HYDRO*pro*
Software Series

HYDRO*pro* Navigation
Software User's Guide




Trimble

HYDRO*pro*™ Navigation

Software User's Guide

Version 2
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Trimble™

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About This Manual

Welcome to the *HYDROpro Navigation Software User's Guide*. This manual describes how to install, set up, and use the Trimble HYDROpro™ Navigation software (referred to as the Navigation software).

Scope and Audience

We assume that you are familiar with the fundamentals of Microsoft Windows. We assume that you know how to use a mouse, open a menu, select options from menus and dialog boxes, make selections from lists, and use standard Help commands. For a review of these techniques, consult your Windows documentation.

The following sections provide you with a guide to this manual, as well as other documentation that you may have received with this product.

Organization

This manual contains the following:

- Chapter 1, Introduction, introduces you to the Navigation software.
- Chapter 2, Installation, shows you how to install the software.
- Chapter 3, Concepts, explains the concepts of the Navigation software.

- Chapter 4, Before You Begin, describes the user interface of the software, and how to start and exit the software.
- Chapter 5, Quick Tours, gives you a step-by-step guide to carrying out frequently used tasks.
- Appendix A, Utilities, describes the Activation, Coordinate Calculator, Coordinate System Manager, Language, and Remote Helmsman utitilies that are part of the HYDROpro software suite.
- Appendix B, HYDROpro Tug and HYDRObms Communications, describes how to configure a Navigation project for use as a tug system working with the HYDRObms™ or HYDROrig™ software.
- Appendix C, Electronic Charts, explains how to use electronic charts in HYDROpro.
- The Glossary contains definitions of words and terms used throughout this manual.

Related Information

The following sections discuss other sources of information that introduce, extend, or update this manual.

Other Manuals

The *HYDROpro Navigation Technical Guide* provides information on decoding devices, equipment interfacing, and other technical information.

Online Help

The software has built-in, context-sensitive online Help that lets you quickly find the information you need. Access it from the Help menu. Alternatively, click the Help button in a window, or press F1.

Readme.doc File

A readme.doc file contains important information added after the manuals went to print. To read this file, double-click it or use a text editor to open it. The installation program also copies it into the program directory.

Release Notes

The release notes describe new features of the product, information not included in the manuals, and any changes to the manuals.

Update Notes

There is a warranty activation sheet with this product. Send it in to automatically receive update notes as they become available. These contain important information about software and hardware changes. Contact your local Trimble Dealer for more information about the support agreement contracts for software and firmware, and an extended warranty program for hardware.

Other Information

This section lists sources that provide other useful information.

World Wide Web (WWW) Site

For an interactive look at Trimble, visit our site on the World Wide Web (www.trimble.com).

File Transfer Protocol (FTP) Site

Use the Trimble FTP site to send files or to receive files such as software patches, utilities, and FAQs. The address is ftp://ftp.trimble.com.

You can also access the FTP site from the Trimble World Wide Web site (http://www.trimble.com/support/support.htm).

To visit the Marine Survey FTP site click on the Pub link from the Trimble FTP home page, then the marine_survey link.

Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, *contact your local dealer.* Alternatively, request technical support using the Trimble World Wide Web site (http://www.trimble.com/support/support.htm).

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All comments and suggestions become the property of Trimble Navigation Limited.

Thank you for your help.

Document Conventions

Italics identify software menus, menu commands, dialog boxes, and the dialog box fields.

SMALL CAPITALS identify DOS commands, directories, filenames, and filename extensions.

`Courier` represents messages printed on the screen.

`Courier Bold` represents information that you must type in a software screen or window.

Helvetica Bold represents a software command button.

Return or Ctrl+C is an example of a hardware function key or key combination that you must press on your computer.

Warnings, Cautions, Notes, and Tips

Warnings, cautions, notes, and tips draw attention to important information, and indicate its nature and purpose.

Warning – Warnings alert you to situations that could cause personal injury or unrecoverable data loss.

Caution – Cautions alert you to situations that could cause hardware damage or software error.

Note – Notes give additional significant information about the subject to increase your knowledge, or guide your actions.

Tip – Tips indicate a shortcut or other time- or labor-saving hint that can help you make better use of the product.

1 Introduction

The HYDROpro™ software suite is made up of:

- The Navigation software – a real-time navigation and data acquisition system.
- The NavEdit software – a data editing and formatting system.
- The Processing software – data presentation and analysis software.

Additionally, HYDROpro includes some utilities:

- Language – a utility that you can use to select the language to be used in Navigation and NavEdit.
- Coordinate Calculator™ – a utility for performing coordinate calculations.
- Coordinate System Manager™ – a geodetic database used for Navigation and NavEdit.
- Activation – a utility used to transfer software activations between disks and security keys.
- Remote Helmsman™ – a small utility run on a separate PC to provide a helmsman display.

Note – The availability of these software modules and utilities depends on the activations available on your security key and what you have selected to install.

1.1 The Navigation Software

The HYDROpro™ Navigation software is a real-time navigation and data acquisition system. It is used for hydrographic survey activities such as port and harbour surveys, marine construction, geophysical surveys, and vessel management.

The computer is generally configured with multiple communications ports to allow multiple input and output of data to and from the Navigation software.

Figure 1-1 shows a typical configuration of a Navigation project.

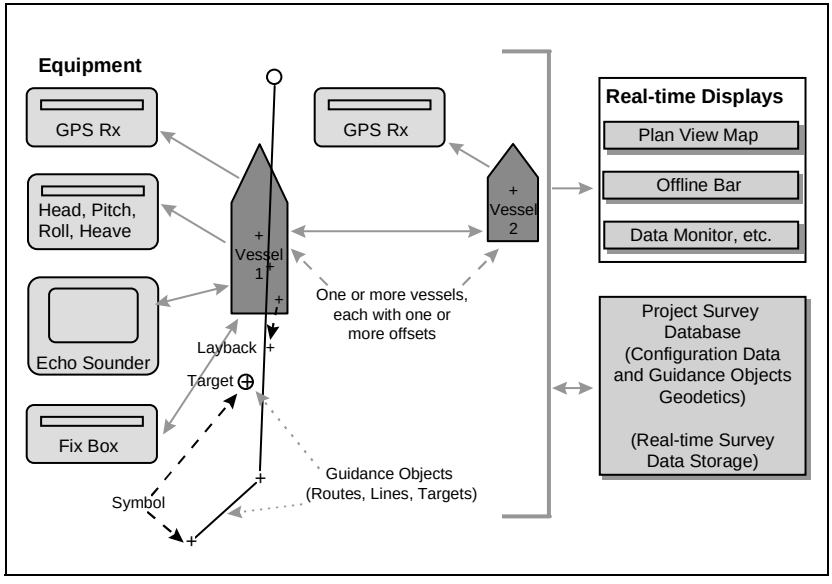


Figure 1-1 A Typical Navigation Project Configuration

You can define all configuration data such as survey lines, routes and targets (guidance objects), vessels, displays, backgrounds, outputs, equipment, and geodetics in a Navigation project.

Any number of vessels with any number of offsets can be configured within a project. A vessel offset can be associated with a guidance object.

Navigation and sensor devices such as GPS receivers, echo sounders and heave compensators can be interfaced via the PC comm ports and multi port cards such as standard four-port PCMCIA cards. Data streams are time stamped, decoded and processed, offsets and laybacks are calculated and position and sensor displays updated.

Events can be generated internally, based on position or time, or externally via a Fix box. At events, actions are configured to occur. An example of configured actions may be to log data and to annotate the echo sounder.

Any data can be output in configurable reports to printers and/or other devices (such as data radios) in real time.

All project configuration and survey data (decoded and event) are stored to the current project database.

HYDROpro NavEdit™ and HYDROpro Processing are used to read and process project databases.

2 Installation

This chapter explains how to install a single license of HYDROpro on a stand-alone computer.

This chapter covers:

- Hardware and software requirements
- Installing the software
- Using the Activation utility to activate the software
- Windows settings
- Removing the software

2.1 Hardware Requirements

Table 2-1 details the minimum and recommended requirements for the HYDROpro software.

Table 2-1 Hardware Requirements

Component	Minimum Requirements (Window 95)	Recommended Requirements (Windows NT)
CPU	Pentium 166 MHz	Pentium 233 MHz
RAM	64 MB	128 MB
Hard Drive	1 GB	2 GB
Monitor	SVGA color 800 × 600	SVGA color 1024 × 768
Parallel Ports*	1	1
Serial Ports**	RS232 port with 16550 UART	RS232 port with 16650 UART
Input Devices	Keyboard with mouse or trackball	Keyboard with mouse or trackball
Data Drives	CD-ROM drive 1.44 MB 3.5" floppy drive	CD-ROM drive 1.44 MB 3.5" floppy drive ZIP drive

* The voltage on pin 9 must be a minimum of 5 volts.

**A RS232 port is generally required for each device to be interfaced with.

Warning – In future releases (v1.5 and later) of HYDROpro the recommended requirements listed above will become the minimum requirements. Only Windows NT (v4 or later) and Windows 2000 will be fully supported in future releases.

2.2 Software Requirements

In order to run HYDROpro, you must have installed one of the following operating systems:

- Windows 95
- Windows 98
- Windows NT (version 4.0 or later)
- Windows 2000

Note – If you are installing the software under Windows NT or Windows 2000 you must have administrator rights, otherwise the software will not install correctly.

2.2.1 System Components

On some computers, the following system components must be updated.

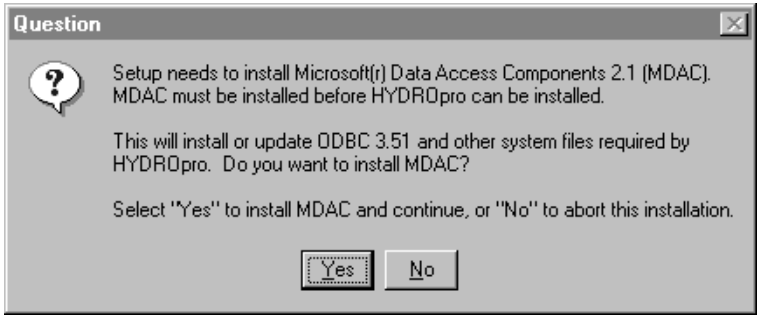
ODBC Drivers

HYDROpro version 1.40 requires version 3.5 of the Microsoft Open Database Connectivity (ODBC) software. ODBC version 3.5 is automatically installed during the HYDROpro installation procedure. If earlier versions of ODBC drivers are already installed, they are automatically upgraded.

The versions installed by HYDROpro version 1.4 are:

- ODBC Driver Manager version 3.510.4202
- Microsoft Access Driver version 4.00.4202.00

In order to install or update the ODBC drivers, the installation procedure will install Microsoft Data Access Components 2.1 service pack 2 (MDAC). If this needs to be done, the following dialog appears:



Note – Although these system files are intended to be backwards compatible this is beyond Trimble's control. Updating these components may affect other applications using these system files.

To determine versions of ODBC drivers you have installed:

1. From the Windows taskbar select *Start* / *Settings* / *Control Panel*.
2. Do one of the following, depending on the operating system that is installed:
   - Windows 95 and 98:

     From the Control Panel double-click 32-bit ODBC.
   - Windows NT:

     From the Control Panel double-click ODBC Data Sources.
   - Windows 2000:

     From the Control Panel double-click Administrative Tools and then double-click Data Sources (ODBC).

   The ODBC Data Source Manager appears.

3. Select the *Drivers* tab to view the version number of the Microsoft Access Driver Manager.
4. Select the *About* tab to view the version number of the ODBC Driver Manager.

DCOM95

On Windows 95 computers, DCOM95 must be installed. If it is not, the HYDROpro installation process will install it. If Microsoft's DCOM95 is not installed, the following dialog appears:

After DCOM has been installed you must restart the computer and restart the HYDROpro installation.

2.3 Installing the Software

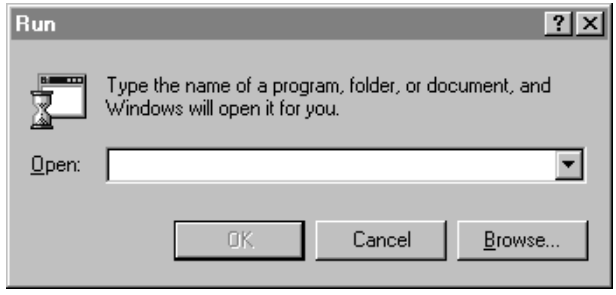
The installation process uses InstallShield, the standard installation program for Windows. InstallShield asks you for folder names to hold the HYDROpro software, data, and other files. No other information is required from you.

Before you install the software, make sure you have read the information in the previous sections.

Before you install the HYDROpro software, you should also make sure that you have closed all other Windows programs.

To install or upgrade the HYDROpro software:

1. Insert the HYDROpro CD-ROM into your CD-ROM drive.
2. The installation program should start automatically. If it does not:
   - From the Windows task bar select *Start* / *Run*. The following dialog appears:



   - In the *Open* field, type **`d:\msetup.exe`** (the drive letter may be different on your computer).

The following dialog appears:

3. Click **Install** to start the install process.
4. Follow the instructions on the screen.

The HYDROpro folder is added to the Start menu. This folder includes icons for each installed module and utilities, online manuals stored on the CD-ROM, and a readme file with the latest amendments.

2.4 Activating the Software Licence

The HYDROpro software requires the correct security key to be plugged into the parallel port of your computer. The security key is required for normal operation and licence activation, but is not required during software installation.

Caution – The security key is an essential part of the HYDROpro software, and the most costly. It effectively provides the licence to use the software. The replacement cost is the same as purchasing new software. Please read your End User Licence Agreement carefully.

2.4.1 HYDROpro Upgrade: NavEdit and Processing

If you purchase a NavEdit and Processing upgrade to your existing HYDROpro Navigation only system you will need to transfer the licence from the activation disk to the security key.

To move an activation from an upgrade disk to a security key:

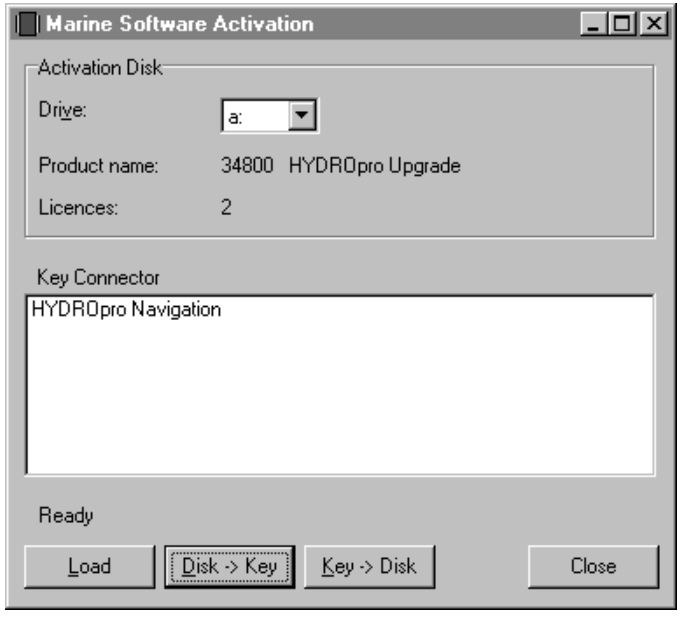
1. Switch off the computer.
2. Connect the security key to the parallel port on the computer.

Note – The security keys cannot be ‘piggybacked’ on other keys. Plug it directly into the parallel port.

3. Switch on the computer.
4. Select *Programs / HYDROpro / Utilities / Activation*.

   The *Marine Software Activation* dialog appears.
5. Insert the upgrade activation disk into the floppy disk drive of the computer and specify the floppy drive letter in the *Drive* field of the dialog.
6. Click **Load**.

The activation software will detect what licences are available on the activation disk and activations installed on the security key:



7. If the NavEdit and Processing activation is not present on the security key, click **Disk** → **Key**.

   Once the activation has been transferred the dialog updates to reflect the current status of the activations.

2.4.2 HYDROpro Upgrade: Navigation/NavEdit and Processing

On request from your Trimble supplier you can be supplied with activation disks to move your Navigation and/or NavEdit/Processing activations from your security key to the activation disk and then onto another security key. This is useful when running several Trimble applications from the same computer, thus letting you incorporate your HYDROpro activations on other Trimble security keys.

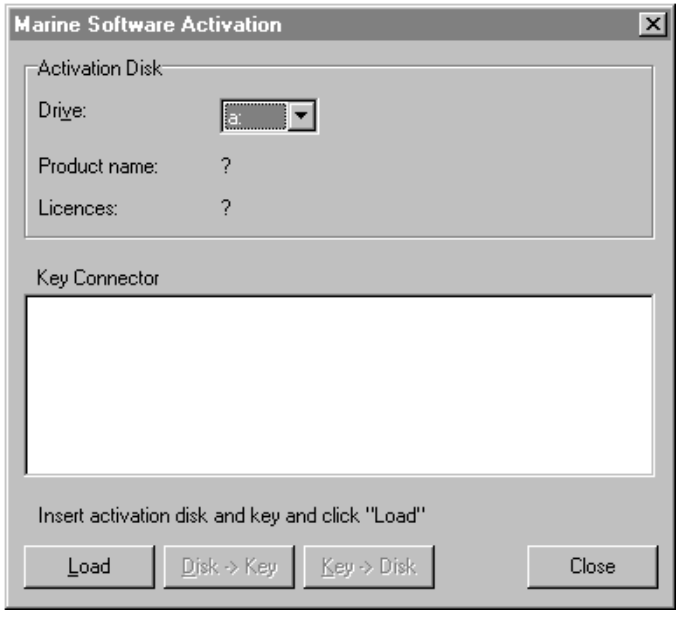
To move an activation from the security key to the activation disk:

1. Switch off the computer.
2. Connect the security key to the parallel port on the computer.

Note – The security key cannot be ‘piggybacked’ on other keys. Plug it directly into the parallel port.

3. Switch on the computer.
4. Select *Programs/HYDROpro/Utilities/Activation*.

The *Marine Software Activation* dialog appears:



5. Insert the activation disk into the floppy drive and specify the floppy drive letter in the *Drive* field of the dialog.
6. Click **Load**.

   The activation software will detect what licences are available on the activation disk and activations installed on the security key.
7. If the NavEdit and Processing or Navigation activation (depending on the activation disk loaded) is present on the security key, click **Key** → **Disk**.
8. Once the activation has been transferred the dialog updates to reflect the current status of the activations.

To move an activation from the activation disk to a security key:

1. Switch off the computer.
2. Connect the security key to the parallel port on the computer.

Note – The security key cannot be ‘piggybacked’ on other keys. Plug it directly into the parallel port.

3. Switch on the computer.
4. Select *Programs/HYDROpro/Utilities/Activation*.

   The *Marine Software Activation* dialog appears.
5. Insert the activation disk into the floppy drive and specify the floppy drive letter in the *Drive* field of the dialog.
6. Click **Load**.

   The activation software will detect what licences are available on the activation disk and activations installed on the security key.
7. If the NavEdit and Processing, or Navigation activation (depending on the activation disk loaded) is not present on the security key and is present on the activation disk, click **Disk** → **Key**.

   Once the activation has been transferred the dialog updates to reflect the current status of the activations.

2.4.3 Security Key Settings

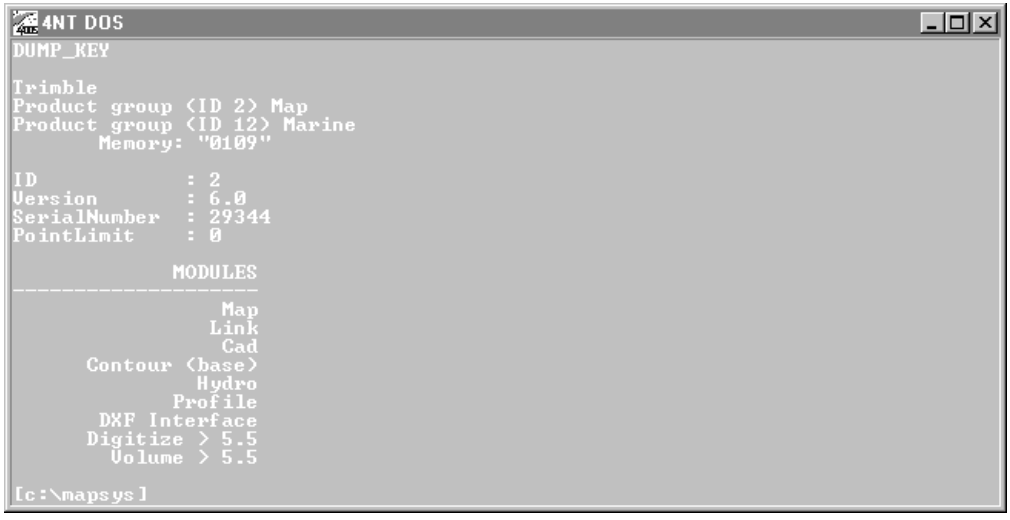
The HYPROpro software provides you with a utility to let you check the activations present on your security key. This utility is called Dump_key.exe.

If you install the Processing component of the HYDROpro software, the Dump_key utility is located in the C:\MapSys directory. Otherwise, it is located in the Util folder on the HYDROpro Installation CD.

To use the Dump_key utility:

1. Connect the security key to the parallel port on the computer.
2. Open a MS-DOS box.
3. In the MS-DOS box:
   a. Change to the directory where Dump_key resides.
   b. Type **dump_key** and press Enter.

The utility will now check what activations are present on the security key. Information similar to that shown below should be displayed:



Of interest is the `Product group (ID 12) Marine Memory` setting as shown above. The following memory settings show that:

- `"0101"` is a Navigation only system
- `"0108"` is a NavEdit only system
- `"0109"` is a Navigation and NavEdit system

Note – The Processing module requires the NavEdit activation to be present.

Tip – On high performing computers the Dump_key utility may not detect the security key. If this is the case, try the following:

• Type **`set SSI_ACT=1000,1000,1000`** in the MS-DOS box.
• Run the MS-DOS box in Full Screen mode. Toggle the MS-DOS box between Full Screen and Window mode by pressing Alt+Enter.

2.5 Windows Settings

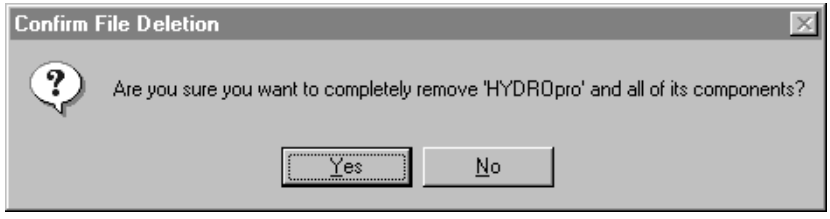
The HYDROpro software uses whatever global Windows settings you have chosen. The time zone settings are of particular importance since they are used by the operating system to set system time to Greenwich Mean Time (GMT). HYDROpro uses Accurate System Time (AST) which is based on system time for data time tagging. Make sure that they are correct for your location. For more information refer to your *HYDROpro Navigation Technical Guide*.

2.6 Removing the Software

This section outlines how to remove the HYDROpro software from your computer.

Note – This process removes more than just the program files. However, it does not delete data files. To delete data files use Microsoft Windows Explorer.

1. Select *Start* / *Settings* / *Control Panel*.
2. From the Control Panel choose *Add/Remove Programs*. The *Add/Remove Programs Properties* dialog appears.
3. Make sure that the *Install/Uninstall* tab is active.
4. Select HYDROpro and click **Add/Remove**. The following message appears:



5. Click **Yes** to delete the files.

3 Concepts

The Navigation software is based on several concepts. They are:

- Projects
- Libraries
- Vessels
- Equipment
- Guidance Objects
- Events
- Surveys

This chapter explains these concepts.

3.1 Projects

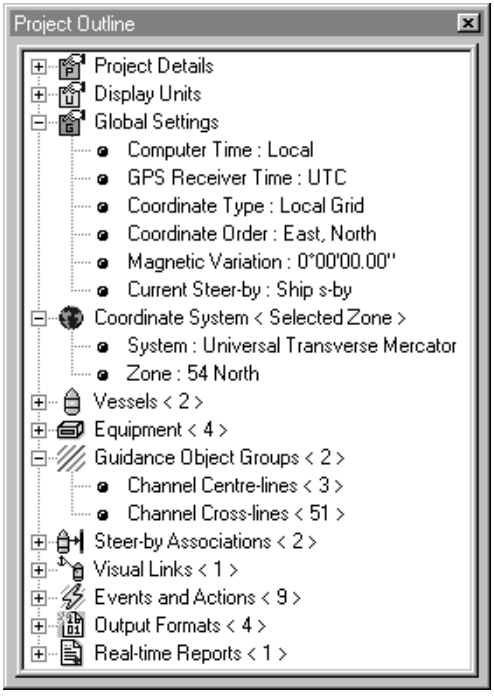
All work in the Navigation software occurs within a ‘project’. Projects can contain the following:

- configuration data
- geodetics
- vessels
- equipment
- guidance objects
- data flows (when online and live)
- events
- survey data

A project determines how data flows are processed, which events occur and how they are handled, what you see on your screen and reports, and the data that is stored in your survey databases.

Only one project can be active at a time. If you create or open another project, then the currently open project is automatically closed.

3.1.1 Project Outline View



The Project Outline view displays a hierarchical outline of the contents of your currently open project. Its purpose is to provide you with a logical view of the information and objects in a project. The Project Outline view is docked to the left edge of the display space.

To expand the view of each item, click Expand: ⊟.

To close the view of each item, click Collapse: ⊞.

To change the configuration of a sub-item, double-click it.

If you have not configured a coordinate system, vessel, equipment, guidance object groups, steer-by associations, or events, double-click the item to configure it. Otherwise, double-clicking the item will expand or collapse the view.

3.1.2 Demonstration Project

The Navigation software comes with a default demonstration project with default demonstration equipment installed. When you open the Navigation software for the first time, this project is opened.

For more information see Chapter 5, Quick Tours.

