NAD 27,
H,Projection General, U.S. State Plane 1927 (SPCS 27),
H,Projection Specific, Texas South Central,
H,Grid Units, US survey feet,
H,Depth Units, meters,
H,DAL Units, meters,

ASCII Bathymetry Record Format

Field	Data	Format	Comment
1	Easting	f.d	Grid units defined in Header
2	Northing	f.d	Grid units defined in Header
3	Depth	f.d	Depth units defined in Header
4	KP	f.d	DAL units defined in Header