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HYPACK
a xylem brand

Side Scan

QUICKSTART MANUAL

HYPACK
56 Bradley St.
Middletown, CT
06457

Web Address: www.hypack.com
Technical Support:
help@hypack.com
Phone: (860) 635-1500

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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.

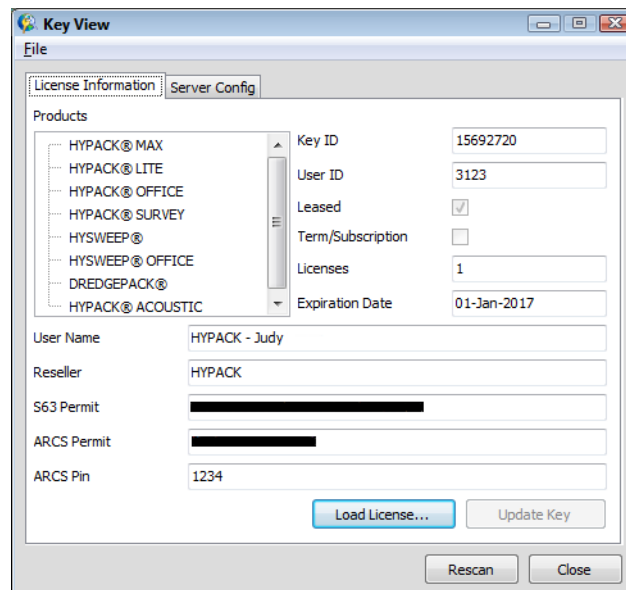
This manual is intended to introduce you to the HYPACK® interface and step you through the most common requirements for preparation and data acquisition in a single beam survey.

LICENSE MANAGER

The LICENSE MANAGER reads your HYPACK® license information from your dongle and displays your dongle status.

To run the dongle test select SETTINGS-LICENSE MANAGER.

FIGURE 1. LICENSE MANAGER



The LICENSE MANAGER display includes the following:

- **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.*

[Rescan] repeats the test.

HYPACK® INTERFACE

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

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.

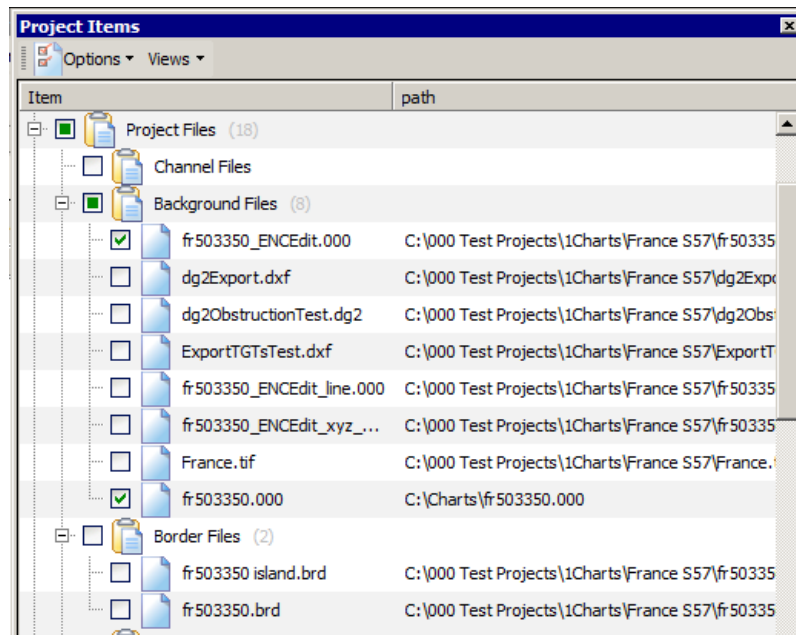
In the Project Items list, you can do any of the following:

- **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.

FIGURE 2. *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.

FIGURE 3. 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 Draw and View 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 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 EDITOR

DISPLAY SETTINGS IN THE HYPACK® CONTROL PANEL

Select SETTINGS-SETTINGS (F9) to control the presentation in the area map.

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.

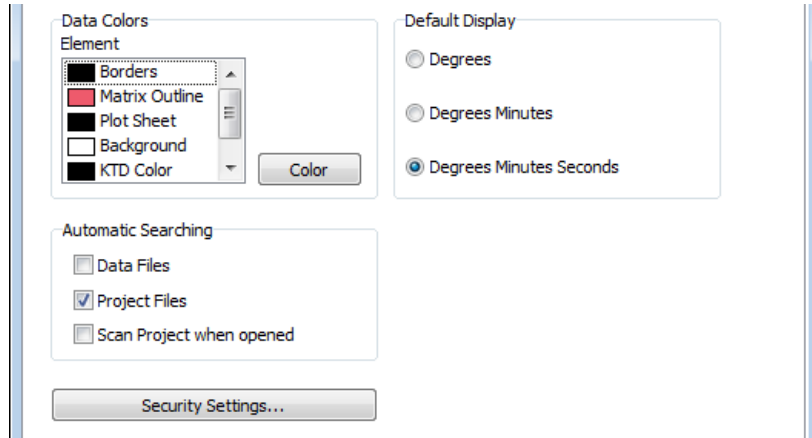
[Apply] enables you to preview your settings before exiting the Control Panel.

GENERAL DISPLAY SETTINGS

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

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

FIGURE 4. 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.

Default Display 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 Tab enables you to specify how HYPACK® displays projection grids and latitude-longitude (lat./lon.) grids. HYPACK® displays the lat./lon. of the local datum.

FIGURE 5. *Grid Tab*

The screenshot shows the 'Grid Tab' settings window with two main panels: 'X,Y Grid' and 'Lat/Lon Grid'.