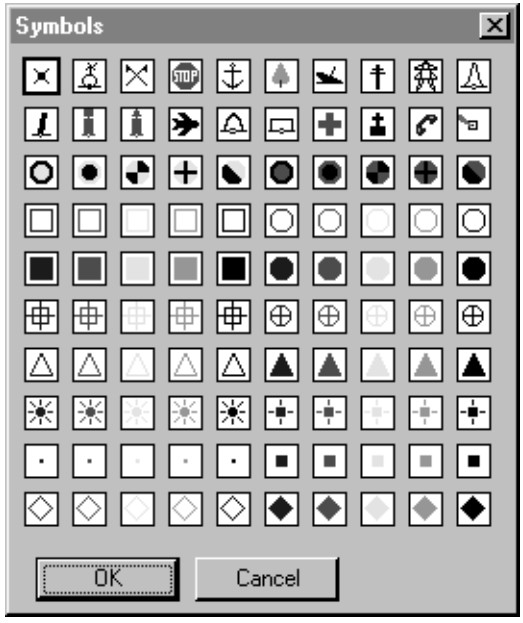
3.2 Libraries

The Navigation library contains a common resource of objects that you can use in any of your projects. The library contains the following objects:

- Symbols

Symbols

Various symbols used for display purposes can be attached to vessel offset points, and to the points which define guidance objects.



The current Symbol library used by the Navigation software contains the symbols shown opposite.

You can edit these symbols using any bitmap graphics editor (for example, Microsoft Paint), so you create your own custom icons.

3.3 Vessels

Your project must contain one or more vessels. You can create them within a project.

There are two ways to define a vessel:

1. By inheriting a vessel definition from a previous project when you create a new project.
2. By adding a new vessel definition directly to the current project.

Each vessel must have an origin point, a unique name, and a unique number. Vessel shapes and offset points are optional.

The shape of a vessel and its offset points are specified relative to the origin point, using the selected distance units. Vessel shapes are specified graphically in 2D plan view.

Zero or more offset points can be specified for each vessel. They are defined by x, y, and z coordinates relative to the vessel's origin.

Define the vessel using the Vessel Editor, as shown in Figure 3-1.

For more information refer to your *HYDROpro Navigation Technical Guide* or search for the topic **`Vessels command`** in the online Help.

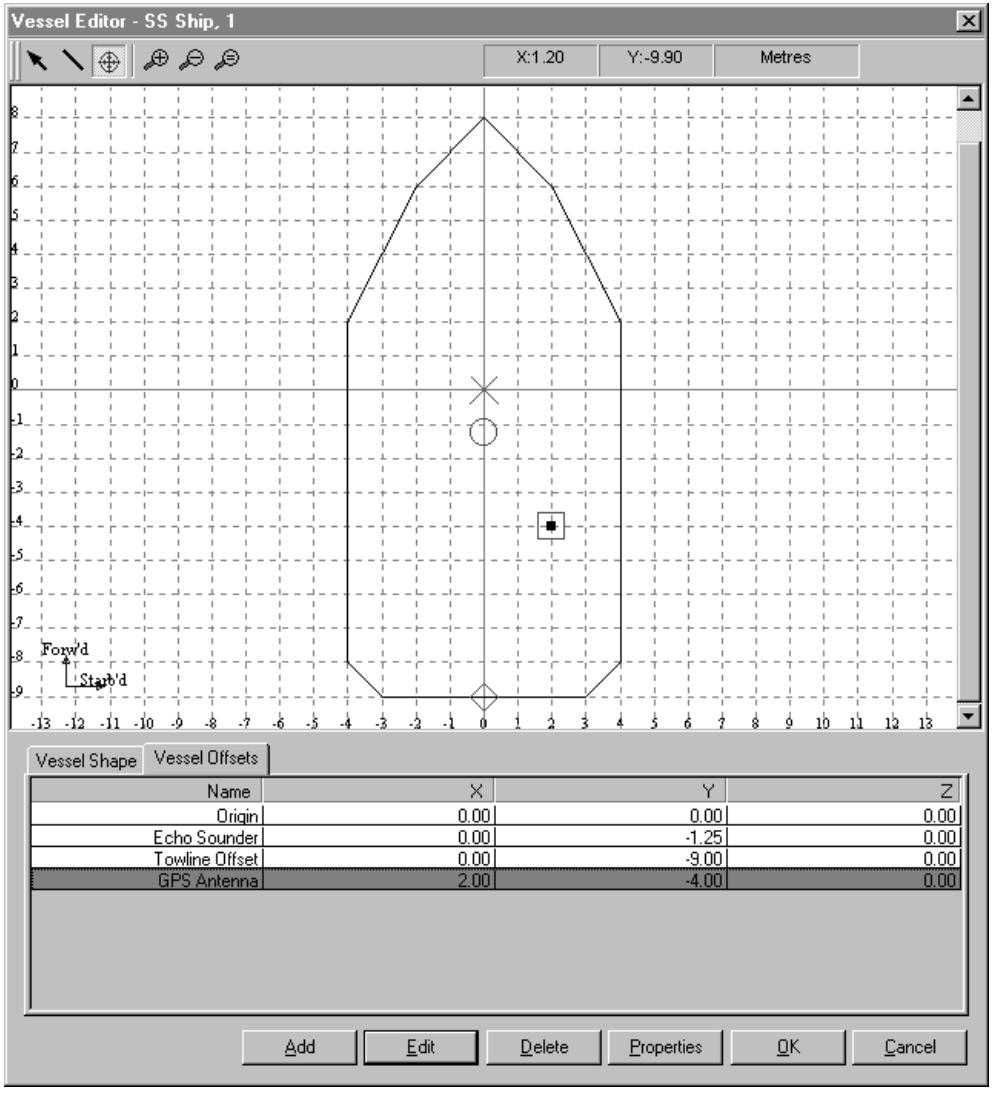


Figure 3-1 The Vessel Editor

3.3.1 Vessel Offsets

The offsets are of critical importance on a vessel. It is these offset locations that determine where equipment devices are located on the vessel and the positions that are derived for them.

For example, if the relationship between the GPS antenna and echo sounder transducer has not been correctly represented in the Vessel Editor then all the derived positions for the depths will be incorrect.

The Vessel Editor lets you define the vessel offsets graphically in 2D (positive in the forward and starboard directions, measured from the vessel origin). Any height (z) aspects to the vessel offsets must be entered manually on the *Vessel Offsets* tab. The z component of the vessel offset uses the convention positive is up (above the water line).

In Figure 3-1 the vessel origin has been drawn roughly at the centre of the vessel. It is from this origin that the vessel offsets are defined. Using the GPS Antenna offset as an example we see that it is to the right and behind the origin, hence its coordinates of 2.00 m starboard (x) and –4.00 m forward (y). Figure 3-2 shows that the offset positions are relative to the vessel origin.

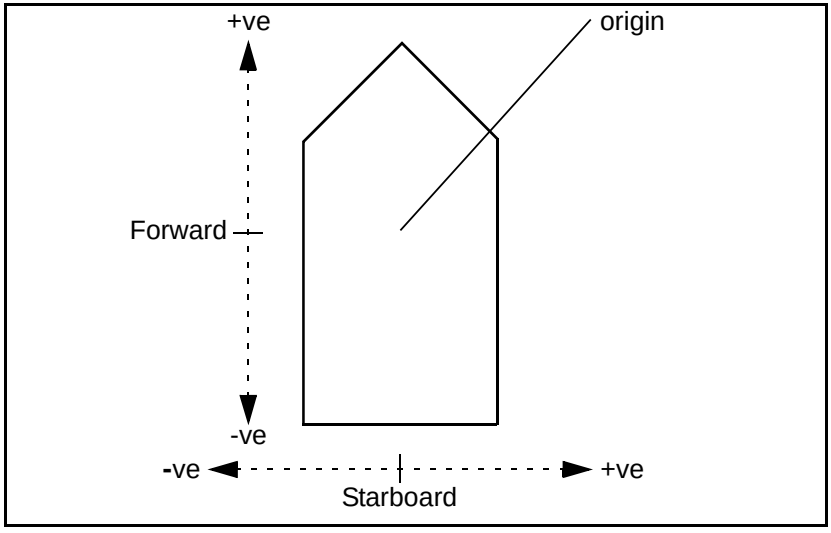


Figure 3-2 Vessel Origin

3.4 Equipment

Equipment objects can be selected by name and added to your project. Each piece of equipment added makes a set of services available, such as GPS Time, GPS Position, GPS Status, and Echo Sounder. These services are assigned to vessel offsets.

Services from a single piece of equipment can be assigned to any of the available and valid offsets (including the origin), on any of the vessels contained in the project.

The Manual equipment is built in. Services from Manual equipment can also be attached to vessel offsets, letting you enter equipment data manually.

There are two equipment categories within the Navigation software:

- Logical equipment

  Logical equipment is also known as built-in equipment. There are two types of logical equipment: Manual and Tow Line.

- Physical equipment

  When the Navigation software starts up, it searches the equipment directory and in the Navigation system directory for equipment DLLs and builds a list of available equipment names and their services.

3.5 Guidance Objects

Guidance Object is the term used for all stationary objects that vessels may use for guidance.

A guidance object contains an ordered set of one or more points at fixed locations. The points are connected by zero or more lines or curves, depending on the number of points. For example, two points are connected by one line, three points are connected by two lines. When a guidance object contains three or more points, it can be defined as either open or closed. If it is a closed guidance object, then the first and last points are connected to form a polygon.

Guidance objects are grouped together. A project can contain several groups of guidance objects. The groups can contain a mix of object types and sizes.

The relationship between a vessel and a guidance object is always via one of its offset points, known as a steer-by offset.

Three types of vessel guidance are available:

- Guidance to a target
- Guidance along a line
- Guidance along a route

By default, a guidance object with a single point is considered to be a target. One with two points is considered to be a line, and a guidance object with three or more points is considered to be a route. However, you can request guidance relative to any point or line in any guidance object.

Guidance objects can have a number of properties, such as color, line type, symbol type, zone, split lines, visibility layer, design units, limits, and annotations. It is also possible to create new guidance objects within another closed guidance object, or relative to another guidance object.

For more information refer to your *HYDROpro Navigation Technical Guide* or search for the topic **`Guidance Objects command`** in the online Help.

3.6 Events

Events occur as a result of input from:

- equipment

  For example, a Fix box

- a request from the user

  For example, log on, log off, or user event

- internally within the software

  For example, time or distance interval events

The Navigation software lets you configure various event types such as a time interval and associate actions with them.

Actions are tasks that Navigation must carry out when the events which own them occur. For example, log an offset position, annotate an echo sounder.

A project automatically contains a complete set of possible events and their applicable actions, based on how you have configured your project.

When event data is logged, it contains details on the inducing event. Default actions can be removed and/or other actions can be added to an event type.

For more information see your *HYDROpro Navigation Technical Guide* or search for the topic **`Events Configuration dialog`** in the online Help.

3.7 Surveys

All survey data that you collect is stored in the project database. This is a Microsoft Access relational database (.mdb) file. You can have more than one survey per project. ***However***, you can have only one survey open at a time.

The Survey menu and the Survey toolbar provide you with access to the commands used to carry out the survey. This includes creating a survey, logging on, selecting vessels, selecting guidance objects, activating events, and so on.

For more information search for the topic **`Survey menu`** in the online Help.

4 Before You Begin

This chapter introduces you to the Navigation software. This chapter shows you:

- How to start the Navigation software
- How to find your way around the Navigation software
- The Navigation menus
- The Navigation toolbars
- Navigation's real-time displays
- Shutting down the Navigation software

For information on using dialogs, windows, and other aspects of the Windows environment, see your Microsoft Windows online Help.

4.1 Starting and Exiting the Navigation Software

Before you can start the Navigation software, Microsoft Windows 95, 98, 2000, or Windows NT version 4.00 or later, must be running on your computer. Once the Navigation software is installed, it can be found in the HYDROpro folder under the *Programs* menu, that is:

The Navigation software can also be found in the HYDROpro folder on your desktop.

To start the software:

1. Click Start.
2. Select *Programs* / *HYDROpro* / *Navigation*.

Alternatively, double-click the shortcut on your desktop.

Tip – To start the Navigation software automatically when you start Windows, create a shortcut to the program in your StartUp folder. For information on creating shortcuts, see your Microsoft Windows Help.

To exit from the Navigation software do one of the following:

- From the *File* menu choose *Exit*.
- Click the Close button in the top right corner of the title bar.

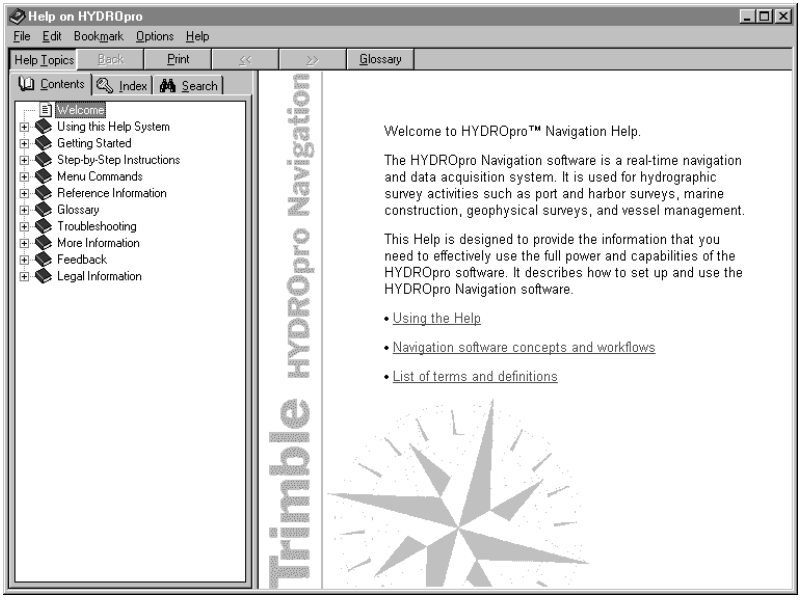
The current project is closed and the Navigation software is shut down.

4.2 Getting Help

The online Help system is the primary source of information about the Navigation software. Use it to obtain more details about the software such as task information and reference information about the dialog controls.

To access the online Help system:

1. From the *Help* menu choose *Help Topics*:



   The help topics are organized by category. Double-click a book icon to see what topics are in that category. To view a topic, double-click it.

To get Help about a dialog, make sure that the dialog is active, and click **Help** or press F1. To get Help about a menu command, place your cursor over the menu command and hold down the left mouse button, then press F1.

This manual is also available in PDF format on the HYDROpro installation CD. To access it, click **Start** on the Windows taskbar and select *Programs* /*HYDROpro* / *User Guides on CD* / *NavEdit User's Guide*.

4.3 Finding Your Way Around the Navigation Software

The Navigation software (by default) is divided into six regions:

- Menu bar

  The Menu bar shows the menus that are available in Navigation. For more information, see Menus, page 4-6.

- Toolbars

  The Navigation software has five toolbars. For more information, see Toolbars, page 4-8.

- The Project Outline View

  The Project Outline View displays a hierarchical outline of the contents of your currently open project. Its provides a logical view of the information and objects within a project. For more information, see Projects, page 3-2.

- The Display Area

  Use the Display Area to open real-time displays. You can open more than one real-time display at the same time. For more information, see Real-Time Displays, page 4-10.

- Journal

  The Journal displays a list of time stamped alarm and note messages. The list contains up to the last 100 messages. For more information, search for the topic **`Journal command`** in the online Help.

- Status bar

  The Status bar at the bottom of the Navigation window displays contextual information, such as descriptive messages about menu items, the online and log on states, the keyboard states, and the date and time.

Figure 4-1 shows the different display regions.

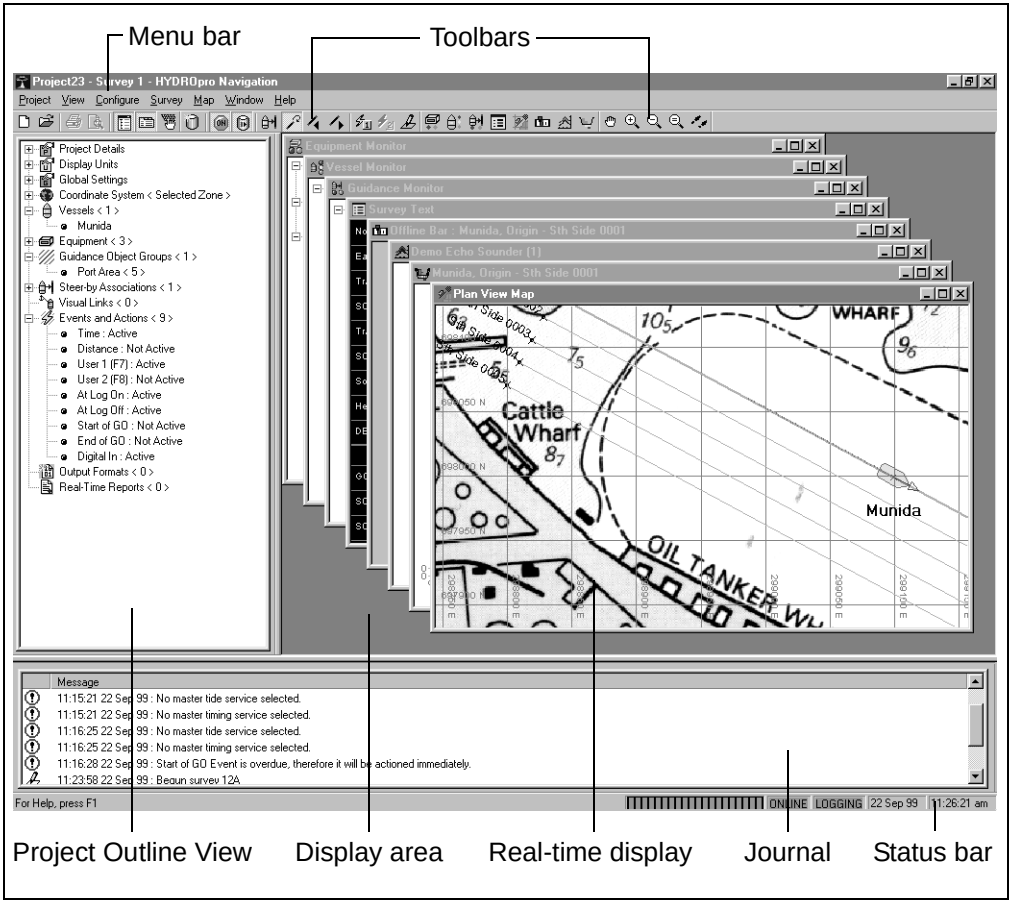


Figure 4-1 The Navigation Desktop

4.4 Menus

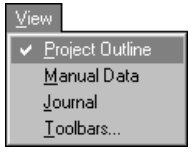
The menu bar provides access to the menus in the Navigation software. Each menu has a number of commands listed in it. The menus change as the focus on different files and windows change.

- *Project*

Use this menu to manage your project.

The *Project* menu contains commands to create, open, close, and display project set-up information.

- *View*



Use this menu to customize the current Navigation display.

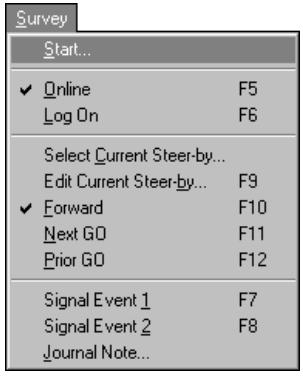
The *View* menu contains commands to enable and disable views and select toolbars.

- *Configure*

Use this menu to configure objects (vessels, guidance objects) and equipment contained in a project.

Also use this menu to configure miscellaneous system parameters that apply to your project.

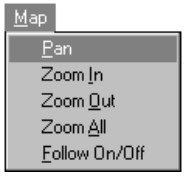
- *Survey*



Use this menu to carry out the actual survey.

The *Survey* menu contains commands to go online, start logging data, move the steer-by, and trigger user-defined events.

- *Map*



Use this menu to control how you view the Plan View Map real-time display.

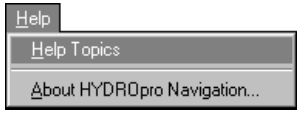
When a Plan View Map real-time display is open and selected, you can use the *Map* menu to pan and zoom the display.

- *Window*

Use this menu to open, re-arrange, and close real-time displays.

The *Window* menu also contains commands to view and configure the properties of a real-time display, as well as displaying a list of open real-time displays.

- *Help*



Use this menu to obtain help on a topic. The online Help system contains comprehensive information on all dialog controls and dialogs, as well as step-by-step instructions.

4.5 Toolbars

The Navigation software contains the following toolbars:

- Standard toolbar

The Standard toolbar contains buttons for the most commonly used items from the *Project*, *Edit*, and *View* menus.

- Survey toolbar

The Survey toolbar contains buttons for the items from the *Survey* menu.

- Display toolbar

The Display toolbar contains buttons for the real-time displays. Use this toolbar in place of the *Window* / *Open Display* command.

- Demo Vessel Control toolbar

The Demo Vessel Control toolbar contains buttons that you can use to control the Demonstration equipment services to any of the vessels. You can only use it when Demonstration equipment is installed.

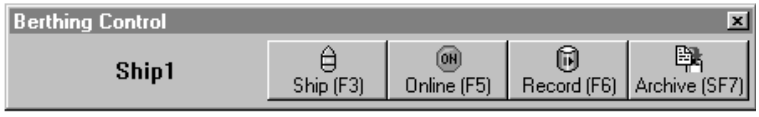
- Plan View Map toolbar

The Plan View Map toolbar contains tools for controlling the current Plan View Map. You can only use it when a Plan View Map real-time display is open and selected.

- Tug Control toolbar

The Tug Control toolbar contains buttons to select guidance objects (anchors) and to trigger anchor status changes. It is designed to use with tug style configurations.

- Berthing Control toolbar



The Berthing Control toolbar contains tools to enter vessel details, go online, start recording a report file, and archive the report file.

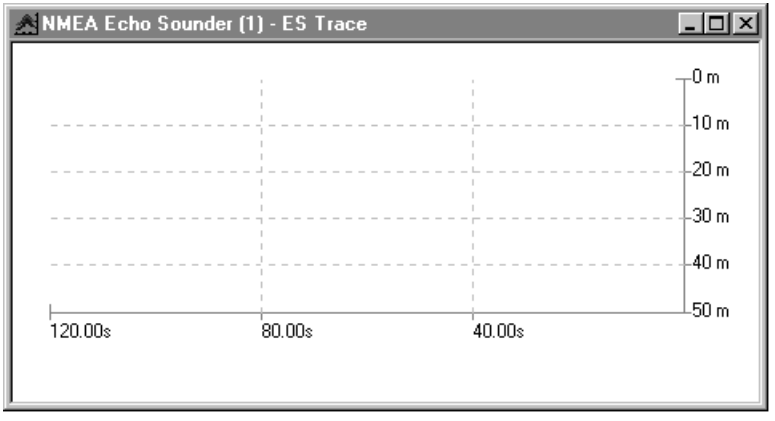
4.6 Real-Time Displays

These real-time displays provide the windows to view all aspects of your survey as they occur. The Navigation software provides several different types of real-time displays:

- Echo Sounder Trace
- Equipment Monitor
- Guidance Monitor
- Offline Bar
- Plan View Map
- Survey Text
- Vessel Monitor
- Profile Display

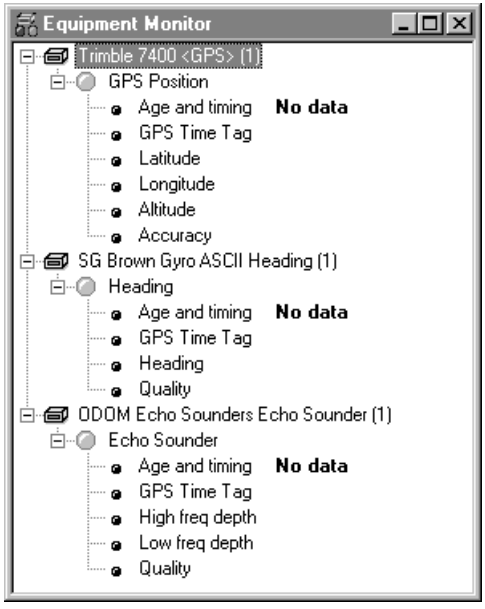
4.6.1 Echo Sounder Trace Real-Time Display

This real-time display shows the depth soundings, scrolling from left to right.

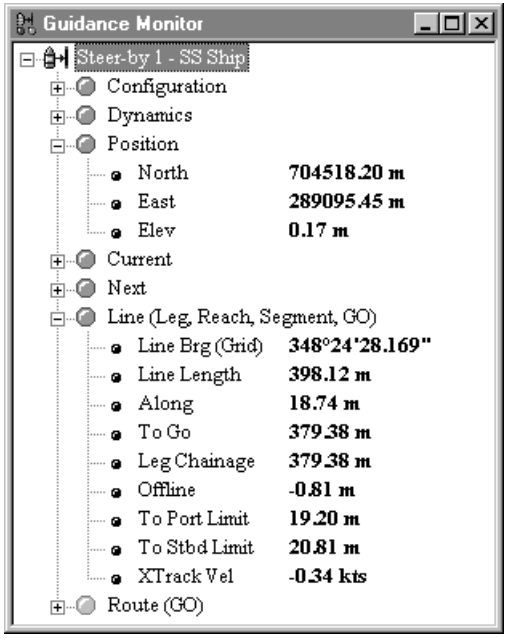


4.6.2 Equipment Monitor Real-Time Display

This real-time display shows the decoded data from the equipment service inputs for any of the services associated with any of the vessels.



4.6.3 Guidance Monitor Real-Time Display

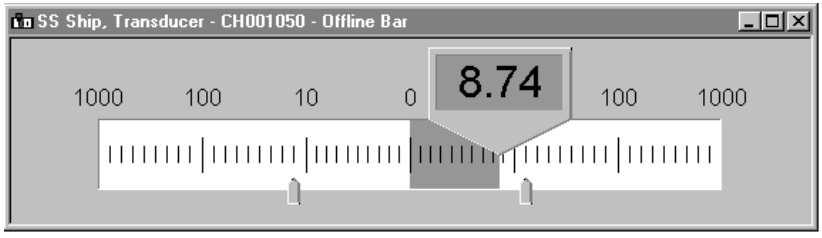


This real-time display is a text display of various guidance values of the vessel steer-by association.

For example, guidance object, distance along a line, distance offline, bearing and distance to target, and so forth.

