HYPACK® SURVEY

QuickStart Manual

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CHAPTER 1

Introduction

HYPACK develops Windows®-based software for the hydrographic and dredging industry. It provides hydrographic surveyors with all of the tools needed to design their survey, collect data, process it, reduce it, and generate final products.

Whether you are collecting hydrographic survey data or environmental data or just positioning your vessel in an engineering project, HYPACK® provides the tools needed to complete your job. With users spanning the range from small vessel surveys with just a GPS and single beam echosounder to large survey ships with networked sensors and systems, HYPACK® gives you the power needed to complete your task in a system your surveyors can master.

This manual is intended to introduce you to the HYPACK® interface and step you through the most common requirements for preparation and data acquisition in a single beam survey.

LICENSE MANAGER

The License Manager reads your HYPACK® license information and displays your license status.

To open the License Manager, select SETTINGS-LICENSE MANAGER.

The License Manager display shows your current license information according to how your license is activated on your computer. **[Rescan]** rereads the license.

Physical Dongle

LIcense Manager—Dongle Display
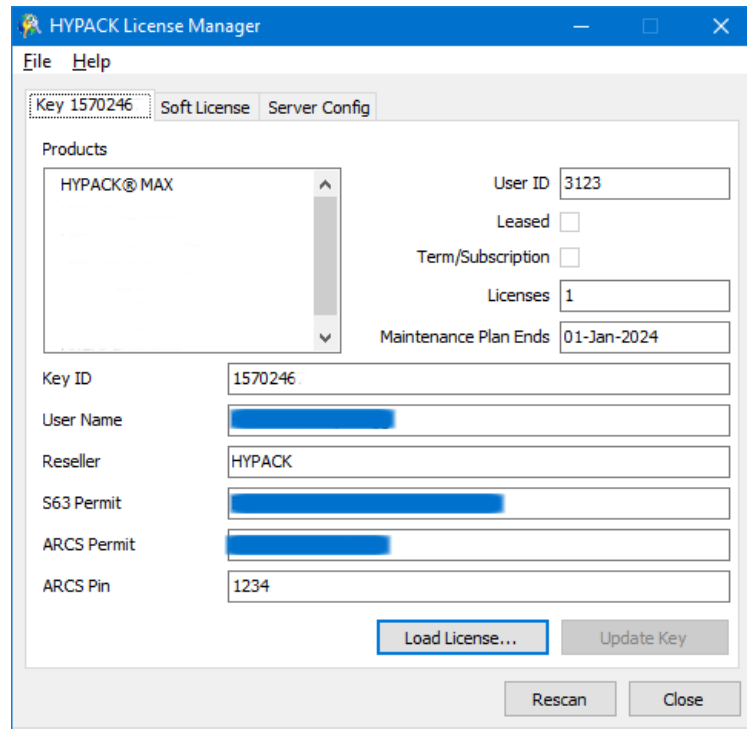
If you are using one or more physical dongles, there will be a tab for each dongle:

- **All dongle types detected** are listed under Products.

- **Maintenance Plan Ends:** The expiration of your Maintenance Plan. HYPACK® continues to function, but *any program updates after this date* will not run. You can arrange with our Sales department (Sales@hypack.com) to renew your Maintenance Plan over the Internet.

- **Leased:** Leased licenses are usually for short-term use. The dongle will not be recognized and *HYPACK® will not run on leased keys after the expiration date*.

- **Term/Subscription**: The license renewal is paid annually. The dongle will not be recognized and *HYPACK® will not run on leased keys after the expiration date*.

Soft License   *License Manager —Soft License Display*
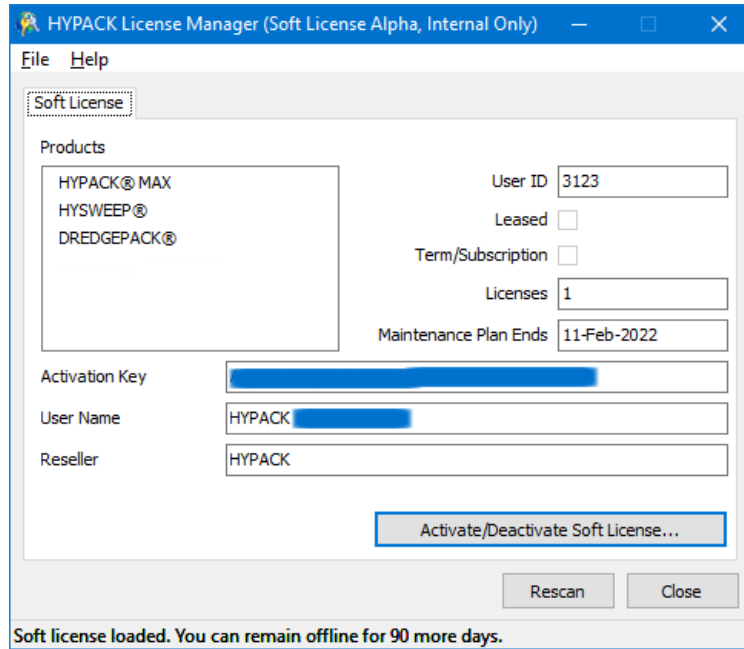
In the HYPACK® License Manager, your license information appears, and the 90-day offline limit counts down in the status bar, restarting each time you refresh or reactivate your license.

BEWARE!   If that number reaches zero, the license automatically deactivates.

HYPACK® INTERFACE

The unified HYPACK® user interface displays the data and project files included in your project.

HYPACK® User Interface

Title Bar
Menu Bar
Toolbar

Panels:

- Project Manager
- Project Items List
- Sounding Colors
- Web Maps

Status Bar
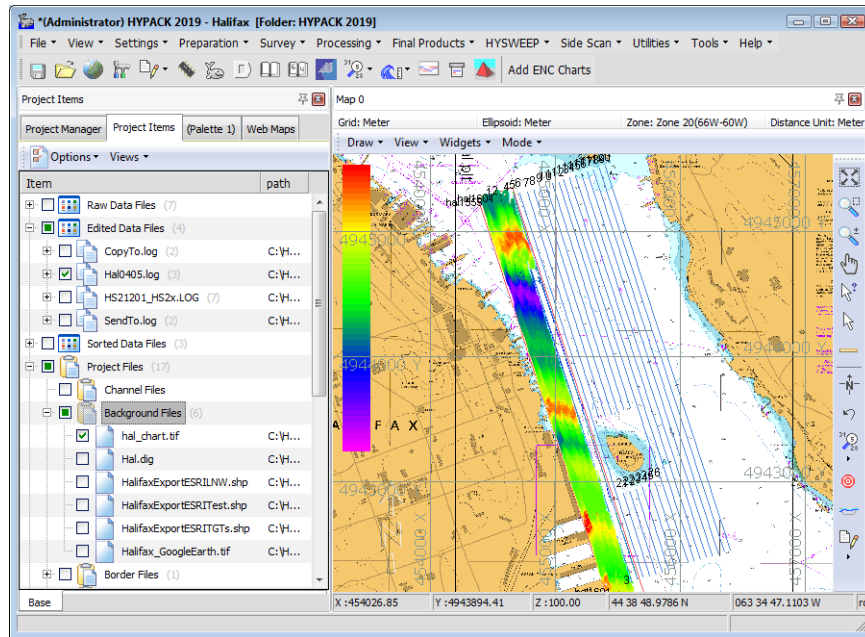
Color Bar　　　　　**Area Map**　　　**Map View Tools**

All of the HYPACK® programs can be accessed from the HYPACK® shell. Start programs from either the toolbar or from the menu bar. The icons and menu selections are enabled according to your type of license (dongle).

NOTE: Some programs are available in both 32- and 64-bit versions. Where the interface of both versions are the same, HYPACK® provides only one icon or menu selection and launches the version according to your operating system.

HYPACK® FILES LIST

The HYPACK® user interface includes a tree view listing of the files associated with the current project, and each file location, called the Project Items list.

To display the Project Items list, select VIEW-PROJECT ITEMS or click the Project Items tab.

In the Project Items list, you can do any of the following:

- **Control which files are loaded to your project** and displayed in the area maps.
  - > **Checkbox checked:** File is enabled in your project (drawn to the screen).
  - > **Checkbox clear:** File is disabled.
- **Rename files** via a right-click menu. HYPACK® does not allow you to rename S57, S63, ARCS or VPF charts.
- **Collapse/expand the tree view** based on your needs by clicking the plus and minus signs on the left side.
- **Customize the folders displayed** using the Options menu selections:
  - > **Folder Visibility:** Select the project file folders to include in the File List. With these options you can omit folders that are not applicable to your project.
  - > **Hide Empty Folders:** Choose to show all folders selected under Folder Visibility, or only those that currently contain project files.
  - > **Folder Icons:** Choose traditional Windows® folder and file icons or just checkboxes.
- **Sort the display order of files in each folder.** Right-click on the folder and select Sort by and your choice of sort method: By name, date or file type.

NOTE: These sort settings remain only until you leave the project or close HYPACK®.

To widen the display area drag the right border horizontally across the screen.

Project Items
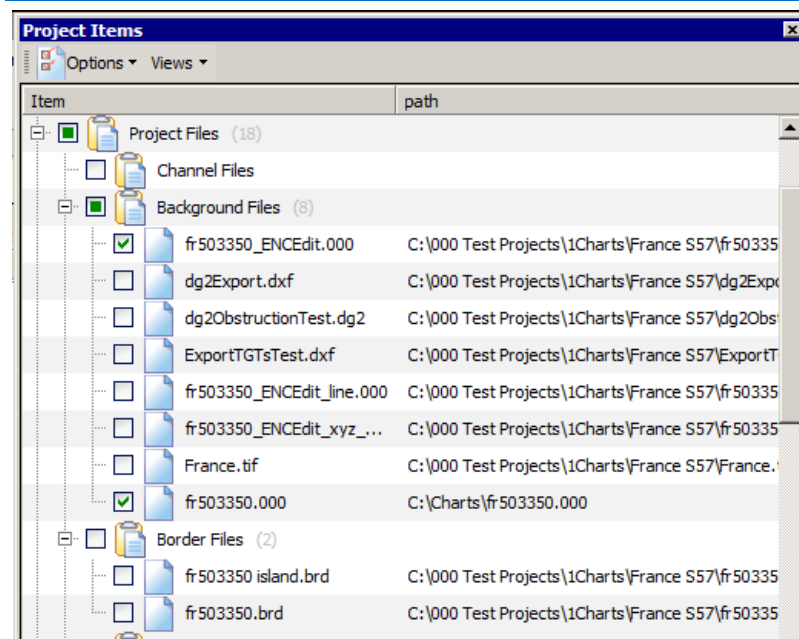
HYPACK® TOOL BARS

The menu and toolbars in the HYPACK® shell access the program modules and display controls. You can toggle the toolbars on and off through a right-click menu or drag the toolbars to whatever position you prefer—even outside of the HYPACK® window.

The screen controls in each Area Map window remain docked in the window, but you can dock it to any side.

HYPACK® MENU BAR

The HYPACK® menu bar selections group all of the component programs into basic functional areas.

In addition, the File, View and Settings menu items provide tools with which you will manage your project and its display settings.

HYPACK® ICON BAR

The **toolbar** quickly launches a program with a click on its icon. As with all toolbars in HYPACK®, if you hover the cursor over an icon, a tool tip appears which describes the function of the icon.

HYPACK® *Toolbar*

To turn the toolbar display on/off, right-click in the toolbar area and select/deselect 'HYPACK® toolbar'.

HYPACK® SCREEN CONTROL BAR

The map view tools enable you to quickly adjust the HYPACK® screen display. Many of its functions are also found in the menus for each Map window.

Zoom In/Out: When this option is selected, a left-click decreases the scale (zoom in) and a right-click increases the scale (zoom out).

Zoom Window: Select this option and drag a rectangle in the window to define the extent of your desired view. The program redraws the screen to display the defined area optimally.

Zoom Extents: Draws the display at a zoom scale that displays all enabled data.

Pan: Select this option, then click in the window and drag the cursor to the position where that point should be displayed. As you drag, the program displays the distance and azimuth of the cursor motion. When you release the mouse button the display updates accordingly.

HYPACK® AREA MAP

The area map displays your project items. It enables you to preview your map display as you prepare to begin a project, and to view the results of many of the files generated in post-processing.

The Map window may optionally include one or more widgets:

- The **color bar** reflects the project colors set in the Color Table Editor panel.
- The **status bar** below the map displays the current cursor position in X,Y and Lat./Lon. (Local Grid) coordinates, and indicates the rotation, tilt, scale and Z-scale of the area map display.

- The **geodesy bar** above the map displays the project geodesy according to current options in the GEODETIC PARAMETERS program.
- The **pan/zoom/rotate control** to adjust your map display with your mouse.

- A **north arrow**

HYPACK® provides numerous tools and settings that enable you to optimize the display of enabled project files. These settings are configured in one or more locations in the HYPACK® interface.

- In the menu and Map View tools for each Map window
- In the Control Panel
- In the Project Items List
- In the Color Table Editor

DISPLAY SETTINGS IN THE HYPACK® CONTROL PANEL

To control the presentation in the area map, select SETTINGS-SETTINGS (F9).

Your control panel display settings are interactive with your schemes. When you make a change through the control panel, the change will also affect the current scheme. Likewise, changes in the scheme will affect your control panel settings.

There is an additional 'twist' to this interaction. When you change a setting in the control panel, the corresponding change is made to the current scheme, but you will not see that change until you have either left and re-entered HYPACK®, opened a different project with the same scheme, or loaded a different scheme then the original one again. Any of these actions causes HYPACK® to re-read the scheme record and modify the display accordingly.

[Apply] enables you to preview your settings before exiting the Control Panel.

Set as Default saves the current settings and uses them any time you create a new project.

GENERAL DISPLAY SETTINGS

The **General Tab** sets the display colors of several features.

Control Panel—General Tab

Data Color Control enables you to select various file types and click [Color] to specify the color used on the screen.

Lat/Lon Display determines the Lat/Lon projection displayed in the HYPACK® status bar.

Lat/Lon Format determines the Lat/Lon format for data input and in the HYPACK® status bar.

Automatic Searching options are used when you return to the main HYPACK® screen from one of the program modules.

- **Search Data Files** loads all Raw, Edited and Sorted data files in the project that are not currently loaded to the HYPACK® display.

  NOTE: To save time, it loads but does not enable HS2 or HSX files.

- **Search Project Files** tells HYPACK® load all project files in the project to the HYPACK® display.
- If you also check the **Scan Project When Opened** option, HYPACK® reloads the files indicated by the first two options when you enter the project.

Tip: These options are selected by default; however, if you have an excessive number of files in your project, you may want to manage the files loaded to your display manually. To do this, deselect one or both of the search options and the Scan Project option, then manually draw or remove them in the display as needed using the Load and Remove options in the right-click menu for each file type of the Project Items list.

GRID DISPLAY SETTINGS

The Grid widget options enable you to specify how HYPACK® displays projection grids and latitude-longitude (lat./lon.) grids. HYPACK® displays the lat./lon. of the local datum.

Grid Configuration Options— XY (left) and Lat/Long (right)

Automatic Spacing is the default setting to determine the spacing between projection grid lines. HYPACK® automatically changes the spacing as you zoom in/out.

Fixed Spacing specifies the meters (or feet) between projection grid lines and seconds of arc between lat/lon grid lines. This will be kept constant while you zoom in/out.

Style enables you to draw your projection grid using either lines or tics.

Label Projection assigns the sides of the HYPACK® screen where you wish to have the projection labels placed.

Font assigns the font of the projection grid labels. Standard Windows® Color Selection and Font Selection dialogs are presented for your choices.

NOTE: Select only true type fonts to achieve the correct rotation.

Color sets the color for your projection grid lines and labels.

The Latitude-Longitude Grid has an additional setting to those found under Projection Grid. **Format** enables you to specify how the lat./lon. labels are written in the grid and in the HYPACK® status bar.

SOUNDINGS DISPLAY SETTINGS

The Soundings Tab enables you to set how the soundings are presented and plotted.

To toggle the display of the soundings, right-click the data file folder and select 'Enable Soundings'.

Soundings Tab

Orientation draws XYZ data at a user-specified angle relative to the first LNW file listed in the project files list. Elect to plot soundings:

- **Perpendicular** to the planned line,
- **Parallel** to the planned line
- **At a user-defined Fixed Angle**. This is the angle the text appears relative to the map window. (It is unrelated to the map orientation.) Any angle from -360 to +360 is permissible

Style: Choose the format with which to write your sounding.

- **Decimal Point on the Mark** (USACE) option places the decimal point at the location of the sounding and writes a normal size fraction.

- **Cartographic** (IHO) centers the integer portion of the sounding at the sounding location and then writes a smaller, lower fraction.

- **Spanish Navy** (IHM) places the decimal point at the location of the sounding and then writes a smaller, lower fraction.

- **Pixel**: represent the location of each sounding with a color-coded Pixel (dot) of a user-defined size.

- **Russian**: The sounding location is marked with a dot with the sounding value from the TIN MODEL Input file to its right. If you have a second TIN model, the depth from the Additional file appears left of the sounding position.