X,Y Grid Panel:

- Plot:** ☒ Plot
- Spacing:** ☒ Automatic Spacing, ☐ Fixed Spacing (1000 m or ft)
- Style:** ☒ Lines, ☐ Tics
- Label Projection:** ☒ Left, ☒ Right, ☒ Top, ☒ Bottom
- Font:** 123.45
- Color:** [Color Selection Button]

Lat/Lon Grid Panel:

- Plot:** ☐ Plot
- Spacing:** ☒ Automatic Spacing, ☐ Fixed Spacing (60 ")
- Style:** ☒ Lines, ☐ Tics
- Label Projection:** ☒ Left, ☒ Right, ☒ Top, ☒ Bottom
- Format:** ☐ ddd.ddddddd, ☐ ddd mm.mmmmm, ☒ ddd mm ss.sss
- Font:** 83 24 16
- Color:** [Color Selection Button]

Plot toggles the grid display on and off.

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 enables you to assign which sides of the HYPACK® screen you wish to have the projection labels placed.

Font enables you to assign 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

SOUNDINGS DISPLAY SETTINGS

the lat./lon. labels are written in the grid and in the HYPACK® status bar.

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'.

FIGURE 6. *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).
- **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 shallower than the 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 HYLOT 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 palette.

- **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 1-16](#)

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.

FIGURE 7. The Planned Lines Tab

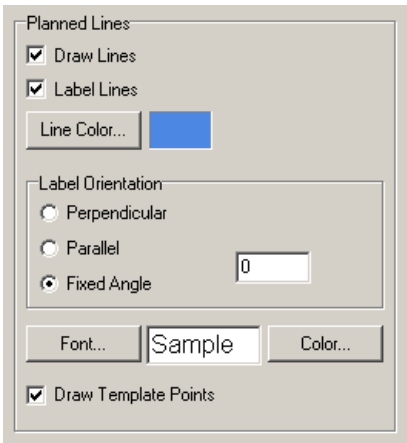


CHART DISPLAY
SETTINGS

The Charts Tab provides display options for background charts.

FIGURE 8. *The Charts Tab*

The screenshot shows the 'Charts Tab' interface with the following options:

- Raster Options:**
 - ☒ Hide Border
 - ☐ Keep .Img Files
 - ☐ Hide Soundings above Safe Contour
 - ☒ Overscale Lines
 - ☒ Show Text
 - ☐ Show Text (.PLN Files)
 - ☒ Color Zones (CHN Files)
- CAD Drawing Option:**
 - ☒ Display Normally
 - ☐ Display All Black
 - ☐ Display All White
- BSB Options:**
 - ☐ Convert to TIF
 - ☒ Despeckle
- Buttons:**
 - S57 Options
 - VPF Display Options

Raster Options

When you enable raster charts in your project, HYPACK® generates an IMG file for display. This process can take significant time and hard drive space; however, you can save the IMG file and display the chart instantaneously after that.

NOTE: Mr. Sid and ARCS charts are excluded from these options.

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

Keep IMG Files saves the IMG file in your project folder and display time going forward is fast. Deselected, disabling a chart also removes its IMG file, and it must be regenerated each time you enable the chart.

Tip:

IMG files tend to be *very large* compared to the raster charts they represent. Consider selecting this option while you are actively using your project to save time as you enable and disable charts. When you want to archive or transfer your project, deselecting this option reduces the size of your project.

BSB Options

Convert to TIF: When you load BSB charts to your project, HYPACK® compares the chart geodesy against your project geodesy. If they do not match, it first re-projects the chart to the project geodesy before it generates the IMG file for display. Select this option to generate a compressed Geo-TIF, which displays when you enable the source BSB chart. The Geo-TIF generates its own IMG file (*.KAP.TIF.IMG), but a bit faster than the BSB because no re-projection is required. The TIF is also much smaller than an IMG file for project storage and transfer purposes.

Creating Geo-TIFs offers a compromise between the best display speed and the smallest project size offered by the Keep IMG Files option.

TABLE 1. *BSB Chart Scenarios—After the First File Load*

Keep IMG Files	Convert to TIF	After the Chart First Enabled...	
		Display Speed	Inactive Project Size ^a
No	No	• Slowest. • Requires re-projection and IMG generation.	• No added files to store
No	Yes	• Faster than source BSB by re-projection time. • Only generates IMG	• Each Geo-TIF is moderately larger than its source BSB.
Yes	No	• Instantaneous	• Each IMG very much larger than its source BSB

a. Inactive Project Size refers to space required to store or transfer. When the project is inactive, HYPACK® deletes the IMG files unless the Keep IMG Files option is selected. In an active project, all enabled raster files also require the IMG files, which require added memory.

NOTE: *You would not select both options.* Keeping the IMG file of the BSB would make the Geo-TIF unnecessarily redundant.

CAD Drawing Option

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

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.

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

SOUNDING COLOR SETTINGS IN HYPACK®

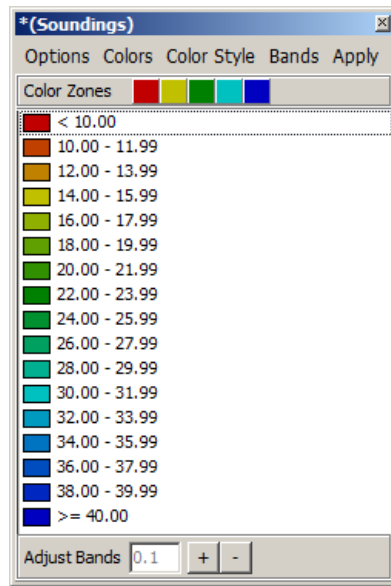
The **Color Editor** enables you to specify your project colors the HYPACK® programs use to code your data. Most often, you color-code your displays by sounding depths, but the project colors may also represent other values. Your project color settings are reflected in the color bar, which can be displayed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

If your current color palette does not reflect the values you want, you can customize the zones, colors and bands for your purposes.