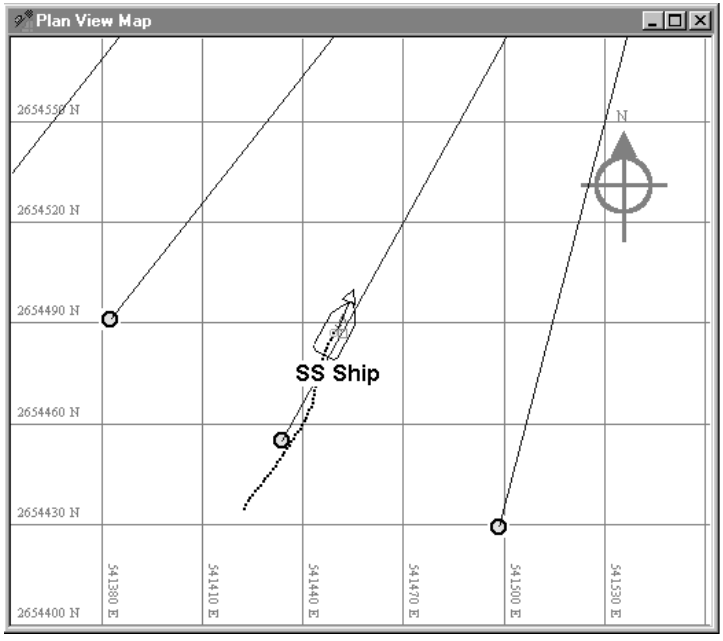
4.6.4 Offline Bar Real-Time Display

This real-time display shows the perpendicular distance from the vessel's steer-by point to the selected line.

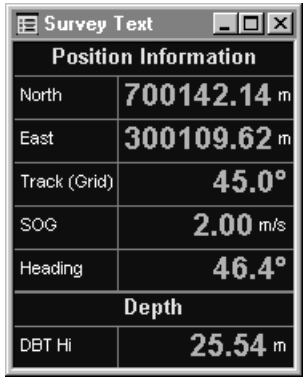


4.6.5 Plan View Map Real-Time Display

This real-time display provides a plan view (with optional background) of DXF files, guidance objects, vessels, and events. The Plan View Map also supports bitmap (*.bmp) and TIFF (*.tif) files.

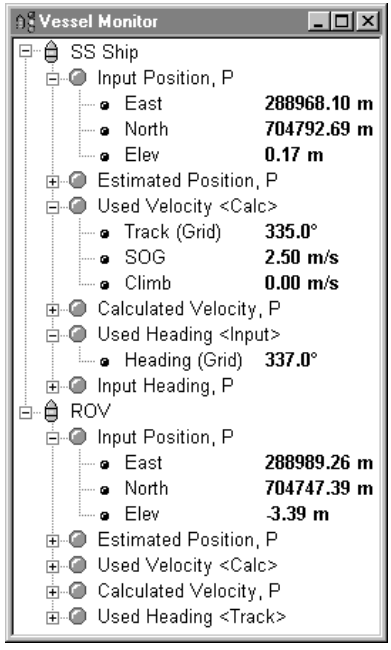


4.6.6 Survey Text Real-Time Display



This real-time display can be fully configured, from the fields displayed to the size and colour of the text and background. Just about any aspect of your survey can be selected for display here.

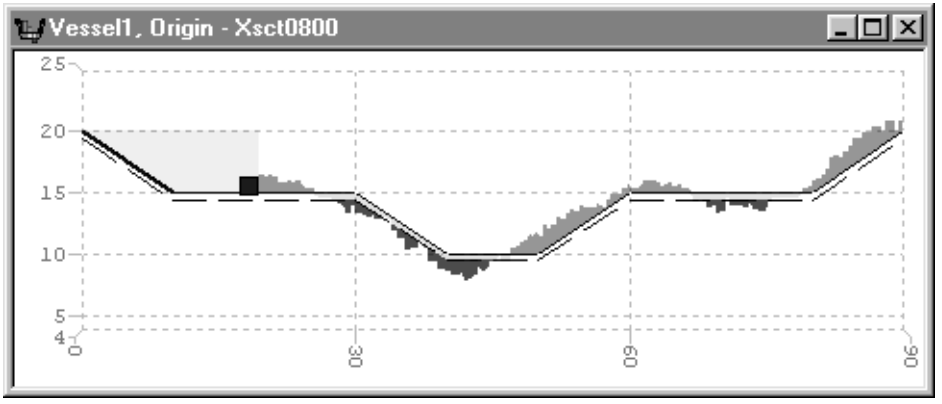
4.6.7 Vessel Monitor



This real-time display is a text display of all the services on each vessel related to the dynamics of the vessel (for example, position, heading, heave, and attitude).

4.6.8 Profile Display

This real-time display shows the reduced level of the echo sounder depth or dredgehead offset. You can display this information against a design template (with overdredge) to immediately identify problems areas.



5 Quick Tours

The aim of this chapter is to help you become confident and familiar with using the Navigation software.

The following examples instruct you how to do common operations and the basic procedures required to configure your project to do a survey. By the end of this chapter you should be able to configure your own project and conduct basic surveys.

This information has been divided into three Quick Tours:

- Using the Demo Project

  Takes you through the demonstration project that comes preconfigured with the Navigation software.

- Creating the Demo Project

  Concentrates on the steps involved in setting up the demonstration project.

- Configuring NMEA GPS, Heading, and Depth

  Presents some of the more involved functions.

This chapter is designed to provide you with an easy-to-use overview of the software for training purposes. For detailed information on the configuration or operation of the software press the F1 key or click **Help** at any stage. This displays comprehensive information about the currently selected dialog.

5.1 Using the Demo Project

The Demo project comes preconfigured with your Navigation software.

If Demo is your only project, or if it was the last project you were working on, the Navigation software automatically opens this project.

To open the Demo project:

1. If your current project is not Demo, click  .

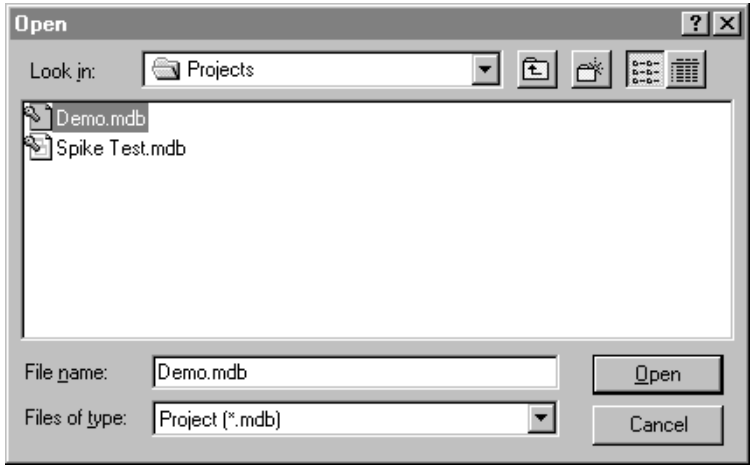
   Alternatively, from the *Project* menu choose *Open*.

   The *Open* dialog appears.

2. Set the *Look in* field to Projects.

   By default, this is C:\Program Files\Trimble\HYDROpro\Project.

3. Set the *Files of type* field to Project (.mdb):



4. Select the Demo.mdb file and click **Open**.

5.1.1 Displaying Information

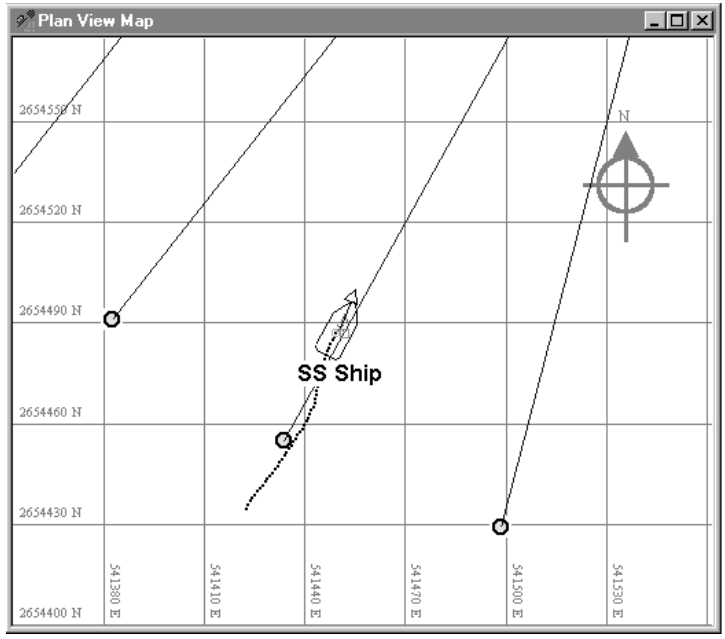
The Navigation software has several real-time displays. They let you monitor different aspects of your survey operation easily and quickly. The Navigation software uses both textual and graphical displays.

Plan View Map real-time display

The Plan View Map real-time display provides a 'bird's-eye view' of your survey operation. Vessels, guidance objects, and topography features can be displayed on the Plan View Map.

To open a Plan View Map real-time display:

1. From the *Window* menu choose *Open Display* / *Plan View Map*. Alternatively, click  on the Display toolbar:



Note – Your display may not exactly resemble the one shown here.

2. Move and resize the display as desired.
3. Use the *Map* menu or the Plan View Map toolbar to zoom, mooz, and pan the *Plan View Map* display.

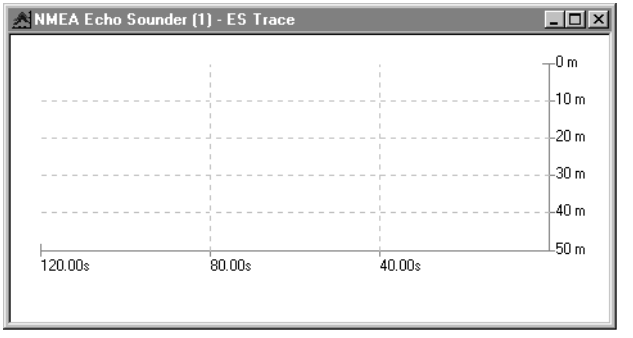
Note – The *Zoom*, *Mooz*, and *Pan* commands are only available when the Plan View Map display is highlighted.

Echo Sounder Trace real-time display

The Echo Sounder Trace displays the incoming depths (both high and low frequency if available) to build up a profile of the seabed, for the selected time interval.

To open an Echo Sounder Trace real-time display:

1. From the *Window* menu choose *Open Display* / *Echo Sounder Trace*. Alternatively, click on the Display toolbar:



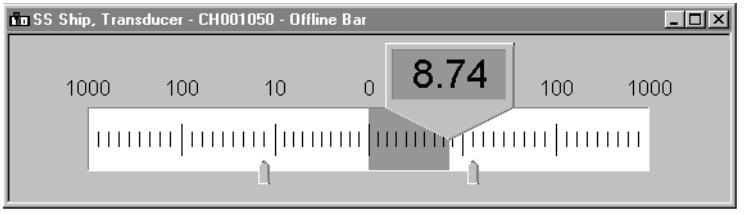
2. Move and resize the display as desired.

Offline Bar real-time display

The Offline Bar displays how far to the port or starboard the vessel is from the selected guidance object.

To open an Offline Bar real-time display:

1. From the *Window* menu choose *Open Display* / *Offline Bar.* Alternatively, click  on the Display toolbar:



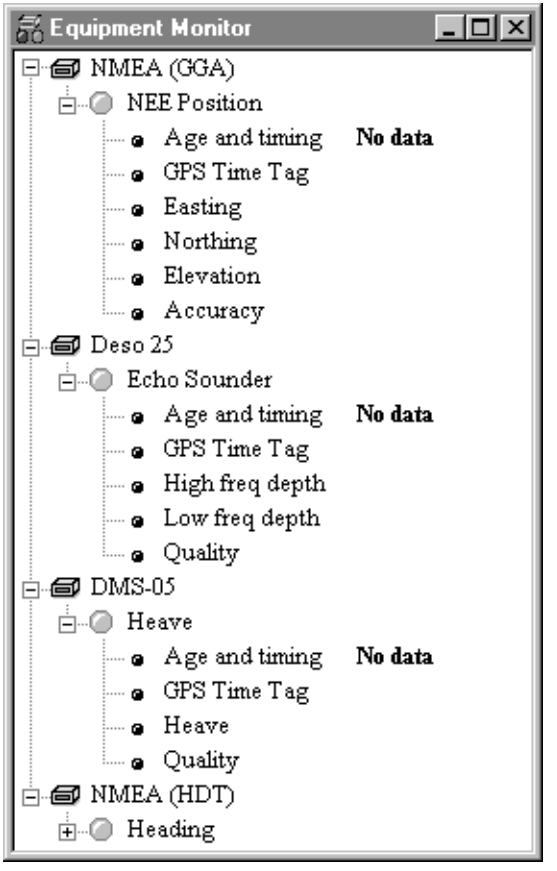
2. Move and resize the display as desired.

Equipment Monitor

The raw decoded incoming data is displayed on the Equipment Monitor real-time display.

To open an Equipment Monitor real-time display:

1. From the *Window* menu choose *Open Display* / *Data Monitor.* Alternatively, click on the Display toolbar:



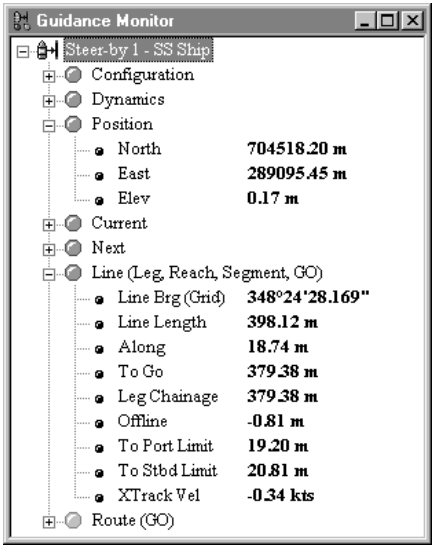
2. Move and resize the display as desired.

Guidance Monitor

All the guidance related information is shown on the Guidance Monitor real-time display.

To open a Guidance Monitor real-time display:

1. From the *Window* menu choose *Open Display* / *Guidance Monitor.* Alternatively, click  on the Display toolbar:



2. Move and resize the display as desired.

Vessel Monitor

All the dynamics information of the vessel is shown on the Vessel Monitor real-time display.

To open a Vessel Monitor real-time display:

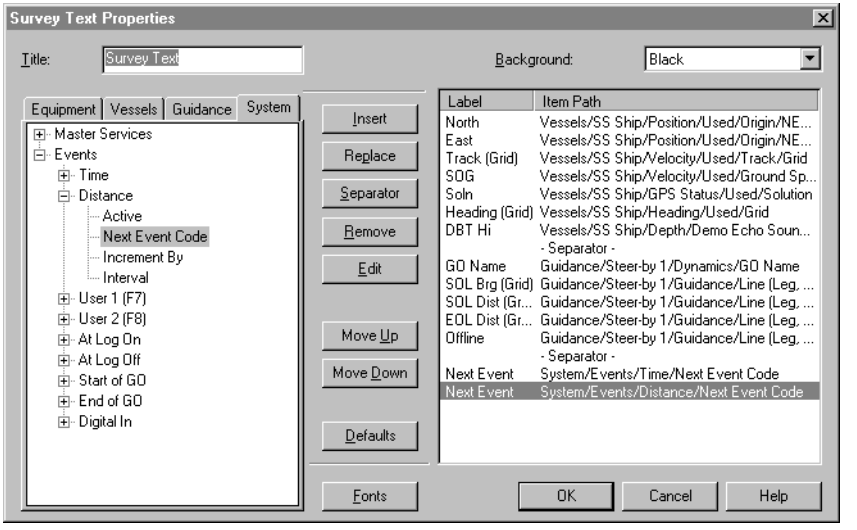
1. From the Window menu choose *Open Display* / *Vessel Monitor.* Alternatively, click  on the Display toolbar.
2. Move and resize the display as desired.

Survey Text

You can select virtually any textual information related to the project to display in the Survey Text real-time display.

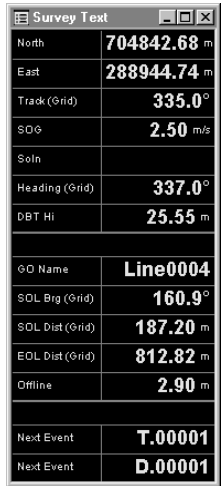
To open a Survey Text real-time display:

1. From the *Window* menu choose *Open Display* / *Guidance Monitor*. Alternatively, click  on the Display toolbar:



2. Edit the Survey Text properties as required and click **OK**. The following dialog appears:

3. Move and resize the display as desired.



5.1.2 Controlling the Vessel Using the Simulator

Demo position services survey along the selected guidance object (GO) by default. However, you can use the Demo Control toolbar to take complete control of the demo services configured on the vessel. As the name suggests, the Demo Control toolbar can only be used with demonstration services (demonstration position, heading, and echo sounder services). The Demo Control toolbar can be used when the Navigation software is online.

The Demo Control toolbar works on a vessel-by-vessel basis.

To open and enable the Demo Control toolbar:

1. From the *View* menu choose *Toolbars*.

   The *Toolbars* dialog appears:

2. Select the *Demo vessel control* check box and click **OK**.
3. From the *Survey* menu choose *Online*.

   Alternatively, click  on the Survey toolbar:

To adjust the demo depths:

1. Select the vessel for which you want to adjust the depths.
   - To do this, select the name of the vessel name from the Demo Vessel Control toolbar.

   In our demonstration project we only have one vessel configured (SS Ship) which is selected by default.
2. Do one of the following:
   - To increase the depth, click  in the Demo Vessel Control toolbar.
   - To decrease the depth, click  in the Demo Vessel Control toolbar.

Note – If two frequencies are configured for the Echo Sounder service then both are affected by this adjustment.

To change the demo heading of the vessel:

1. Select the vessel for which you want to change the heading.
   - To do this, select the name of the vessel from the list on the Demo Vessel Control toolbar.

   In our demonstration project we only have one vessel configured (SS Ship) which is selected by default.
2. Do one of the following:
   - To change the heading to port, click  on the Demo Vessel Control toolbar.
   - To change the heading to starboard, click  on the Demo Vessel Control toolbar.

To change the demo track of the vessel:

1. Select the vessel for which you want to change the Heading
   - To do this, select the name of the vessel name from the Demo Vessel Control toolbar.

   In our demonstration project we only have one vessel configured (SS Ship) which is selected by default.
2. Do one of the following:
   - To change the track to port, click  on the Demo Vessel Control toolbar. Alternatively, press Ctrl+PageUp.
   - To change the track to starboard, click  on the Demo Vessel Control toolbar. Alternatively, press Ctrl+PageDown.

To change the demo velocity of the vessel:

1. Select the vessel for which you want to change the velocity.
   - To do this, select the name of the vessel name from the Demo Vessel Control toolbar.

   In our demonstration project we only have one vessel configured (SS Ship) which is selected by default.
2. Do one of the following:
   - To increase the velocity, click  on the Demo Vessel Control toolbar. Alternatively, press Ctrl+Home to increase the vessel's speed.
   - To decrease the velocity, click  on the Demo Vessel Control toolbar. Alternatively, press Ctrl+End to decrease the vessel's speed.

To reset the demonstration values:

1. Select the vessel for which you want to reset the demonstration values.

   - To do this, select the name of the vessel from the Demo Vessel Control toolbar.

   In our demonstration project we only have one vessel configured (SS Ship) which is selected by default.

2. Click  on the Demo Vessel Control toolbar.

   Alternatively, press Ctrl+F7.

Note – This affects all demonstration values configured for the vessel.

5.1.3 Configuring Events

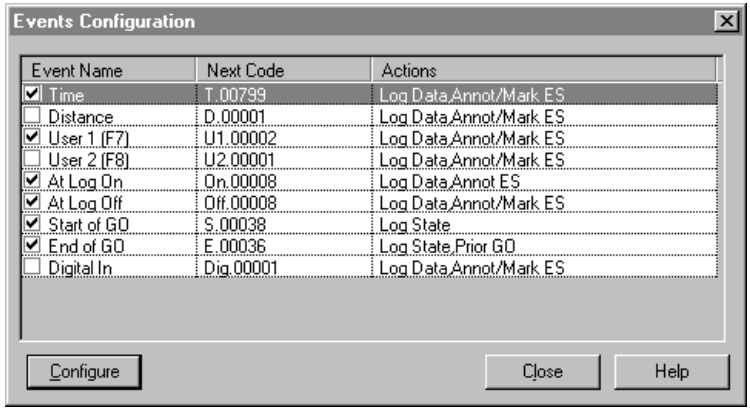
The Navigation software has various events that are automatically or manually generated. When an event occurs, certain actions result. Actions that occur can range from logging data to marking and annotating echo sounder traces.

Note – The tabs that appear in the event configuration dialogs depend on the configuration of your project. For example, the *Annot ES* tab does not appear unless an echo sounder has been configured.

To configure an event every 10 seconds:

1. From the *Configure* menu choose *Events*.

   The *Events Configuration* dialog appears:

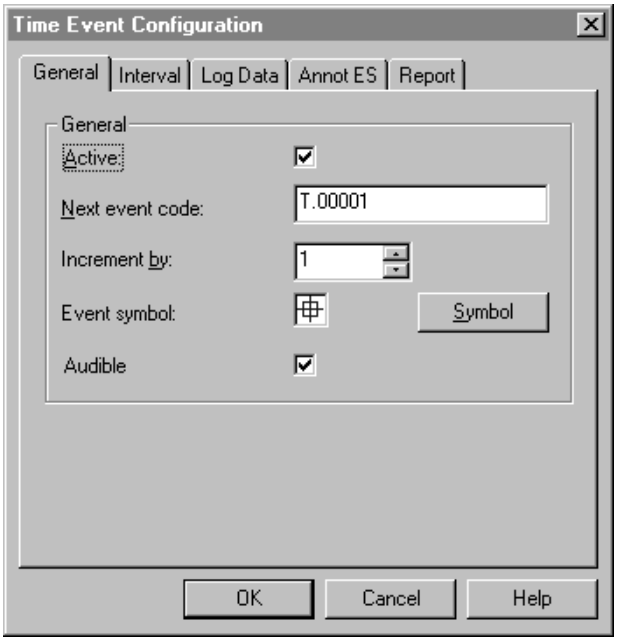


2. Select the Time event name and click **Configure**.

   Alternatively, double-click *Events and Actions* / *Time* in the Project Outline view.

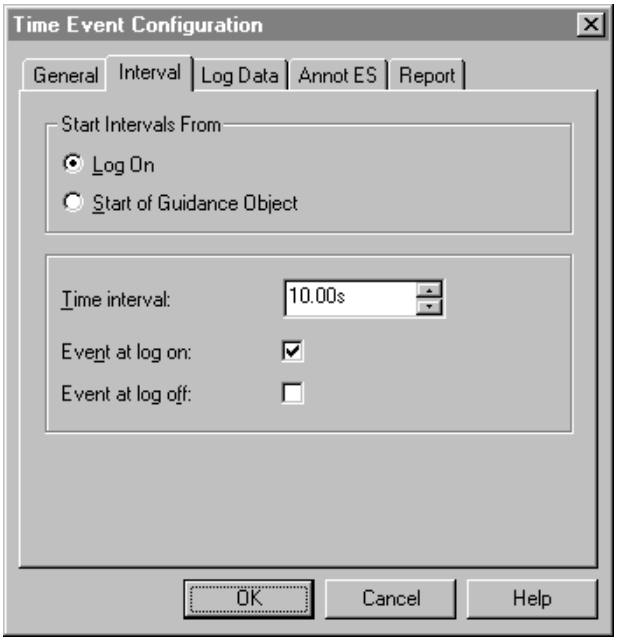
   The *Time Event Configuration* dialog appears.

3. Select the *General* tab:



4. Select the *Active* check box.

5. Select the *Interval* tab:



6. Set the *Time Interval* field to **10.00s**.

   To do this, click the spin control buttons or type the number.

Note – The units for the *Time Interval* field are set by the system-wide duration units.

7. Click **OK** to return to the *Events Configuration* dialog.

   The *Actions* field is updated with the new event configuration details.

8. Click **Close** to close the *Events Configuration* dialog.

To annotate the echo sounder with the current GO Name and date at log on:

1. From the *Configure* menu choose *Events*.

   The *Events Configuration* dialog appears.

2. Select the At Log On event name and click **Configure**.

   Alternatively, double-click *Events and Actions* / *At Log On* in the Project Outline view.

   The *At Log On Event Configuration* dialog appears.

3. Select the *General* tab and select the *Active* check box.

4. Select the *Annot ES* tab:

5. Make the following entries and selections in the *Annotate/Mark Echo Sounders* group.

   c. Set the *Events per annotation/mark* field to **1.**

      To do this, click the spin control buttons or type the number.

   d. Select the *Annotate with* check box and select the *Guidance Object name, date, and time* option.

   e. Clear the *Mark* check box.

   f. Make sure that the correct echo sounder equipment configuration(s) is selected in the list at the bottom of the dialog. In this case it is `Deso 25`.

6. Click **OK** to return to the *Events Configuration* dialog.

   The *Actions* field is updated with the new event configuration details.

7. Click **Close** to close the *Events Configuration* dialog.

To mark and annotate the echo sounder with Code and Time name every second Time event:

1. From the *Configure* menu choose *Event*s.

   The *Events Configuration* dialog appears.

2. Select the Time event name and click **Configure**.

   Alternatively, double-click *Event / Time* in the Project Outline view.

   The *Events Configuration* dialog appears.

3. Select the *General* tab and select the *Active* check box.

4. Select the *Annot ES* tab:

5. Make the following entries and selections in the *Annotate/Mark Echo Sounders* group.

   a. Set the *Events* per *annotation/mark* field to **2**.

      To do this, click the spin control buttons or type a number into the field.

   b. Select the *Annotate with* check box and select the *Event code and time* option.

   c. Select the *Mark* check box.

   d. Make sure that the correct echo sounder equipment configuration is selected in the list at the bottom of the dialog. In this case it is `Deso 25`.

6. Click **OK** to return to the *Events Configuration* dialog.

   The *Actions* field is updated with the new event configuration details.

7. Click **Close** to close the *Events Configuration* dialog.

5.1.4 Selecting a New Guidance Object

Guidance objects (GOs), as their name suggests, are used as guidance aids during your survey. A guidance object can be a target, line, route, or any combination of these.

The following procedure assumes you have configured at least one vessel with offsets, and at least one GO group with guidance objects.