Resolution enables you to specify soundings to either one 1 Decimal (Tenths) resolution or 2 Decimal (Hundredths) resolution.

Rounding enables you to determine how the soundings are presented.

- **None** displays the soundings decimal places according to the resolution setting.

- **Truncate to Tenth** just leaves off the hundredth digit. For example, 6.97 is written as 6.9.

- **HYPACK:**
  - > **Depth below Nearest Tenth value:** Round to nearest tenth using a x.05 rounding point (e.g 12.46 -> 12.5)
  - > **Depth below Nearest Half value:** Round using 3 rounding points:

    <x.3 =x.0 (e.g 42.28 -> 42.0)

    <=x.8 = x.5 (e.g. 42.6 -> 42.5)

    > x.8 = (x + 1).0 (e.g. 42.83 -> 43.0)

  - > **Depth above Nearest Half value:** Round to a whole number using x.8 rounding point (e.g. 123.7 -> 123.0, but 123.8 -> 124.0).

- **ROK Rules (Republic of Korea):**
  - > **Depth < the specified Nearest Tenth** threshold, it is displayed at the specified decimal resolution.
  - > **Depth >= 31**, it is truncated to a whole value, otherwise it is truncated to the first decimal.

> **NOTE:** The rule stated 31 meters as the whole value threshold but, *if you are using depths in feet, the threshold will be interpreted as 31 feet by the sounding engine.*

- **UKHO Rules (United Kingdom Hydrographic Office)**:
  - > **Depth < 0:** Drying Heights are rounded nearest tenth using a x.03 threshold.
  - > **Depth below Nearest Tenth value:** Round to nearest tenth using a x.08 threshold.
  - > **Depth below Nearest Half value:** Output x.0 or x.5 using a x.5 threshold.
  - > **Depth above Nearest Half value:** Round to a whole number using a x.75 threshold.
- **NOAA (National Oceanographic and Atmospheric Administration)**:
  - > **Depth < 0:** Drying Heights are rounded to nearest whole number using a x.5 threshold.
  - > **Depth below Nearest Tenth value:** Round to nearest tenth using a x.075 threshold.
  - > **Above Nearest Tenth** (Nearest Half not used) Round to a whole number using a x.75 threshold.
- **AHOI (Australian Hydrographic Office)**:
  - > **Depth < 31:** (designed for meters) Display in Tenths, round at a x.065 threshold.
  - > **Depth >= 31:** Display as a whole number, round at a x.65 threshold.

[Test Rounding] provides a quick test platform to aid in understanding how your current settings affect your sounding display, and to ensure that the rounding rules have been implemented correctly. Just enter any sounding value in the dialog provided and see the display value based on the current option set.

The **Options** settings contain the following items:

- **Negative Soundings get "+"** does just that. If you have processed your sounding data in elevation mode (z values are negative), this setting will display them on the screen in depth mode (z values are positive).

Tip: Similarly, from the Project Items list, you can invert the Z-value in an individual XYZ file: right-click on the XYZ file and select Invert Depths. A File Save dialog appears for you to save the inverted depths using the same file name or using a new name to create a

new file. [Cancel] temporarily displays the inverted values until you disable and enable the file again; it does not change the data.

- **Hide Soundings Above** a user-defined level plots only soundings deeper than the specified depth.

- **Hide Soundings Below** a user-defined level plots only soundings shoaler than he specified depth.

- **Depth 1 Text** and **Depth 2 Text** (HYPACK® Control Panel only) are the terms by which you, personally, call the depths in a dual frequency data string. If you prefer a term other than 'Depth 1' and 'Depth 2', enter them in the fields provided. Your terms will then replace 'Depth 1' and 'Depth 2' in this and other HYPACK® dialogs.

   NOTE: These labels have not been fully implemented . They occur initially in the HYPACK® and HYPLOT Control Panels, and in the SB SELECTION program.

- **Hide Above CHN Design Depth Plus this Value**: Omits soundings that are more than the user-defined distance from the channel template.

Color: Defines predefined sounding color settings (Black or ECDIS) or the value HYPACK® is color-coded according to a user-defined color table.

- **Black**: HYPACK® ignores the project colors and draws all soundings in black.

- **Color By File** enables you to set specific colors for each catalog or individual file through the right-click menus in the Project Items list. Files loaded as part of a catalog all inherit the color of the catalog. When you assign a color to a file, the file name appears in the same color in the Project Items list.

   NOTE: **To color individual files**, you must first load them to the project separately.

- **ECDIS Colors:** HYPACK® ignores the project colors and draws all soundings according to ECDIS convention.

- **Color by Depth** colors your data based on the Z-values. Configure your palette according to your expected Z range.

Draw Mode: Select a method and set the corresponding parameters.

Fonts: [Font] displays the Windows® Font dialog where you can set font, and font size. (Ignore the remaining options; HYPACK® does.)

• **Prevent Sounding Overwrites** When you are drawing soundings with Windows® fonts, this option plots soundings gridded with sufficient spacing to make them readable. To accomplish this, the number of soundings displayed in a given area changes with the zoom range. *This is for display purposes only*. It does not thin your data.

Vector options: Set the Vector Scale at which you expect to plot your survey, then enter a Vector Size that appears as you wish.

More Information:
• [Sounding Color Settings in HYPACK® on page 1-17](#)

PLANNED LINE DISPLAY SETTINGS

The Planned Lines tab includes checkboxes where you can choose whether to display the lines and the labels.

Click **[Line Color]** to access a color dialog where you can choose the color that the planned lines will display.

The **Label Orientation** and **[Font]** options are the same a track line options.

Draw Template Points: If you have a planned line with template information, HYPACK® draws small circles at each template inflection point in the area map display.

The Planned Lines Tab
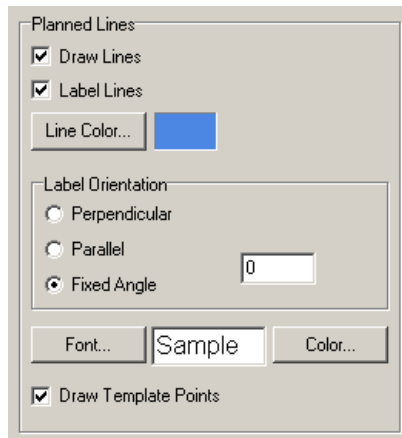
CHART DISPLAY SETTINGS

The Charts Tab provides display options for background charts.

The Charts Tab

Raster Options

Hide Border displays only the map part of the chart file, omitting the text, scales and other 'extraneous' information around the outside.

Ignore Source Alpha Value: Enables HYPACK® to draw an opaque TIF chart when its Alpha value, which affects opacity, indicates otherwise. You can then adjust the level of transparency with the slider.

Despeckle quickly fills scattered pixels that were unfilled by the re-projection process.

CAD Drawing Option

Display Normally (default) draws your chart using the colors specified in the file.

Display All Black and **Display All White** override the chart colors in the HYPACK® display.

To override the setting in the Control Panel, right-click on the file name in the Project Files list, and select DISPLAY OVERRIDE and your desired setting.

To return to the setting in the Control Panel select DISPLAY OVERRIDE-PROJECT SETTING in the right-click menu.

Additional Chart Options

Hide Soundings above Safe Contour displays soundings, other than those in the Project Items list, greater than the Safety Contour value in the S57 Options.

Overscale Lines tell you that you are viewing the chart at a smaller scale than that in which it was created. An over scale chart will appear with diagonal, white-dotted lines. These appear on ARCS chart displays.

Show Text includes item labels in the display. If you have several labeled items in a small area or if you are viewing a large area at a small zoom scale, the labels may become confusing. If this is the case, clear this option to display only the symbols.

Show Text (PLN Files) labels the nodes in enabled channel plan files.

Color Zones shows the channel zone colors assigned in ADVANCED CHANNEL DESIGN. Otherwise, it only outlines the channel faces.

SOUNDING COLOR SETTINGS IN HYPACK®

The **Color Editor** enables you to specify your project colors the HYPACK® programs use to code your data. Most often, you color-code your displays by sounding depths, but the project colors may also represent other values. Your project color settings are reflected in the color bar, which can be displayed in the HYPACK® interface by selecting WIDGETS-COLOR BAR in the map window menu.

Use the Color Table Editor to create color palettes for the value ranges that are represented in your data.

Your selections of color style, zone colors and band settings define your palette colors. Once you select your color style, you can further customize the colors and the values they represent by editing the color range, zones and bands.

To configure your color table, do the following:

1. **Open the Color Table Manager.** In the Colors panel, click [Select Color Table].

Color Table Manager

Select Color Table dialog
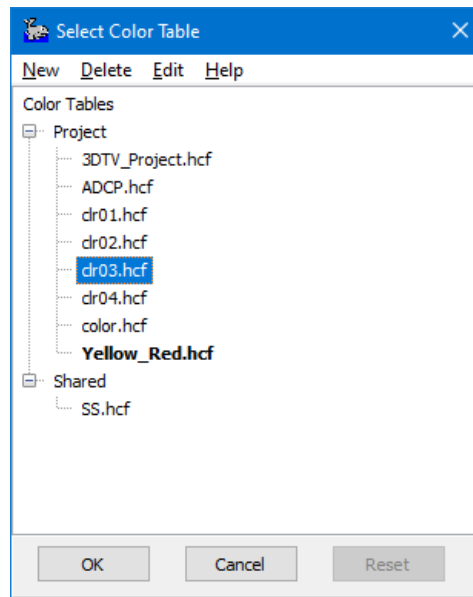
2. **Open a color table in the Color Table Editor.**
   > **To begin a new color table**, select FILE-NEW.
   > **To modify an existing color table**, select the HCF file name and click [Edit].

Color Table Editor

Color Table Editor dialog
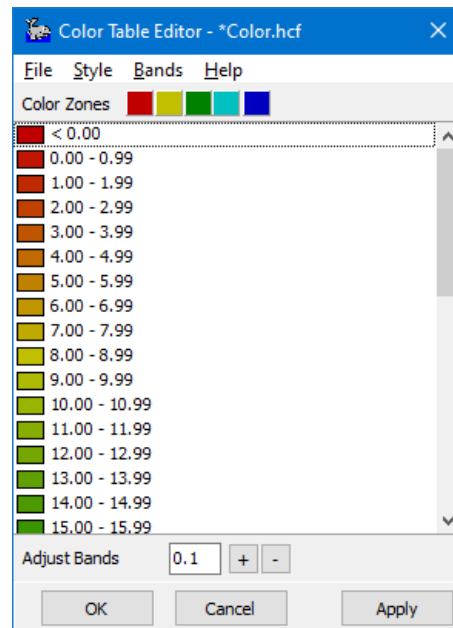
Tip: When you're editing the current project color table, click **[Edit Color Table]** in the Colors Panel to reach this point more quickly.

3. **Select your color style.**

4. **Customize your zones. (Optional)** This option is unavailable for some color styles.

5. **Generate an initial color palette.** You define the range and increment for the values represented in the palette. The Color Table Editor evenly distributes the color zones over the user-defined color range, then "smooths" (interpolates) the colors for the bands (value increments) between each zone color.

6. **Customize your color bands by setting the value range and increment.** Once the initial color palette is established, you can further customize your settings by adding and deleting bands.

Tip: **To preview existing (saved) color tables, click [Apply].** This updates your displays with the new color palette and stores your current palette in the corresponding HCF file.

7. **Save your color palette for future use.** (Optional) HYPACK® stores color table configurations with an HCF extension. This allows you to load the same color palette at a later time by simply selecting the HCF file.

> **To save a new file or overwrite an edited file in the project folder**, select FILE-SAVE.

> **To create a new file** in the project folder, select FILE-SAVE AS and name your file.

The same options followed by "Shared" do the same thing, but default to the C:\HYPACK Store folder for more efficient use of color tables that may be used in multiple projects.

NOTE: Color.HCF and ColorInt.HCF are reserved for other purposes. You should use other names for your color tables.

# *PROJECTS IN HYPACK®*

A **project** is a folder, with a user-defined project name, and all of the information about your survey it contains. Each time you open HYPACK®, it opens the most recently used project and displays the project name in the title bar.

Every time you begin a new survey in HYPACK®, you create a new "project". Under the project folder, HYPACK® creates a series of subfolders:

The **project file group** is a folder that stores one or more HYPACK® projects. HYPACK® stores projects, by default, to the HYPACK 2020\Projects folder. Projects stored there are known as **local projects**.

Project Manager
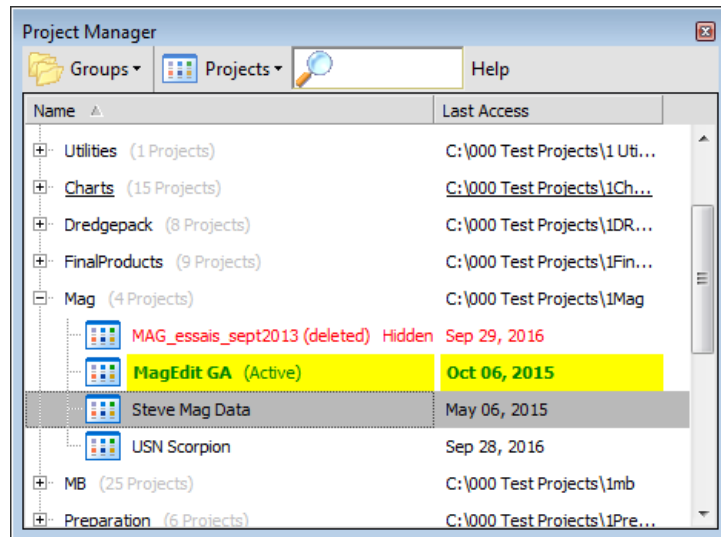
Over time, as you survey different areas at different times, you will create and work on several projects, and change from one project to another according to the set of data on which you are working.

Of course, over time, if you kept every project you ever recorded, the long project lists would become unnecessarily awkward, so you can hide them in the project list or delete them from your hard drive.

All of these tasks are done through the Project Manager. Additionally, the Project Wizard facilitates opening an existing project, or copying or creating a new project.

CREATING A NEW PROJECT

Each time you begin a new survey, you should create a new project. HYPACK® enables you to name your project and then stores all of the information about that survey in the project folder.

When you create a new project, HYPACK® copies the geodesy, hardware and survey settings of the most recent project to your new project.

Tip: To optimize efficiency, begin in a project with the same or most similar geodesy, hardware and survey settings as what you want for your new project.

1. **Select FILE-NEW PROJECT** and the New Project dialog appears.

Setting the New Project Name and Location
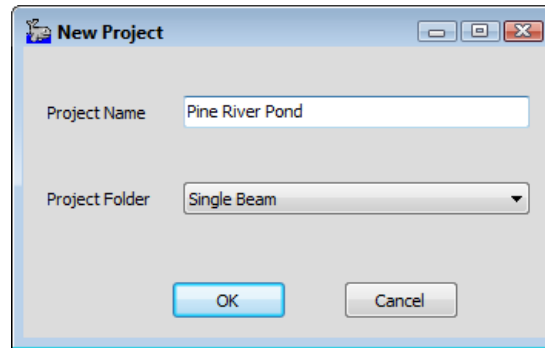
2. **Name the project and select a folder where the project will be stored.**

   > **Project Name**: Enter a name that will remind you of the location and the date of the survey. Project names may not contain periods, back or forward slashes, question marks, less than or greater than signs, or bars.

   Invalid Characters

.	/	\	?	<	>	|
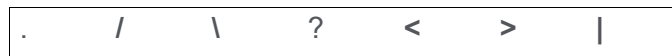
   > **Project Folder:** Enter the project group folder where your project should reside. We recommend you use the default project folder (HYPACK 2020).

   The software creates a folder in the specified location using the project name.

3. **Click [OK].**

FILE-SAVE PROJECT saves all of the settings and files used in the current project. When you re-open a project, it will restore all features as they were when you last saved the project.

MANAGING FILES IN YOUR PROJECT

Several types of files may comprise your project data. These files are listed in the Project Items lists. The Project Manager provides a number of tools with which you control the files used in your project at any one time.

Loading: You must load files that you want to use in your project, but do not yet appear in your project items. The process tells HYPACK® the name of the file and where it is stored on your system.

Enabling and Disabling: Generally, enabled files are drawn to your map window. By enabling and disabling select files, you control the combination of files displayed in the map window at any one time.

Renaming files in the Project Items list and on your hard drive simultaneously from the HYPACK® interface.

Removing files unloads them from your project, but *does not* remove them from your hard drive. If you change your mind, you can reload them to you project.

Deleting files unloads them from your project and moves them to the Windows® Recycle Bin.

LOADING FILES TO YOUR PROJECT

Files that you create while working in a project are saved, by default, to the project folder, enabled (drawn) on the screen, and added to the Project Items list. HYPACK® attempts to draw your data in an order which will optimize the display of all enabled files. Occasionally, modifications to the draw order or transparency are required.

1. **Right-click the folder in the Project Items list that corresponds to the file type you want to load** in the Project Items list.
2. **Select Add File or Add File & Copy and choose the file.** The loaded program becomes enabled in the Project Items list.
   > **Add File** reads the file from its current location but *does not copy it to the project folder*. This can be useful if you are using very large files (eg. charts) that take excessive space on your hard drive in multiple projects.
   > **Add File & Copy** allows you to select a file from outside the project folder. It then imports the file from its current location to the project folder and enables it in the project.