To configure your color palette, do the following:

1. **Open the COLOR EDITOR.** Select VIEW-COLOR EDITOR (or SETTINGS-SOUNDING COLORS).

FIGURE 9. COLOR EDITOR



2. **Select a color palette from the Colors menu.**
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 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.
7. **Click [Apply].** This updates your displays with the new color palette and stores your current palette in the corresponding HCF file.
8. **Save your color palette for future use. (Optional)** Select OPTIONS-SAVE COLOR FILE and name your file something *other than the default file names*: color.hcf, and clr01.hcf, clr02.hcf, clr03.hcf and clr04.hcf. This allows you to load the same color palette at a later time by simply loading the HCF file to the selected palette (OPTIONS- OPEN COLOR FILE).

PROJECTS IN HYPACK®

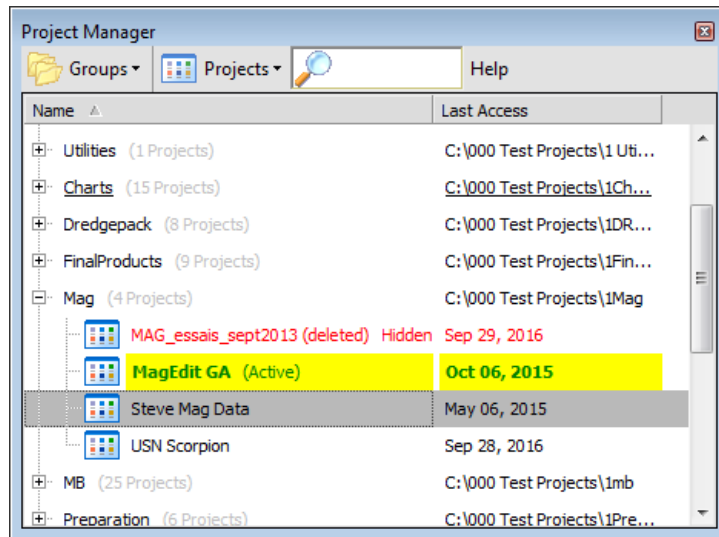
A **project** is a folder, with a user-defined project name, and all of the information about your survey it contains. Each time you open HYPACK®, it opens the most recently used project and displays the project name in the title bar.

NOTE: The first time you open HYPACK®, or if you have removed the project folder from the hard drive, the title bar says “No Project Loaded” and most menus and icons are disabled.

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

- **Raw, Edit, Sort** data files will be saved, by default, to the subfolder appropriate to their type.
- **RT TIFs:** *For side scan surveys only*, real-time mosaic is a series of georeferenced TIF (GeoTIF) images (tiles) generated by HYPACK® SURVEY.
- **SS Images:** SIDE SCAN SURVEY stores the images of the target locations as a JPG images in the SS Images folder named with the target timestamps. They are not listed in the Project Items list, but they appear in the TARGET EDITOR with their corresponding target information.

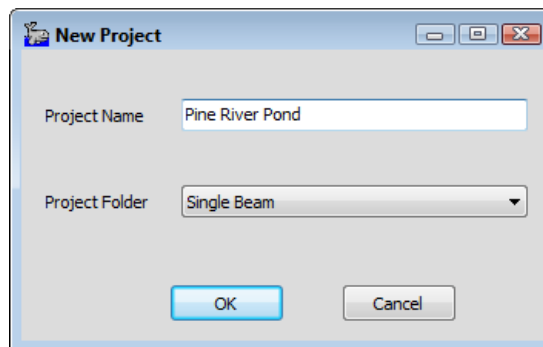
The **project file group** is a folder that stores one or more HYPACK® projects. HYPACK® stores projects, by default, to the HYPACK 2020\Projects folder. Projects stored there are known as **local projects**.

FIGURE 10. Project Manager

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.

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

FIGURE 11. 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.

TABLE 2. *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 DREDGEPAK® 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.

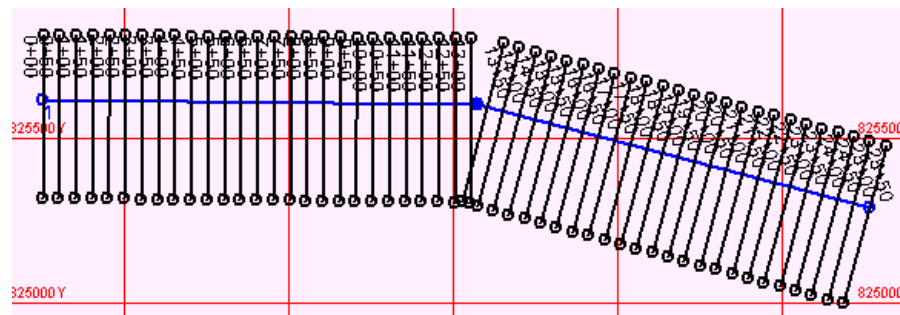
HYPACK® programs use the data from the RAW files to position the data in the corresponding multibeam or side scan HSX files.

HYPACK® PROJECT FILES

The Project Files list includes files, other than data files, used in the project. In single beam projects, these typically include planned survey lines and background charts.

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.