To select another guidance object:

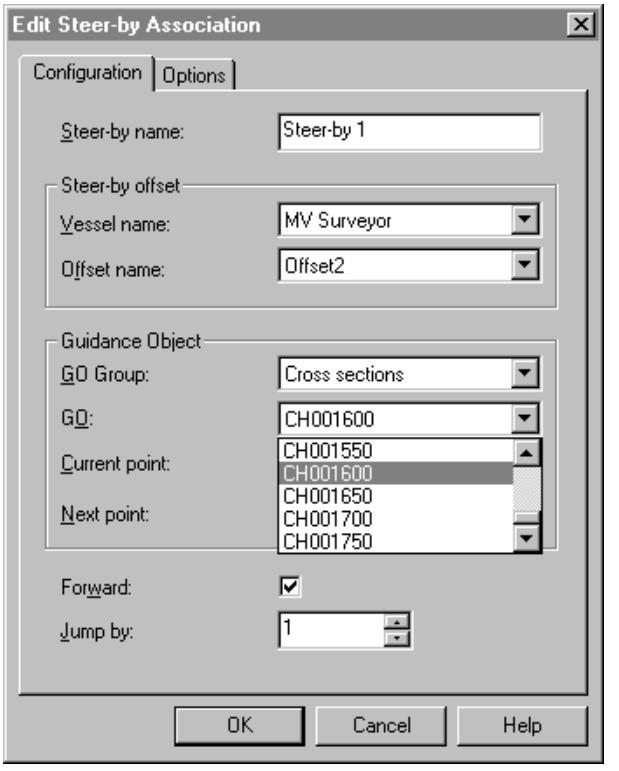
1. From the *Configure* menu choose *Steer-by Associations*.

   Alternatively, double-click *Steer-by Associations* from the Project Outline view, or click  on the Survey toolbar.

   The *Steer-by Association Configuration* dialog appears.

   Highlight the desired steer-by and click **Edit**.

The *Edit Steer-by Association* dialog appears:



2. Select the *Configuration* tab.
3. From the *GO* list select the guidance object required.
4. Click **OK** to load the new GO and close the *Steer-by Association* dialog.

5.1.5 Going Online and Logging On

For the Navigation software to start using the incoming data the software must first be online. Once online the real-time displays start updating, and guidance information is calculated.

Logging (recording data) can be triggered in several different ways. Most often, however, we use the **Log on** button to do this.

To go online and log on:

1. Click  on the Survey toolbar.

   Alternatively, from the *Survey* menu choose *On line*.

   The Navigation software goes online and the real-time displays start updating.

2. Once you are online you can log on. To do this, click  on the Survey toolbar.

   Alternatively, from the *Survey* menu choose *Log on*.

5.2 Creating the Demo Project

This second Quick Tour shows you how to create the Demo project used in the first Quick Tour.

In this Quick Tour we focus on the general setup procedure required when creating and configuring a project. Although we are only configuring demonstration equipment, as far as the Navigation software is concerned, the generated data is the same as that from actual physical equipment, and is treated as such. Use the same setup procedure when configuring real equipment devices.

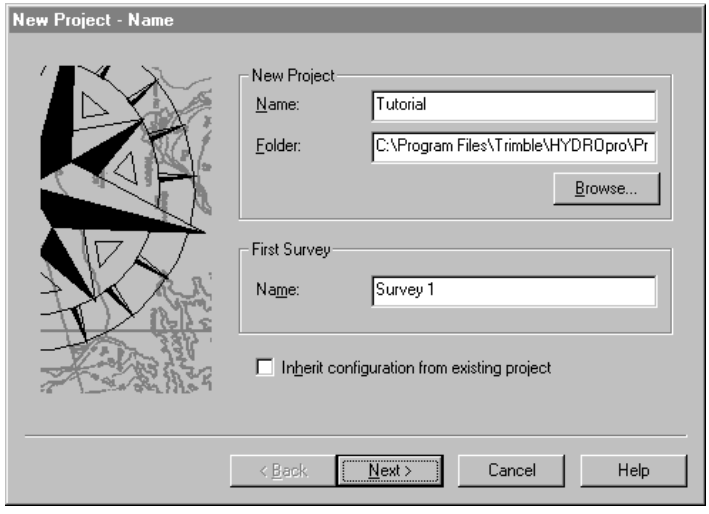
5.2.1 Creating a New Project

Trimble recommends that you create a new project for each job or location you survey.

To create a new project:

1. From the *Project* menu choose *New.*

   Alternatively, click on the Standard toolbar:



2. In the *New Project Name* field, enter the name of the new project.

   In this Quick Tour we are calling the project ‘Tutorial’.

   By default, the *Directory* field is C:\Program Files\Trimble\HYDROpro\Projects. You can change the directory if required. In this Quick Tour we are using the default directory.

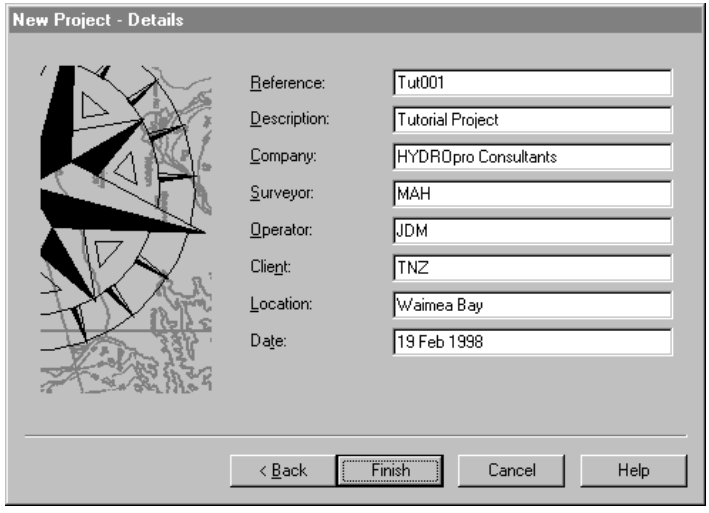
3. Leave the *First Survey – Name* field set to Survey 1.

4. Clear the *Inherit configuration from existing projects* check box. In this tutorial we will configure everything ourselves.

5. Click **Next >** to open the *New Project – Details* dialog.

Note – If the *Inherit configuration from existing projects* check box is selected the *New Projects – Inherit* dialog is opened.

6. Edit the following fields as required. For this Quick Tour we are using the following details:



7. Click **Finish** to create the project.

5.2.2 Configuring the Project Properties

Now that we have created a new project we need to configure it for our survey operation.

Changing the Project Properties

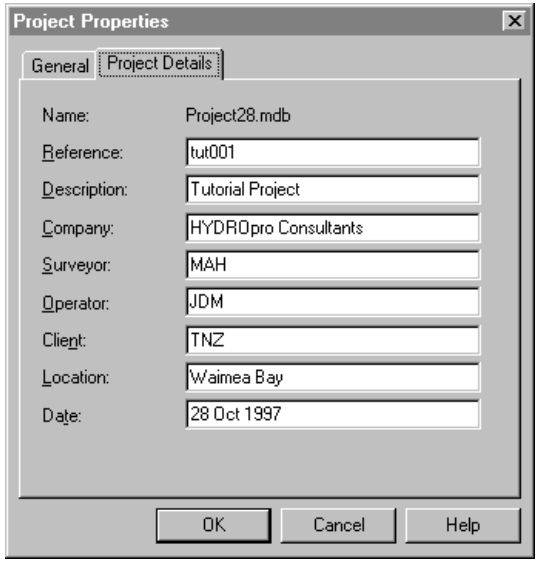
From time to time it is necessary to change the project details. This is easily done in the Navigation software.

To change the project properties:

1. From the *Project* menu choose *Properties*. Alternatively, double-click any of the Project Details icons in the Project Outline view.

   The *Project Properties* dialog appears.

2. Select the *Project Details* tab:



3. Edit the fields as required and click **OK**.

   For this Quick Tour we are ***not*** changing the details from what we entered when we created the project.

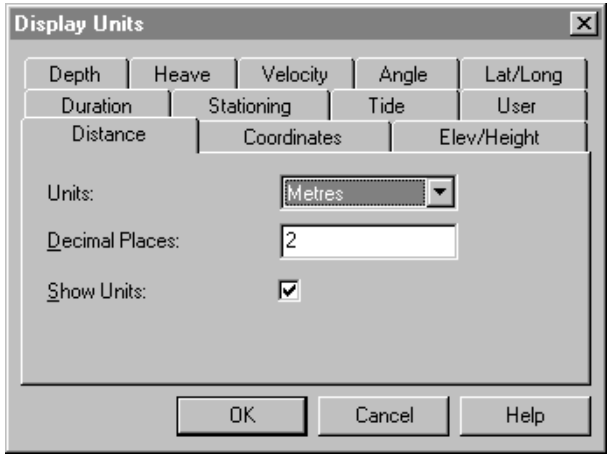
Changing the Display units

The Navigation software supports many different display units.

To change the display units:

1. From the *Configure* menu choose *Display Units*.

   Alternatively, double-click any of the Display Unit icons in the Project Outline view:



2. Select the tab corresponding to the type of units you want to change.
3. Use the list boxes to select the required units for the different value types (for example, US feet, metres). Changes made here affect ***all*** Display windows.

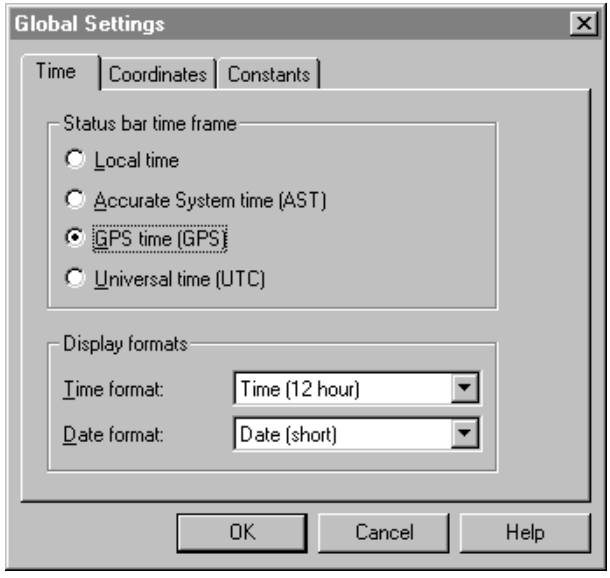
   For this Quick Tour we are using the default units.
4. Set the number of decimal places to be displayed for the selected unit type by clicking on the *Decimal Places* field and typing in the required number.
5. Select the *Show Units* check box to display the units (for example, US feet, metres).
6. Click **OK** to save the changes.

Changing the Display formats

The Navigation software lets you set your display time preference as well as the coordinate type and order.

To change the display formats:

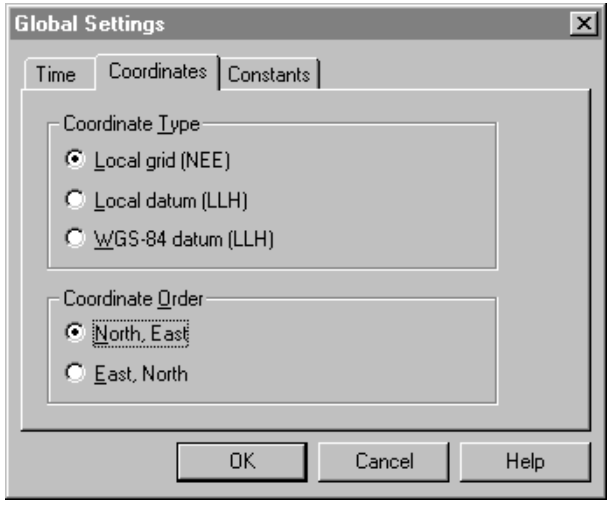
1. From the *Configure* menu choose *Global Settings*:



   Alternatively, double-click any of the Global Settings icons in Project Outline view.

2. Select the *Time* tab.
3. In the *Computer Time Display* group, select the *Local time* option.
4. In the *GPS Receiver Time Display* group, select the *Universal time (UTC)*.
5. Select the *Coordinates* tab.

6. In the *Coordinate Type* group, select the *Local grid (NEE)* option:



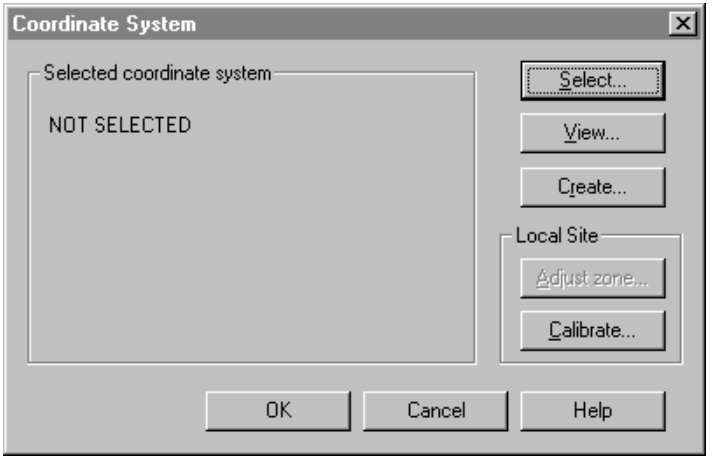
7. In the *Coordinate Order* group, select the *North, East* option.
8. Click **OK** to save the changes.

5.2.3 Configuring the Geodetic Information

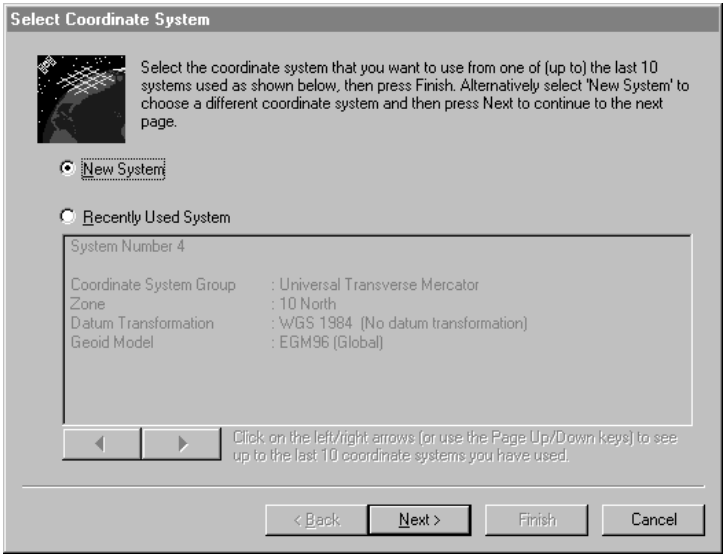
The geodetic information required to convert GPS WGS-84 Latitudes, Longitudes and Elevations to local Easting, Northing and Elevation values is contained within the *System*, *Zone*, and *Site* fields of the *Coordinate System* command in the *Configure* menu.

To change the geodetic information:

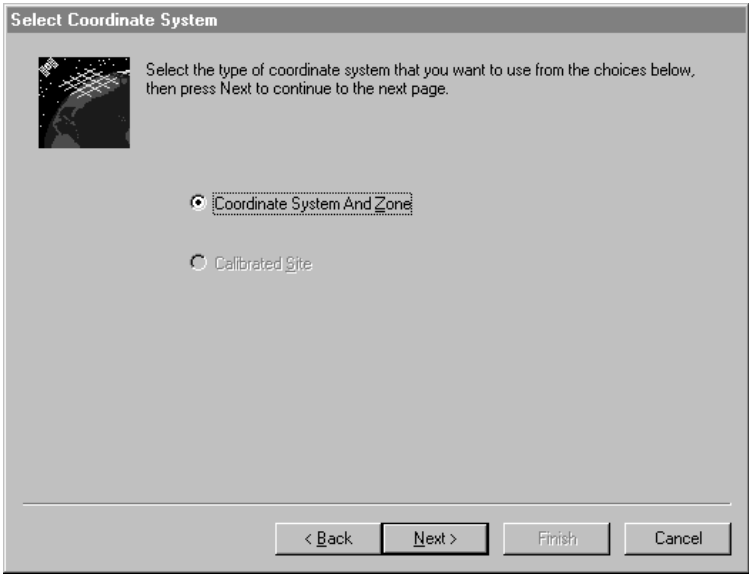
1. From the *Configure* menu choose *Coordinate System*. Alternatively, double-click any of the Coordinate System icons in the Project Outline view:



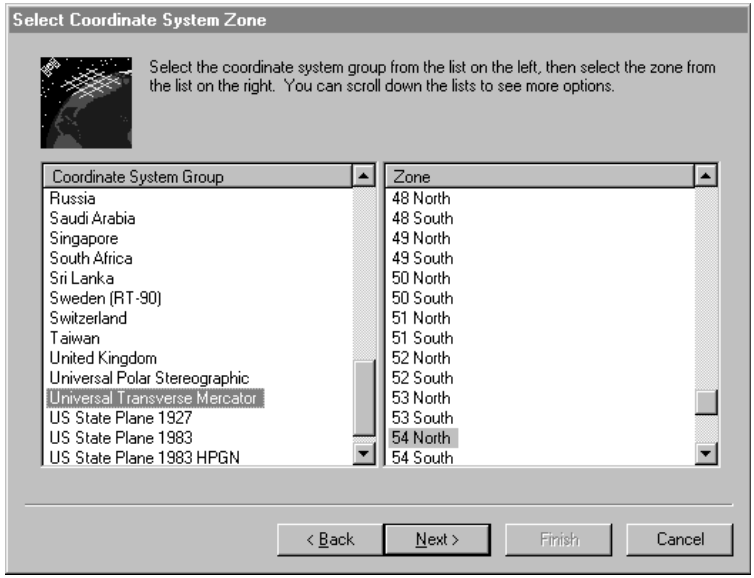
2. Click **Select** to see the geodetic parameters from the list of preconfigured datums and projections:



3. Select the *New System* option and click **Next >**:



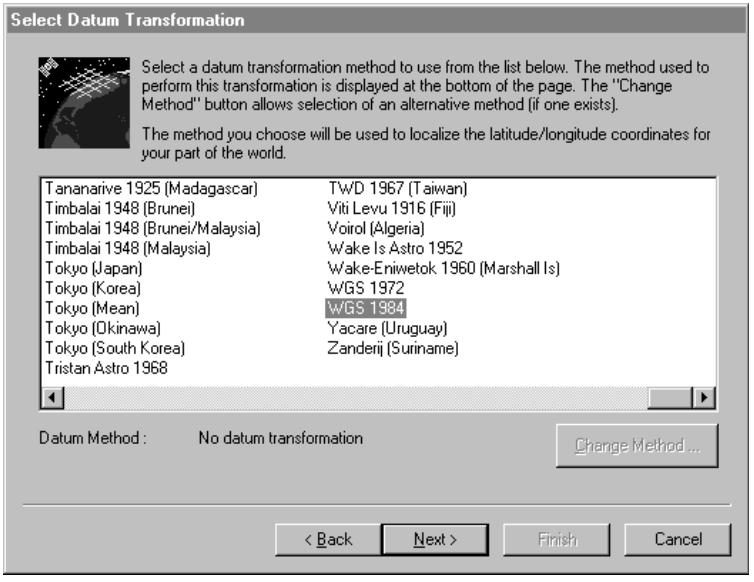
4. Select the *Coordinate System And Zone* option and click **Next >**:



5. In the *Coordinate System Group* list, select Universal Transverse Mercator.

6. In the *Zone* list, select 54 North and click **Next >**.

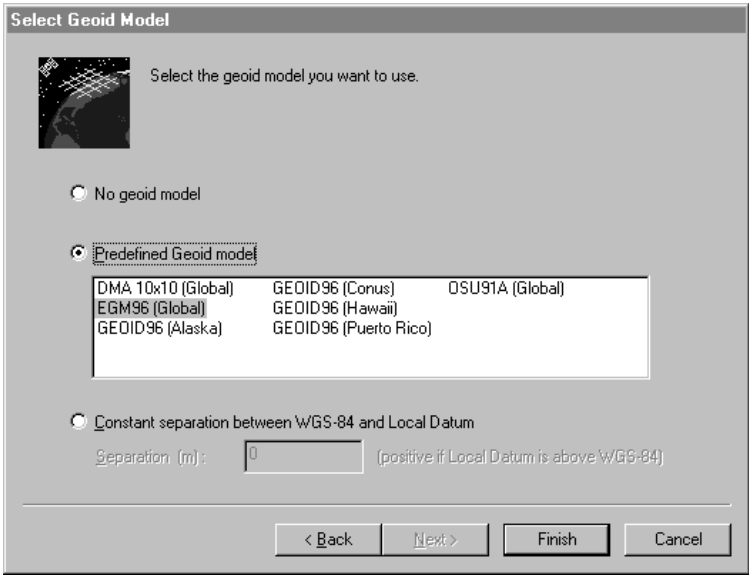
   The *Select Datum Transformation* dialog appears:



In this Quick Tour we are using a WGS-84 datum therefore we do not need a datum transformation.

7. Select the WGS 1984 item and click **Next >**.

   The *Select Geoid Model* dialog appears:



8. For this Quick Tour, select the *Predefined Geoid model* – (EGM96 (Global)) option and click **Finish**.

   You are returned to the *Coordinate System* dialog which now displays the geodetic parameters you have just set up.

9. Click **OK**.

5.2.4 Creating a Vessel

Before you can configure any equipment you must configure a project. A vessel usually consists of a shape (graphical representation of the survey vessel) and offsets (points of interest on the vessel generally coinciding with equipment locations). The vessel shape and offsets are optional, although when a vessel is created, an offset at the origin will be created, which can not be edited.

To create a vessel:

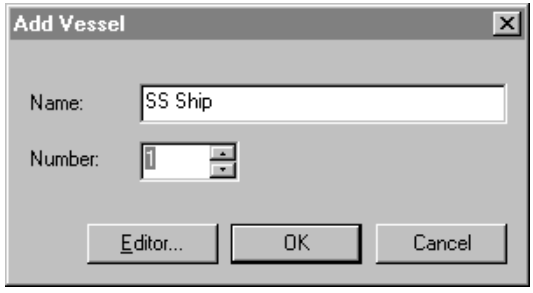
1. From the *Configure* menu choose *Vessels*.

   Alternatively, if the project does not contain any vessels, double-click the Vessels icon in the Project Outline view.

   The *Vessel Configuration* dialog appears.

2. Click **Add**.

   The following dialog appears:



3. In the *Name* field, type a suitable name for the vessel.

   For this Quick Tour we are naming the vessel ‘SS Ship’.

4. Assign the vessel a unique number. As there are no other vessels configured in this project **1** is a suitable number.

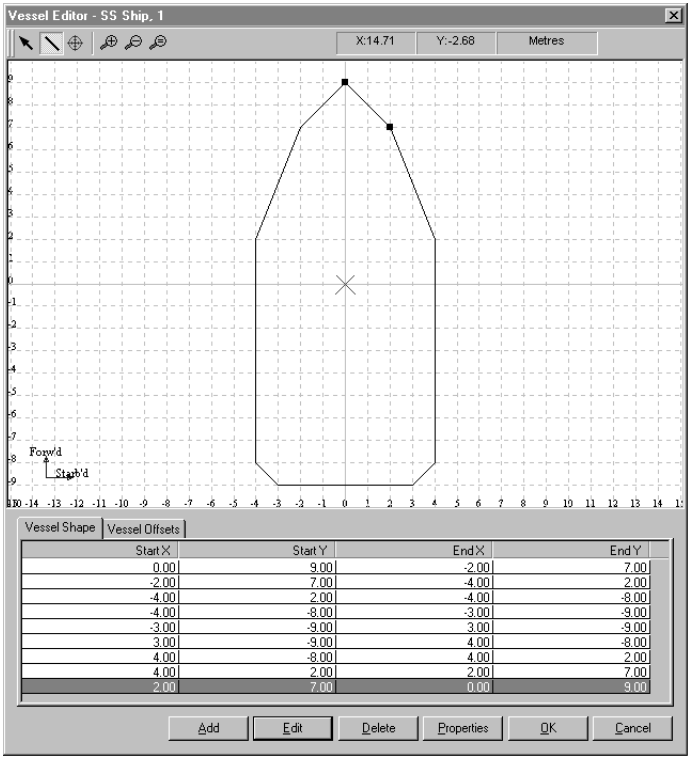
   To do this, click the spin control buttons or type a vessel number.

5. Click **Editor** to open the *Vessel Editor* dialog.

6. First, we will define the vessel shape. There are two ways to do this.

   Method 1:

   - Click  to add line segments. Move the mouse cursor to a point on the grid and click the left mouse button to start drawing the line. Now move the cursor to where the end of the line is to go and click the left mouse button again:

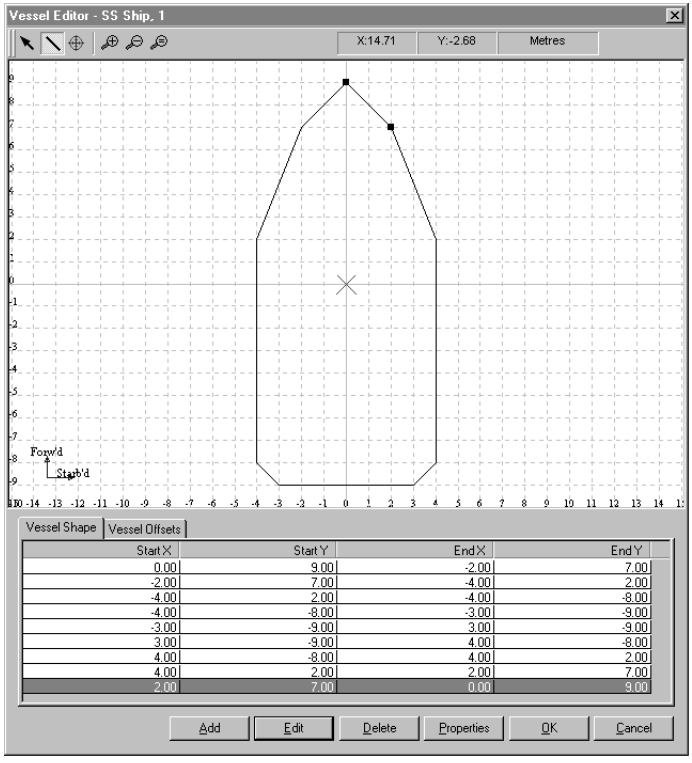


Tip – To delete a line click  . Click the line on the graphical screen with the left mouse button. The currently selected line will have a small black box at either end. Now click the right mouse button and choose *Cut* from the shortcut menu. The line is now deleted.

To change the grid interval use the , , and tools on the Plan View Map toolbar.

Method 2:

- Select the *Vessel Shape* tab and use the keyboard to enter the start of line and end of line coordinates:



Note – The Graphical Vessel Editor is two dimensional.