BEWARE! Saving the project folder does not save a file that has not been copied into the project folder. When you only add a file to the project, it must remain where it is on your system so HYPACK® can find it when you open the project.

This manual assumes that you store all project files in the project folder.

RAW DATA FILES

Raw files are the data files that result from the SURVEY or DREDGEPACK® program. Every time you log data, a new Raw data file is created. They are ASCII format files that contain the header information and time-series information for each survey device.

By default, they have the RAW extension and, in a standard HYPACK® project, are stored in the HYPACK 2020\Projects*ProjectName*\Raw folder.

A list of individual data files is provided in a catalog (*.LOG) file. You can quickly draw or process a group of files by specifying the *.LOG name, instead of entering the name of each data file.

The SINGLE BEAM EDITOR reads RAW format files, merges the data with Tide and other corrections and outputs the results as Edited All format files.

HYPACK® PROJECT FILES

Project Files are the support files (not data files) used in the project. These typically include files used to guide your work during data collection, and other files commonly used in post-processing.

Planned survey lines (*.LNW) define where you want your vessel to go. The line file contains the grid coordinates and names for each planned line in your project area and can also contain cross section template information. Line files are typically created in the LINE EDITOR program.

Sample Planned Survey Lines
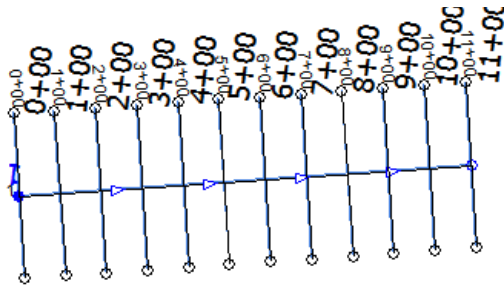
Background charts provide context and navigational reference for your work. HYPACK® displays several types of electronic charts in the area map and in the data collection and editing programs.

NOTE: Charts drawn in XY (DGN, DXF, DIG, TIF and SHP) *must be in the same geodesy as your project* to be positioned correctly. Charts drawn in WGS-84 (S57, VPF), the SURVEY or DREDGEPACK® program will transform the data files to the local datum, using the datum transformation parameters in the GEODETIC PARAMETERS program, before converting them to your projection. This allows you to use these file formats on any projection.
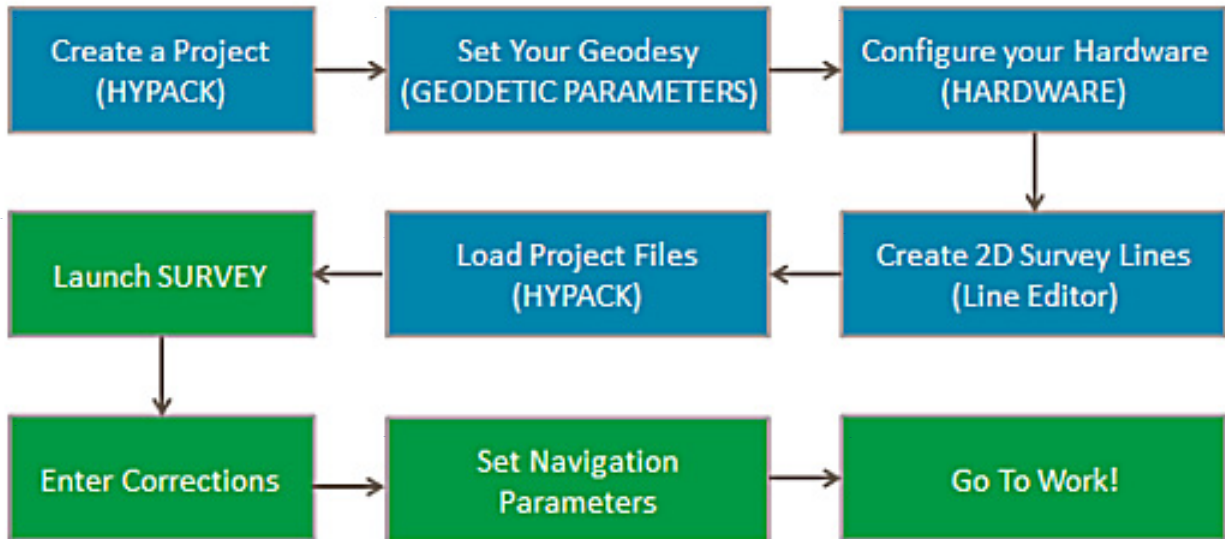

CHAPTER 2   *Preparation*

WORK FLOW

The following flowchart shows the general work flow in a HYPACK® project. The blue items are part of the preparation phase; you can do them all ahead of time in the office. The green items are in the HYPACK® SURVEY program.

Tip: Click on any step in the flowchart to jump to the corresponding information in this manual.

SURVEY Work Flow

Before you begin your work in your project area, there are several tasks to consider:

1. **Create a new project.** You can create a new project and all of the files in it by using the FILE-NEW command.

    When you create a new project, it inherits the last settings for geodesy and hardware.

2. **Check your Geodesy.** If you have not previously specified your geodesy, enter the GEODETIC PARAMETERS program and configure your geodesy.

3. **Configure and calibrate your hardware.** If you have not previously specified your sensors, configure your equipment in the HARDWARE program.

4. **Create your planned survey lines.** (Optional)

   If you are working on a new survey project, you typically create planned survey lines to assure even coverage. Create planned lines in the LINE EDITOR.

5. **Prepare and load other support files as needed**. These may include:

   > Background charts

   > Corrections files

Tip: Click on any step in the flowchart to jump to the corresponding information in this manual.

ENTERING YOUR GEODETIC PARAMETERS

Geodesy is the science of positioning objects on the earth's surface. Even though you don't need to be a master of geodesy to run HYPACK®, some basic geodetic knowledge can make the difference between obtaining a correct position and having your boat plot elsewhere.

Most GPS equipment outputs your position in WGS-84. HYPACK® receives the Latitude, Longitude and Height information based on the WGS-84 ellipsoid, and transforms it into a Latitude, Longitude and Height on the Local Datum. It then performs a grid conversion to calculate an X (Easting) and Y (Northing) on the specified projection.

The **GEODETIC PARAMETERS** define your local grid. This enables HYPACK® to correctly calculate your XY position on your local grid from your GPS data (typically WGS84).

You must define the following geodetic parameters for your local grid.

• The reference ellipsoid.

• Any necessary datum transformation parameters: If your local grid is not based on the WGS-84 ellipsoid, datum transform

parameters are required. (Consult your project specifications. Refer to the full HYPACK® User Manual or Help for detailed directions.)

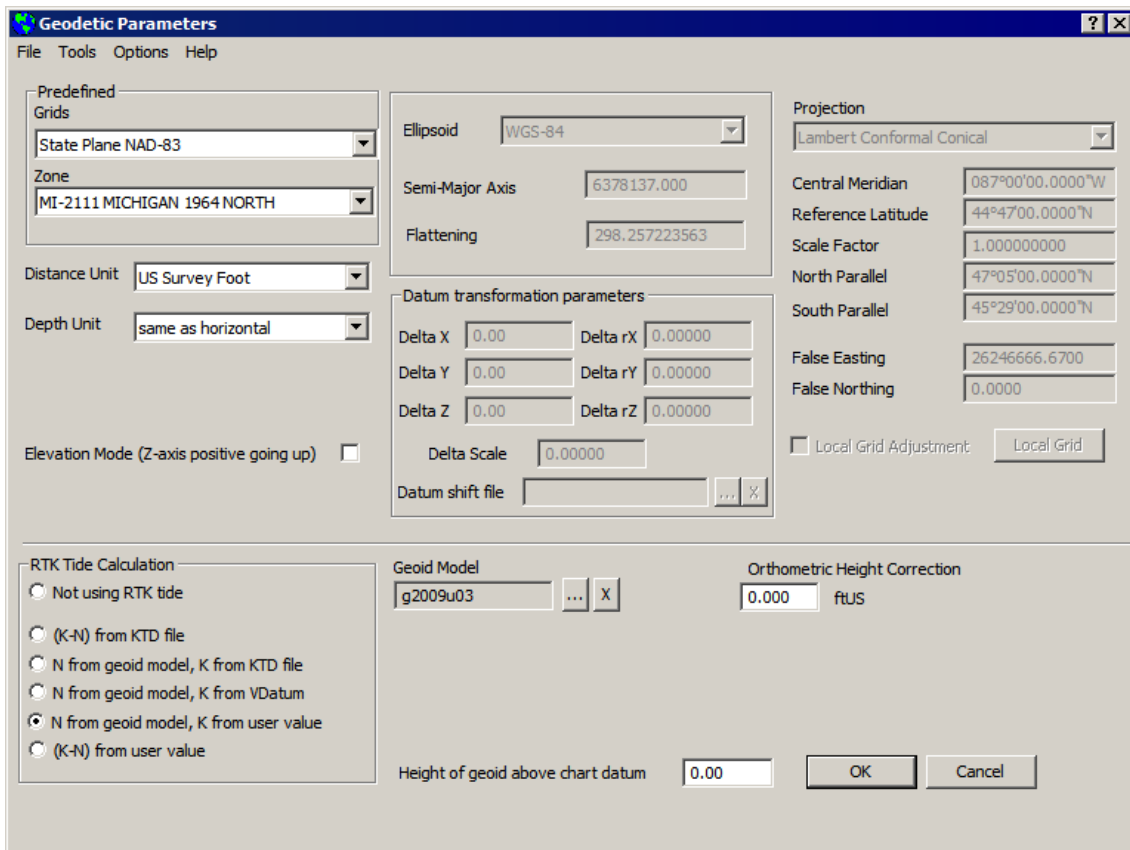- The projection parameters: Automatic when you choose one of the pre-defined grids.

Tip: If you don't know the correct geodesy settings, choose the correct pre-defined UTM grid and zone. The UTM grid is based on the WGS-84 ellipsoid so no datum transform parameters are required and the data can be converted to the proper geodesy later.

The grid, zone, ellipsoid and survey units are displayed in the HYPACK® status bar above the area map.

1. **Start the GEODETIC PARAMETERS program** by selecting PREPARATION-GEODETIC PARAMETERS.

Geodetic Parameters Dialog

2. **Select your Ellipsoids and Projection Parameters**. Many grids have been built into HYPACK®. Just select the correct grid and zone, and your projection parameters are automatically loaded.

NOTE: If your ellipsoid is other than WGS-84, you must also enter datum transformation parameters. Consult your project specifications. The HYPACK® User Manual and Help files include directions for calculating datum transformation parameters.

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3. **Select your Distance Units.** Notice that you can set your vertical and horizontal distances to be measured in different units if you wish.

4. **Set your Datum Transformation values**.

5. **Choose your degrees format.** Select OPTIONS-DEGREES FORMAT and the format you want to use.

6. **If you are logging RTK (Real-Time Kinematic) tides, set your vertical correction settings according to the following table**. When you make your RTK Tide Calculation selection, the dialog updates to display the other relevant options. (Please refer to the full version of the HYPACK® User Manual or your Help files for the full details on RTK tide corrections.)

Configuring your Geodesy for RTK Tide Corrections

Area Description	RTK Selection	Enter Geoid?	KTD File?	Enter Chart Datum[a]?
• US Coastal Waters	N from Geoid[b], K from VDatum[c]	Yes	No	Chart Datum
• **Geoid** Present • **Constant Separation** of Geoid - Chart Datum	N from Geoid, K from user value	Yes	No	Height of Geoid above Chart Datum
• **Geoid** Present • **Changing Separation** of Geoid - Chart Datum	N from Geoid, K from KTD	Yes	Yes Geoid above Chart Datum values	No
• **No Geoid** Present • **Constant Separation** of Reference Ellipsoid-Chart Datum	(K-N) from user value	No	No	Height of Ellipsoid above Chart Datum
• **No Geoid** Present • **Changing Separation** of Reference Ellipsoid-Chart Datum	(K-N) from KTD	No	Yes Ellipsoid above Chart Datum values	No

a. The fields related to the Chart Datum are enabled and disabled according to the RTK selection.

b. The Geoid and VDatum files must be of the same year.

c. When using the VDatum database, you *must* use one of the pre-defined chart datums. If you enter a user-defined chart datum level, the VDatum database is ignored.The Vertical Datum field is written to the header of your file, but HYPACK® doesn't use it for anything else.

7. **If you are working in Elevation mode, do the following**:
   > **Select the Elevation Mode option**.
   > **Enter a user-defined Chart Datum Level above Geoid.**

8. **Click [OK].** Your geodesy settings will automatically be saved to your project.

HARDWARE SETUP IN HYPACK®

'Hardware' is the term we use for the sensor devices from which HYPACK® receives data. The hardware configuration describes what devices you have, how they are connected to the survey computer, and your logging instructions.

All devices are configured from a common HARDWARE interface; however, HARDWARE includes three separate sets of configuration tabs according to the type of project and device—HYPACK, HYSWEEP® and SIDE SCAN HARDWARE.

A single beam survey requires only HYPACK® devices.

If your equipment does not change, and you are satisfied with the communication between your equipment and the survey programs, you don't have to run HARDWARE again.

If you change survey equipment, you will have to reconfigure your hardware.

1. **Select PREPARATION-HARDWARE SETUP** or click on the Hardware icon. The HARDWARE window will appear with any configured devices listed on the left. When there are no devices configured, it lists a "boat" with no devices.

2. **Select FILE-NEW.** The configuration begins with a single vessel and no devices. The program asks whether to save the current configuration. If you want to save it, click [Yes] and save your configuration file before proceeding with this step. If you don't need it or have already saved the current configuration, click [No] and build a new hardware configuration from the beginning.

3. **Set your mobile settings.** Your hardware configuration includes a mobile for each device position you will track.

For a simple single beam configuration, you need only the initial boat mobile with the tracking point at the transducer.

Each vessel (mobile) in your configuration has an associated Mobile dialog which appears when you select the vessel name in your device list. This is where you can rename the mobile and set the tracking point.

In the Vessel Shape tab, you may also assign a boat shape which can be used in place of the simple symbol options to more closely represent your vessel in SURVEY.

4. **Configure each device in your system.** This includes selecting a device driver for each device and configuring the driver setup options, connection information and the position of the device relative to a fixed reference point on the mobile (measured offsets).

5. **Test the communication** between the devices and your survey computer.

6. **Calibrate your system and correct your offsets.**

7. **Save your configuration.** When you select FILE-SAVE, your current hardware configuration is stored in the HYPACK 2020\Projects*ProjectName*\survey32.ini.

Saving Your Hardware Configurations

Device Type	FILE-EXPORT Menu Selection	INI File
GPS, Single Beam and Dredge equipment	Hardware Settings	survey32.ini

Each time you save a your settings in HARDWARE, they are recorded to this file where it is read by other programs to enable your data collection, and by HARDWARE itself to display your settings when you re-open the program.

MOBILES AND MOBILE SETTINGS

A **Vessel** (also called a **mobile**) in HYPACK® is any independently mobile object. If HYPACK® needs to have a position for it, it's a vessel. For each mobile, SURVEY displays a symbol or boat shape at its current position.

HARDWARE always has at least one mobile. One mobile is all that is necessary for a simple survey. Each mobile has an origin (reference point) and a tracking point. You may also assign a boat

shape which can be used in place of the simple symbol options to more closely represent your vessel in SURVEY.

The **vessel origin** is the reference by which you position your devices and tracking point on your vessel. The tracking point and each sensor is referenced to the origin based on the distance in survey units it is starboard (X-direction), forward (Y-direction) and vertically (Z-direction). Vertical offsets are measured from the static water line, and are always *positive downward*.

A **tracking point** is the position used by SURVEY to position the mobile in the world. It is used to provide left/right guidance, make automatic "start line" and "end line" decisions, and calculate horizontal distances between the vessel and features in your survey area. It is also the location at which Quickmark targets are marked.

To properly position your data, our hardware configuration defines the devices, the mobiles, which devices are on each mobile and each device position relative to the origin of its mobile.

SPECIFYING DEVICES IN HARDWARE

HARDWARE divides devices into three categories: HYPACK®, HYSWEEP® and Side Scan.

A simple survey configuration uses only HYPACK® devices: a GPS and an echosounder.

NOTE: To assist in configuring your drivers, you can refer to the Interfacing notes found in the HYPACK 2020\Help folder.