FIGURE 12. 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

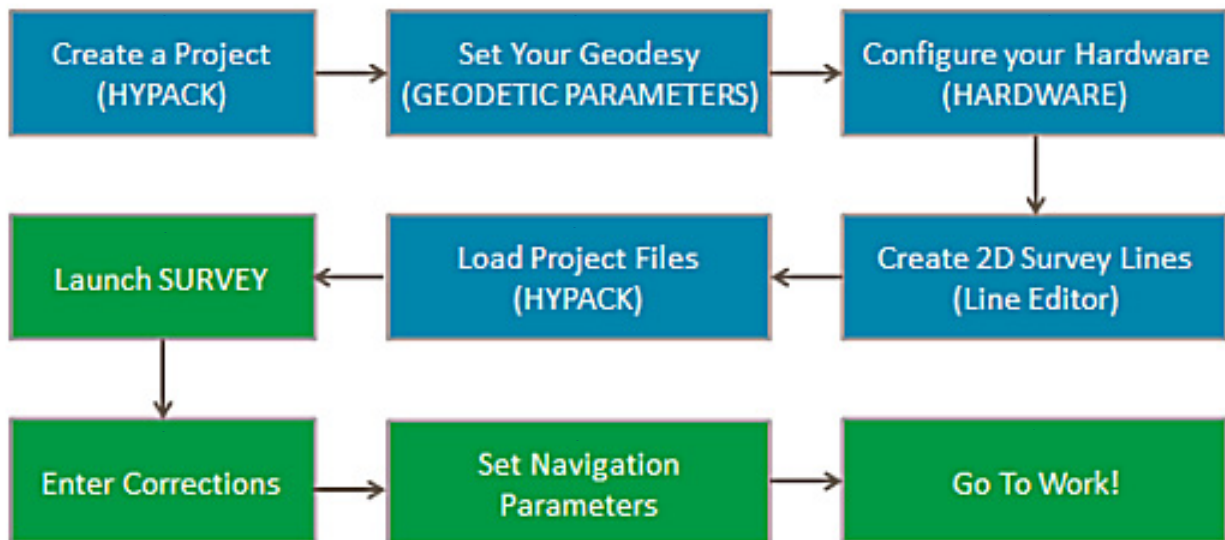
Preparation

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.

FIGURE 1. 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.

FIGURE 2. *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.

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 related fields are enabled and disabled according to the RTK selection.

b. If you use the 2012 Geoid, you must also use the 2012 VDatum files. Otherwise, use the previous version of VDatum with Geoid 2009.

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.

When you indicate that your configuration includes side scan, a SIDE SCAN SURVEY subheading appears below the vessel. When you select the subheading, the program displays the corresponding tabs for side scan devices and options (SIDE SCAN HARDWARE).

TABLE 1. *Hardware Divisions*

System Setting	Devices
HYPACK® HARDWARE	• Positioning devices • Devices used exclusively in single beam projects (single beam sounders) • Devices used in <i>both</i> single beam and multibeam surveys (ex. GPS, tide gauges) • Dredging tools (inclinometers, digging tool drivers) • Other non-bathymetric sensors
Side Scan	• Side scan 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. **Create a mobile for each device position you will track.** For example, the vessel and the towfish.
4. **Set your mobile settings.** Your hardware configuration includes a mobile for each device position you will track. For a simple side scan 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.
5. **Configure your System settings.** If you are configuring a system with **multibeam or side scan devices**, add either group to the appropriate mobile.
6. **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).
7. **Test the communication** between the devices and your survey computer.
8. **Save your configuration.** when you select FILE-SAVE, your current hardware configurations are stored in the project INI files.

TABLE 2. *Saving Your Hardware Configurations*

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

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

SYSTEM SETTINGS

To access the **System settings** select “Hardware” in the tree view.

SIDE SCAN SURVEY Options:

- The **Include** option makes side scan devices available in the HARDWARE interface.
- **Installed on Towfish** assigns the side scan device to the second mobile in the tree view. Otherwise it is assigned to the first mobile. Use the Towfish driver to calculate the towfish position relative to the boat.

IMPORTANT: All side scan devices must reside on the same mobile.

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. 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

When you have created a mobile for each position you want to track in SURVEY, you are ready to begin configuring your devices.

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

- **HYPACK® devices (for positioning, heading, etc.):** You must configure at least one positioning device for each mobile. HARDWARE includes position drivers for mobiles that move independently (eg. GPS.dll) and mobiles that move relative to another mobile (eg. towfish.dll).
- **Side scan sonar devices:** The drivers are listed in alphabetical order by manufacturer. Side scan devices automatically get their positioning from HYPACK® SURVEY.

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

When your configuration includes side scan devices, HARDWARE displays a subheading below the mobile to which they are assigned.

NOTE: Side scan devices must be assigned to the first or second mobile. All side scan devices must be assigned to the same mobile.

1. **Open the HARDWARE program.** Select PREPARATION-HARDWARE SETUP.
2. **Add a mobile for each vessel.**
3. **In side scan projects, add the side scan subheadings to the appropriate mobile using your system settings.**
 - a. **Access the System settings.** Select “Hardware Configuration” in the tree view.

FIGURE 3. *Hardware System Settings*

System

HYSWEEP Survey

☒ Include ☐ Installed on Towfish

☒ Sidescan devices on Towfish

SIDESCAN Survey

☐ Include ☐ Installed on Towfish

Synchronize the Computer Clock

Select Device to Synchronize Clock

GPS NMEA-0183

Survey Options

☒ Show XYZ files in SURVEY

☒ Automatically Start Logging upon startup

☒ Individual Tide Per Mobile

Printer Connection: HYPACK\Projects\Halifax\print.txt

- b. **In the SIDE SCAN SURVEY area, check the Include option** to make side scan devices available in the HARDWARE interface.
4. **For each HYPACK® device:**
 - a. **Select the correct mobile in the tree view for your device.**
 - 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)

FIGURE 4. *HARDWARE Drivers—Sorted by Description (left) and by DLL Name (right)*