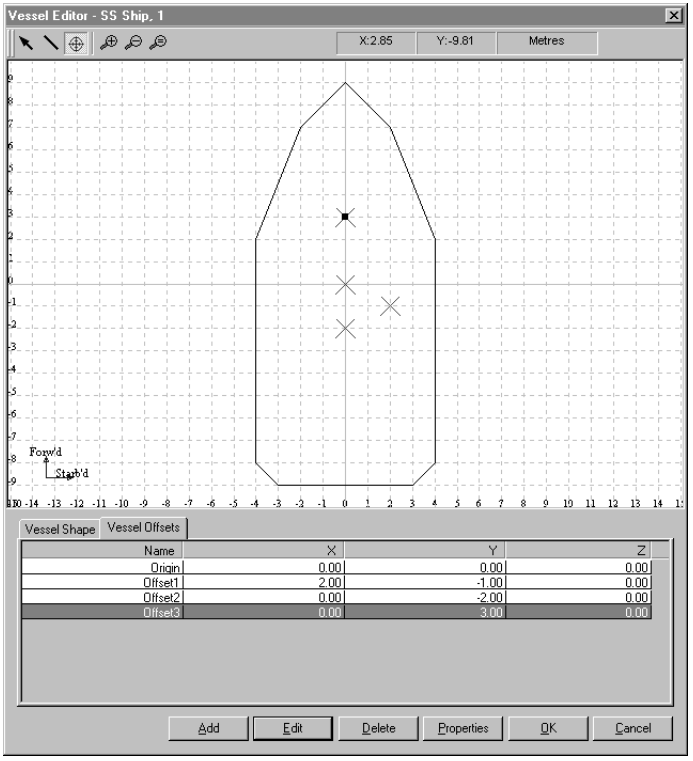
For this Quick Tour we are using lines listed in the *Vessel Editor* dialog.

7. Now we will assign offsets to the vessel. Again, there are two ways to do this:

   - Click  to add offsets. Move the mouse cursor to a point on the grid and click the left mouse button to assign the offset.

Tip – To delete an offset, click  . Click the offset on the graphical screen with the left mouse button. The currently selected offset has a small black box in the centre of the cross. Now use the right mouse button and select *Cut* from the shortcut menu. The line is deleted.

   - Click the *Vessel Offsets* tab and use the keyboard to enter the start of line and end of line coordinates:



For this Quick Tour we are using the offsets listed in the *Vessel Editor* dialog – *Vessel Offset* tab.

8. Once you have defined the vessel and assigned the offsets, Click **OK** to return to the *Vessel Configuration* dialog
9. Click **Close**.

5.2.5 Adding Demonstration Devices to the Vessel

Once you have added on or more vessels to the project equipment, you can add services to the vessel offsets.

In this Quick Tour we are adding the following services:

- NEE Position
- Heading
- Echo Sounder

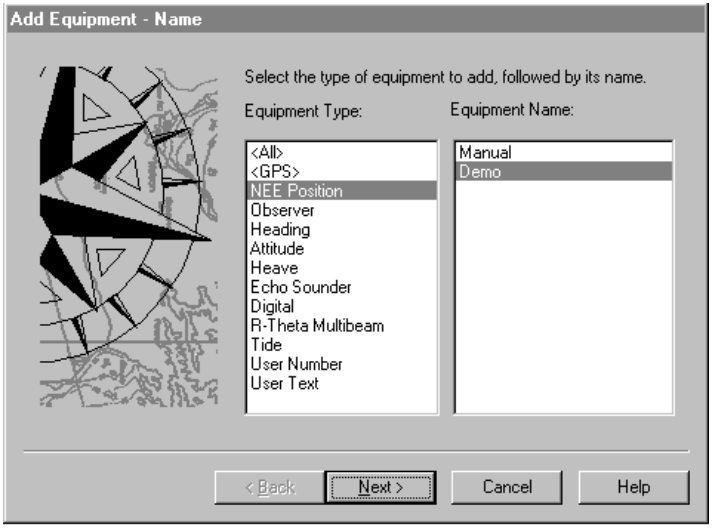
To add a NEE Position service to the vessel:

1. From the *Configure* menu choose *Equipment*.

   Alternatively, if the project does not contain any equipment devices, double-click the Equipment icon in Project Outline view.

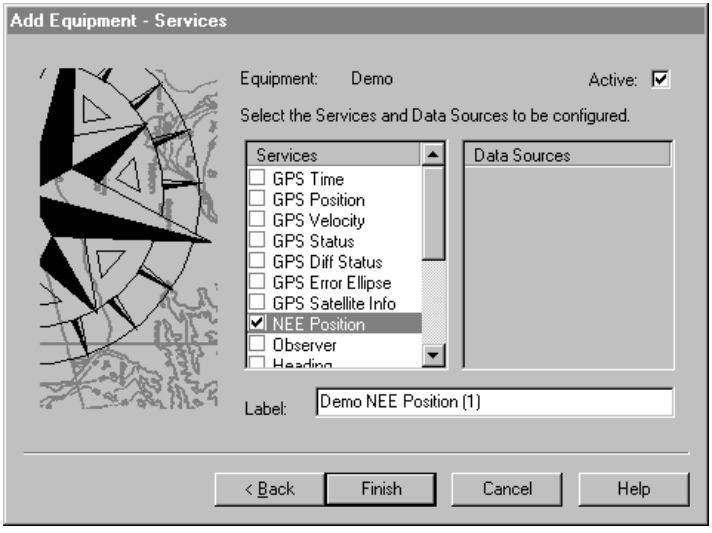
   The *Equipment Configuration* dialog appears:

2. Click **Add** to add a new equipment device. The *Add Equipment – Name* dialog appears:

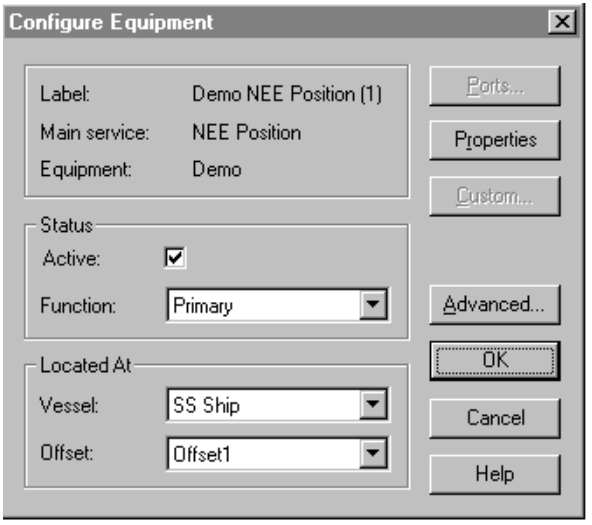


3. In the *Equipment Type* list, select the NEE Position item.

4. In the *Equipment Name* list, select the Demo item and click **Next >**. The *Add Equipment – Services* dialog appears:



5. Confirm that the *Active* check box is selected.
6. Confirm that the NEE Position item is selected and the other items are ***not*** in the *Services* list.
7. Click **Finish** to open the *Configure Equipment* dialog.
8. In the *Offset* list, select the Offset1 option.



9. Click **OK**.

   This closes the *Configure Equipment* dialog and returns us to the *Equipment Configuration* dialog.

The NEE Position service has now been added to the *Equipment Configuration* list.

To add a Heading service to the vessel:

1. Click **Add** again to add another new equipment device.
2. In the *Equipment Type* list, select the Heading item.
3. In the *Equipment Name* list, select the Demo item and click **Next >**.

   The *Add Equipment – Services* dialog appears.
4. Confirm that the *Active* check box is selected.
5. Confirm that the Heading item is selected and the other items are ***not*** in the *Services* list.
6. Click **Finish** to open the *Configure Equipment* dialog.
7. In the *Offset* list, select the Offset3 option.
8. Click **OK**.

   This closes the *Configure Equipment* dialog and returns us to the *Equipment Configuration* dialog.

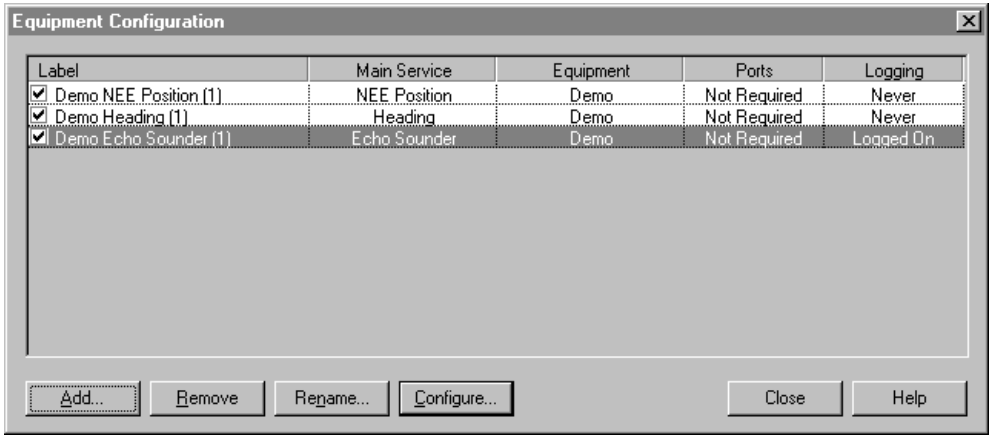
The Heading service has now been added to the *Equipment Configuration* list.

To add a Echo Sounder service to the vessel:

1. Click **Add** again to add another new equipment device.
2. In the *Equipment Type* list, select the Echo Sounder item.
3. In the *Equipment Name* list, select the Demo item and click **Next >**.

   The *Add Equipment – Services* dialog appears.
4. Confirm that the *Active* check box is selected.
5. Confirm that the Echo Sounder item is the only one selected in the *Services* list and the other items are ***not*** in the *Services* list.
6. Click **Finish** to open the *Configure Equipment* dialog.
7. In the *Offset* list, select the Offset2 option.
8. Click **OK**.

   This closes the *Configure Equipment* dialog and returns us to the *Equipment Configuration* dialog.



The Echo Sounder service has now been added to the *Equipment Configuration* list.

9. Click **Close**.

5.2.6 Defining Guidance Objects for Your Project

Guidance object (GOs) is the name given to targets, lines, and routes that can be used to guide the vessel. The Navigation software takes a uniform approach to create any of these types of GOs.

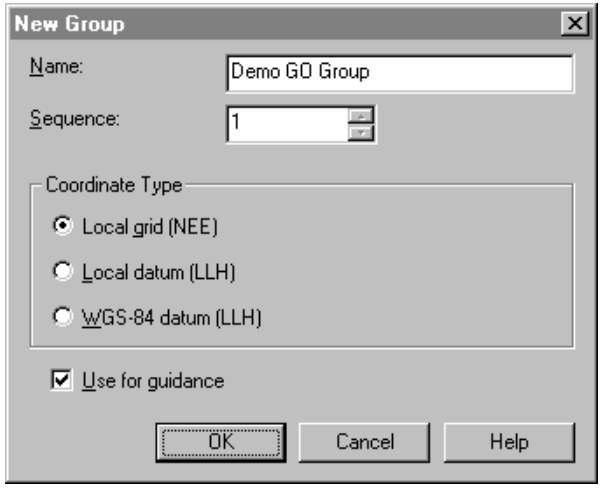
Creating GO Lines in a New Guidance Object Group

The Navigation software partially guides you through this process. This topic has been broken into three parts. Parts 2 and 3 follow directly on from Part 1.

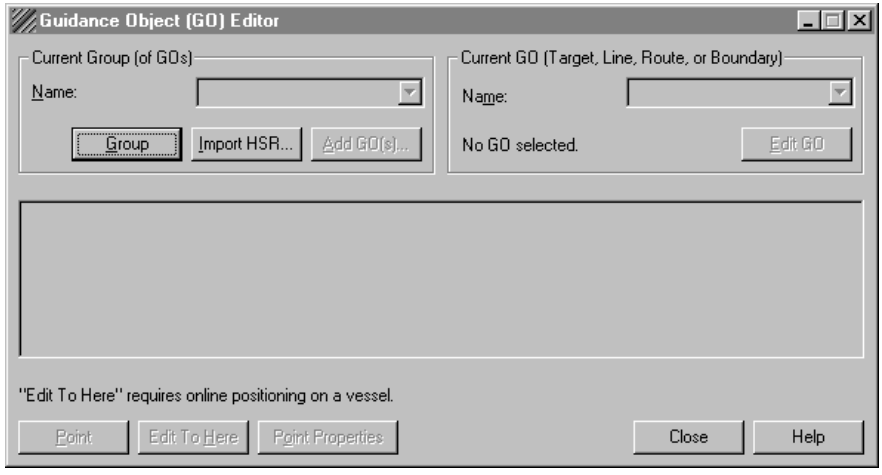
Part 1. To create a new guidance object group to be used for guidance:

1. Select *Guidance Objects* from the *Configure* menu or from the Project Outline view.

   If there are no existing groups, the *New Group* dialog appears:



Otherwise the *<Group Name> – Guidance Object (GO) Editor* dialog appears:



- If the *<Group Name> – Guidance Object (GO) Editor* dialog is opened, click **Group** and select *New.*

2. In the *Name* field, type a name for the group.

   We are calling our group ‘Demo GO Group’.

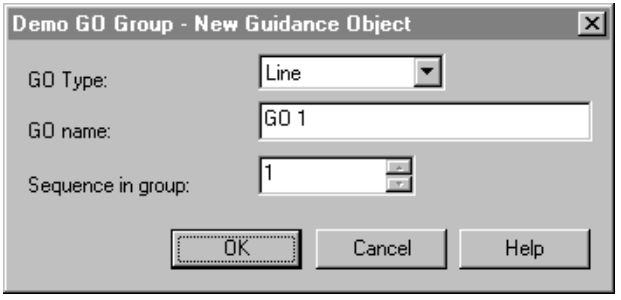
3. Make sure that the *Use for guidance* check box is selected and click **OK**.

Once we have created a GO group we can configure the individual GOs. The Navigation software automatically opens the *<Group Name> – New Guidance Object* dialog.

Tip – You can also open the *<Group Name> – New Guidance Object* dialog by clicking **Add GO(s)**.

Part 2. To create a new guidance object that is a line:

1. In the *GO Type* list, select the Line option:



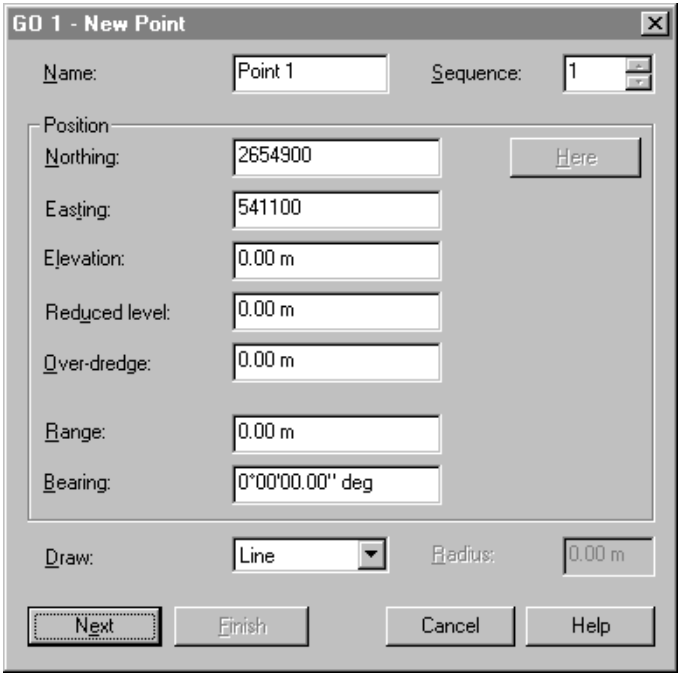
2. In the *GO name* field, type a name for this GO and click **OK**.

   In this Quick Tour we are calling this GO ‘GO 1’. The name must be unique to the project.

   The Navigation software now guides you through entering a line. The *<GO name> – New Point* dialog appears.

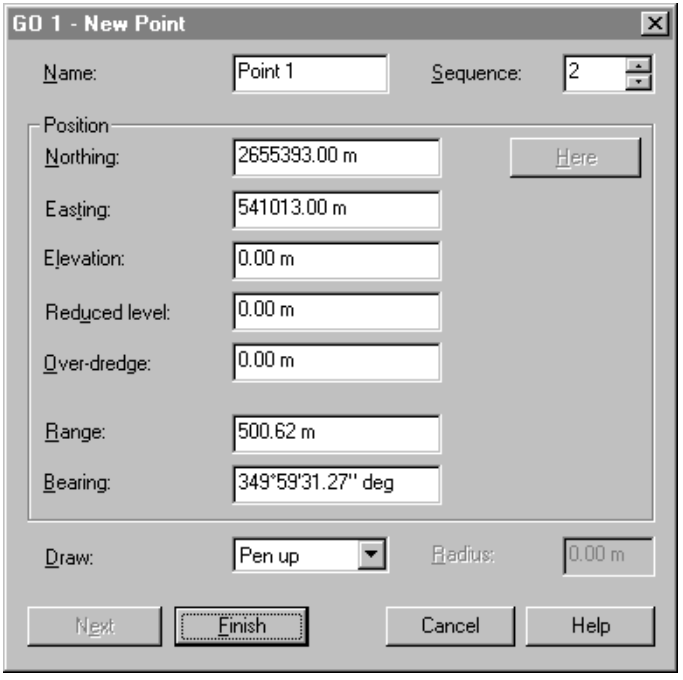
3. If required, enter a name for this point (we are calling our point ‘Point 1’).

4. Enter the grid coordinates for one end of the line. For the start of the line use the following settings:



5. Click **Next**.

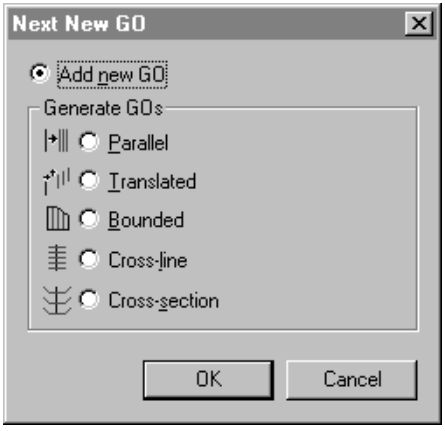
6. Because you selected the Line option in the *GO Type* field, the Navigation software now requires you to enter the end of line coordinates. Enter the details as listed below:



Tip – Enter the end of line coordinates by either typing in the coordinates or by entering the range and bearing from the start of line position.

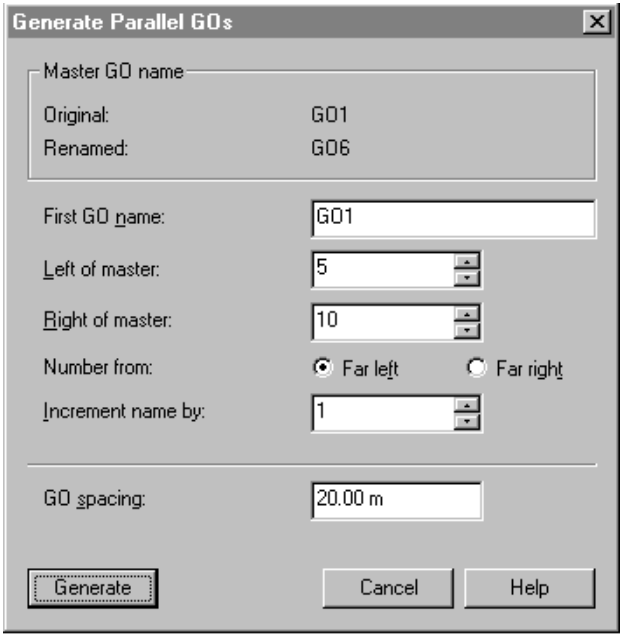
7. Click **Finish**.

8. Now that you have successfully created a GO that is a line, you are prompted to create the next new GO from the *Next New GO* dialog:



Part 3. Generating multiple parallel GOs:

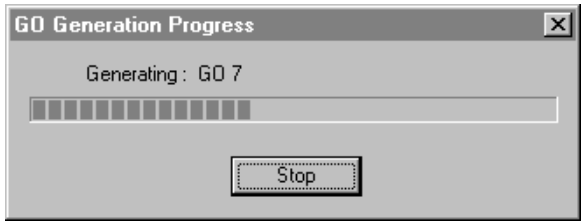
1. Select the *Generate multiple parallel GOs* option and click **OK**.
2. In the *Generate Parallel GOs* dialog we will set how many lines to the left and right of the master GO (the GO we created in Part 2) to generate. Use the following settings:



Note – The original master GO name may be changed when generating parallel GOs.

3. Click **Generate**.

4. The Navigation software now generates the parallel GOs:



Once this has been done the *<Group Name> – Guidance Object (GO) Editor* dialog appears.

5. Click **Close**.

Creating GOs using Boundaries

When creating guidance objects using a boundary, you firstly need to create a boundary GO. A boundary GO defines the area for the GO creation. Once you have created the boundary GO, then specify the spacing, orientation and so forth for the guidance objects to be created within the boundary.

Note – Exclusion zones are supported in boundary GO generation. However, they are not covered in this Quick Tour.

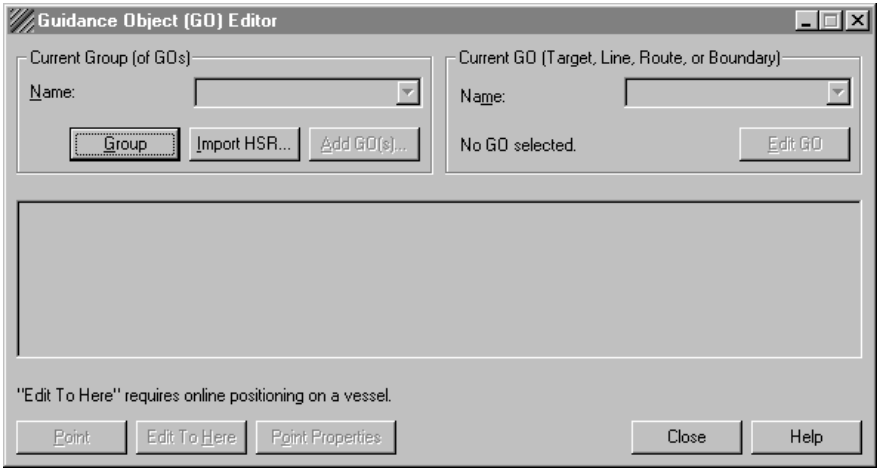
Once again the Navigation software wizards partially guides you through this process. This topic has been broken into three parts. Parts 2 and 3 follow directly on from Part 1.

Part 1. To create a new guidance object group to be used for guidance:

1. Select *Guidance Objects* from the *Configure* menu or from the Project Outline view.

   If there are no existing groups, the *New Group* dialog appears:

   Otherwise the *<Group Name> – Guidance Object (GO) Editor* dialog appears:



- If the *<Group Name> – Guidance Object (GO) Editor* dialog is opened, click **Group** and select *New.*

2. In the *Name* field, type a name for the group.

   We are calling our group ‘Bounded GOs’.

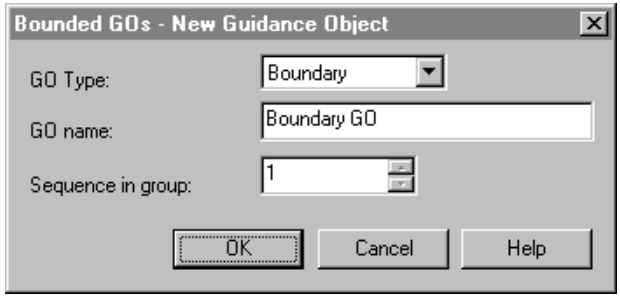
3. Make sure that the *Use for guidance* check box is selected and click **OK**.

Once we have created a GO group we can configure the individual GOs. The Navigation software automatically opens the *<Group Name> – New Guidance Object* dialog.

Tip – You can also open the *<Group Name> – New Guidance Object* dialog by clicking **Add GO(s)**.

Part 2. To create a new guidance object that is a boundary:

1. In the *GO Type* list, select the Boundary option:



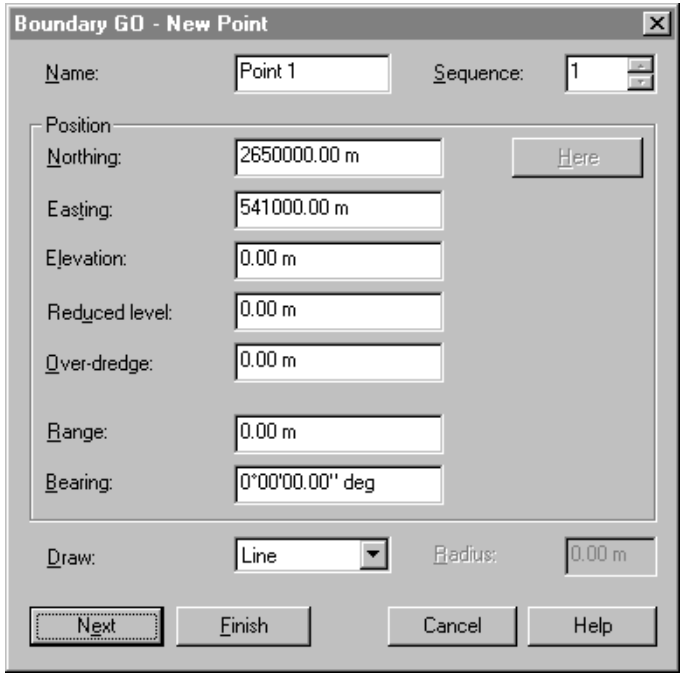
2. In the *GO name* field, type a name for this GO and click **OK**.

   In this Quick Tour we are calling this GO ‘Boundary GO’. The name must be unique to the project.

3. The Navigation software now guides you through entering a line. The *<GO name> – New Point* dialog appears.

4. If required, enter a name for this point (we are calling our point ‘Point 1’).

5. Enter the grid coordinates for the first boundary point (in this example we will create a simple square). For the first boundary point use the following settings:



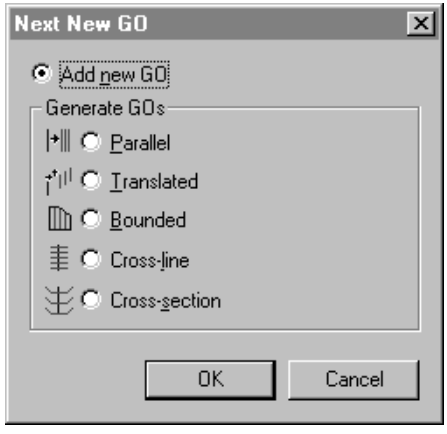
6. Click **Next**.

7. Because you selected the Boundary option in the *GO Type* field, the Navigation software now requires you to enter the next boundary point. Enter the details as listed below, clicking **Next** to move onto the next boundary point. On the last boundary point, click **Finish**.