1. **Open the HARDWARE program.** Select PREPARATION-HARDWARE SETUP.
2. **For each HYPACK® device:**
   a. **Select the boat in the tree view.**
   b. **Select the Survey Devices tab.**
   c. **Use the View option to sort the device list** by driver name (eg. gps.dll) or description (eg. GPS NMEA-0183). (Optional)

HARDWARE Drivers—Sorted by Description (left) and by Dll Name (right)
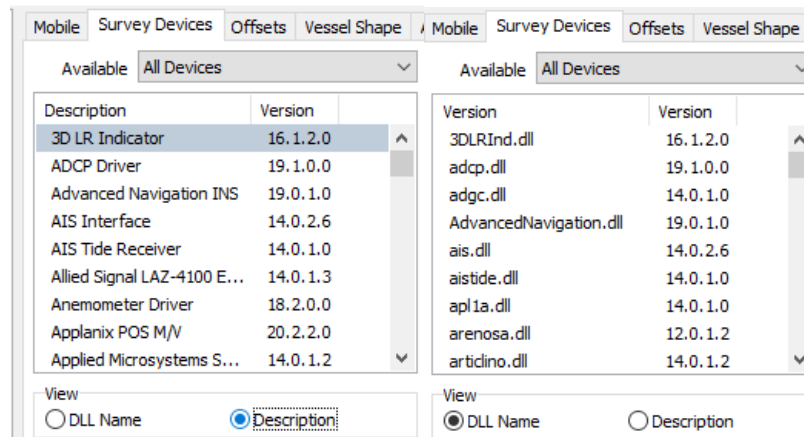
d. **Use the Available option to list only drivers that record the desired data type.** (Optional)

e. **Move the devices in your configuration to the Installed list.** For each device, select the driver in the Available list on the left and click [Add->]. You must, at least, include a positioning driver for each mobile.

- Add the GPS driver (GPS.dll) to position your boat or barge.
- Add the echosounder driver

3. **Configure the Connection, Offsets and Driver Setup options.**

4. **Save your configuration (FILE-SAVE).**

CONNECTION INFORMATION IN HARDWARE

The Connect information provides the device location and communication parameters to the SURVEY program.

CONFIGURING CONNECTIONS FOR HYPACK® DEVICES

The Connect information tells the SURVEY program the device location and communication parameters.

1. **Select the device in the tree view and open the Survey Connect tab.**

2. **Check the Enabled option**.
3. **Specify the device connection type for this device**.
   a. **Click [...].** The Device Connection dialog appears.

Device Connection Dialog


   b. **Select the connection type**. The default settings corresponding to the selected type are displayed below the selection.

   c. **Enter the port settings or data file you are simulating.** If the default settings are not accurate, they may be edited.

   HYPACK® uses the same serial (COM1: through COM50:) and parallel (LPT1: through LPT4:) drivers utilized by the Windows® operating systems.

   • The **Serial connections** (Parity, Flow Control, Baud, Data Bits, Stop Bits and Flow Control) must be set to
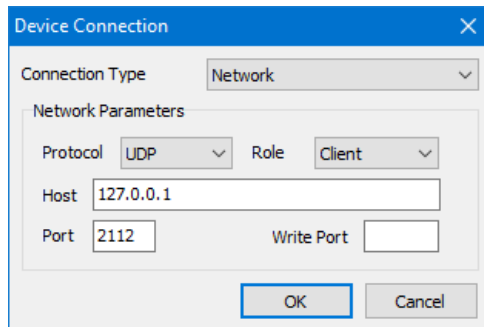
match your equipment or SURVEY will not read the device data.

Serial Connect Options
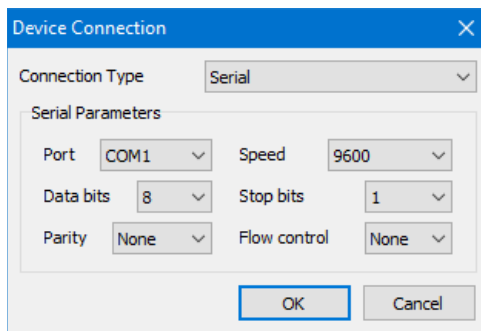
- **Network Connections**: Network devices are becoming more common. Echosounders with network connections are advantageous in that full scan information can be recorded instead of only the depths.

Network Connect Options

Protocol: Choose between TCPIP, which passes data between two specific computers or UDP, which broadcasts to all computers on the local network.

Role: *Only valid for TCPIP protocol*, it depends the configuration in the echosounder. You can check your sounder's user manual for that information but, the majority of the time, the sounder will be the Server so you should configure HYPACK® to be the Client.

Host: This is the IP address of your sounder. Your sounder should be set to read the IP address of your survey computer.

Port: The port number is set for each device. It is the port from which HYPACK® is to read data. (Odom devices use 1601. Reson devices use 1998.)

Write Port is only required for the UDP protocol. It is the port at which HYPACK® should respond to this device.

- **Parallel Connections:** The port number is the only setting required for parallel connections.
- **No Connection (None):** Analog devices are frequently found on dredges to measure rotation. They interface with your survey computer through an Analog to Digital (A/D) card specific for the kind of input: 4-20mA, 0-5VDC, 0-10VDC, or -5 to +5VDC

d. **Click [OK].**

4. **Set any of the remaining options where they are applicable:**

   > The **Limit Update Rate To** option is the time interval (in milliseconds) that the SURVEY program requests information from the device. The default value is 10, but you can modify the amount of information passed between the device driver to the SURVEY program through this setting.

   A millisecond is 1/1000th of a second. If your echosounder is updating 20 times per second and you specify an update frequency of 100 milliseconds, the device driver will only pass the last depth received to the SURVEY program 10 times per second, based on the update frequency setting.

   All devices in HYPACK® operate on a "Last Only" basis. This means if a new piece of information arrives at the device driver before it has delivered the last update, it deletes the earlier information and holds only the last measurements. If you want to get every bit of information received from a particular device, make sure the update frequency is quicker than the update rate of the equipment.

   > **Recording Rate** is the rate (in seconds) at which SURVEY records values for the device when logging. The default rate is 10 msec.

   NOTE: If you attempt configure any recording rate other than the default for a positioning device, the program immediately displays a warning questioning your intentions.

Tip: In most cases, we highly recommend you do not limit the recording rate. This will give you plenty of data from which to select your final soundings in post-processing. Remember, it is better to come home with too much data than with too little.

   > **Device Initialization Script** sends user-supplied configuration information to certain echosounders. The information is sent at the start of HYPACK® SURVEY to restore the device to exact settings.

TESTING SERIAL COMMUNICATION WITH WCOM32

When your drivers are configured, you can use WCOM32 to capture serial data strings to a text file.

1. **Make sure the equipment is turned on** and actually sending information. This can be confirmed by attaching a serial LED line tester to the end of your cable. The Receive Data light should be flashing (changing state from red to green) at each measurement transmission. If there are no lights flashing, your equipment is not transmitting or your cable is grossly wrong. A serial LED line tester is a great piece of equipment that can be picked up inexpensively at an electronics store.

2. If you have verified the equipment is transmitting, **try to display or record the data in the WCOM32 program.** HYPACK has included a shareware program (courtesy of Comtrol Corp., the manufacturer of Rocketport serial cards) in your HYPACK® install to make this recording process really easy. Here's how it works.

    a. **Launch the Wcom32 program** by selecting OPTIONS-WCOM32 in the HARDWARE window. The WCom32 dialog will appear.
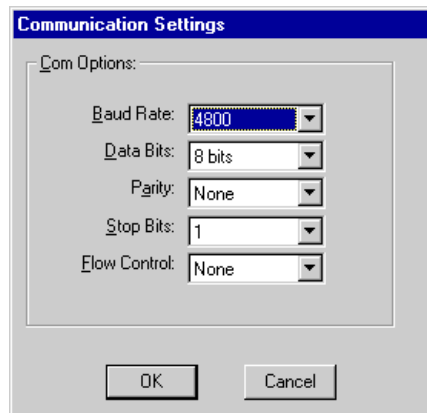
Connect-Data Window
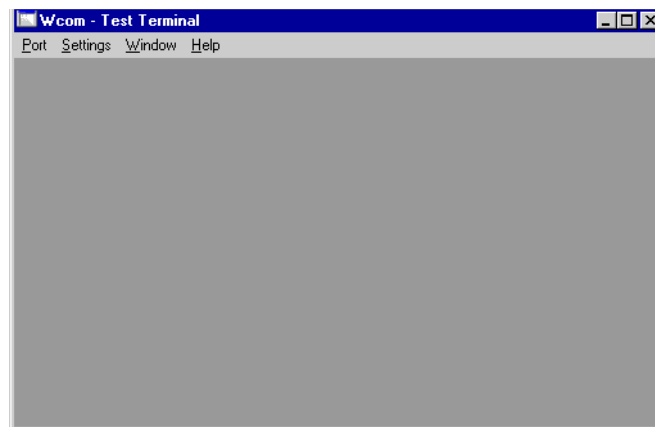
    b. **Select PORT-OPEN PORT** and select the port from which you want to capture data.

Selecting the Port
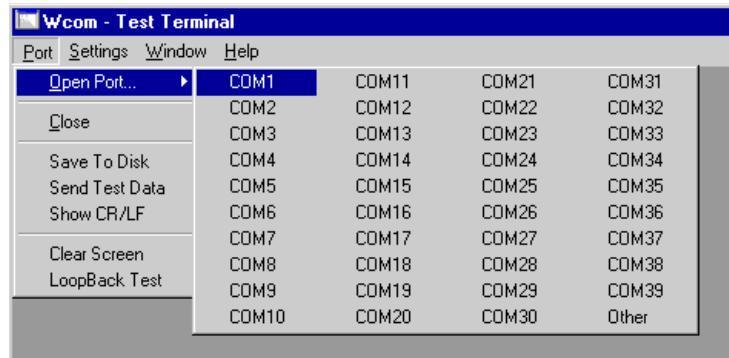
c.   **Select SETTINGS-PORT SETTINGS** and select settings that match those of your device.

Port Settings

d.   **Repeat the steps 3 and 4 for each device** from which you would like to record data.

e.   **Select PORT-SAVE TO DISK** and wait about a minute. The data is now recording to files on your hard drive.

f.   **Select PORT-SAVE TO DISK** again (deselecting this option) to end the recording process.

g.   **Rename your saved data files by device name.** Use Windows® Explorer to go to the HYPACK 2020\Support\Com directory. The files that you have just recorded are named KOMx.txt where x is the port number from which the data was recorded. You can see that a data file named for the port rather than the device would soon be mixed up with all of the others that are named in the same way. Name the file for the device to avoid that problem.

NOTE: This is also the procedure to use if you have questions or problems regarding your data and or

Technical Support asks you to send us some sample data.

3. If you are successful in reading the messages in the WCOM32 program, **test each device in the HARDWARE program**. This checks that you are using the correct device driver and whether the communication settings have been properly set.

    a. **Start the HARDWARE program**.

    b. **Test your first device.**

        i. **Select the device in the configuration list**

        ii. **In the Survey Connect tab, click [Test Device].** The HARDWARE program launches the TEST program with a sample device window for that device.

            To suspend the display updates so you can view it more easily, select TEST-PAUSE ALL. Repeat the same selection to resume scrolling.

            To terminate the test, select TEST-STOP ALL.

        If you are unsuccessful at this point, you probably have the wrong device driver specified in the library entry. Contact HYPACK, and ask for Technical Support.

    c. **Repeat the test process for each device.** When all test correctly individually, go on to the next step.

        NOTE: Once the Test program is open, you can test remaining devices from within the Test program by selecting TEST- *DeviceName*.

    d. **Test all of the survey devices at once.** This determines if there are hardware conflicts between serial ports. In the TEST program, select TEST-TEST ALL. A device window will appear for each device.

If every device is being properly interfaced, you are ready to enter the HYPACK® SURVEY program.

If all of your devices work when testing them individually, but *do not* work when testing them together, you have a problem with your serial communication hardware. Contact Technical Support at HYPACK, Inc. for assistance.

TESTING NETWORK COMMUNICATION FOR ALL NETWORK DEVICES

If you are using a network connection, you can test your settings to which you are connecting:

Click [Network Test] on the Connect tab. The Network Connections dialog automatically displays the connect information you have entered in the Connect tab.

- **For TCP/IP connections**, click **[Ping Device]**. If the designated address is found, the status reads 'Ping OK'. If not, it says 'Time out waiting for a reply'.

TCP Network Test Dialog
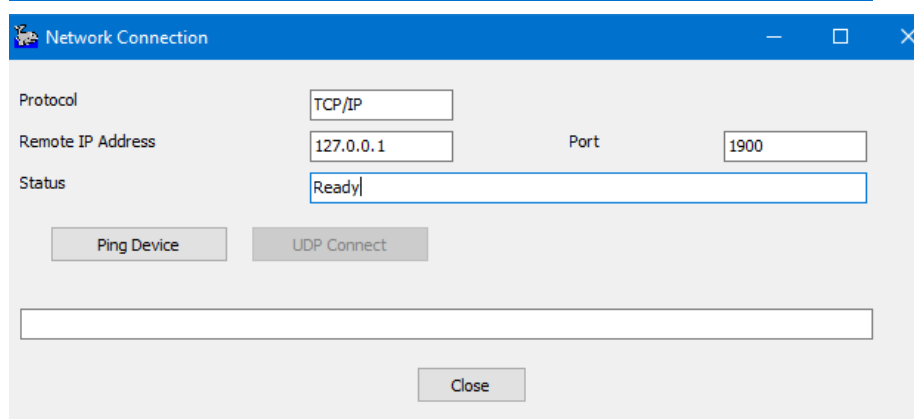
- **For UDP connections,** click **[UDP Connect]** to attempt to read incoming data from the UDP port. If the connection is successful, the status field continuously updates the number of messages and their size. Each message display in the field at the bottom, though it will not be text you can read.

UDO Network Test Dialog
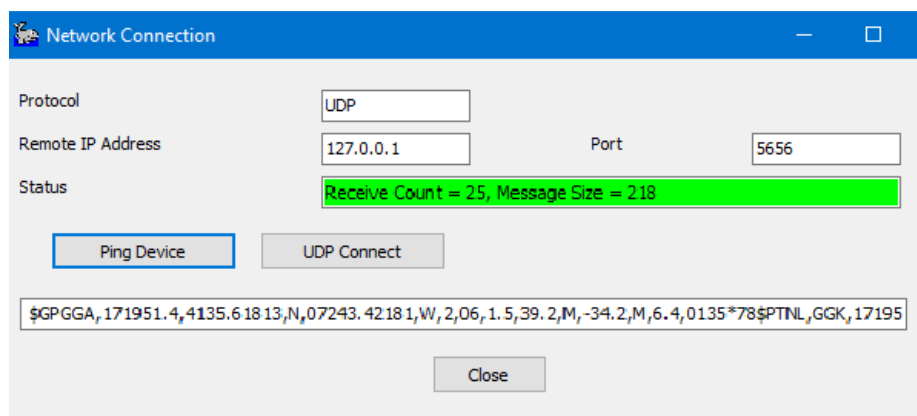
MEASURING HARDWARE OFFSETS

The position of everything on a mobile is determined by applying their offsets to the mobile heading and origin position. For the most accurate data collection, it is important to measure as accurately as possible.

Location Measurements

Position measurements are the distances, measured in survey units, starboard, forward and vertically from your boat origin to your device.

- The **Starboard** and **Forward** offsets: Use positive numbers for positions forward and starboard of the origin and negative numbers for devices aft and port of the origin.

- The **Vertical** offset is the distance below the static waterline of the vessel. Enter the antenna height above the water line as a *negative* value. The distance from the waterline to the transducer head will be positive.

Latency

The **latency time** is the time delay in seconds from when a piece of survey equipment makes a measurement to when it outputs it to the survey computer. This allows the HYPACK® SURVEY program to correctly time-tag information from each piece of equipment. Values for single beam systems can be determined in the SINGLE BEAM LATENCY routine.

IMPORTANT: All devices must use the same time basis. If any device sends UTC time-stamped data, you must synchronize your computer clock with UTC time using the 1PPS box or the NMEA ZDA message. (Refer to the full HYPACK® User Manual or HYPACK® Help for further details.)

OFFSETS AND LATENCY

The best position for the boat origin varies depending on what sensors are included in your configuration. The following table provides our general recommendations for the position of the origin.

NOTE: Ideally, the MRU should be at the vessel center of mass.

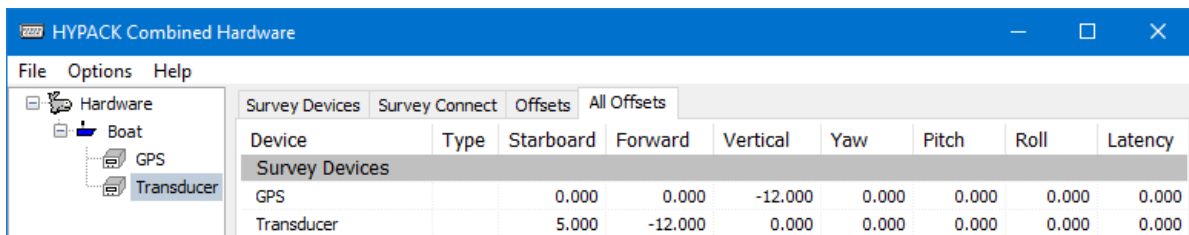| Vessel Type	Recommended Origin Location
With MRU:Single or Multibeam	At the MRU location
Single Beam without MRU	At the Sounder location (XY).
Vessel with sensors other than a sounder and no MRU	Vessel Center of Mass

In the Offsets tab, as you enter the offsets for each device, a 3-dimensional model shows their location on the mobile relative to the vessel origin. The tracking point position is marked with a green symbol at the height of the water line.