Survey Devices

Available: All Devices

Description	Version
ADCP	12.0.1.3
AIS Interface	14.0.2.5
AIS Tide Receiver	12.0.1.0
Allied Signal LAZ-4100 E...	12.0.1.3
Anchor Manager	12.0.0.2
Applanix POS M/V Network	13.0.6...
Applied Microsystems S...	12.0.1.2
Atlas Deso 14	12.0.0.1
Atlas Deso 15/17 GLDD	12.0.1.3

View: ☐ DLL Name ☒ Description

Survey Devices

Available: All Devices

DLL Name	Version
adcp.dll	12.0.1.3
adgc.dll	12.0.1.2
ais.dll	14.0.2.5
aistide.dll	12.0.1.0
AnchorManager.dll	12.0.0.2
arenosa.dll	12.0.1.2
artidino.dll	12.0.1.2
atlantic_crane.dll	12.0.1.0
AutoPilot.dll	12.0.1.0

View: ☒ DLL Name ☐ Description

- 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. (For example, use the GPS driver for your boat and the towfish driver to position towed devices).

5. **For side scan devices, select the heading or subheading on the correct mobile in the tree view for your device type.** Choose the mobile for HYPACK® devices and SIDE SCAN SURVEY for side scan devices.

NOTE: If you are logging both multibeam and side scan, configure all of them using the options in the HYSWEEP® SURVEY area.

6. **Move the side scan device in your configuration to the Installed list.** Select the device in the Available list on the left and click [Add->] or double-click the device in the available list.
7. **Configure the driver options:**
 - > **Name your device.** (Optional) The name (under the Installed list) defaults to the driver description, but you can change it to something simpler or to distinguish between two devices using the same device driver.
 - > **Click [Setup] and select the appropriate options** according to the Interfacing Notes, your device manual and your project requirements.
 - > **If you are using GEOCODER™ with side scan data, check the device specified under 'Specific Sonar Identification' to be sure it matches the model you are using.** This is automatically filled when you add your device, but some drivers support more than one model. GEOCODER™ needs detailed information that may differ between models.
 - > **Assign the side scan device to the correct mobile.** Select the **Installed on Towfish** in the SIDE SCAN SURVEY area to assign the side scan device to the second mobile in the tree view. Otherwise, it is assigned to the first mobile.
8. **Configure the Connection, Offsets and Driver Setup options.**
9. **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.

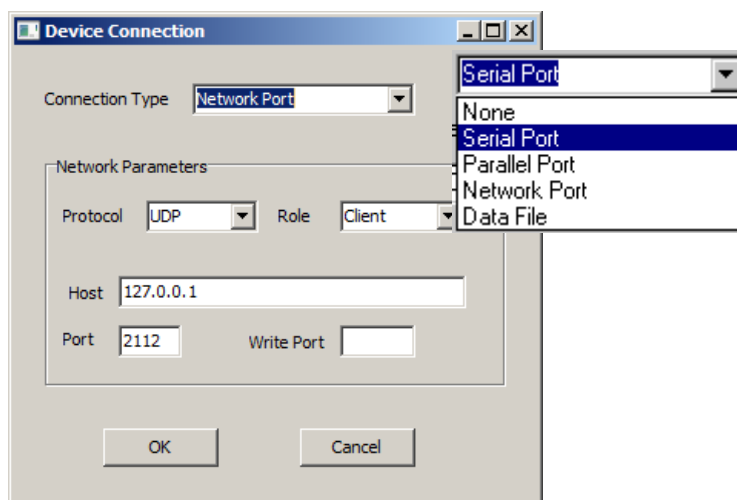
1. **Select the device in the tree view and open the Survey Connect tab.**

FIGURE 5. Survey Connect Tab

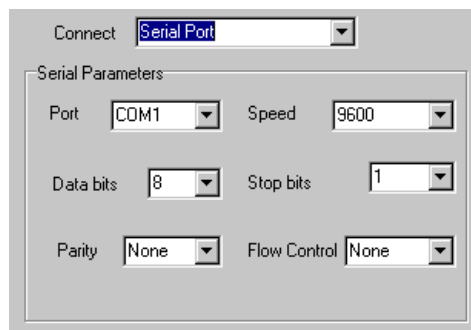
The screenshot shows the 'Survey Connect' tab of a software window. The window has three tabs: 'Survey Devices', 'Survey Connect' (selected), and 'Offsets'. The 'Survey Connect' tab contains the following elements:

- Enabled:** A checked checkbox.
- Limit update rate to:** A checkbox that is unchecked, followed by a text box containing '0' and the unit 'msec'.
- Device Connection:** A text box containing 'Serial (COM1:9600,n,8,1)' and a button with three dots '...'.
- Recording Rate:** A group box containing three radio buttons:
 - Default Recording Rate (10 mSec)**: Selected.
 - Limit Recording Rate**: Unselected, followed by a text box and the unit 'Sec'.
 - Do not record this device.**: Unselected.
- Device Interrogation:** A group box containing two text boxes:
 - Device Query Command**: Empty.
 - Device Initialization Script**: Empty.
- Buttons:** Three buttons are located at the bottom: 'Comport Test...', 'Network Test...', and 'Test Device...'.

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

FIGURE 6. *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.

FIGURE 7. *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.

FIGURE 8. Network Connect Options

The screenshot shows a dialog box titled 'Network Connect Options'. At the top, there is a 'Connect' dropdown menu currently showing 'Network Port'. Below this is a section titled 'Network Parameters' which contains four fields: 'Protocol' (a dropdown menu showing 'TCP'), 'Role' (a dropdown menu showing 'Client'), 'Host' (a text box containing '127.0.0.1'), and 'Port' (a text box containing '2112').

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.

CONFIGURING CONNECTIONS FOR SIDE SCAN DEVICES

Select the device in the tree view then click the Connect tab to access device communication settings. Connection settings are required for each serial or network device. Serial or Network connection options are included in this dialog according to your device.