   Because the GO type has been set to Boundary, the Navigation software automatically joins the first and last boundary points to form a polygon.

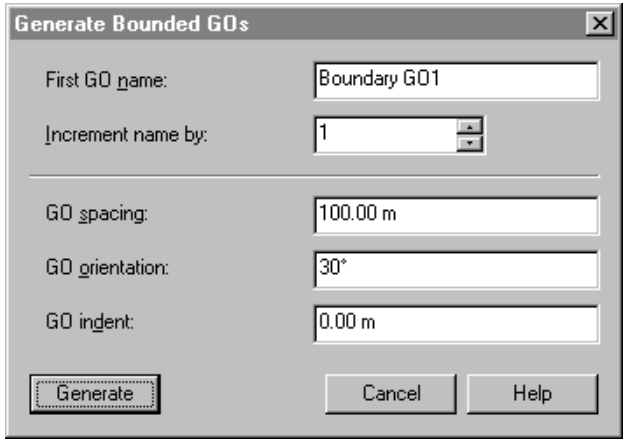
   - Point 2
     Northing **2655000 m** *Easting* **541000 m**
   - Point 3
     Northing **2655000 m** *Easting* **541500 m**
   - Point 4
     Northing **2650000 m** *Easting* **541500 m**

8. Now that you have successfully created a GO that is a boundary, you are prompted to create the next new GO from the *Next New GO* dialog:

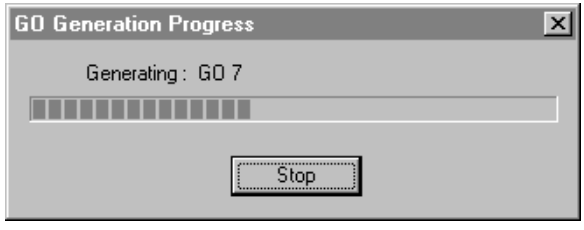


Part 3. Generating GOs inside the boundary:

1. Select the *Generate multiple bounded GOs* option and click **OK**.
2. In the *Generate Bounded GOs* dialog we will set the spacing and orientation of the GOs to be created inside the boundary (the GO we created in Part 2). Use the following settings:



3. Click **Generate**.
4. The Navigation software now generates the bounded GOs:



Once this has been done the *<Group Name> – Guidance Object (GO) Editor* dialog appears.

5. Click **Close**.

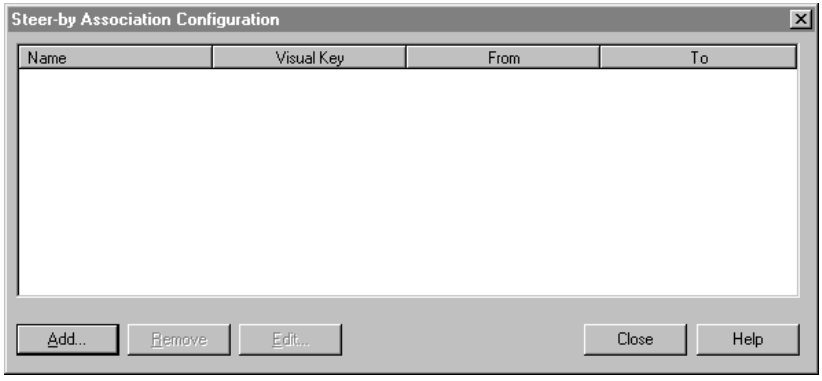
5.2.7 Selecting a Steer-by

A Steer-by Association (steer-by) is the linking of a vessel's offset to the selected guidance object.

The following procedure assumes you have configured at least one vessel with offsets, and at least one GO group with guidance objects.

To select a steer-by:

1. From the *Configure* menu choose *Steer-by Associations*:



   Alternatively, select *Steer-by Associations* from the Project Outline view.

2. Click **Add** to open the *Add Steer-by Association* dialog.
3. Select the *Configuration* tab.
4. If desired you can enter a unique name for the steer-by association in the *Steer-by name* field, otherwise the Navigation software uses the default name.
5. In the *Offset name* list select the offset required. In this tutorial we are choosing **Offset2** (the offset to which the Echo Sounder is assigned).
6. In the *GO Group* list, select the group to be used.
7. In the *GO* list, select the GO to be used.
8. Click **OK** to load the new steer-by and close the *Steer-by Association* dialog.

5.3 Configuring NMEA GPS, Heading, and Depth

This Quick Tour provides an example of how to configure three common equipment devices. To configure these three equipment devices your computer needs three free communication ports.

Also included are instructions on how to change the default latency and timeout values for a particular service. In this Quick Tour we change the Echo Sounder's latency and timeout settings.

5.3.1 Configuring an NMEA GPS Service

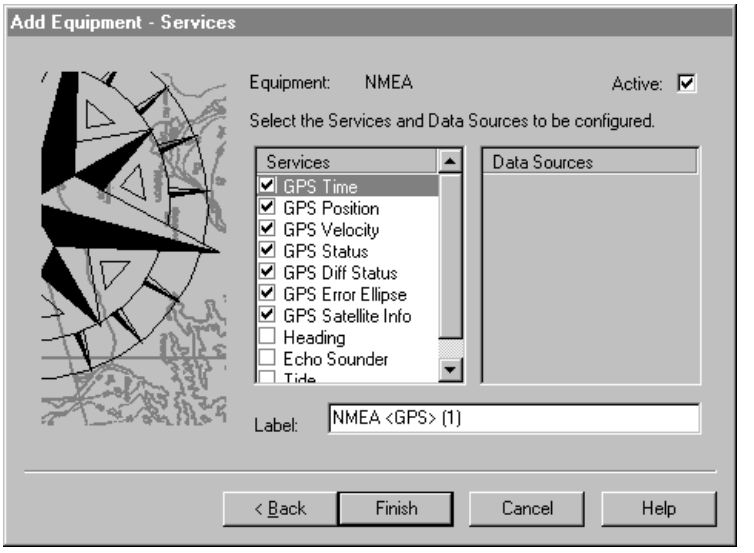
Configuring NMEA services is very similar to configuring Demonstration services, except that you must also configure the communication port properties to be used.

To configure an NMEA GPS service:

1. From the *Configure* menu choose *Equipment*. Alternatively, if the project does not contain any equipment devices, double-click the Equipment icon in Project Outline view.
2. Click **Add** to add a new equipment device.

   The *Add Equipment – Name* dialog appears.
3. From the *Equipment Type* list, select <*GPS*>.
4. From the *Equipment Name* list, select *NMEA*.
5. Click **Next >** to open the *Add Equipment – Services* dialog.
6. Confirm the *Active* check box is selected.

7. Confirm the following selections are made:

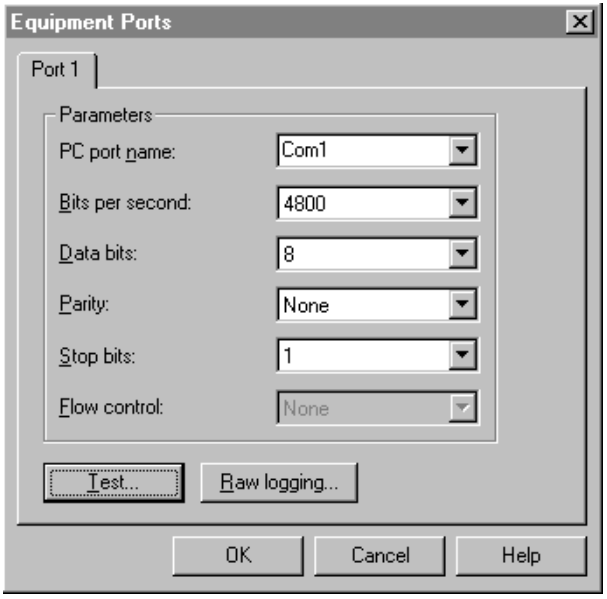


Note – The above selection is suitable for GPS receivers outputting NMEA, GGA, GST, GSV, GSA, VTG, and ZDA messages. If a subset of other NMEA messages are output some, or all, of the above selection may not be applicable.

8. Click **Finish** to open the *Configure Equipment* dialog.
9. Make sure you have the correct vessel and the offset corresponding to the GPS antenna selected.
10. Click **Ports**.

    The *Equipment Ports* dialog appears.

11. In the *PC port name* list, select the appropriate communication port (the port that your GPS device is connected to). For this Quick Tour we are using *Com1* for the GPS:



12. Once the correct port and the communication parameters are set correctly click **OK** to return to the *Configure Equipment* dialog.
13. Click **Custom**.

    The *NMEA Custom Properties* dialog appears.
14. Select the *GPS Position* tab.
15. Set the *Position input* group to the NMEA string type to be decoded.

    For example, the *GGA-GPS Fix Data* option would be selected if the GPS receiver was outputting the NMEA GGA message.
16. Set the *Minimum GPS Quality* field to the minimum GPS solution type you want to use in your survey. Click **OK**.

Note – The Minimum GPS Quality options available depend on the selection in Step 15.

17. Click **OK** in the *Configure Equipment* dialog to return to the *Equipment Configuration* dialog.

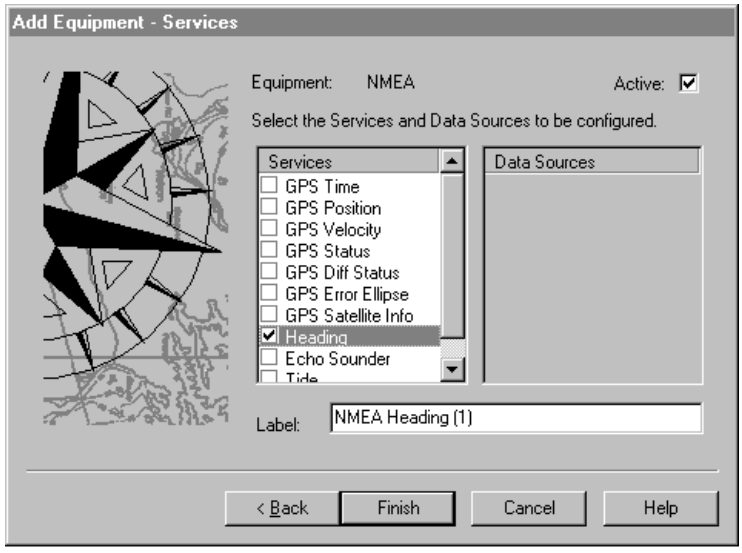
Note – *NMEA <GPS> 1* is now listed on the *Equipment Configuration* dialog, check that the *Ports* column contains *1:com1* (this indicates the equipment configuration requires 1 communication port and that the PC's com port 1 has been assigned).

5.3.2 Configuring an NMEA Heading Service

To configure an NMEA Heading service:

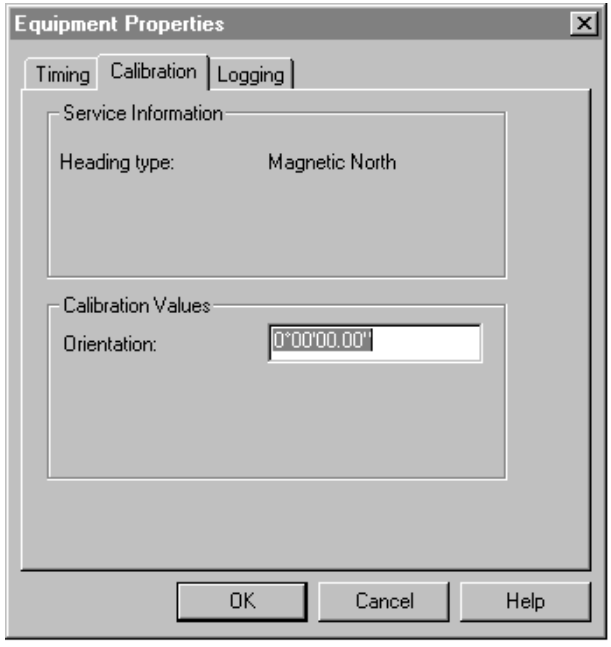
1. We are now configuring a heading device using the following method. Click **Add** in the *Equipment Configuration* dialog to add a new equipment device.
2. From the *Equipment Type* list, select *Heading*.
3. From the *Equipment Name* list, select *NMEA*.
4. Click **Next >** to open the *Add Equipment – Services* dialog.

5. Confirm the following selections are made:



6. Click **Finish** to open the *Configure Equipment* dialog.
7. Make sure you have the correct vessel and the offset corresponding to the Heading device selected.
8. Click **Ports** to open the *Equipment Ports* dialog.
9. In the *PC port name* list, select the appropriate communication port (the port that your Heading device is connected to). This time we are using *Com2* for the Heading.
10. Once the correct port and the communication parameters are set correctly click **OK** to return to the *Configure Equipment* dialog.
11. Click **Custom**. The *NMEA Custom Properties* dialog appears.
12. Select the *Heading* tab.
13. Select which NMEA heading string type is to be decoded in the *Heading Input* group.
14. Select what the incoming heading is to be decoded as in the *Heading Type* group and click **OK**.

15. Click **Properties** to open the *Equipment Properties* dialog.
16. Select the *Calibration* tab:



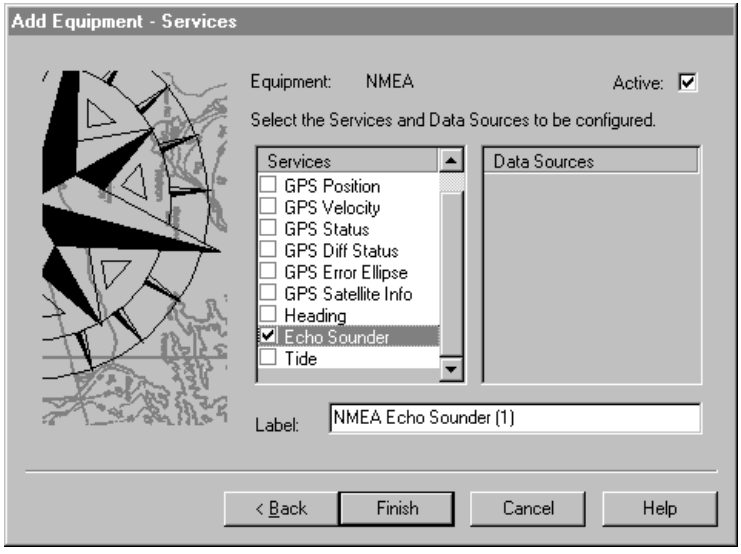
17. If required, enter an orientation correction into the *Orientation* field.
18. Click **OK** in the *Configure Equipment* dialog to return to the *Equipment Configuration* dialog.

5.3.3 Configuring an NMEA Echo Sounder Service

Finally, we will add an Echo Sounder device.

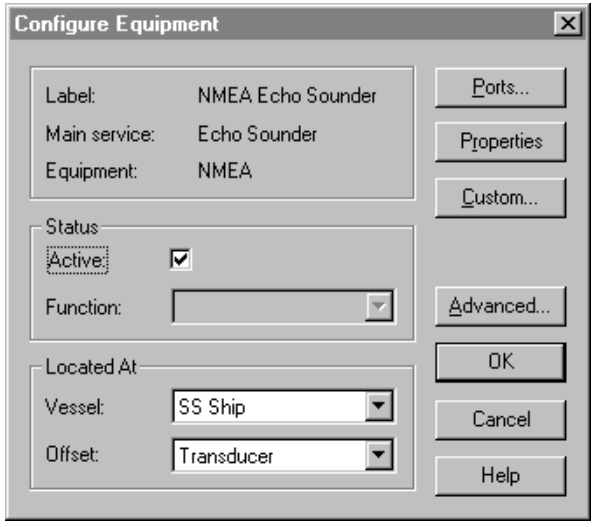
To configure an NMEA Echo Sounder service:

1. Click **Add** to add a new equipment device.
2. From the *Equipment Type* list, select *Echo Sounder.*
3. From the *Equipment Name* list, select *NMEA* and click **Next >**.
4. Confirm the following selections are made:



5. Click **Finish** to open the *Configure Equipment* dialog.

6. Make sure you have the correct vessel and the offset corresponding to the Echo Sounder Transducer selected:



7. Click **Ports** to open the *Equipment Ports* dialog.
8. In the *PC port name* list, select the appropriate communication port (the port that your echo sounder device is connected to). This time, we are using *Com3* for the echo sounder.
9. Once the correct port and the communication parameters are set correctly click **OK**.
10. Click **Custom**.

    The *NMEA Custom Properties* dialog appears.
11. Select the *Echo Sounder* tab.
12. Select the NMEA depth string type to be decoded in the *Depth Input* group.
13. Select what frequency(s) to decode the depth as in the *Decode Depth As* group. Click **OK**.

Note – If Both Frequencies (same value) is selected the incoming depth will be decoded as both high and low frequencies.

Note – All NMEA depths can have transducer depth corrections applied in real-time, regardless of the depth string type. If the offset height (z) box is selected, in the real-time display's properties, then the z component (height) of the Echo Sounder offset will be applied to the decoded depth.

14. Click **OK** in the *Configure Equipment* dialog to return to the *Equipment Configuration* dialog.
15. Click **Close** to complete the equipment configuration.

5.3.4 Changing the Latency of the Echo Sounder Device

As with many other devices the latency of an echo sounder can vary with the operating conditions (for example, water depth and salinity). The Navigation software lets you adjust the latency values applied to the incoming data. The following steps describe how to adjust the latency for an Echo Sounder service. You can also use the same procedure to adjust the latency (and timeout) of any other service type.

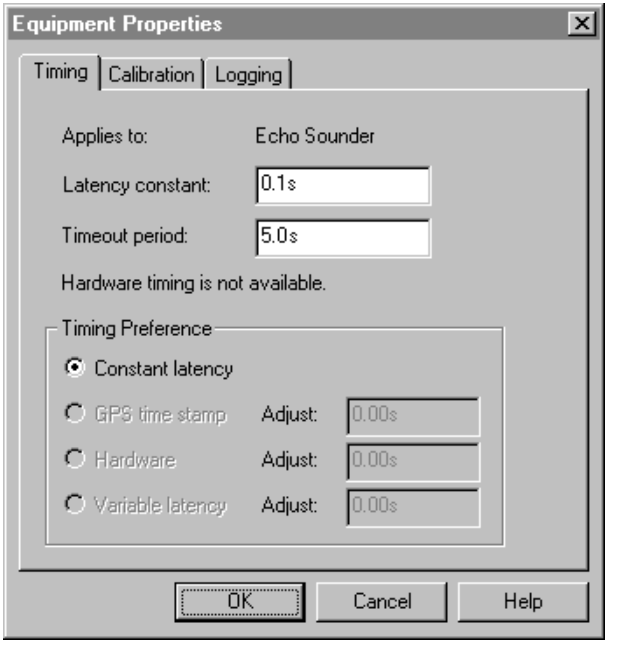
To change the latency of the echo sounder:

1. From the *Configure* menu choose *Equipment*. Highlight the Echo Sounder service and click **Configure**. Alternatively, double-click on the Echo Sounder Equipment icon in the Project Outline view.
2. Click **Properties** to open the *Equipment Properties* dialog.
3. Select the *Timing* tab (if it is not already the one displayed).

4. Set the *Latency constant* to **`0.1`** (seconds).

   This means that when the Navigation software first receives each depth data string it is assigned a 0.1 second age (that is, the Navigation software thinks the data is 0.1 second old by the time it arrives).

5. Change the *Timeout period* to **`5.0`** seconds:



   Now the Navigation software will only timeout the echo sounder device if no valid data strings are received for 5 seconds or more.

6. Click **OK** to return to the *Configure Equipment* dialog and click **OK** again.

7. Click **Close** to exit the *Equipment Configuration* dialog.

A Utilities

In addition to the main software components (Navigation, NavEdit, and Processing) the HYDROpro software also contains the following utilities:

- Activation
- Coordinate Calculator™
- Coordinate System Manager
- Language
- Remote Helmsman™

The availability of these utilities depends on which software components you have installed.

A.1 Activation Utility

The Activation utility detects what licences are available on the activation disk and activations installed on the security key.

To start the Activation utility:

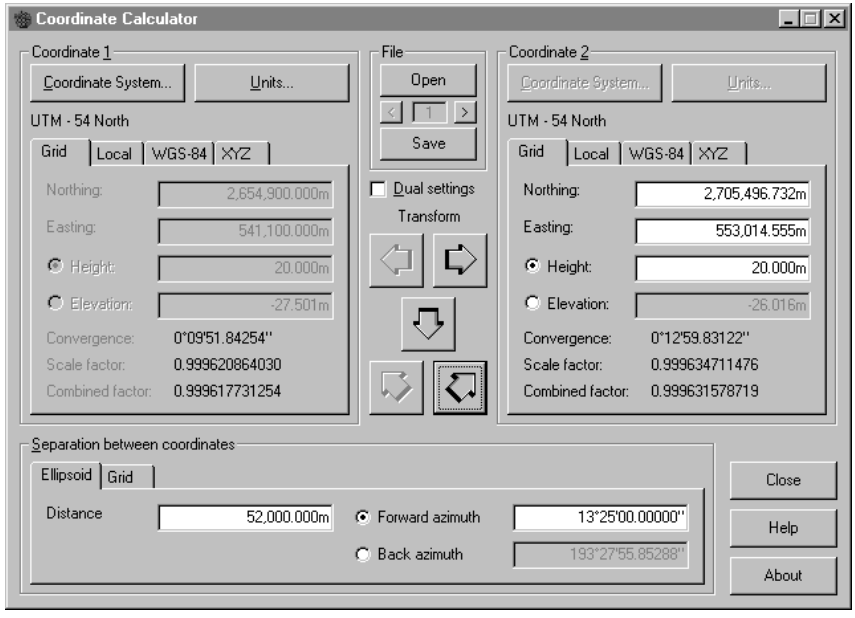
- Click **Start** on the Windows taskbar and select *Programs / HYDROpro / Utilities / Activation*.

For more information on the Activation utility, see Activating the Software Licence, page 2-8.

A.2 Coordinate Calculator Utility

Use the Coordinate Calculator utility to perform calculations between coordinate systems. To start the Coordinate Calculator utility:

- Click **Start** on the Windows taskbar and select *Programs / HYDROpro / Utilities / Activation / Coordinate Calculator*:



Use the Coordinate Calculator to:

- convert between any WGS-84 LLH (latitude, longitude, height) and LLH on a local datum, as well as map projection coordinates
- convert the data above to earth-centered-earth-fixed (ECEF) coordinates
- calculate the bearing (forward and reverse) and distance between two points if both are on the grid and spheroid
- calculate coordinates of a point by inputting a starting coordinate and a bearing and distance
- reorder and convert ASCII coordinate files

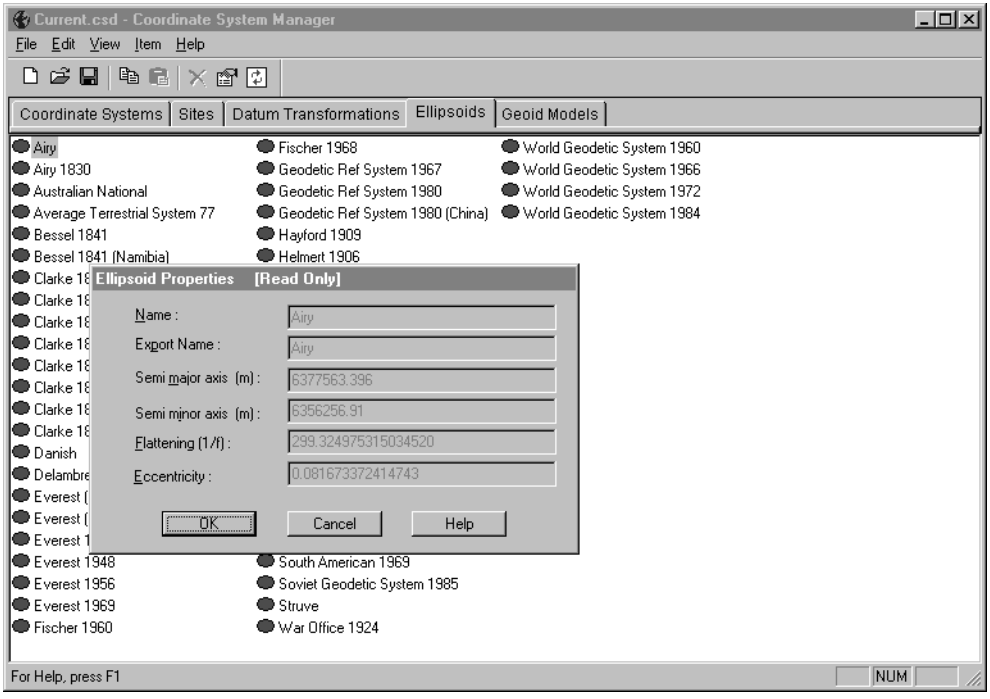
You can input data in local units such as metres, US Survey feet etc.

A.3 Coordinate System Manager Utility

The Coordinate System Manager utility is supplied with a number of Trimble surveying and mapping systems. For most users, the projections, zones, and datum transformations that are supplied with those systems are all that you need.

To start the Coordinate System Manager utility:

- Click **Start** on the Windows taskbar and select *Programs / HYDROpro / Utilities / Coordinate System Manager*:



With the Coordinate System Manager software you can:

- view the coordinate systems – know what parameters you are using as you work
- change definitions – although you cannot edit the definitions that are supplied, you can duplicate records and use the duplicated record to make changes
- create sites – establish a site if you are working in an area that is not adequately covered by the definitions provided

Use it to:

- create or edit a site, zone, datum, ellipsoid, or geoid
- select the projection used by a zone
- select the ellipsoid of any datum
- specify vertical and/or horizontal adjustments to a zone and save them as a named site
- select a geoid model
- assign the files to be used by a geoid model or datum transformation

Note – Remember that geodetic information is of a highly technical and specialised nature. You should fully understand what you are doing and know the significance of each piece of data. Trimble recommends that you only attempt to edit coordinate systems if you have land surveying or geodetic expertise. If not, ask someone with this expertise to do the work for you.