Tip: Install your GPS directly above your transducer and set your origin at the transducer to eliminate horizontal offsets.

When you have carefully measured your position offsets, enter your measurements for each device in HARDWARE: select the device in the tree view and enter the offsets in the Offsets or All Offsets tab.

In the **Offsets tab**, enter the offsets for the selected device and view its position in a configurable 3D model.

In the **All Offsets tab**, you can view and modify the offsets of all devices in your system in one spreadsheet. For devices with multiple offsets, like multibeam systems, multiple rows appear with a specified type (for example Sonar Head 1 or Sonar Head 2).

All Offsets Tab

NOTE: You can leave latency set to zero then correct it with the results from your latency test.

1. **Open HARDWARE.**
2. **For each device, do the following**:
   a. **Add the device to the appropriate mobile in your configuration.**

b. **Select the device in the tree view**.

c. **Click the Offsets tab**.

d. **Enter your position offsets**.

3. **Close HARDWARE.**

4. **Run your calibration tests.** For single beam surveys, the LATENCY TEST measures GPS latency.

5. **Reopen HARDWARE and enter the offset corrections derived from your calibration test.**

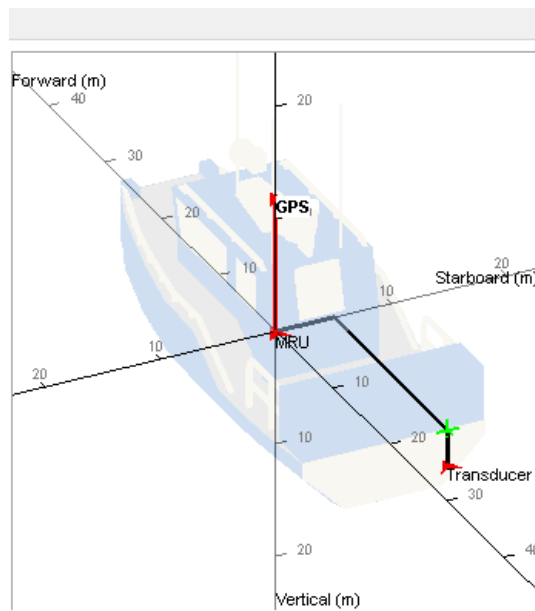6. **Save your configuration** (FILE-SAVE).

Sample Single Beam Setup

The following example shows a simple single beam configuration:

Sample Single Beam Boat
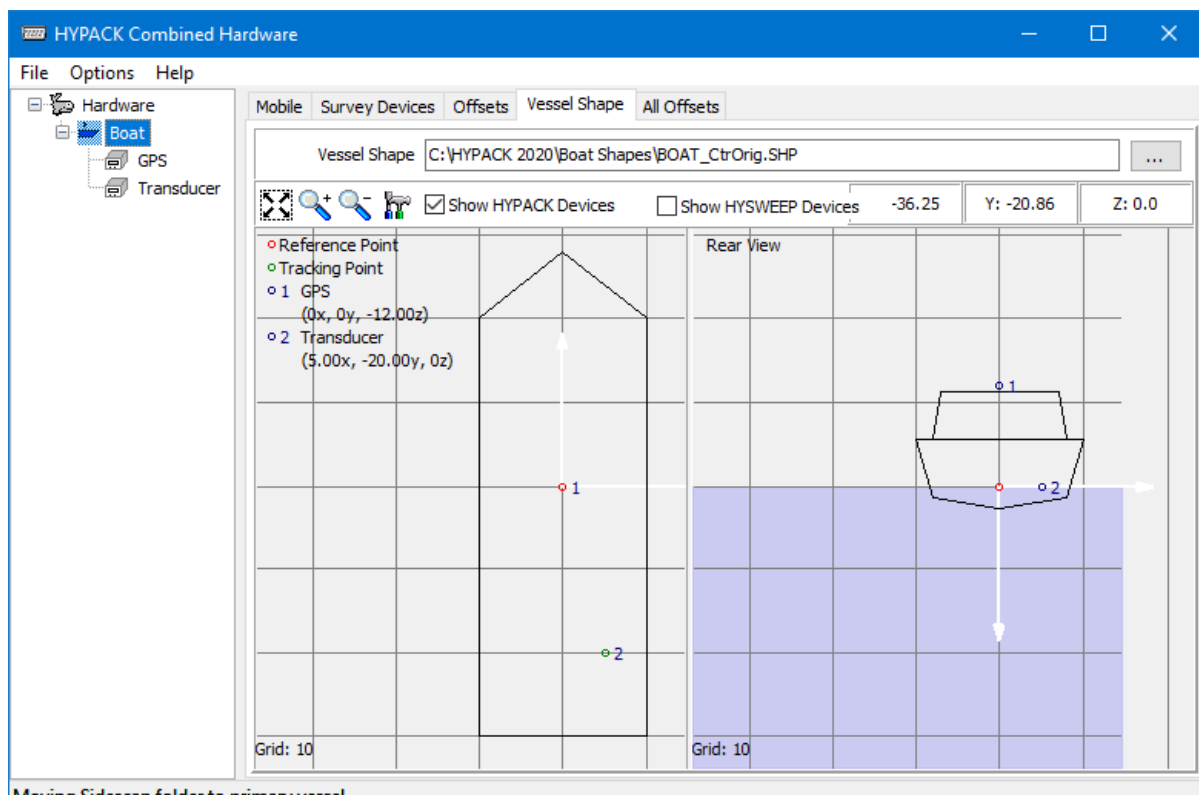
Sample Offsets

- The boat **origin** has been positioned at the vessel center of mass and at the level of the static water line.
- The **GPS antenna** is directly above the boat origin so the port and forward offsets are zero. The vertical offset is the distance above the waterline. This value is negative because, in HYPACK®, the Z axis is positive downward from the waterline.
- The **transducer** is starboard and aft of the origin so the starboard offset is positive and the forward offset is negative.

Offsets—GPS (leftt), Transducer (right)

- The **tracking point**, used by HYPACK® SURVEY to position your vessel in the world, is positioned over the transducer. This assists the helmsman in keeping the transducer head over the survey line and bases all logging calculations such as start and end line, alarms, etc on the transducer position.

Tracking Point Coordinates in the Mobile Tab

ASSIGNING THE TRACKING POINT IN HARDWARE

A **tracking point** is the position used by SURVEY to position the mobile in the world. It is used to provide left/right guidance, make automatic "start line" and "end line" decisions, and calculate horizontal distances between the vessel and features in your survey area. It is also the location at which Quickmark targets are marked.

To define the tracking point position, enter its offset distances from the vessel origin in the Mobile tab.

On a single beam survey, you typically place the tracking point over the transducer because all of the tracking point functions should be relative to the transducer.

.CONFIGURING YOUR DEVICES

Once you have specified your devices in HARDWARE, you must enter the device-specific settings for each one.

CONFIGURING THE GPS

FUNCTIONS

When you are configuring HYPACK® devices (not multibeam or side scan), the Functions list in the Survey Devices tab shows types of data the selected driver can collect. Select the driver in the tree view and check the data types that you want to record with the selected driver. The following are the typical functions selected. Please refer to the Common Driver Notes document found in your HYPACK 2020\Help folder for full details.

Position stores position data from this device.

Depth is typically unused by GPS devices. However, it is used in conjunction with the 'Record Tide as Depth' option to, for example, record waterfront depths using land vehicles.

Use for matrix update: Color-codes a matrix based on the data received from this device when recording tide as depths.

Heading tells the SURVEY program to use the Course Made Good from the VTG, RMC or HDT message for the orientation of the vessel.

BEWARE!

If you are using a gyro for heading, you should not select heading for your GPS. If both were selected for heading, the SURVEY program would switch between gyro and GPS orientation as each device updates and you would see the vessel in your SURVEY Map window twitch at each update. This is because it is unlikely that the two heading values will be exactly the same.

The **Speed** box tells the SURVEY program to use the speed information from the VTG message for the vessel speed.

Tip: The GPS speed is much smoother and more accurate than the speed the SURVEY program will calculate. We recommend that you use the speed from your GPS antenna.

DRIVER SETUP

When you are configuring HYPACK® devices (not multibeam or side scan), the Functions list in the Survey Devices tab shows types of data the selected driver can collect. Select the driver in the tree view and check the data types that you want to record with the selected driver. The following are the typical functions selected. Please refer to the Common Driver Notes document found in your HYPACK 2020\Help folder for full details.

Position stores position data from this device.

Depth is typically unused by GPS devices. However, it is used in conjunction with the 'Record Tide as Depth' option to, for example, record waterfront depths using land vehicles.

Use for matrix update: Color-codes a matrix based on the data received from this device when recording tide as depths.

Heading tells the SURVEY program to use the Course Made Good from the VTG, RMC or HDT message for the orientation of the vessel.

BEWARE!   If you are using a gyro for heading, you should not select heading for your GPS. If both were selected for heading, the SURVEY program would switch between gyro and GPS orientation as each device updates and you would see the vessel in your SURVEY Map window twitch at each update. This is because it is unlikely that the two heading values will be exactly the same.

The **Speed** box tells the SURVEY program to use the speed information from the VTG message for the vessel speed.

Tip: The GPS speed is much smoother and more accurate than the speed the SURVEY program will calculate. We recommend that you use the speed from your GPS antenna.

GPS CONNECTION

Most GPS devices today are network devices. Please refer to Configuring Connections for HYPACK® Devices .

GPS OFFSETS

Install your GPS directly above your transducer and set your origin at the transducer to eliminate horizontal offsets. Please refer to your device manual and Measuring Hardware Offsets .

CONFIGURING YOUR ECHOSOUNDER

ECHOSOUNDER DEVICE SETUP

The functions for most Echosounders are all the same: the function, logically, is **Depth** and **Use for Matrix Update**. (If your echosounder supports annotation, the Paper Annotation option is available to be selected.)

ECHOSOUNDER DRIVER SETUP

Driver Setup dialogs are customized according to the individual device capabilities and the information that HYPACK® needs to access and use them. They may define anything specific to the driver:

*   Display properties of the Device Window in SURVEY
*   Annotation settings
*   Device settings

The following figure shows the Driver Setup for the NMEA driver. Please refer to the Common Driver Notes document found in your HYPACK 2020\Help folder for full details on this and other echosounder drivers.

Sample Echosounder Driver Setup
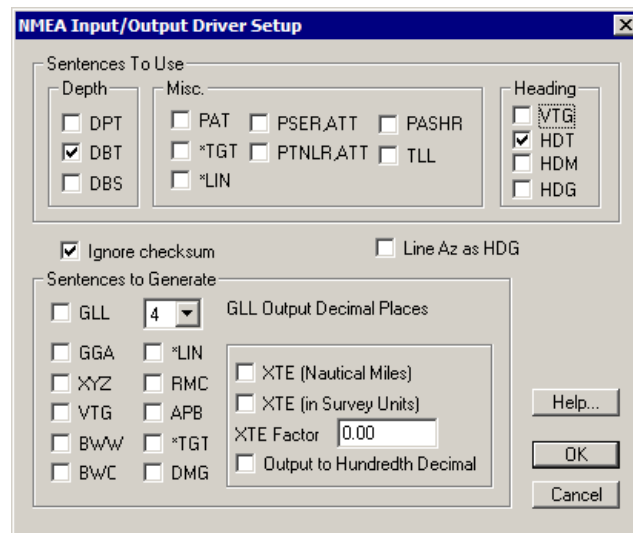
ECHOSOUNDER CONNECTION

Single beam echosounders come with many different interface connections. Please refer your echosounder manual and to Configuring Connections for HYPACK® Devices .

ECHOSOUNDER OFFSETS

In a simple, single beam configuration, set your origin at the transducer to eliminate horizontal offsets. The latency between the echosounder and GPS is entered only for the GPS.

Depth sent to the computer is sum of the measured depth from the transducer to the bottom transducer and the static draft correction.

The 'Static Draft' represents the vertical offset of the transducer beneath the static waterline when the vessel is not moving.

Static Draft
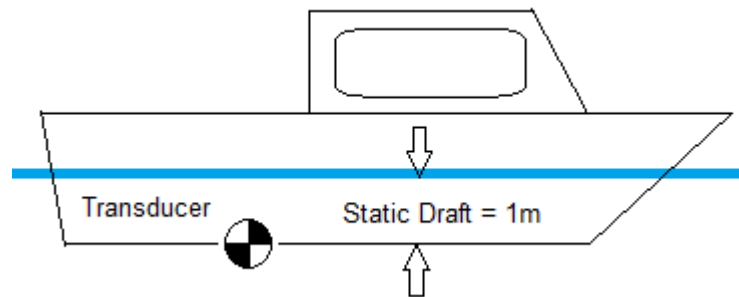
In HYPACK®, static draft (and dynamic draft) are measured positive downward. The deeper the transducer is beneath the static waterline, the larger (more positive) the static draft correction.

Static draft can be corrected in one of two methods in HYPACK®.

- **Enter the static draft adjustment into the echosounder and set the vertical offset for the echosounder to 0.00 in the HARDWARE program.** Most surveyors use this method. The echosounder will then output a sounding that incorporates the static draft.

- **Set a static draft adjustment of 0.00 in the echosounder and enter the static draft as the vertical offset into HYPACK®.**

BEWARE! Do one or the other, *but not both*. Otherwise, you will be double-correcting for the static draft.

CALIBRATING YOUR HARDWARE

For single beam systems:

- The **latency test** measures the GPS latency offset. Enter the results in HARDWARE.

- The **bar check** measures the static draft for your echosounder.
    - > **To output depths from the surface**, enter this distance and adjust the sound velocity in your echosounder.

> **To output depths from the transducer,** enter this distance as the vertical offset for the echosounder in HARDWARE, so SURVEY corrects the depth for static draft.

BEWARE! Do one or the other, *but not both*. Otherwise, you will be double-correcting for the Static Draft.

Tip: You can collect your latency test lines as part of your first survey, then correct the survey data with the calculated latency during post-processing.

BAR CHECKS

Most **single beam, dual frequency and multiple transducer systems** are calibrated by lowering a plate a fixed distance below the transducer then adjusting the draft and sound velocity settings on the echosounder. The procedure is summarized in the following example where we will use 5 and 25 foot depths.

Bar Check Calibration
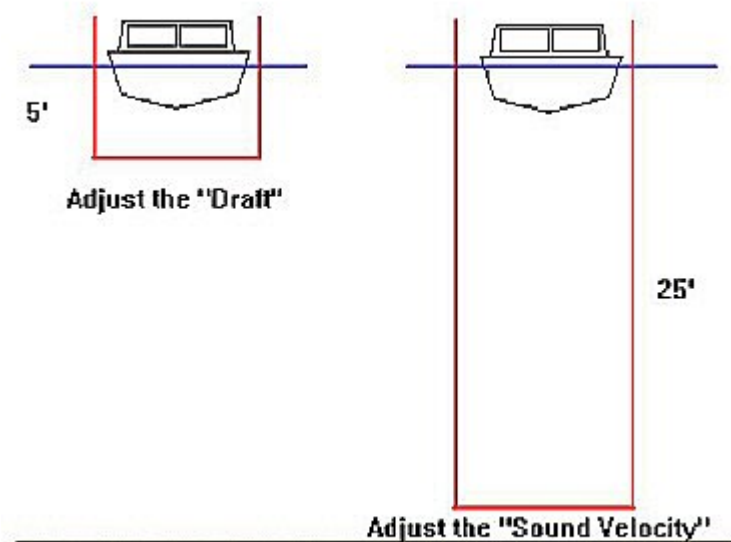
1. **Lower a bar or disk directly below the transducer to a predetermined depth.** (Keep the bar close enough to the transducer so that sound velocity errors don't enter into this.)
2. **Adjust the Draft setting on your echosounder until the paper chart/digitizer reads the correct depth.** In this example, the depth is 5 feet.

This incorporates the static draft into your echosounder readings; the vertical offset for your echosounder in HARDWARE will be '0'.

3. **Lower the bar/disk to a depth that is approximately the depth of your channel.** In our example, we have lowered it to 25 feet.

4. **Adjust the Sound Velocity setting** until your echosounder reads 25 feet.

5. **Return the bar/disk to 5 feet and check the depth.** It may have changed, since you just changed the sound velocity.

    > **If the depth has not changed**, your echosounder is calibrated and you may begin work.

    > **If the depth has changed**, repeat the process (steps 1-4) until the sounder accurately reports the 5-foot and 25 foot levels.

Using this process, you now have an echosounder that is calibrated at 5 feet and 25 feet. Assuming the sound velocity is constant through the water column, it should also be calibrated for the depths between this range. If sound velocity is not a constant through these ranges, your intermediate depths may have small errors.