FIGURE 9. *Serial Connections*

The screenshot shows the 'Serial Connections' dialog box in HYPACK. The 'Connect' tab is selected. The 'Enabled' checkbox is checked. The 'Ignore Checksum' checkbox is unchecked. The 'Record Raw Messages' checkbox is unchecked. The 'Timeout Interval (Seconds)' is set to 15.0. The 'Serial Connection' section contains: Port (COM2), Baud Rate (9600), Parity (None), Data Bits (8), and Stop Bits (1). The 'Read From File' checkbox is unchecked. At the bottom, there are buttons for 'Comport Test...' and 'Network Test...'.

- **Enabled:** Clear this selection to temporarily remove a device from the configuration without losing the device settings.
- **Ignore Checksum** is not recommended, but there are situations (normally testing) where the checksum is wrong, but the data is good.
- The **Timeout Interval:** The Devices alarm turns from green to red when the last data received from any, individual device exceeds the defined time. It defaults to 15 seconds. This option can be useful where a normal return interval is greater than the 30 second time out that is hard-coded for the other individual device alarms (Nav, Side scan, etc).
- **Record Raw Messages** saves the original data string as it is read from the device into the raw data file. (Binary data is output in hexadecimal format.)
- **Port, Baud Rate, Parity, Data Bits, Stop Bits:** Enter your device settings. These should be in the information received from the device manufacturer.
- The **Read from File** checkbox enables you to simulate data input from this device by reading a file. Many times, when you are having a problem with a device in the field, we will ask you to log some of the output from the device to a file and upload it to us. We can then replay the information using the File setting to see what is happening.

Serial Connection Settings

Network Device Connections

Drivers specify the network connection automatically. Define the network settings in the Connect Tab.

FIGURE 10. *Network Connections*

The screenshot shows a software window titled 'Network Connections' with three tabs: 'Manufacturer / Model', 'Connect', and 'Offsets'. The 'Connect' tab is selected. Inside the 'Connect' tab, there are several settings: a checked 'Enabled' checkbox, an unchecked 'Record Raw Messages' checkbox, an unchecked 'Ignore Checksum' checkbox, and a 'Timeout Interval (Seconds)' field set to '15.0'. Below these is a 'Network Connection' section containing a 'Port' field set to '1998' and an 'Internet Address' field set to '127.0.0.1'. At the bottom of the window are two buttons: 'Comport Test...' and 'Network Test...'.

If you have a DNS server, you can define your destination computer by name or by IP Address. If you do not have a DNS server, you must include the IP Address. If these values are unknown, contact HYPACK or the device manufacturer for help.

IMPORTANT: Be sure each network device has a unique IP Address to avoid network conflicts.

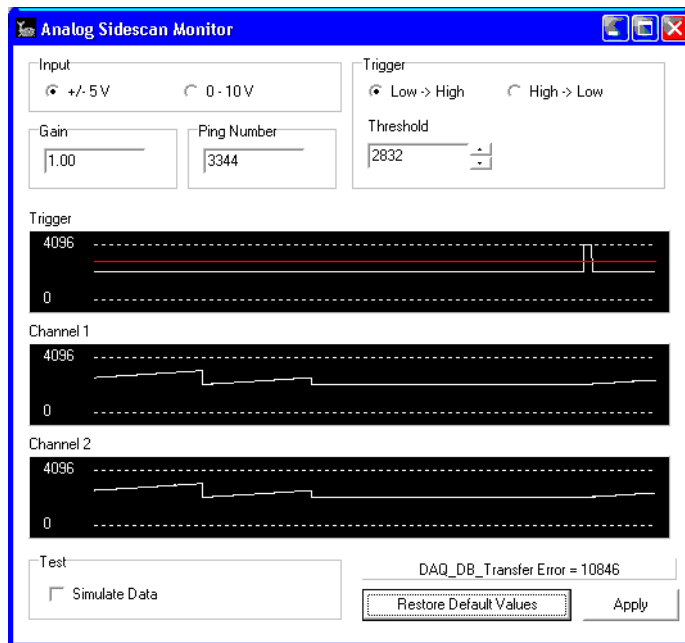
No Connection

Some devices, such as the HYPACK® Side Scan, receive data from other places and no connection settings are necessary.

HYPACK® Side Scan converts analog side scan data from single beam devices with side scan capability, which are configured in HARDWARE, and passes it to SIDE SCAN SURVEY or HYSWEEP® SURVEY where it is stored to RSS records in the raw HSX file. When this driver is loaded, the Analog Side Scan program is automatically launched with HYPACK® SURVEY and the Analog Side Scan Monitor appears. This dialog enables you to monitor and control the device activity.

Most analog devices are supported by the Analog Side Scan option and an A/D card connection in your data collection computer.

NOTE: Certain A/D adapters are not compatible with Windows® Vista.

FIGURE 11. Analog Side Scan Monitor

Input: Select a -5 to +5 volt or 0 to 10 volt range according to the device specifications.

Gain: Multiplies signal by this amount. A value of 1.0 is usually the best choice.

Ping Number displays the sequential ping numbers.

Trigger: Enter the change in the strength of the return when it hits the bottom (the threshold) in A/D count. The value must be within the 0-4096 range.

The **graphs** allow you to monitor device activity.

Test: Check the **Simulate Data** box for simulated side scan data.