A.4 Language Utility

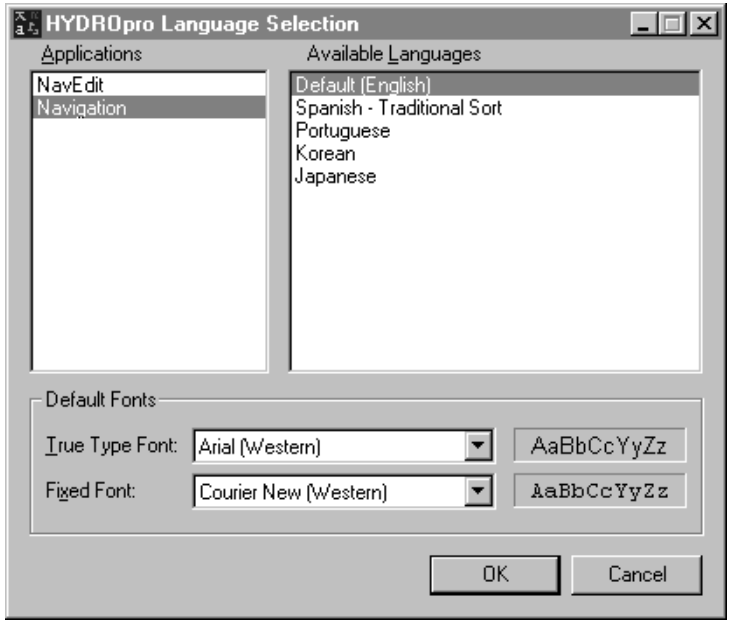
Use the Language utility to change the language of the Navigation and NavEdit software. The Navigation and NavEdit software have been translated into several languages.

To start the Language utility:

- Click **Start** on the Windows taskbar and select *Programs / HYDROpro / Utilities / Language*.

To change to a different language:

1. Make sure the Navigation or NavEdit software is closed.
2. Start the Language utility.
3. In the *Applications* field, select the application that you want to change the language for:



4. In the *Available Languages* field, select the required language.

Tip – If you want to change to a language not listed, please contact your local Trimble dealer for details on the languages available after this manual was released.

Note – Some languages are not supported on some operating systems. The Language utility indicates this.

5. For the Navigation software, you can also change the default font. To do this, select the options in the *Default Fonts* group.
6. Click **OK**.

Each language available, is made available through dynamic linked library (.dll) files. Language .dll files for use with the Navigation software have a ‘Navi’ prefix. Language .dll files for use with the NavEdit software have a ‘Nave’ prefix.

To add a new language or language update:

1. Make sure that the Language utility is closed.
2. Copy the language file into the appropriate directory:
   - For Navigation: C:\Program Files\Trimble\HYDROpro\Nav
   - For NavEdit: C:\Program Files\Trimble\HYDROpro\NavEdit
3. Start the Language utility.

   The new language files will be detected, which you can now select.

Warning – It is important that you use the correct language .dll with the correct version of the software.

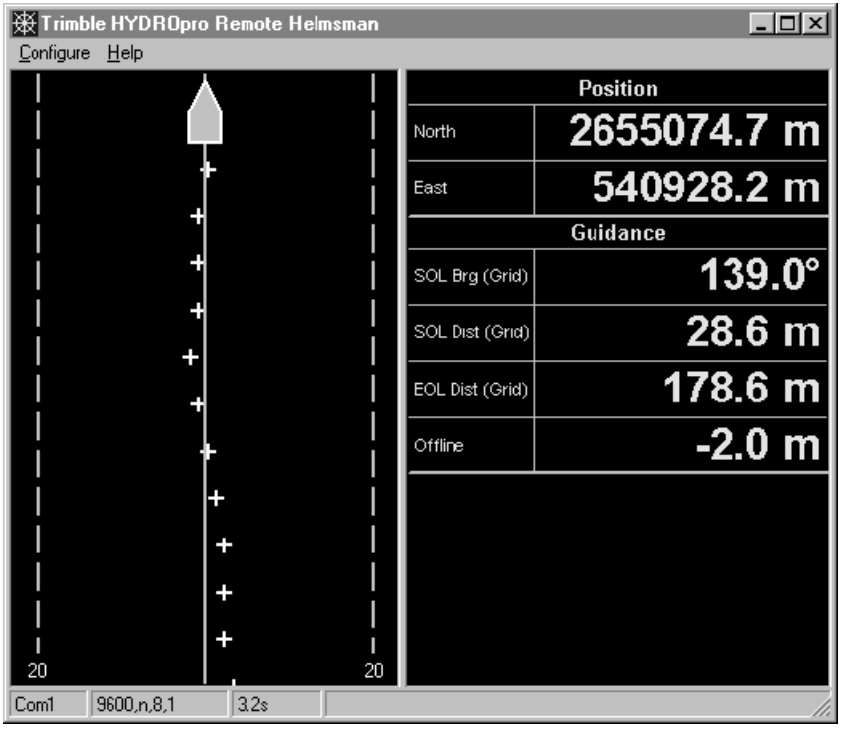
A.5 Remote Helmsman Utility

The HYDROpro Remote Helmsman is a simple stand-alone utility. It receives an incoming stream of text guidance information and displays it, along with a simple offline left/right history display.

The Remote Helmsman utility can run on a low specification Windows PC. The Remote Helmsman utility will run on Windows 95, 98, NT, and Windows 2000 operating systems.

To start the Remote Helmsman utility:

- Click **Start** on the Windows taskbar and select *Programs / HYDROpro / Utilities / Remote Helmsman*.



The Remote Helmsman utility is divided into four regions:

- Menu bar

  The menu bar shows the menus that are available in the Remote Helmsman.

- Status bar

  The status bar at the bottom of the window displays the selected communication port and parameters. Additionally, it displays the age of the last record.

- Offline left/right history pane

  This pane displays a simple graphical history of the previous offline values.

- Text pane

  The text pane displays textual information. It is comprised of separators, labels, and values.

You can change the display size, font size, and colours, as well as the background colour. You can also resize the two panes.

The Real-time Reports facility generates the text stream of guidance information. The communication uses a standard serial communication port.

You can also use special field prefixes in the data streams. See Table A-1.

Table A-1 Field Prefixes

Prefix Character	Function	Description
=	Separator field	The text in this field is a row separator. It occupies a complete row in the text display.
*	Label field	The text that follows in this field is a row label.
@	Offline value	The number that follows this field is an offline value, positive for starboard and negative for port. This value drives the history display. Units are not relevant to the offline history display.

Fields which do not have a special prefix character are considered to be text values and are displayed to the right of their respective labels.

If the data stream contains more than one offline value, only the last offline value is used to update the offline history display.

The format of the text display is determined dynamically and depends on the last data stream received. Data streams can contain virtually any combination of separators, label fields, and text data.

Value fields are displayed next to their corresponding labels according to their corresponding order or arrival in each sentence. For example, the fourth value is displayed next to the fourth label. If there are more labels than values then the leftover rows will contain labels, but no values. Likewise, if there are more values than labels, the leftover rows will contain values, but no labels.

All fields are alphanumeric text and can be optionally enclosed in double quotes (“ ”). Field quoting is necessary when the Regional Settings in the Windows Control Panel are configured to use commas as decimal separators, or when space padding is required. This prevents the decimal separators being interpreted as field separators.

When a field is not quoted, a field begins at the first non-space character in the sentence or the first non-space character after the comma separator, and ends at the last non-space character before the comma separator or carriage return character.

Example – One Body Real-time Report

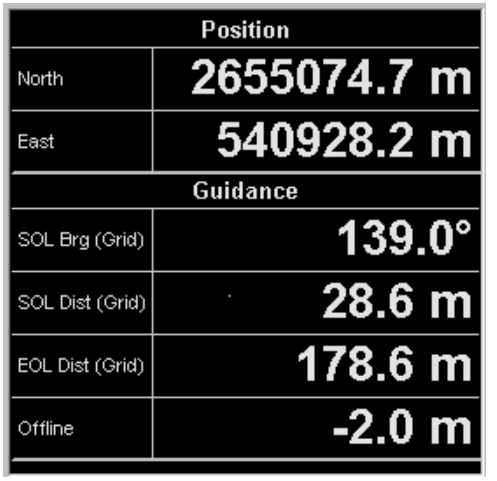
Consider the following output format in HYDROpro:

```
=Position,
*North,[North],*East,[East],
=Guidance,
*SOL~Brg~(Grid),[SOL Brg (Grid)],
*SOL~Dist~(Grid),[SOL Dist (Grid)],
*EOL~Dist~(Grid),[EOL Dist (Grid)],
*Offline,@[Offline][CR]
```

The resultant Real-time Report sentence using this output format looks similar to the following:

```
=Position,*North,2655074.7 m,*East,540928.2
m,=Guidance,*SOL Brg (Grid),139.0°,*SOL Dist
(Grid),28.6 m,*EOL Dist (Grid),178.6
m,*Offline,@-2.0 m
```

The test pane of the Remote Helmsman displays the following:



Note – The @ character is removed from the value before it is displayed in the text pane. The purpose of the @ character is to identify the offline value to use for the offline history pane.

Example - One Header and One Body Real-time Report

You could also use the data in the previous example to configure two output formats in a real-time report. All the separators and labels are put into a header format, and the values go into the body format.

Header Output Format:

```
=Position,
*North,*East,
=Guidance,
*SOL~Brg~(Grid),
*SOL~Dist~(Grid),
*EOL~Dist~(Grid),
*Offline[CR]
```

Body Output Format:

```
[North],[East],
[SOL Brg (Grid)],
[SOL Dist (Grid)],
[EOL Dist (Grid)],
@[Offline][CR]
```

The resultant Real-time Report sentences using these output formats will look something like this:

```
=Position,*North,*East,=Guidance,*SOL Brg
(Grid),*SOL Dist (Grid),*EOL Dist
(Grid),*Offline
```

```
2655074.7 m,540928.2 m,139.0°,28.6 m,178.6 m,@-
2.0 m
```

The test pane of the Remote Helmsman is the same as before.

Example – Lines with Multiple Values

The Remote Helmsman utility shows alphanumeric values verbatim. This means that it is possible to show more than one value in one row, as demonstrated in the following output format example:

```
=Position,
“*North,~East”,”[North],~[East]”,
=Guidance,
“*SOL~Brg,~Dist”,”[SOL Brg (Grid)]~[SOL Dist
(Grid)]”,
“*EOL~Brg,~Dist”,”[EOL Brg (Grid)]~[EOL Dist
(Grid)]”,
*Offline,@[Offline][CR]
```

The test pane of the Remote Helmsman displays the following:

Note – The value in the North, East row includes a comma between the northing and easting. The comma is within the quoted North, East field and so becomes part of the alphanumeric value displayed.

B HYDROpro Tug and HYDRObms Communications

The HYDROpro software includes features and a tug tracking equipment handler that allow it to be configured as a tug operating with the HYDRObms™ system or with the HYDRORig™ system with multi vessel tracking functionality.

Figure B-1 on the next page shows an overview of the HYDROpro Tug / HYDRO(DOS)bms communications flow. The tug only ever responds to the barge's polling thus avoiding data collision. This communications protocol allows use of simple radio systems.

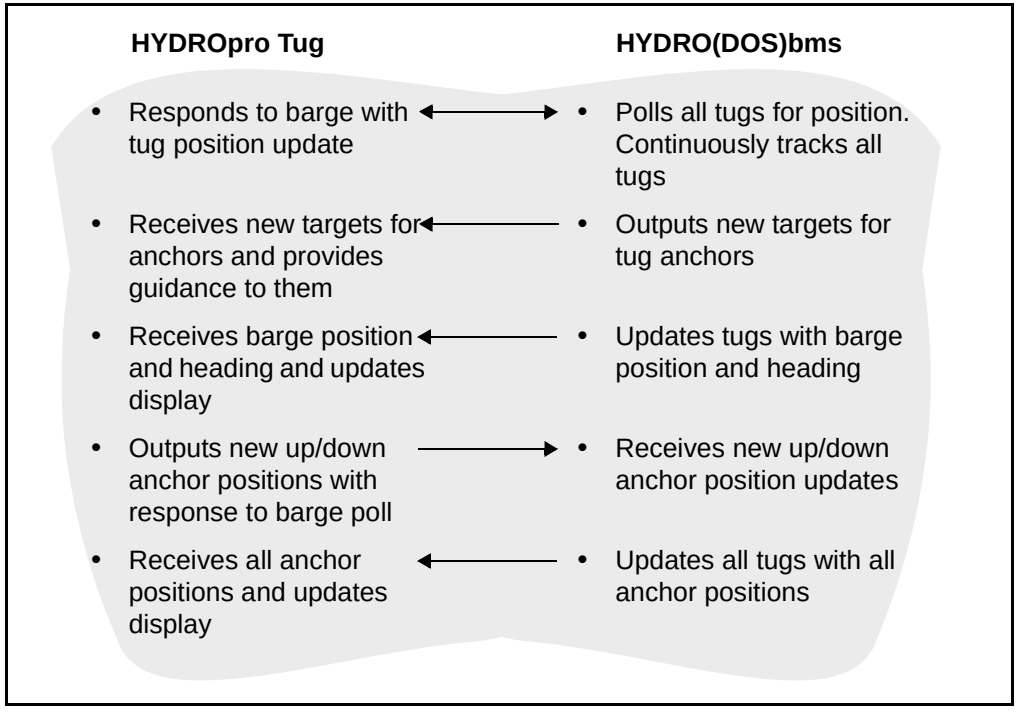


Figure B-1 Communications Flow

The communications protocol is detailed in the Tug Track DLL text file.

B.1 Configuring HYDROpro as a Tug

A project called Tug.mdb is supplied with your HYDROpro installation. Trimble recommends that you copy this project and then edit the copy to your specific needs.

This project includes preconfigured vessel shapes for barge and tug, equipment, blank targets, and visual links for anchors and their lines.

The following notes are intended to help you to configure a new Navigation project for use as a tug system working with the HYDRO(DOS)bms system.

1. Configure project details, unit, and global settings as required.
2. Configure tug coordinate system.

   The tug and barge coordinate systems must match. Positions passed between vessels are in the local grid and so assume that the coordinate systems are the same.

   The tug system units do not affect the data in the communications.
3. Define the shape and offset for the tug.
   - Offset(s) for GPS antenna position(s).
   - Offset for point of anchor deployment from the tug. For example, the tug's stern roller.
4. Define the shape and offsets for the barge.
   - Offset for Primary GPS antenna. This is the position output from the barge to the tug.
   - Offsets for all winch locations. These are required for the visual links (anchor lines).
5. Select and configure Tug GPS and Heading equipment as usual.
6. Select the Tug Tracking equipment handler.

- Select Equipment type NEE position (or NEE position out or Guidance Update). These categories include the Tug Tracking equipment handler. Select this equipment handler and proceed to finish the wizard. The *Configure Advanced Equipment* dialog appears.

7. Configure the tug tracking properties.

   Four services are preconfigured. The vessels and offsets must be reconfigured so that they are appropriate for each of the services. To do this, highlight the service and click **Properties**. Select the appropriate vessel and offset for each of the services as follows:

   - The NEE Position service is used for the update of the barge position. Select the barge vessel and the barge offset on which the prime position system is installed.
   - The Heading service is used for the update of the barge heading. Select the Barge vessel and the barge offset on which the prime position system is installed.
   - The Guidance Update service is used to update anchor position and status information. It is also used for new anchor targets for the tug. Select the tug vessel and steer-by offset (for example, the centre of the stern roller).
   - The NEE Position Out service is used for the output of the tug steer-by offset. Select the tug vessel and steer-by offset.

8. Configure Tug Tracking communications port.

   Configure the appropriate port and settings for the tug/barge communication system. To do this, click **Ports**.

9. Configure the Tug Tracking custom settings.

   Configure the Tug ID to identify input and output messages to and from this tug. To do this, click **Custom** and set the Tug ID number to match that configured in the HYDRObms system.

10. Preconfigure the anchors.

    a. Open the Guidance Object Editor and add a new group called Anchors. In this group, add a target type Guidance Object (GO) for each of your anchors. Use the GO name convention Anchor#. That is, Anchor1, Anchor2, and so forth.

    b. If you have initial target positions for each of the anchors then you can enter these. Otherwise you can leave the position fields as 0.

Note – The Guidance Object Update service will automatically create the group and guidance objects (targets) when a new target is received from the barge, if they do not already exist. The purpose of preconfiguring the anchors is so that you can preconfigure the visual links (anchor lines).

11. Preconfigure the visual links.

    a. Open the *Visual Link Configuration* dialog and add a link for each of your anchors. For each link select the barge and offset (winch), the GO group called Anchors and the appropriate GO (anchor).

    b. Configure the properties of the visual link so that the link (anchor line) is displayed only when you require it. Anchor lines are normally configured to be displayed only when the anchor is laid (Down). To do this, clear the *Always* check box and select Down in the *Point status* field.

       When a tug drops an anchor the status for the drop point is automatically set to Down.

       When an anchor is recovered the recovery point status is set to Up.

       The anchor update information from the barge includes point status information.

12. Configure a steer-by association.

    a. Open the *Steer-by Association* dialog and select the tug and offset from which the anchor is deployed (for example, center of the stern roller). Select the GO group called Anchors and the GO (anchor) to be laid.

    b. If you want a bulls-eye around the current anchor target set the *Visual Key* field to Bulls-eye in the *Next/Prior* tab of the *Steer-by Association* dialog.

    c. To specify the outer tolerance of the bulls-eye return to the Guidance Object Editor and the GO group called Anchors, select the *Points* menu and choose *Properties*. Modify the *Radius* field as required.

Note – A steer-by association is automatically configured or modified when a new anchor target is received from the barge.

13. Configure the tug and barge dynamics.

    a. Open the *Vessel Dynamics* dialog.

    b. Select the tug in the *Dynamics for vessel* field. Modify the tug dynamics configuration if you require. The defaults are generally suitable for a tug.

    c. Select the barge in the *Dynamics for vessel* field. In the *Estimation* tab clear the *Use position estimation* check box.

Note – It is not valid to estimate the barge position between updates from the barge.

14. Configure the *Plan View Map* real-time display.

    Open a *Plan View Map* real-time display and select its properties by choosing *Properties* from the *Window* menu.

    By default, the tug and barge vessels are selected for display. Select the *Background* tab and select the check box next to the guidance object group called Anchors. This configures the *Plan View Map* real-time display to display symbols at the anchor locations.

Note – If you have not got initial positions for your anchors they will be plotted at coordinate 0,0. This will be inconvenient for Plan View Map auto scaling as it will include these points when determining a scale to include all on the map. To avoid this problem, enter sensible dummy coordinates or do not select the anchors group for display.

15. Display and use the Tug Control toolbar.

    a. From the *View* menu choose *Toolbars*.

       The *Toolbars* dialog appears.

    b. Select the *Tug Control* check box and click **OK**.

       The Tug Control toolbar appears:

       You can move this toolbar around your screen. You cannot ‘dock’ it like other toolbars.

       The current anchor target and its status (Up or Down) are displayed on the left of the bar.

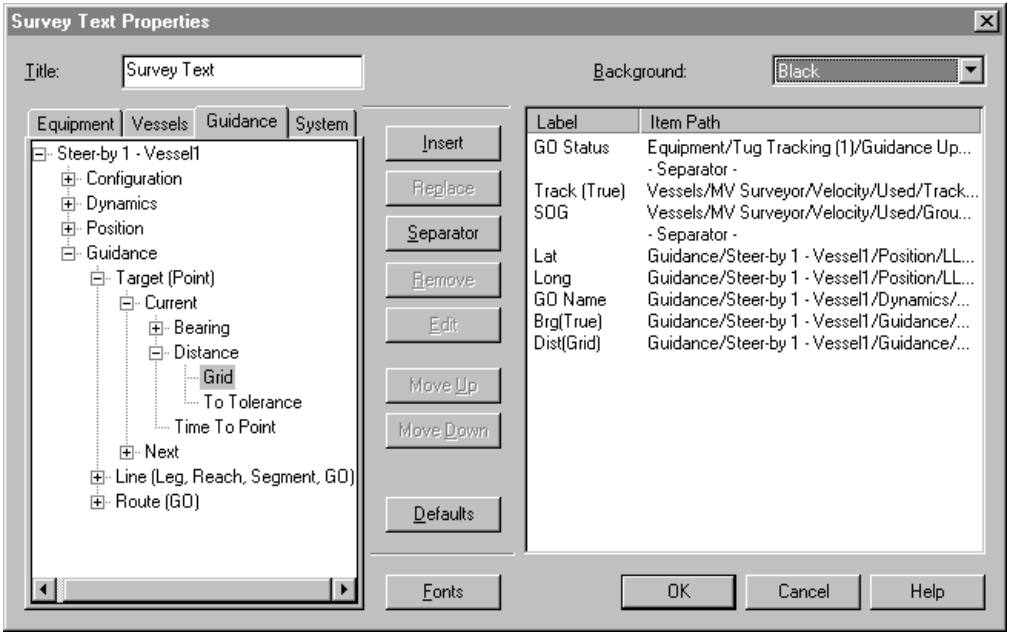
    c. Click the Up/Down button on the right side of the toolbar (or press F4) when you drop or recover an anchor.

At this point, a recovery or drop position for the anchor is determined and is sent to the barge. The anchor state on the toolbar is also updated.

The Next and Prior buttons on the toolbar let you make any anchor in the tug system current. However, the barge normally dictates what anchor is current by sending a message to the tug. The tug system automatically loads the new anchor target information and makes it current.

16. Configure the *Survey Text* real-time display.

    You can use the *Survey Text* real-time display to display any information from the Navigation system. When you open a new *Survey Text* real-time display, the *Survey Text Properties* dialog appears:



The list of items available for display on a *Survey Text* real-time display is contained in the four tabs on the left. The items available depend on the project configuration. Make sure that you have completely configured the project before configuring the *Survey Text* real-time display. A suggested survey text format for the tug is:

- GO Status (anchor up or down)
- Track (tug track)
- SOG (tug speed)
- Lat (tug latitude)
- Long (tug longitude)
- Name (anchor name)
- Brg (true) (bearing from tug to anchor target)
- Dist (grid) (Distance from tug to anchor target)

To select a GO Status:

1. Select the *Equipment* tab.
2. From the tree expand Tug Tracking / Guidance Update and highlight the GO Status item.
3. Click **Insert** to put the GO status into the Survey Text list on the right side.

To select Track and SOG:

1. Select the *Vessel* tab.
2. From the tree expand the appropriate tug / Velocity / Used / Track and highlight the True item.
3. Click **Insert**.
4. Highlight the Ground Speed item and click **Insert**.

To select lattitude and longitude:

1. Select the *Guidance* tab.
2. Expand Steer-by Tug / Position / LLH and highlight the Latitude item.
3. Click **Insert**.
4. Highlight the Longitude item and click **Insert**.

To select a GO name:

1. In the *Guidance* tab expand Steer-by tug / Dynamics and highlight the GO Name item.
2. Click **Insert**.

To select bearing (True) and distance (Grid):

1. In the *Guidance* tab expand Steer-by Tug / Guidance / Target (Point) / Current / Bearing and highlight the True item.
2. Click **Insert**.
3. In the *Guidance* tab expand Steer-by Tug / Guidance / Target (Point) / Current / Distance and highlight the Grid item.
4. Click **Insert**.

The list should look similar to the one shown in the dialog on page B-8. Click **OK** to open the *Survey Text* real-time display.

You can change the format of the display at any time. For more information search for the topic **`Survey Text Properties dialog`** in the online Help.

C Electronic Charts

This appendix explains how to use electronic charts.

The Navigation software allows raster images to be displayed as a background to the Plan View Map real-time display. You could include images such as aerial photographs, seabed images, and marine charts as a backdrop to survey operation.

Formats supported by the Plan View Map real-time display are Bitmap (.bmp), TIFF (.tif) and colour .dxf images. You can use use multiple charts so that navigation can occur across the boundaries of several adjacent charts without manual switching between the charts. DXF images can be used as a layer on top of images to enhance detail.

C.1 Chart Formats and Colours

Navigation supports the use of bitmap or TIFF raster images as a background to the Plan View Map real-time display. There is no limit to the number of colours that can be displayed by the Plan View Map real-time display. This is governed by the number of colours the image is saved with and the current settings in the Windows Control Panel Display Settings. As a rule, images that are saved with fewer colours (that is, 256 colour, 8-bit files) are much smaller than those saved in true colour (that is, 16 million colour, 24-bit file). True colour images will enhance detail and aesthetic appearance, but will produce a much larger file and slower redraw speed. A 256-colour image can be as much as three times smaller and optimise redrawing performance.

C.2 ESRI World (*.tfw, *.wld) File

To display a background chart in Navigation, it must be oriented North-up and be accompanied by an ESRI World format (geo-reference) file. For more information, see Orienting An Image Using The Esri World (.wld Or .tfw) File Rotations, page C-4.

The ESRI file is a geo-reference file which relates the pixel coordinates of the image to the real world. It must be stored in the same directory as the image and have the same filename as the image, while using either of the extensions *.tfw or *.wld. The ESRI file allows the Navigation software to locate the top left corner of the image on the *Plan View Map* real-time display, and scale the x and y-axis to match the relative northing and easting grid axis. HYDROpro does ***not*** orient the image using the ESRI file.

The ESRI World file uses a simple 6-parameter linear transformation. Files are of the format:

a
b
c
d
x_o
y_o

Where:

a = scale in map units per pixel from left of image

b = rotation = -sinθ

c = rotation = -sinθ

d = scale in map units per pixel from top of image

x_o = Easting or Longitude of left side of image

y_o = Northing or Latitude of top side of image

These parameters are used to transform coordinates using the following equation:

$$(x',y') = (x_\circ,y_\circ) + (x,y)\begin{pmatrix} a, & b \\ c, & d \end{pmatrix}$$

where $(x_\circ,y_\circ)$ defines the translation, and $\begin{pmatrix} a, & b \\ c, & d \end{pmatrix}$ defines the linear transformation (scaling, rotation, skewing).

Rotations *b* and *c* will in most cases be of the same sign, while the scalars *a* and *d* will usually be of the opposite sign. This may seem incorrect but this is because the coordinate system of a bitmap or TIFF image is different to a real world system. In an image, the origin is at the top left of the image, with the Y coordinates increasing to the south. A real world system has y ordinates increasing from the bottom up the image, that is, northings.

C.3 Orienting An Image Using The Esri World (.wld Or .tfw) File Rotations

HYDROpro Navigation does ***not*** support the rotation of an image using the ESRI World file rotations. For this reason all images must be oriented North-up if they are to be oriented correctly on the Plan View Map real-time display. You can change the orientation using a third-party drawing package (such as Paint Shop Pro), in conjunction with a geo-referencing software package. It is important to remember that once an image has been oriented north-up, it needs to be geo-referenced again so that a new ESRI World file is produced that reflects the new orientation. If the image has been correctly oriented north up, the rotations in the ESRI file will be close to zero.