*Slight depth errors occurring due to sound velocity factors*
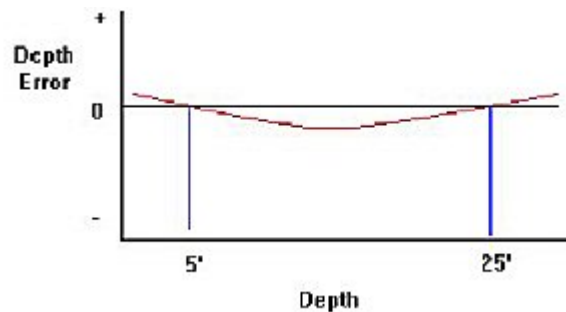
NOTE: Another method used for calibrating your echosounder is to set the sounder for a fixed velocity (for example 1500m/s or 4800 ft/s) and then use a sound velocity profile to adjust the depths in real time or post processing. The sounder is first calibrated using the process described above. This finds the electronic draft of the sounder. After calibration, the velocity is then set at a recommended level. Measured depths are later adjusted based on the initial setting and the sound velocity profile to determine the final measured depth.

MEASURING GPS LATENCY IN SINGLE BEAM CONFIGURATIONS

We calculate latency by comparing data from pairs of reciprocal lines over a changing bottom and enter the results as the GPS Latency offset in HARDWARE.

1. **Log your test data.** Run the same line up and down over a sloping bank or over a prominent bottom feature.
2. **Open the program.** Click UTILITIES-CALIBRATION-LATENCY TEST.
3. **Select FILE-OPEN SOUNDING CATALOG and select the LOG file** containing your latency test lines.
4. **Click [OK].** A list of files will appear.

Sounding Catalog in LATENCY TEST
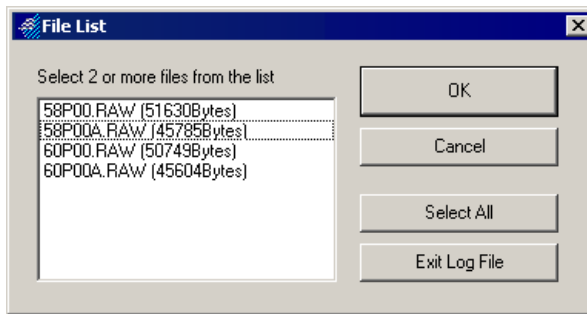
5. **Click on the two files to be used for the latency calculation and click [OK].** After the first file header is read, the Read Parameters dialog appears.

*Latency Read Parameters Dialog*
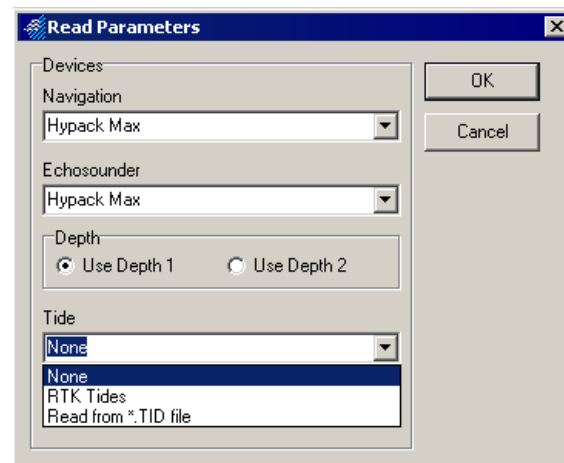
6. **Set your Read Parameters and click [OK] to continue.** A cross section graph will display the profiles of your two survey

lines. You may notice the sections are not "aligned" meaning there is an error in the latency time setting.

> **Select the devices whose data you are using.** Make sure you have selected the single beam echosounder. If your data files were collected over an area of fluff, use Depth 2 for the calculation.

> **Choose a Tide Correction method.** If you collect your test data at slack tide, you should be able to get fairly accurate results without accounting for tide.

Graph Displaying the Results of Coarse Adjustments
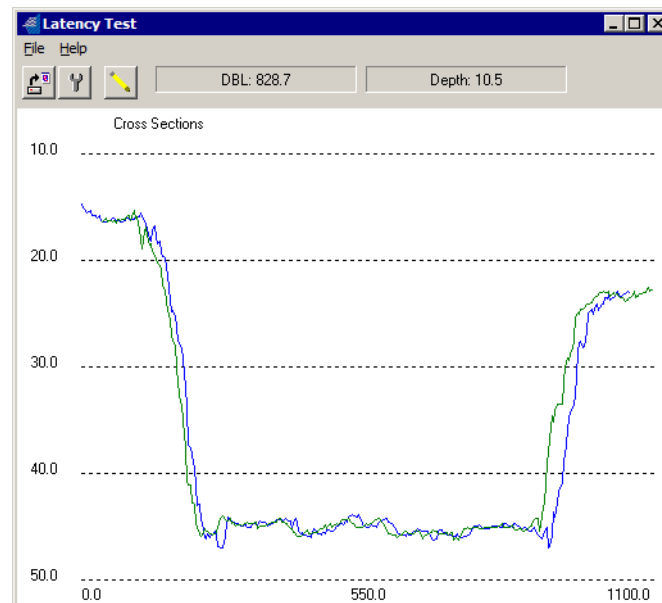
7. **Select FILE - ADJUSTMENTS** (or click the wrench icon) to display the Adjustments dialog.

Latency Adjustments Dialog
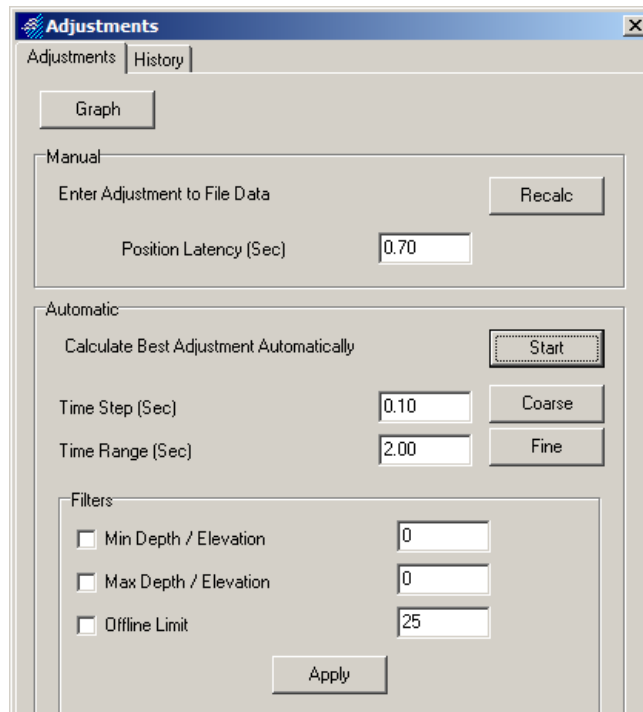
8. **Set Filters to omit obvious bad soundings.** You can set filters for minimum and maximum depth or elevation, and for soundings farther off line than the user-defined limit.

9. **Perform Coarse Adjustments**.

    a. **Select the coarse adjustment settings.** Click [Coarse] and the settings are automatically calculated.

    b. **Begin calculations.** Click [Start]. When the calculations are complete, a graph will appear showing the results.

    c. **Return to the Adjustments dialog**. Click [Close] .

10. **Perform Fine Adjustments.**

    a. **Click [Fine].**

    b. **Click [Start]** to test using the Fine settings. The graph reappears with a new value, listed as the final offset, to be used as your latency offset.

Latency Value
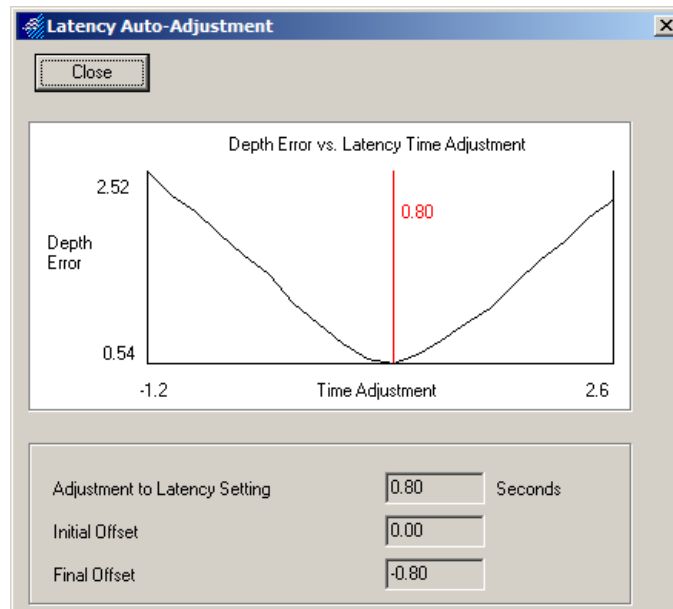
Manually Testing Latency Adjustment Values

You can also use the LATENCY TEST to test the results of a latency value of your choice:

1. **Enter your value as the Position Latency.**

2. **Click [Recalc].** The program redraws the profiles using your latency value so you can see how closely they align.

FINALIZING HARDWARE OFFSETS USING CALIBRATION TEST RESULTS

Calibration tests calculate adjustments that must be made in your hardware offset settings to collect accurate depth and position data. The values calculated should be used as follows for maximal accuracy of your hardware offsets.

In the HARDWARE program:

1. **Click on the DEVICE menu and select your position device.**

2. **In the Offsets tab, enter your latency** in seconds.

    In single beam configurations, subtract the value calculated in the LATENCY TEST program from the current latency value.

CORRECTING OFFSET AND LATENCY ERRORS IN SURVEY DATA

If you run your calibration test before the survey, and the calculated adjustments made in the hardware setup, data should not have to be adjusted. We all know, however, that things happen and we may need to adjust survey data. When it is required, existing data files are fixed in the editing program.

If you have already collected survey data with incorrect offsets, the LATENCY TEST value can be used to adjust data files as they are read into the editor program.

When the editor reads your raw data, the Read Parameters dialog displays the offsets for each device as they were set in your hardware configuration during SURVEY. (Select the Offsets tab in the SINGLE BEAM EDITOR.)

The dialog displays settings for each device in your project. Select the device of interest from the drop-down box and enter the correct offsets (as they should have been during SURVEY). These offsets are applied to all currently selected files in place of those in your hardware configuration during Survey.

NOTE: Editing the offsets in this manner affects only the edited data. *It does not affect raw data.*

Offsets Tab in the Single Beam Editors
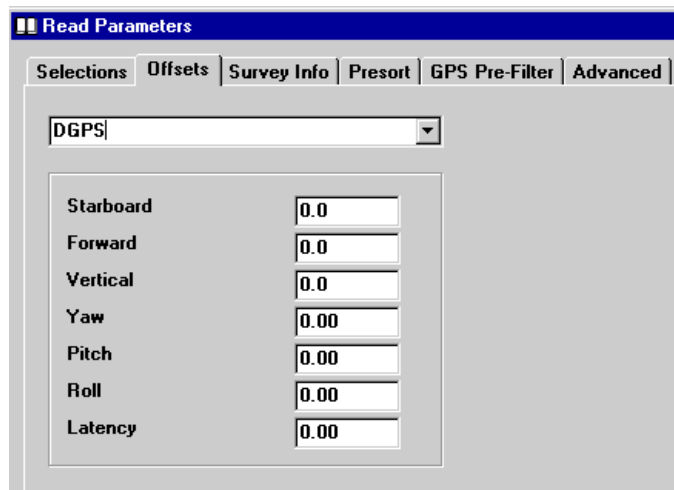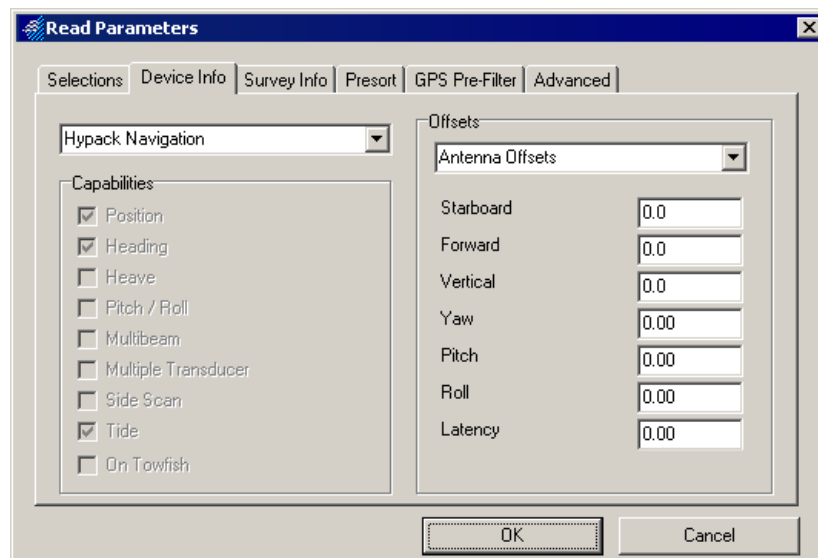
PLANNED SURVEY LINES

Planned survey lines (*.LNW) define where you want your vessel to go. The line file contains the grid coordinates and names for each planned line in your project area and can also contain cross section template information. Line files are typically created in the LINE EDITOR program.

Planned lines are saved with an LNW extension and are saved in the project folder. You should give each set of planned lines a unique name which will allow you to determine for what area the survey lines were created.

Although it is possible to collect survey data without planned lines, it will make the editing process more logical and assure your required coverage if you have referenced some kind of survey lines in your area.

LINE EDITOR creates planned line files. Create each line individually, or create one line then additional lines offset in a choice of patterns. There is no limit to the number of waypoints per line or lines per file.

Alternatively, the LINE EDITOR Import dialog enables you to extract data from ASCII text files and use it to populate the fields of the LINE EDITOR to generate single-segmented planned lines.

SPACING PLANNED LINES

Line spacing for single transducer surveys is somewhat arbitrary, because full bottom-coverage is almost never practical. For sweep surveys, where full bottom-coverage is practical, line spacing is usually chosen to insure full coverage.

If your boat is equipped with a multibeam system, where the coverage of a single sweep varies depending on water depth, line spacing will often change from one survey to the next. Some simple trigonometry gives the coverage relationship with water depth.

- **Port Coverage** = Water Depth x Tan(Port Theta)
- **Starboard Coverage** = Water Depth x Tan(Starboard Theta)
- **Sweep Coverage** = Port Coverage + Starboard Coverage

It is tempting to orient the sweep transducer with somewhat side-looking geometry, as this increases the coverage per sweep. Be careful about this because the trade-off is decreased data quality in the outer beams.
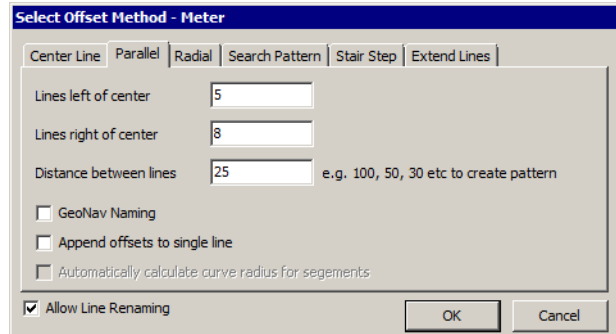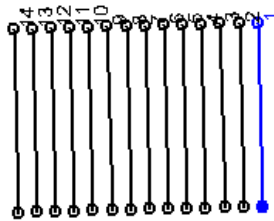
OFFSET PATTERNS FOR PLANNED LINES

Planned lines can be created in any one of several patterns using the Offsets function.

Parallel Offsets

Parallel lines on either side of the initial line.

Center Line Offsets

Perpendicular lines at user-defined spacing along the initial line.
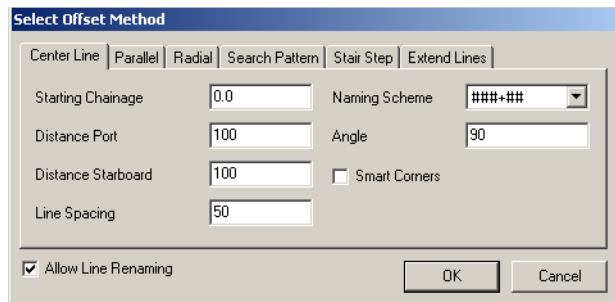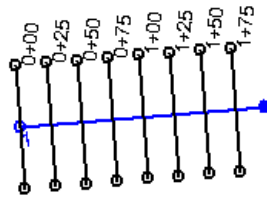
CREATING 2-D PLANNED LINES USING THE CURSOR AND OFFSET TECHNIQUE

In the LINE EDITOR Import dialog you can extract data from ASCII text files and use it to populate the fields of the LINE EDITOR to generate single-segmented planned lines. Alternatively, you can interactively create planned survey lines in the LINE EDITOR:

1. **Open a Background File** of your survey area.

2. **Open the LINE EDITOR.** Select PREPARATION-EDITORS-LINE EDITOR.

3. **Create your initial planned line.** Click the Cursor icon and the LINE EDITOR will minimize.

4. **Click in the area map to mark each waypoint in the initial line**.