TESTING SERIAL COMMUNICATION WITH WCOM32

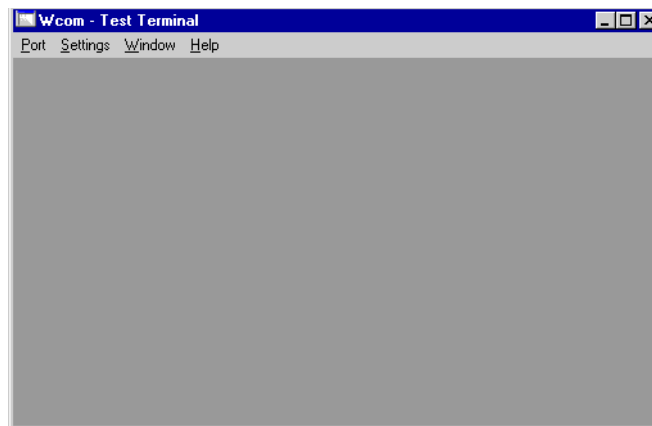
When your drivers are configured, you can use WCOM32 to capture serial data strings to a text file.

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.

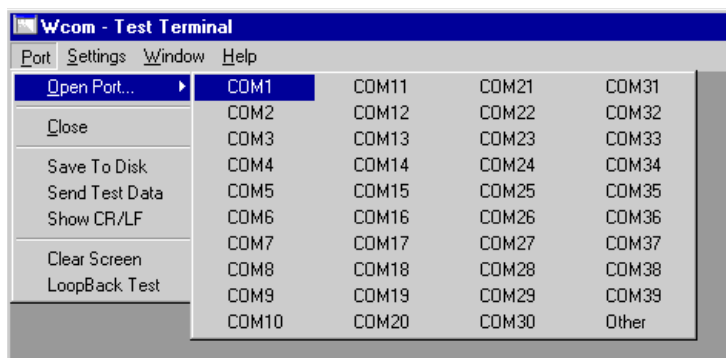
2. If you have verified the equipment is transmitting, **try to display or record the data in the WCOM32 program.** HYPACK has included a shareware program (courtesy of Control Corp., the manufacturer of Rocketport serial cards) in your HYPACK® install to make this recording process really easy. Here's how it works.
 - a. **Launch the Wcom32 program** by selecting OPTIONS-WCOM32 in the HARDWARE window. The WCom32 dialog will appear.

FIGURE 12. *Connect-Data Window*

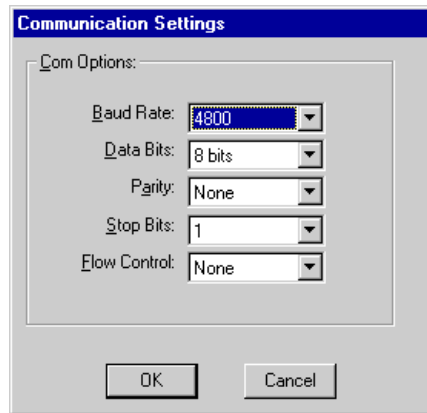


- b. **Select PORT-OPEN PORT** and select the port from which you want to capture data.

FIGURE 13. *Selecting the Port*



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

FIGURE 14. 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.

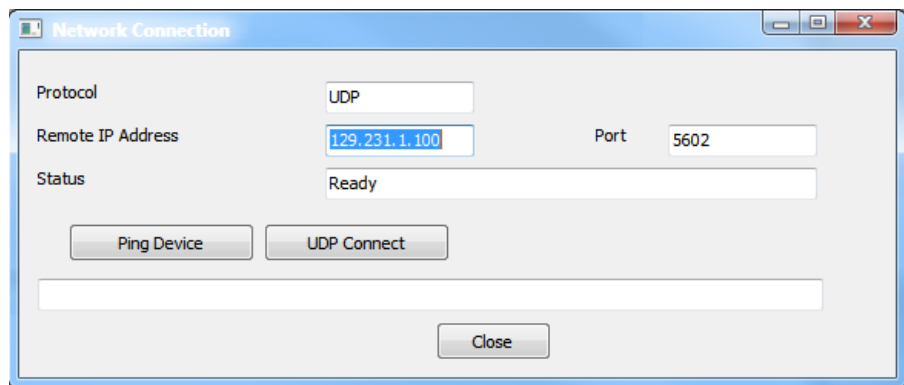
If all of your devices work when testing them individually, but *do not* work when testing them together, you have a problem with your serial communication hardware. Contact Technical Support at HYPACK, Inc. for assistance.

TESTING COMMUNICATION FOR ALL 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.

FIGURE 15. Network Test Dialog



- **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'.
- **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.

MEASURING 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.

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 **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*.

The offsets for a device on the towfish is measured from the cable anchoring point on the towfish.

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.

TABLE 3. *Recommended Vessel Origin Placements*

Vessel Type	Recommended Origin Location
Vessel with sensors other than a sounder and no MRU	Vessel Center of Mass
Towed Devices	Attachment point of the cable to the towfish

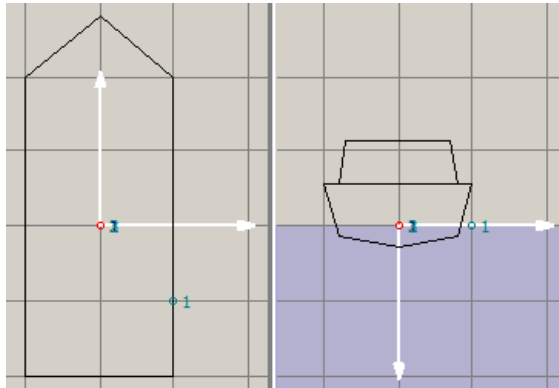
When you have carefully measured your position offsets, enter your measurements for each in the Offsets tab of HARDWARE.

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 and close HARDWARE.**
3. **Save your configuration (FILE-SAVE).**

Sample Side Scan Setup

The following example shows a hull-mounted side scan configuration:

FIGURE 16. Hull-mounted Side Scan



- The **Origin** in a side scan vessel is at the center of mass (vessel center of gravity (X,Y) and at the static waterline (Z)).
- 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.
- **MRU** devices are optional in side scan configurations. We do not measure rotational offsets for side scan sonar.