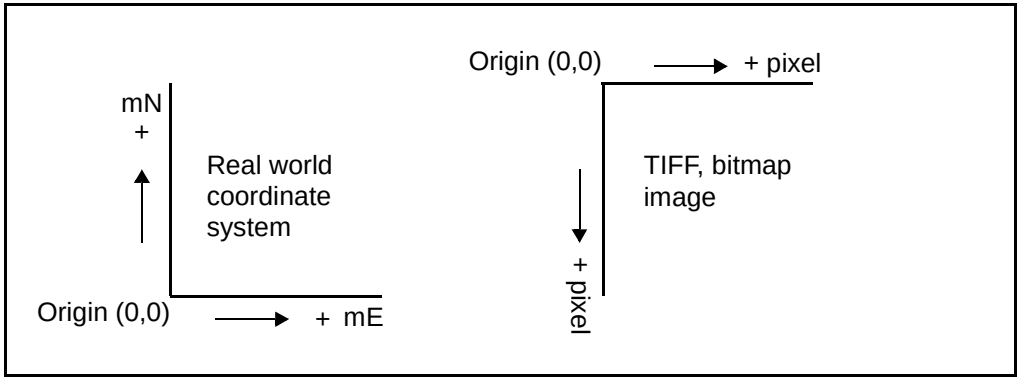


Figure C-1 Orienting an image using the ESRI World (.wld or .tfw) File Rotations

C.4 Orienting the Image

Using a third-party software package such as the Blue Marble Geographic Transformer (http://www.bluemarblegeo.com/), produce an ESRI World file using at least eight known reference coordinates, ensuring that some of the coordinates are located at the extents of the image. (For information on how to do this, refer to third-party documentation).

The image needs to be rotated using the rotations produced in the ESRI World (*.tfw, *.wld) file. Using the rotation values listed above the angular rotations can be calculated:

θ_x = -Asin(b) and θ_y = -Asin(c).

The mean of the two rotations can now be calculated and used to rotate the image in a third-party graphics package such as Paint Shop Pro. That is, the angular rotation = $(\theta_x + \theta_y)/2$.

Once the image has been rotated it needs to be geo-referenced again. Use the same coordinates as before since the previous geo-reference file will be invalid as it referred to the rotated image. Once you have produced a geo-reference file, check the quality of the orientation. The rotations in the geo-reference file should approach zero. If not, the image may need to be rotated and re-referenced a second or third time, depending on the accuracy required.

Note – It is important to use a good coverage of coordinates throughout the entire image. If a coordinate is excluded near one extent of the chart because the error is high, but no other coordinates are used in the same proximity, the chart will be scaled incorrectly in that region and fitted to the area with the greatest concentration of points. The best idea is to have an even spread of points over the entire image. In some cases it may be feasible to concentrate control points within the survey area because this particular area of the image may be of more importance because the majority of work will be performed there.

Glossary

This list contains terms specific to navigation and hydrographic surveying. It does not cover Microsoft Windows terms.

actions	Perform a task configured in events. Events trigger actions. For example, annotate echo sounder.
active	A setting in several dialogs that informs the software whether or not to use that configuration. When it is set to active the corresponding configuration will be used.
accurate system time	Based on Win9x/2000/NT system time (which in turn, is based on GMT). Navigation initially uses the computers system time and then starts a performance counter to accurately determine time from that point on.
adjust zone	A method of calculating local site coordinates based upon a previously defined zone coordinate system.
alarms	Error and warning messages raised in Navigation. *See also* **message boxes**.
analog	Communication using constantly varying values.
analog to digital	The conversion of analog data to a digital data format.

ASCII	American Standard Code for Information Interchange. An eight-bit code for character representation, (seven bits plus parity), used for serial communication. Generally the data in this format can be read.
AST	*See* **accurate system time**.
AST to GPS offset	The time difference between accurate system time and GPS time.
attitude	Pitch and Roll components of a vessels movement.
autonomous positioning (GPS)	A mode of operation in which a GPS receiver computes position fixes in real time from satellite data alone, without reference to data supplied by a base station. Autonomous positioning is the least precise positioning procedure a GPS receiver can perform, yielding position fixes that are precise to ±100 metres.
azimuth	The azimuth of a line is its direction as given by the angle between the meridian and the line measured in a clockwise direction from the north branch of the meridian.
backup	Equipment to be used in case of failure of Master equipment.
baud rate	*See* **bits per second**.
binary	Data that is in a base 2 format. Generally this data cannot be read.
bits per second	The number of bits sent or received each second. For example, a baud rate of 9600 means there is a data flow of 9600 bits each second. One character roughly equals 10 bits.

BNC	Bayonet Neill Concellman. Developed in the 1940s, the BNC connector provides a secure, easy-to-use means of connecting shielded cables to electronic equipment.
calculated velocity	Velocity calculated from position updates from a navigation receiver.
Calibrate (Local site adjustment)	A method of calculating local site coordinates based upon ECEF coordinates.
Calibrate (Equipment)	Adjustments made to the incoming raw decoded data values. For example, applying an orientation correction to the heading data.
Cartesian (Coordinates)	A system of coordinates that defines the location of a point in space in terms of its perpendicular distance from each of a set of mutually perpendicular axes.
Cartesian (Observer)	Observations to another vessel using the delta X and Y format.
chainage	The running distance along a centreline or route that starts at 0.00 and increments as you proceed along the route.
checksum	A method for checking the integrity of transmitted data. A checksum is an integer value computed from the data string.
coordinate system	Any three-dimensional reference frame that locates objects in space.
constant latency	*See* **latency**.
convergence	The angle between true north and grid north at a given location.

course	The horizontal direction in which a vessel is steered or intended to be steered.
CSID	Configured Service Identification. The unique number Navigation has assigned for that particular configured service.
current steer-by	The steer-by association that is selected as the ‘current steer-by’. This steer-by is used for GO operations (Next, Prior, Forward/Reverse) and event actions.
data	Information. *See* **decoded data, raw data**.
data bits	(binary digit or bits) A bit is the smallest unit of data in computing, with a value of either 0 or 1.
data source	ID number used to distinguish between two or more data strings of the same type (but produced by different devices) incoming on the same port. For example, two NMEA Echo Sounders connected to the same com port.
datum	A model of the earth consisting of an ellipsoid and an origin. Positioning are described as latitude and longitude relative to a specified point on the surface. The ellipsoid and origin are generally chosen to yield that most accurate and convenient approximation of the surface of the earth for mapping in a particular region.

datum transformation

A datum transformation provides the parameters that you need to convert coordinates from one datum to another. It defines the transformation that must be applied to transform points defined in terms of one datum to their equivalent position in terms of a different datum.

You can change WGS-84 coordinates to local coordinates, or local coordinates to WGS-84 coordinates. Using the Coordinate System Manager™ software, you can perform the following datum transformations:
– Molodensky (sometimes called Three Parameter)
– Seven Parameter
– Multiple Regression
– Datum Grid

Typically, you use datum transformations to convert data collected in terms of the WGS-84 datum using GPS methods onto datums used for surveying and mapping purposes in individual regions and countries.

DCE

Data Communications Equipment. The devices and connections of a communications network which connect the communication circuit with the end device (data terminal equipment or DTE). A modem can be considered a DCE.

DDDddd

A format for entering angles or latitudes and longitude values. With this option selected the values are entered as degrees and decimal degrees. For example, 45.21457° is entered as 45.21457. Southern latitudes and western longitudes are entered as negatives.

DDDMMmmm A format for entering angles or latitudes and longitude values. With this option selected the values are entered as degrees, minutes and decimal minutes. For example, 45°21.457' is entered as 45.21457. Southern latitudes and western longitudes are entered as negatives.

DDDMMSSsss A format for entering angles or latitudes and longitude values. With this option selected the values are entered as degrees, minutes, seconds and decimal seconds. For example, 45°21'45.7" is entered as 45 21 457. Southern latitudes and western longitudes are entered as negatives.

decoded data Data input to Navigation that has been interpreted, extracted and calibrated.

decoded data logging The storing of the decoded data in Navigation's Project database (*.mdb tables).

Demonstration An equipment (handler) setting. Services using the demonstration equipment handler data use data that has been generated internally by the demonstration DLL.

deskew Matching of difference services time of applicability.

DGPS *See* **differential GPS**.

differential GPS DGPS. A positioning procedure that uses two receivers, a rover at an unknown location, and a base station at a known, fixed location. The base station computes corrections based on the actual and observed ranges to the satellites be tracked. The coordinates of the unknown location can be computed with sub-metre level precision by applying these corrections to the satellite data received by the rover.

digital Communication consisting of 0s and 1s.

display	Windows that provide the operator with graphical or textual information about the survey operation and the status of the Navigation system. For example, Plan View Map is a graphical display and Data Monitor is a textual display.
display properties	Settings relating to how, or what, information is displayed in the selected real-time display.
Distance event	Events occurring at defined distance interval.
DLL	*See* **equipment handler**.
DOP	Dilution of Precision. A class of measures of the magnitude of error in GPS position fixes due to the orientation of the GPS satellites with respect to the GPS receiver. There are several DOPs to measure different components of the error. Note, this is a unitless value. *See also* **HDOP**, **PDOP**, **VDOP**.
Drawing operation	Instruction used in GO definition. Defines how a GO is used for guidance (point or segment).
DTE	Data Terminal Equipment. The part of a data station that serves as a data source, destination, or both, and that provides for the data communications control function according to protocols. DTE includes computers, protocol translators, and multiplexers.
Dual pos heading	Dual Position Heading. The heading calculated between master and backup position inputs.
DXF	AutoCAD Data Exchange Format. A DXF file is a standard file format for storing graphics files.
dynamics	Motion of the vessel and the associated parameters governing how this motion is calculated.

Easting	*See* **NEH**.
ECEF coordinates	Earth Centred Earth Fixed coordinate system that is used to convert WGS 84 latitiude, longitude and height values to X,Y,Z cartesian coordinates.
elevation	Distance above or below Local Datum.
ellipsoid	A mathematical figure (approximating the earth's surface) generated by rotating an ellipse on its minor axis.
End of GO	The last point of a guidance object.
End of GO event	Event occurring at the end of a GO that belongs to the current steer-by association set in the project.
equipment	Electronic devices that provide Navigation with raw data. For example, GPS receiver or echo sounder.
equipment configuration	Settings used to define the type and format of the incoming service information. This includes communication, basic logging, calibration, and assigned offset parameters.
equipment handler	The section of the Navigation software that extracts (or in some cases it will generate) relevant information from the incoming data string for the particular service it is associated with.
equipment label	*See* **label (Equipment)**.
equipment properties	Timing, logging (decoded) and in some cases, calibration settings used in relation to that configured service.
error messages	*See* **message boxes**.
estimation	*See* **position estimation**.

event	A unique occurrence recorded by Navigation. *See* **Distance event**, **Time event**, **User event**, **Start of GO Event**, **End of GO event**, **Log On event**, **Log Off event**.
event logging	A trigger for logging. For example, decoded data is logged only when both the **Online** and **Log on** buttons are active.
FBK	Trimble Fast Backdrop. A FBK file is a graphics file generated from a DXF file. FBK files provide improved performance.
fix	*See* **event**.
flattening	A measure of the deviation of an ellipse from the shape of a circle (which has a flattening of zero).
Flow control	A means of coordinating two communicating devices so that one transmits data only when the other is prepared to receive it.
Forward	Navigate a GO in an incrementing point sequence.
format	Method of data display and entry.
FTP	File Transfer Protocol. The standard, high-level protocol for transferring files from one network node to another using TCP/IP.
function (primary or secondary equipment device)	Every vessel may have primary and secondary functions for services relating to time, vessel positioning and dynamics. These primary and secondary services can be compared and either may be chosen as the master service to be used for the vessel navigation (the other may be set as a backup).

geodetics	Datums, transformations, and coordinate system details.
geoid	The gravity-equipotential surface that best approximates mean sea level over the entire surface of the earth.
Global	Throughout Navigation.
GMT	*See* **Greenwich mean time**.
Greenwich mean time	The local time the of 0° meridian passing through Greenwich, England.
GO	*See* **guidance object**.
GO Group	*See* **guidance object group**.
GPS	Global Positioning System. The navigation/positioning system consisting of NAVSTAR satellites, their ground stations, and GPS receivers such the series 7400.
GPS time	A measure of time used internally by the NAVSTAR system. GPS time is based on UTC, but does not add periodic 'leap seconds' to correct for changes in the earth's period of rotation. As of 1 July 1997, GPS time was 12 seconds ahead of UTC.
GPS time stamp	*See* **latency**.
GPS velocity	Velocity supplied by a GPS receiver.
Grid Lines	Lines drawn on Plan View Map at fixed eastings and northings.
Grid convergence	*See* **convergence**.
Grid north	The direction of zero degrees on the local grid.

group	*See* **guidance object group**.
guidance object	(GOs) stationary objects that vessels can obtain guidance with respect to.
guidance object group	Group of guidance objects. All GOs belong to a GO group.
hardware latency	*See* **latency**.
HDOP	Horizontal Dilution of Precision; a measure of the magnitude of DOP errors in latitude and longitude. *See also* **DOP**.
Heading	The horizontal direction in which the vessel points.
Heave	The high frequency vertical component of a vessel's movement.
height	*See* **NEH**.
HH:MM:SS.ss	A format for entering time values. With this option selected the values are entered as hours, minutes, seconds, and decimal seconds.
HYDROpro	The name of this navigation, data acquisition, data editing and processing software package. *See also* **NavEdit, Processing**.
ID	A unique identity number given to various Navigation entities such as Guidance objects, equipment, and coordinate systems.
inherit	Configurations obtained from other Navigation projects.
inputs	Data received by Navigation.
International feet	Unit of linear measure. 1 International foot = 0.3048m.

Journal	A Navigation window that displays a list of time stamped alarm and note messages.
Jump by	Defines the interval between consecutively selected guidance objects or segments or points, when using the next and prior functions.
kilometre	Unit of linear measure. 1 Kilometre = 1000 m.
Kilometre Post	The running distance along a pipeline. The KP 'zero' will normally be the physical termination of the pipeline. The running distance is displayed in thousands of the selected units.
KP	*See* **Kilometre Post**.
label (Equipment)	A unique name given to an equipment configuration.
Lat	*See* **Latitude**.
latency	Age of the data and its determination. Latency calculations fall into four categories in Navigation. *Constant* – A constant time value is applied to the incoming data (approximating the average latency value). *GPS time stamp* – The GPS time stamp contained in the data string is used in conjunction with navigation's AST to GPS time offset. *Hardware* – A synchronising hardware pulse is sent in conjunction with a time stamp in the data packet. *Variable* – The latency value changes depending on the data value. For example, depth of water and the speed of sound.

Latitude	The north/south component of the coordinate of a point on the surface of the earth; expressed in angular measurement from the plane of the equator to a line from the centre of the earth to the point of interest. Often abbreviated as Lat.
Layback	*See* **Towline**.
leg	*See* **segment (GO)**.
Line	Drawing operation in GO definition. Usually results in a segment.
lines (vessels)	An object used to define the shape of the vessel. This can be entered either graphically or textually.
local datum	A datum that is designed for accuracy and convenience in surveying in a particular locality.
Located at	The vessel offset at which a piece of equipment is placed.
Log Off	End data recording.
Log Off event	Event occurring when data recording is ended.
Log On	Begin recording data.
Log On event	Event occurring when data recording is begun.
Long	*See* **Longitude**.
Longitude	The east/west component of the coordinate of a point on the surface of the earth; expressed as an angular measurement from the plane that passes through the earth's axis of rotation and the 0° meridian and the plane that passes through the axis of rotation and the point of interest. Often abbreviated as Long.

Main service	The service or service group selected in the equipment configuration.
Magnetic north	The direction of the earth's northern magnetic pole as given by a north seeking gyro or magnetic compass.
magnetic variation	The constant angular offset from magnetic north to true north for a given geographical location.
Manual Data	Data entered into Navigation manually.
Master service	The service that takes precedence to all others in position, time, and tide calculations.
Master position	The Position service used to locate the vessel.
Master heading	The Heading service used to horizontally orient the vessel.
Master Attitude	The Pitch and Roll service used to vertically orient the vessel.
Master heave	The Heave service used for depth adjustment in real-time displays.
Master GPS time	The GPS time service used for GPS to AST offset depth adjustment in real time.
Master Tide	The Tide service used for depth adjustment in real time.
Mean Sea Level	A model of the earth's surface that represents sea level averaged over time for each point.
Meridian	One of the lines joining the north and south poles at right angles to the equator, designated by degrees of longitude from 0° at Greenwich to ±180°.

message boxes	The message boxes are designed to inform you of what activities are occurring, or about to occur, or why they will not occur.
Moving range time span	The time span in which the first and last master position updates are used to calculate the velocity vector (used for position estimation).
MSL	*See* **Mean Sea Level**.
name	A selection of characters to identify various Navigation entities. For example, GO name, Point name, Event name.
NavEdit	The data editing component of HYDROpro.
NAVSTAR	The name of the satellites used in the Global Positioning System (GPS). It is an acronym for Navigation System with Time and Ranging.
NEH	Northing, Easting, Height. A method of describing a position by its distance north and east of the origin zone. The height is the same as on the datum associated with the zone.
NMEA	National Marine Electronics Association. This association publish an internationally recognized standard for interfacing marine electronic devices (NMEA 183). More information is available from the NMEA website http://www2.nmea.org/nmea/
Northing	*See* **NEH**.
Null modem	A RS232 cable/connector with pins 2 and 3 reversed.

ODBC	Open Database Connectivity. This set of application programming interfaces, created by Microsoft, defines how to move information in and out of any PC database that supports the standard.
Observed	A vessel that is being positioned by an observer.
Observer	A device used to observe the position of a vessel. The device is usually located on another vessel. For example, Trackpoint.
offline	The non-real-time mode of operation for Navigation. In this mode you can fully configure any aspect of the project.
offset	This is the distance at right angles to the centreline at a given chainage (stationing or KP). It is positive to the right of the centreline and negative to the left (assuming you are proceeding ‘up’ the route).
offsets	Points on a vessel used for equipment placement and guidance.
online	The real time mode of operation for Navigation that starts providing you with positioning and sensor information.
orientation	The constant angular offset required to align the axis of the compass with the axis of the vessel.
origin	Vessel origin. The point, relative to which the vessel shape (if any) is defined, also an offset.
override	Replace current data. See **Manual Data**.
pan	To move the extents of the Plan View Map real-time display.

parallel port An interface that can handle multiple bits transmitted at the same time. This is done by sending each bit over a separate wire.

parity This is a method of detecting communication errors by using a parity bit. These days, communication ports are almost always set to No Parity.

parity bit An extra bit added to a group of bits. The parity bit can be a 0 or 1 value so that every byte will add up to an odd or even number (depending on whether odd or even parity is chosen).

PCMCIA Personal Computer Memory Card International Association. This acronym stands for the name of a trade association founded in 1989 to establish standards for expansion cards for portable computers.

PDOP Position Dilution of Precision; a measure of the magnitude of DOP errors in the x, y, and z coordinates. *See also* **DOP**.

Penup Drawing operation used in GO definition. Results in Point.

pitch A dipping or raising of the front and rear of the vessel. A positive pitch value indicates that the front of the vessel is up.

point (GO) A single point in space used in defining guidance objects. The point position in space is defined by LLH or NEE. One or more points make up a valid guidance object.

Polar (Observer) Observations to another vessel using the bearing and horizontal distance format.

port	Left hand side of the vessel if you are standing on the centre line of the vessel facing the bow (forward).
position estimation	Position prediction.
Plan View Map	A dynamic display of selected vessels and guidance objects in plan view.
PPS (1PPS)	Pulse Per Second. Used in Hardware Timing. A pulse is generated in conjunction with a time stamp. The defines the instant when the time stamp is applicable.
Primary (Equipment function)	*See* **function (primary or secondary equipment device)**.
Prior	Previous in sequence.
Prior GO	The GO prior to the current GO.
Prior Segment	The segment prior to the current segment.
Prior Point	The point prior to the current point.
Processing	The Data processing component of HYDROpro, includes Contour, Profile, Volume, Digitize.
project	A mechanism for grouping related data and operations. A set of tables in a MDB file is used for storing Navigation's configuration and logged data.
projection	A mapping of a set of coordinates from a datum to a plane; or a set of mathematical rules for performing such a translation. Projections are used to create flat maps that represent the surface of the earth or parts of it.
Project Outline view	Overview of the project configuration.
project properties	Details specific to the project.

properties (Displays)	*See* **display properties**.
properties (Equipment)	*See* **equipment properties**.
properties (Project)	*See* **project properties**.
PRN	Pseudorandom Noise. A sequence of binary that appears to be randomly distributed but can be exactly reproduced. Each GPS satellite transmits a unique PRN in its signals. GPS receivers use PRNs to identify and lock onto satellites and to compute their pseudoranges.
quality	A measure of the value of an observation. For example, Depth quality, Position quality.
RAM	Random Access Memory. Both programs and data are called up from permanent storage (usually a hard drive or floppy disk) and operate in RAM. In general, this means that the more RAM you have, the more able you are to handle large amounts of data and big programs.
raw data	Data input to Navigation before it has been decoded (that is, in the same format as it was sent from the originating device).
reach	*See* **segment (GO)**.
Real-time kinematic	A GPS system that yields very accurate 3D position fixes in real-time (immediately). Accuracies of a few centimetres in all three dimensions are possible. RTK requires dual frequency GPS receivers and high speed radio modems.
roll	A raising or dipping of the right and left sides of the vessel. A positive roll value indicates that the right side of the vessel is down.
route (GO)	Two or more GO segments joined together.

ROV	Remotely Operated Vehicle. A vehicle in which the operator is not located inside the vehicle. ROVs use a 'Remote Control' system of some description to drive the vehicle.
RS232	Recommended Standard 232. This was originally a nine-wire interface standard for teletype machines from the Electronics Industry Association. It is the standard for computer serial-port transfers.
RTCM SC-104	Radio Technical Commission for Maritime Services, Special Committee 104. A standard format for differential GPS corrections; used to transmit corrections from a base station to rovers.
RTK	*See* **Real-time kinematic**.
RTK Tide	The Navigation software allows an RTK rover to be used to determine Tide in real-time. Select Tide service when you configure your GPS Position service.
scale factor	A map projection parameter used to convert ellipsoid distances to projection (grid) distances, and vice versa.
Secondary (equipment function)	*See* **function (primary or secondary equipment device)**.
segment (GO)	Two GO points joined by a line.
semi-major axis	Half of the major axis of an ellipsis.
semi-minor axis	Half of the minor axis of an ellipsis.
sequence	Ordering used for group sequence, GO sequence, and point sequence.

serial port This is the communications port on your computer; it's also called the COM or RS-232 port. It is called serial because, although it has nine pins and many wires, the PC sends data on only one wire and receives data on one other wire.

service The information extracted from one or more data strings relating to one aspect of the equipment device.

signal-to-noise ratio (SNR) A measure of a satellite's signal strength, expressed in arbitrary units.

significant figures The number of digits that will be used for the values in numerical displays.

site system A site system is a locally defined plane projection on a zone (consisting of a seven parameter translation and height adjustment by an incline plane or constant offset).

snail trail A graphical representation, by dots, of the movement history of an offset point on the vessel.

SNR *See* **signal-to-noise ratio**.

starboard The right hand side of the vessel if you are standing on the centre line of the vessel facing the bow (forward).

Start of GO The first point of a guidance object.

Start of GO Event Event occurring at the start of a GO that belongs to the current steer-by association, set in the project.

stationary gate A minimum horizontal speed setting for calculations involving Track Made Good. If a velocity vector is received, or is calculated, less than this setting then the previous Track Made Good value will be used.

stationing	The US equivalent to **chainage**, though it may be written in a different format. *See also* **chainage**.
status	The state of the Navigation system (For example, online or offline). The state of components of Navigation (For example, equipment active or non active).
steer-by association	The linking of a vessel and a guidance object.
survey	The name given to a set of data recorded by Navigation.
SV	Space Vehicle. Specifically, a GPS satellite.
symbol	Representation placed at a Navigation position, used in displays and records (at events, points).
system (coordinate)	A system contains zones that have been defined on a geodetic datum. The geodetic datum consists of a known ellipsoid and a set of transformation parameters to transform data from the WGS-84 ellipsoid to the local ellipsoid (or datum).
Time event	Event occurring on a specified time interval.
time of applicability	The time at which the associated data was measured or valid.
time of arrival	The time Navigation receives the string.
timeout	A state indicating navigation has not received any raw data within the timeout period.
timeout period	The maximum time period between raw data updates before the system indicates that a timeout state has occurred for this device.

time zone	The part of the earth surface where the same time is adopted by convention. Usually it is bounded by meridians, or state borders that approximated the meridians.
TMG	*See* **Track Made Good**.
Towline	A special Observer equipment configuration for towed objects. A horizontal distance and the towing vessel's track is used to compute the towed object's position.
track	The intended or desired direction of travel with respect to the earth.
Track Made Good	The single resultant direction from a point of departure to a point of arrival at any given time.
True north	The direction of a fixed point representing the earth's northern pole after it has been adjusted for migration. The angular value of this migration as viewed from a given location is called the magnetic variation.
units	A standard chosen for display of quantities. For example, distances, depths.
User event	Externally triggered event.
US feet	Also referred to as US Survey feet. Unit of linear measure (primarily used in the USA). 1 US foot = 1200/3937m.
UTC	Universal Time Coordinated. A time standard maintained by the United States Naval observatory, based on local solar mean time at the Greenwich meridian.
variable latency	*See* **latency**.

VDOP	Vertical Dilution of Precision. A measure of the magnitude of DOP errors in the vertical component. *See also* **DOP**.
velocity	Speed in a given direction: a vector.
velocity gate	A maximum horizontal speed setting. If a velocity vector is received or calculated that exceeds this value then the previous velocity vector is retained.
vessel	A graphical representation of the vessel.
waypoint	A position that is used for navigation. It can represent a special location, a destination, a point along a line or route, or the location of a hazard.
WGS-84	World Geodetic System 1984. The current standard datum for global positioning and surveying. The WGS-84 is based on the GRS-80 ellipsoid.
word length (data communication)	Number of data bits grouped together during data communications between devices.
zone	A zone is a named instance of a particular map projection that contains information on the datum and projection parameters that will be used.
zoom	Rescale the Plan View Map real-time display.
zoom all	Fit all objects into the Plan View Map real-time display extents.
zoom in	Decrease the Plan View Map real-time display scale.
zoom out	Increase the Plan View Map real-time display scale.

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HYDRO*pro* Navigation Software User's Guide **June 2001**
P/N 34815-00-ENG **RevisionA**

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