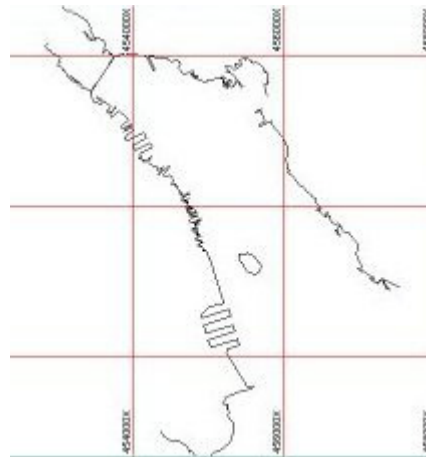5. **Restore the LINE EDITOR** by clicking [Line Editor] in the toolbar. You can review the points of your first line, and then continue.

6. **Create your Offset Lines**, as needed.

   a. **Click the Offsets icon.** The offsets dialog will appear.

   b. **Select the pattern of lines** you wish to use by selecting the corresponding tab.

   c. **Enter the number of offsets to be created as well as the distance or angle between them**. For Parallel and Center line Offsets, imagine you are standing at the start of the initial line looking toward the end to determine which way is left or right (port or starboard).

   d. **Choose whether to allow line renaming**.

   e. **Click [OK].** HYPACK® will create the additional offset lines and display your filled spreadsheet.

7. **Preview your lines** by clicking the Extents icon. The LINE EDITOR spreadsheet minimizes and the area map zooms in to the line file.

Planned Lines Preview on HAL.DIG
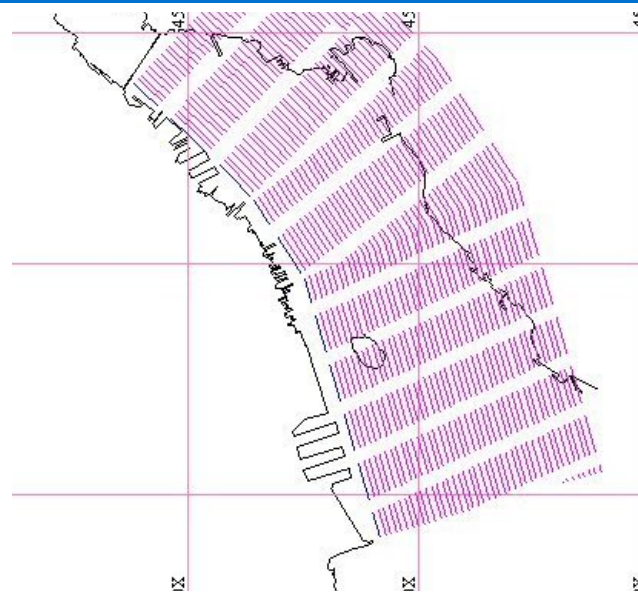
8. **Return to the LINE EDITOR.** Click [Line Editor] in the toolbar.

9. **Save your Line File.** Select FILE-SAVE or FILE-SAVE AS and name your file. Your data will be saved, by default, with an LNW extension to your project folder and enabled in the project files listing.

More Information
•   Loading Files to your Project on page 1-22

CHAPTER 3

Survey

The survey programs provide you with information to monitor survey data collection and to assure full coverage of the survey area. Customize the real-time displays and set the navigation parameters to suit your normal needs and preferences then use the easy keyboard commands to manually guide your data collection.

HYPACK® SURVEY provides navigational data and logs single beam, sub-bottom and magnetometer data.

Once you have set up your project, you are ready to set up your SURVEY options. The consider the following tasks before you begin to collect data:

- **Set the correct geodesy settings**.
- **Test and calibrate your hardware.** Do this before you are far from shore with pressing deadlines.
- **Configure the size, position and features of the display windows**.
- **Load and configure planned survey lines.** (Optional) Recommended for survey projects.
- **Set the Navigation Parameters.**
- **Input the Project Information**. (Optional)
- **Configure your Boat Features**.
- **Load and configure any Targets.** (Optional)
- **Load and configure any Matrix Files.** (Optional.))
- **Preset your Tide Corrections information.** (Optional)
- **Automate your Draft/Squat.** (Optional)

SURVEY INTERFACE

To launch HYPACK® SURVEY, select SURVEY-HYPACK® SURVEY or click the icon.

Tip: **Smart Launch Survey icon** in the HYPACK® toolbar launches one or more survey programs according to your current hardware configuration.

- **Single beam, sub-bottom or magnetometer** configurations launch only HYPACK® SURVEY.

The HYPACK® SURVEY program loads the information from the current project. The program reads geodetic information and hardware information from the project initialization files. It loads the most recently used planned survey line file (*.LNW) from the current project, as well as any background files and matrix files that are currently 'Enabled'.

HYPACK® SURVEY functions can be executed through the menus in the shell, the (optional) toolbar, or through keyboard shortcuts.

Toolbar
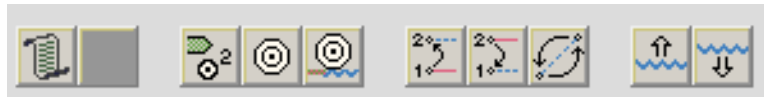
The toolbar is a row of icons that duplicate the function of several of the menu selections. To determine each icon's function, hold the cursor over the icon and a tool tip will appear.

WINDOWS IN SURVEY

The SURVEY display is comprised of the 'shell', with a menu bar, toolbars and alarm indicators, as well as your choice of several independently-displayed and configured windows:

- **Area Map:**This is a plan view of your project area. It displays any enabled project files along with the position of the vessels and their track lines.
- **Left-Right Indicator:** Shows the position of the boat relative to the current planned line segment.
- **Data Display:** Shows real-time, textual information regarding your logged content.

You may reposition and size all windows, in one or more monitors, using the cursor to drag the title bars and window edges.

Once you have configured, sized and placed the windows on the screen, the SURVEY program remembers and restores them to the same status and location each time you start the SURVEY program.

AREA MAP IN SURVEY

The Area Map window contains a plan view of your survey area that includes all files active in HYPACK® when you start SURVEY and a symbol representing each mobile in your hardware configuration.

A Sample Area Map
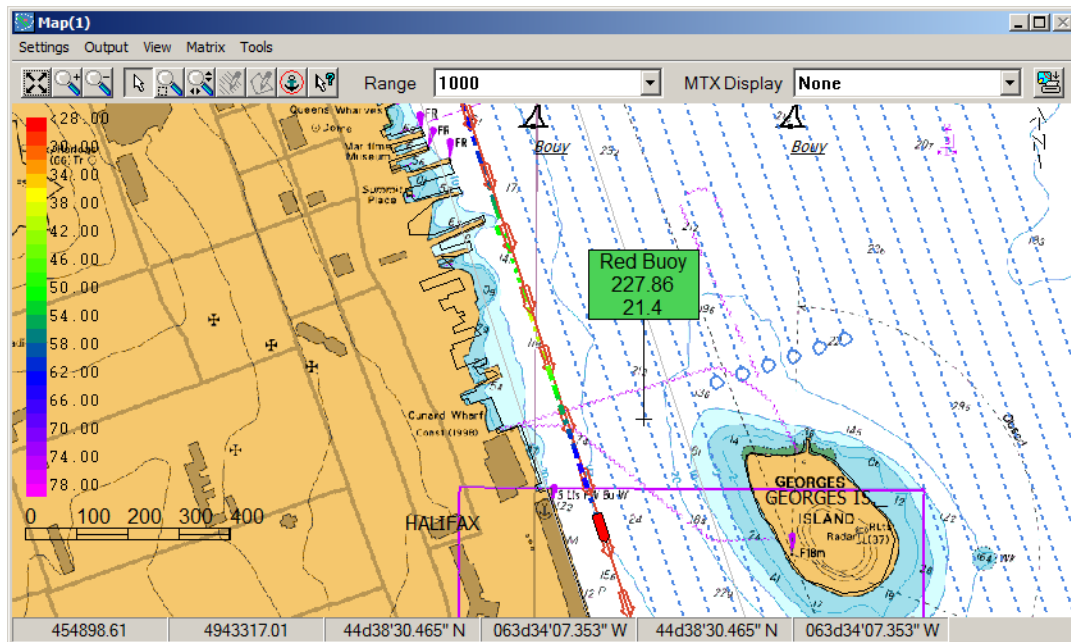
Sounding colors are determined by the project's color settings. The position of the survey boat is updated on the Area Map at an interval defined by the GPS Update Frequency in the HARDWARE program.

Each area map includes the standard zoom and pan controls.

NOTE: The Range setting in the Area Map toolbar enables you to set the zoom at any of a series of preset zoom scales.

A tracking setting other than "No Tracking" overrides the effect of the pan tool.

When you exit the SURVEY program, it records the status of the items in the Area Map and restores the same configuration when you re-start the program.

AREA MAP LAYER MANAGER

In addition to your project files, you may also include chart features, such as a legend, scale, north arrow, and projection and lat./lon. grids, in your area map display.

To set the files displayed and their draw order:

1. **Access the Layer Manager** by selecting SETTINGS-LAYER MANAGER.
2. **Check the files and features you want to display**.
3. **Set the draw order.** You can click and drag the files in the list or select one and reposition it with the Up and Down buttons. Items at the end of the list are drawn first and will be overlaid by any in the list above them that are selected.
4. **Click [OK]**.

A Sample Area Map
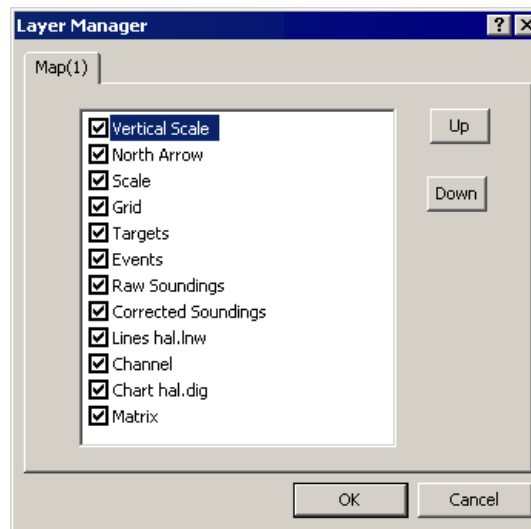
AREA MAP GRID PROPERTIES

Grid Properties set how the projection and lat/long grids are presented. Select SETTING-GRID PROPERTIES to access the Grid Setup dialog. As in the HYPACK® Control Panel, you can choose automatic or fixed spacing and the style of the labels. Labeling is available on all four sides of the map.

NOTE: The Lat/Lon grid is displayed in Lat/Lon of the local datum.

Grid Setup Dialog
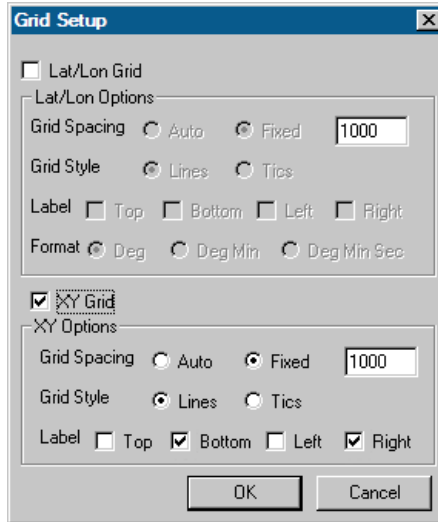
AREA MAP TRACKING AND ORIENTATION OPTIONS

Tracking and Orientation options automatically re-adjust the screen when the boat leaves the display area and to rotate your map to your preferred orientation.

Vessel track points are limited to one per second.

Tracking and Orientation Dialog

Select SETTINGS-TRACKING/ORIENTATION from the menu and the Orientation and Tracking dialog appears.

Vessel Tracking

- **In Center** returns the boat to the center of the screen as it nears the edge. The **Edge Dist to Win Size Pct** option determines when the centering will occur based on the distance between the vessel and the edge of the area map (expressed in percentage of the Area Map window size with an allowable range of 5-25%).

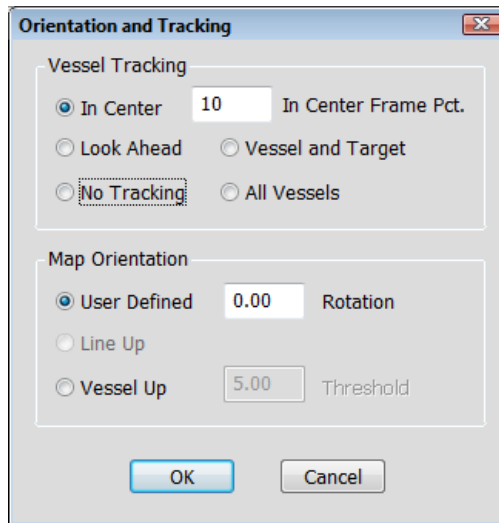**NOTE:** If you enter a value outside the 5-25 range, the program resets the value to 5, if you have entered a value less than 5, or 25 if you have entered a value greater than 25.

- **Look Ahead** moves the boat further back from the center to maximize the amount of space displayed ahead of the vessel.
- **Vessel and Target** keeps the boat and the current active target in view. The map automatically zooms to fit as you approach.
- **All Vessels:** The map automatically zooms to fit to keep all mobiles in view.
- **No Tracking** allows you to move the screen anywhere you want without having it zoom back to keep the boat in view. (Press the Home key to center the vessel on your screen.)

The toolbar displays the current tracking method. If you set your preferred method of tracking, you can quickly toggle between this setting and "No Tracking" by clicking the toggle tracking icon (Ctrl+T) or selecting SETTINGS-TOGGLE TRACKING.

Map Orientation

- **Vessel Up** aligns the Area Map with the current vessel heading. Define a threshold (in degrees) to determine how much the vessel heading must change to cause the map orientation to adjust. This prevents constant (annoying) updates of the map orientation with only small changes in vessel heading.
- **Line Up** draws the screen so the current line segment is directly "up" the screen. If you are in the "Line Up" orientation, the boat should be progressing up the screen. If your boat is going "down" the screen, you need to "whip" the line ends (change the start-line and end-line points) by using the Ctrl-W key command or the LINE–SWAP menu item.
- **User-Defined Rotation** draws the Area Map according to the specified degrees. Zero degrees will orient the map with North up.

LEFT-RIGHT INDICATOR IN SURVEY

The Left-Right Indicator window only appears when you have planned lines loaded into the SURVEY program. It shows the position of the main vessel relative to the planned survey line, as well as certain information of particular interest to the helmsman:

Left-Right Indicator Statistics

Logging Status	Display
Logging	Distance and Time[a] to the end of the current survey line.
Not Logging	Distance and Time* to the start of the next survey line.
Always	Logging status, uncorrected depth and tide

a. Times are calculated based on distance and current speed.

To load additional displays, select WINDOW-NEW- LR INDICATOR.

The Left-Right Indicator
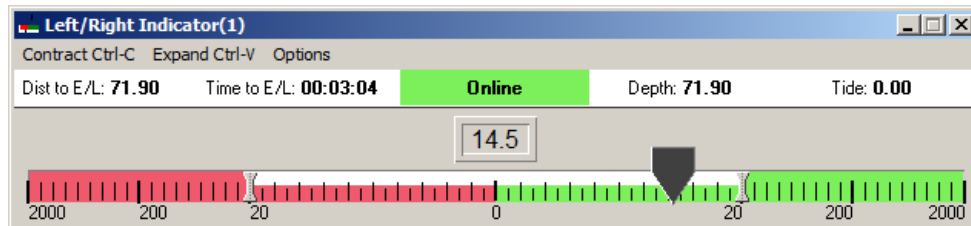
Configuring the Scale

You can display the cross track error using either of two scales, and expand and contract the either scale to suit your purposes.

To choose the type of scale, select or deselect the Logarithmic Scale option in the Options menu.

To contract the scale:
- Click 'Contract' on the menu bar.
- Use Ctrl-C (Contract) from the keyboard.

To expand the scale:
- Click 'Expand' on the menu bar.
- Use Ctrl-V (Expand) from the keyboard.

> **NOTE:** These keyboard commands only work with the focus on the Left-Right Indicator window.

Configuring the XTE Label

The cross track error label is a real-time display of the distance off line. The font and float properties can be configured to meet the needs of different operators.

To modify the font, select OPTIONS-FONT in the indicator menu. The Windows® Font Dialog appears for you to make your adjustments. *Only the font, style and size apply*. These settings override the current scheme until you exit SURVEY.

The label can float above the pointer in the indicator or remain centered over the graphical display.

To toggle the float setting, select and deselect the OPTIONS-FLOATING TEXT menu option.

Setting the XTE Alarm Distance

SURVEY alerts you that your vessel is too far off the currently selected survey line. You can decide the distance at which you will be alerted.

To set a "Cross Track Error Alarm" distance:
- **Drag the tab indexes in the left–right indicator window.** The tab indexes are small gray bars, equidistant from center on the indicator scale.
- **Set the XTE limit in the Navigation Parameters dialog** (in the Options menu).

When this setting is changed, all other Cross Track Error displays update accordingly.

When the boat travels outside this range, the frame around the cross track label turns either red (planned line is to starboard) or green (planned line is to port), and the 'XTE' alarm appears in the shell. *This has no effect on the data logging*; it is only a visual alarm to the helm to steer toward the survey line.

DATA DISPLAY IN SURVEY

The Data Display window in HYPACK® SURVEY shows textual information about the survey.

The Data Display Window
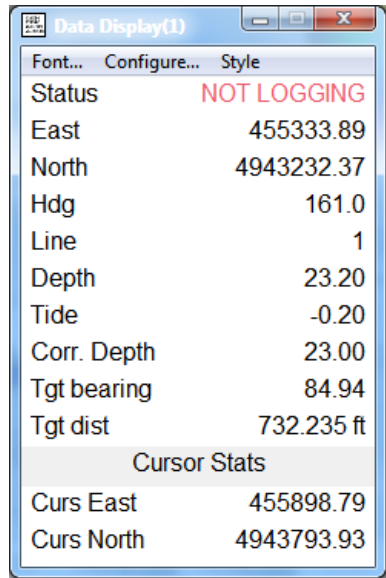
When you first start the SURVEY program, the display does not contain any items. Use the menu in the Data Display window to configure the Data Display. You can select the items to display, the font of the displayed items, or change the style of the display. The **Stay on Top** option in the Style menu assures the window will always be visible.

ALARMS IN SURVEY

Alarm windows are located along the bottom of the SURVEY screen. They are used to denote error conditions to the operator. When the criteria are met, the alarm window turns red and the Windows® exclamation alarm sounds. You can turn off the audio alarm by pressing the Escape key. This will also change the alarm boxes to yellow until the reason for the alarm has been corrected.

The SURVEY program can generate the following alarms:

Survey Alarm

Alarm	Text Displayed	Reason	Documented
Time Out	Time Out	Generated when a device has not reported an update within the last 5 seconds.	Survey Log
Track Error	XTE	Generated when the tracking point is outside the limit set in the Navigation Parameters[a] dialog or the Left-Right Indicator.	Trace File[b]
Minimum Depth	Min Depth	Generated when the measured depth drops below the value defined in the Navigation Parameters[a] dialog	Survey Log
Maximum Depth	Max Depth	Generated when the measured depth is greater than the value defined in the Navigation Parameters[a] dialog	Survey Log
Heave Drift	Drift = Current Drift Value	If the heave value differs from the average of the last 100 heave readings by more than the "Alarm Threshold" set in the Vessel Setup.	Survey Log

a. Select OPTIONS-NAVIGATION PARAMETERS.

b. The Trace file is named RAW date.txt (eg RAW0927.txt) and saved in your project folder. It contains basic information about which files you are using as you survey, as well as data about events, targets, logging, etc. You can read it with any text editor.

CORRECTIONS IN SURVEY

Tide and sound velocity corrections affect the accuracy of the depth and positioning data. During acquisition, SURVEY logs these corrections in the header of each raw data file when you start logging, and in a correction-specific record any time a correction changes during your data collection.

TIDE CORRECTIONS IN SURVEY

In HYPACK®:

Final Depth	=	Measured Depth	+	Tide Correction	+	Draft Correction	+	Sound Velocity Correction

Since the tide correction is normally added to the measured depth, it will normally be a negative value in HYPACK® (unless the tide drops below the chart datum).

For example, if the water level is 1.3m above the chart datum, the tide correction in HYPACK® would be "-1.3".

You can display one or more of the following data affected by tide in the Data Display:

- Current tide correction
- Measured depth from the echosounder
- Corrected depth

Since the tide correction is applied to all vessels, it is displayed in Black in the Data Display window.

You can set the initial value of the tide correction by clicking the TIDE–SET menu item. This value will be assigned to all soundings logged until you set a new value. Update this value often, especially if the tide level is changing quickly.

Setting the Tide Value
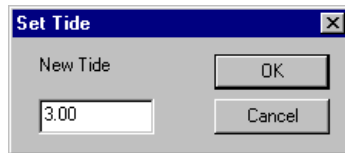
The Tide Increase (Alt-Y) and Tide Decrease (Alt-Z) can be used to increase or decrease the current tide value by the current increment. The increment is set from the OPTIONS–CORRECTIONS INCREMENT menu item.

Setting the Corrections Increments
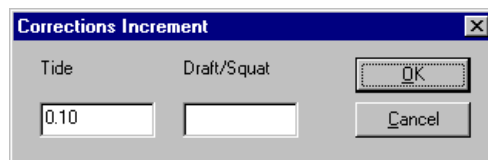
NOTE: If you use the same time and tide correction information to create a tide correction file, then use it to apply your corrections during post-processing, your results will be more realistic. The editor will interpolate the tide correction values over time, thus avoiding the sudden changes in tide correction values.

The tide correction value at the time each raw file is opened will be recorded in the header of the file. Each time you modify the correction value, it will be recorded as a TID record and used to correct soundings taken after that time.

Alternatively, you can record tide corrections from a telemetry tide gauge:

The SURVEYprogram treats telemetry tide gauges like another piece of survey equipment. A device driver in the hardware configuration receives data from the device and automatically sets the tide correction to the appropriate value.

DRAFT CORRECTIONS

Dynamic draft is the vertical movement of the echosounder transducer as the vessel is underway.

In HYPACK®, Final Depth = Raw Depth + Static Draft + Dynamic Draft (+ Tide, SV and Heave corrections)

To log accurate depths, you must correct for both static and dynamic draft. You have already accounted for static draft in your hardware configuration, but you correct for dynamic draft during data collection.

Dynamic draft corrections are logged with the rest of your data using your choice of the following options:

- **Manual Corrections:** Use the Draft option in the Vessel Setup dialog to adjust the correction currently logged in the data file. The draft correction is logged in the header of each data file and to a DFT record each time it is changed. This value is also displayed for each vessel in the Data Display using the Vessel Perimeter Color associated with each vessel.
- **Use the DraftTable Driver:** The DRAFTTABLE.DLL allows you to construct a table of Dynamic Draft Correction versus Speed. The driver then uses the Speed Over Ground from the GPS (or the internal speed computed by SURVEY or DREDGEPACK®) and interpolates a draft correction based on the Speed Over Ground.

NOTE: On a river, your speed through the water column may not equal your speed over ground. This could cause

some significant errors in the Dynamic Draft correction being assigned by the driver.

MANUAL DRAFT CORRECTIONS

Define Draft corrections for each vessel in the Vessel Setup dialog in SURVEY or DREDGEPACK® under "Dynamic Draft".

To set the amount that the arrow keys in the Vessels dialog increment/decrement the Dynamic Draft, select OPTIONS–CORRECTION INCREMENT and enter it under "Draft/Squat".

Setting the Corrections Increments
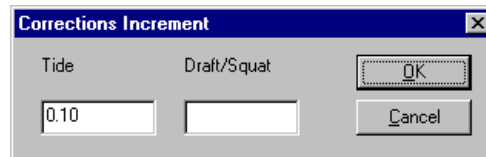
AUTOMATIC DRAFT CORRECTIONS

Automatically apply draft/squat corrections by installing the Draft Table Driver in HARDWARE. The Draft Table is a listing of draft correction values with their corresponding vessel speeds. This option enables SURVEY or DREDGEPACK® to automatically apply dynamic draft/squat corrections based on the speed of the vessel.

The driver allows for Shallow Water and Deep Water curves. Shallow depths can affect how the wake forms around the vessel and it has been shown it can significantly affect the draft. If this is the case, enter different drafts for shallow and deep water.

If you enter both shallow water and deep water draft values:
- **When the depth is less than the Shallow Depth Limit**, use just the shallow water table.
- **When the depth is greater than the Deep Depth Limit**, use just the deep water table.
- **When the depth is between the Shallow and Deep Depth Limits**, interpolate between the two table values.

NOTE: If there are soundings taken at speeds greater than those defined in the Draft Table, the driver will assign draft correction value that corresponds to the fastest speed in the draft table.

1. **In HARDWARE, select DEVICES-ADD DEVICE** and select the DraftTable driver.

2. **Click [Setup] and configure your driver for your project**.
   The Driver Setup is a table defining draft values and their
   corresponding vessel speeds. SURVEY interpolates draft
   values according to the selected interpolation method and
   within the defined speed range and stores a draft correction
   value appropriate to the vessel speed with each sounding.

   [Graph] plots your corrections over speed on the right.

DraftTable Driver SetupI

3. **Click [OK].**

NAVIGATING PLANNED LINES IN SURVEY

The Navigation Parameters in SURVEY to help automate the
planned line navigation and data logging. This allows the
helmsman to focus on driving while the program handles the data.

To access the Navigation Parameters, select OPTIONS-
NAVIGATION PARAMETERS.

Navigation Parameters Dialog

SELECTING SURVEY LINES IN SURVEY

The active planned line file in your project will be loaded to the SURVEY program. You can load a different line file by selecting LINE-SELECT FILE and choosing the new line file from the file selection dialog. The program will unload any active line file and load the selected file. Only one planned line file may be enabled at a time. (You can unload any active line file and work with no lines loaded by selecting LINE-UNLOAD.)

When you first enter the SURVEY program, it will select the first line in the queue as the current active line. When you exit the program, it writes the current active line to a default file. Next time, it reads this default file and re-establishes the last active line as the current active line.

To select the line you wish to survey, use one of the following methods:

- **Right-click on a line handle and then click the "Select" item**. The "handles" are located at each line origin (the first

point entered when creating the line) and are drawn as little boxes at the origin of a planned line.

Selecting a Line Using "Handles"
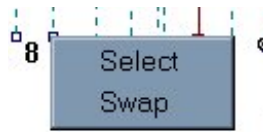
- **Use the LINE–INCREMENT LINE menu item** or Ctrl-I to move ahead by the number of lines defined under Line Increment in the Navigation Parameters.
- **Use the LINE–DECREMENT LINE menu item** or Ctrl-D to move back by the number of lines defined under Line Increment in the Navigation Parameters.
- **Enter the desired line number under Next Line in the Navigation Parameters**. You may enter either the number or name ("34+00") associated with a line.

LOGGING DATA IN SURVEY

Typically, when you set up a survey project, you create a set of planned survey lines to guide your navigation as you collect data. They help insure that you achieve the proper coverage of your survey area. Most surveyors begin on the first line of the line file and navigate up one line and down the next, logging data for each line, until they reach the end.

When you begin logging data at the beginning of each planned line (start line), the SURVEY program opens a data file and begins to record data. The status in the Data Display window will change to 'Logging'. This is your indication that you have started line and the SURVEY program is logging data.

Logging Data   You can start line manually or automatically.

- **Manually** by selecting LOGGING-START LOGGING (Ctrl+S)
- **Automatically** using the automatic Start Line Gate feature.

The automated Start Line Gate feature begins logging automatically if the vessel tracking point passes within the specified distance of the start line point.

The **Start Line Gate** is specified in the Navigation Parameters window. Select OPTIONS–NAVIGATION PARAMETERS.

- **Start Line Gate = "0.0",** the feature is disabled and the SURVEY program only starts and ends logging if you manually intervene.

- **If the Start Line Gate > 0**, the program starts logging automatically when the distance from the tracking point to the starting point of the planned line is less than the absolute value of the Start Line Gate. This "trigger area" is shown as a circle at the beginning of the planned line. A positive **Offset** shifts the circle down line by the specified amount, while a negative offset shifts it backward along the line.

*Start Line Gate = 25 (left), with Offset=10 (right)*
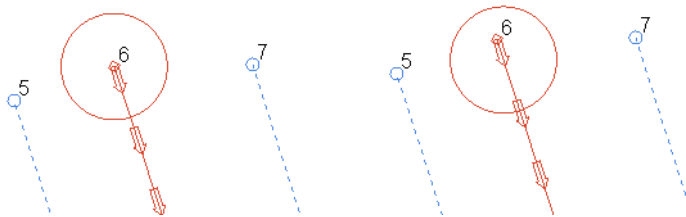
- **Start Line Gate < 0**, the SURVEY program only starts logging when the tracking point breaks the perpendicular projection of the start line point and the distance from the tracking point to the starting point of the planned line is less than the absolute value of the Start Line Gate.

Negative Start Line Gate
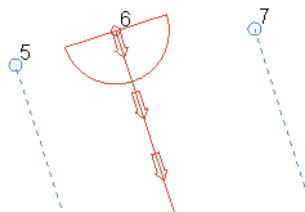
Approach Line Extends 50 Meters from the Start Line
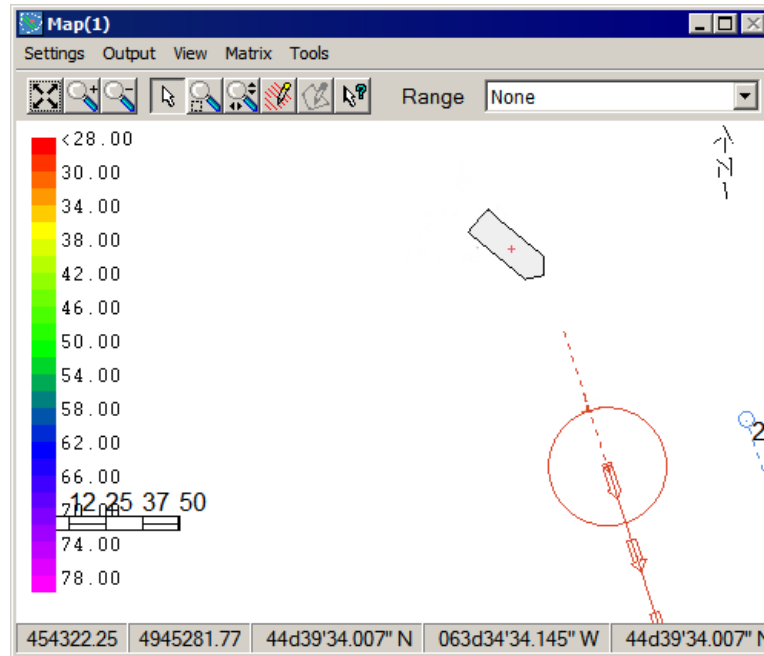
Suspending Logging

At any time while logging, select LOGGING-SUSPEND LOGGING (Ctrl+U). The status in the Data Display window will display the word "Suspended". A target with the name "Paused" will be placed on the screen at the tracking point position. You will still receive screen updates and position information, but the program will not write information to disk. This is useful if the survey boat needs to pause for traffic.

Resuming Logging

Select LOGGING-RESUME LOGGING (Ctrl+R).

To Abort Logging

At any time while "On-Line", select LOGGING-ABORT LOGGING (Ctrl+A). SURVEY stops logging data and saves the data logged to that point with an *.XXA extension. (If this would cause a duplicate file name, the extension becomes *.XXB, *.XXC...). The aborted file is *not included in the current catalog file*.

To End Logging

Once logging has been started, it can be ended (end line) as follows:

• **Manually** by selecting the LOGGING-END LOGGING (Ctrl+E).

• **Automatically** if you are using the Start Line Gate. The line will be ended automatically when the tracking point breaks the a line projected perpendicular from the end segment point of the planned line.

   To disable the automatic end line, select the Disable End Line Gate option in the Navigation Parameters dialog. In this

case, you must stop logging manually, though a start line gate automatically starts logging.

When the SURVEY program executes an "End Line" event, it closes and saves the data file and then selects the next line in the line queue. It determines the start line point based on the Line Mode in the Navigation Parameters dialog. A small red circle is drawn about the start line point and arrows indicate the direction of travel.

RAW DATA FILES

Raw files are the data files that result from the SURVEY or DREDGEPACK® program. Every time you log data, a new Raw data file is created. They are ASCII format files that contain the header information and time-series information for each survey device.

By default, they have the RAW extension and, in a standard HYPACK® project, are stored in the HYPACK 2020\Projects*ProjectName*\Raw folder.

A list of individual data files is provided in a catalog (*.LOG) file. You can quickly draw or process a group of files by specifying the *.LOG name, instead of entering the name of each data file.

The SINGLE BEAM EDITOR reads RAW format files, merges the data with Tide and other corrections and outputs the results as Edited All format files.

SURVEY KEYBOARD SHORTCUTS

SURVEY Keyboard Commands

	Functions	Commands
Line Functions	Decrement line by Line Increment set in the Navigation Parameters. (Only when not logging.)	Ctrl+D
	Increment line by Line Increment set in the Navigation Parameters. (Only when not logging.)	Ctrl+I
	Swap planned start end	Ctrl+W
	Decrement line segment by 1	Ctrl+B

	Functions	Commands
Logging Functions	Increment line segment by 1	Ctrl+F
	Start Logging	Ctrl+S
	Pause Logging	Ctrl + U
	Resume Logging	Ctrl + R
	Manual Event Mark	Ctrl+N
	Abort Logging	Ctrl + A
	End Logging	Ctrl+E
Target Commands	Mark target at tracking point	F5
	Target Properties dialog	F6
	Marks a Waters Edge Target	F7
Tide Corrections	Increment by current increment	Alt+Y
	Decrement by current increment	Alt+Z
Map Zoom Commands	Zoom In	+
	Zoom Out	-
	Move left, right, up and down	Arrow Keys
	Rotate Starboard	Ctrl++
	Rotate Port	Ctrl + -
	Center Map	Home
	North Up	Ctrl+Home
L/R Indicator Commands	Contract scale	Ctrl+C
	Expand scale	Ctrl+V
Profile Window Commands	Contract horizontal scale	Ctrl+C
	Expand horizontal scale	Ctrl+V
	Decrease vertical scale	Alt+C
	Increase vertical scale	Alt+V