FIGURE 17. Sample GPS Offsets

Survey Devices | Survey Connect | Offsets

GPS NMEA-0183

Position
Enter Device Offset From Boat Reference Point (Center of Mass).

The Vertical Offset is Positive Downward and Measured From Waterline.

Starboard: 0.000
Forward: 0.000
Vertical: 12.0

Rotation
Enter Device Rotation from Forward (Yaw) and Vertical (Roll and Pitch)

Yaw rotation follows azimuth (clockwise rotation is positive). Bow up is positive pitch, port side up is positive roll.

Yaw: 0.00
Pitch: 0.00
Roll: 0.00

Device Latency
Enter the Latency Time (Positive) in Seconds: 0.000

- The **transducer** is starboard and aft of the origin so the starboard offset is positive and the forward offset is negative.

FIGURE 18. Side Scan Offsets

Manufacturer / Model Connect Offsets

Sonar Head 1

Position
Enter Device Offset From Boat Reference Point (Center of Mass).
The Vertical Offset is Positive Downward and Measured From Waterline.

Starboard: 10.000
Forward: -10.000
Vertical: 2.8

Rotation
Enter Device Rotation from Forward (Yaw) and Vertical (Roll and Pitch)
Yaw rotation follows azimuth (clockwise rotation is positive). Bow up is positive pitch, port side up is positive roll.

Yaw: 0.00
Pitch: 0.00
Roll: 0.00

Device Latency
Enter the Latency Time (Positive) in Seconds: 0.000

ASSIGNING THE TRACKING POINT IN HARDWARE

In addition to the sensors, your hardware configuration must include a tracking point.

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

On a side scan survey, you typically place the tracking point at the towfish attachment point (0,0).

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

The **Alarms** and **GPS Status Codes** tabs provide settings to show alarms based on the quality information in the GGA string.

*Alarms Tab***FIGURE 19.** *GPS Driver Setup - Alarms Tab*

Setting	Value	Show alarm
Maximum HDOP value	0.0	☐
Min number of satellites	0	☐
Max synchronization error	500	☐
Max baseline	0.0	☐
Max correction age interval (s)	0.0	☐

In the Alarms Tab:

1. Enter alarm conditions.
2. Check the corresponding Show Alarm box for each condition to which you want to be alerted.

TABLE 4. *Alarm Conditions*

Alarm Condition	Alarm Shown When
Maximum HDOP	HDOP greater than the value entered. (Recommended Value = 4)
Number of Satellites	Number of satellites less than the value entered. (Recommended Value = 5)
Maximum Synchronization Error	Difference between the computer time and GPS time at any sync. attempt is greater than the value entered. (Recommended Value = 100ms)
Maximum Baseline Error	Distance between GPSs configured for OTFGyro is greater than the distance entered. (Recommended Value = 2m for DGPS or 0.5 m for RTK.)

GPS Status Codes

FIGURE 20. GPS Driver - GPS Status Codes Tab

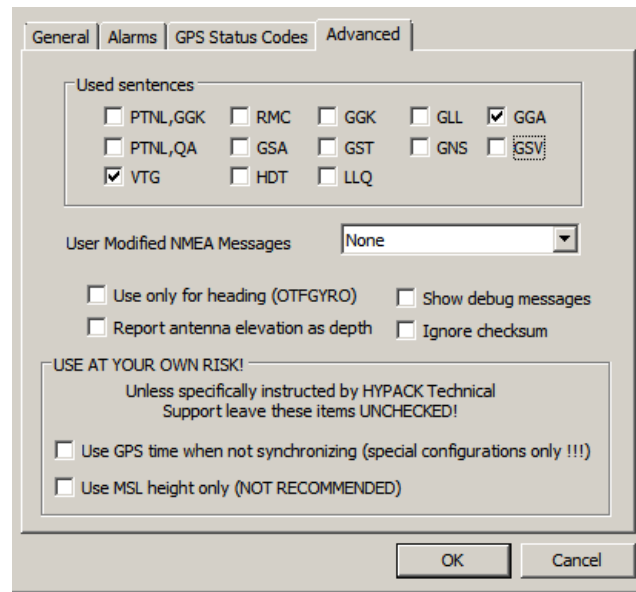
		Show alarm
Invalid	0	☒
Stand-Alone	1	☐
Differential	2	☐
Float RTK	5	☐
Fix RTK	4	☐

In the GPS Status Codes Tab:

1. **Select a GPS Status Code** according to your GPS output.
 - > If you select either the NMEA 2.1 or NMEA 3.0 option, the status fields will automatically reflect the correct values.
 - > If your GPS does not conform to either of these standards, select the Custom option and define your own status codes.
2. **Check the corresponding Show Alarm box for each condition to which you want to be alerted.** Alarms will show when the status codes equal the selected status.

Advanced

FIGURE 21. GPS Advanced Options



Used sentences: Instructs which strings the driver should read from your GPS output. Select *one position string* and at least one string for each of the other functions selected in the Device Setup (heading, speed, etc).

NOTE: In general we recommend that you configure the GPS receiver to output only the messages that you need and leave all the other check boxes unchecked.

Tip:

For all DGPS applications, we prefer to receive the GGA and the VTG messages.

Ignore Checksum: Some devices use a different checksum calculation than we do. In this case, you may get a lot of bad checksum errors when the data is good. Check this option to skip the checksum routine and assume the data is good.

GPS CONNECTION

Most GPS devices today are *devices*. Please refer to [Configuring Connections for HYPACK® Devices](#).

GPS OFFSETS

If you can, set your GPS directly above the boat origin to eliminate horizontal offsets.

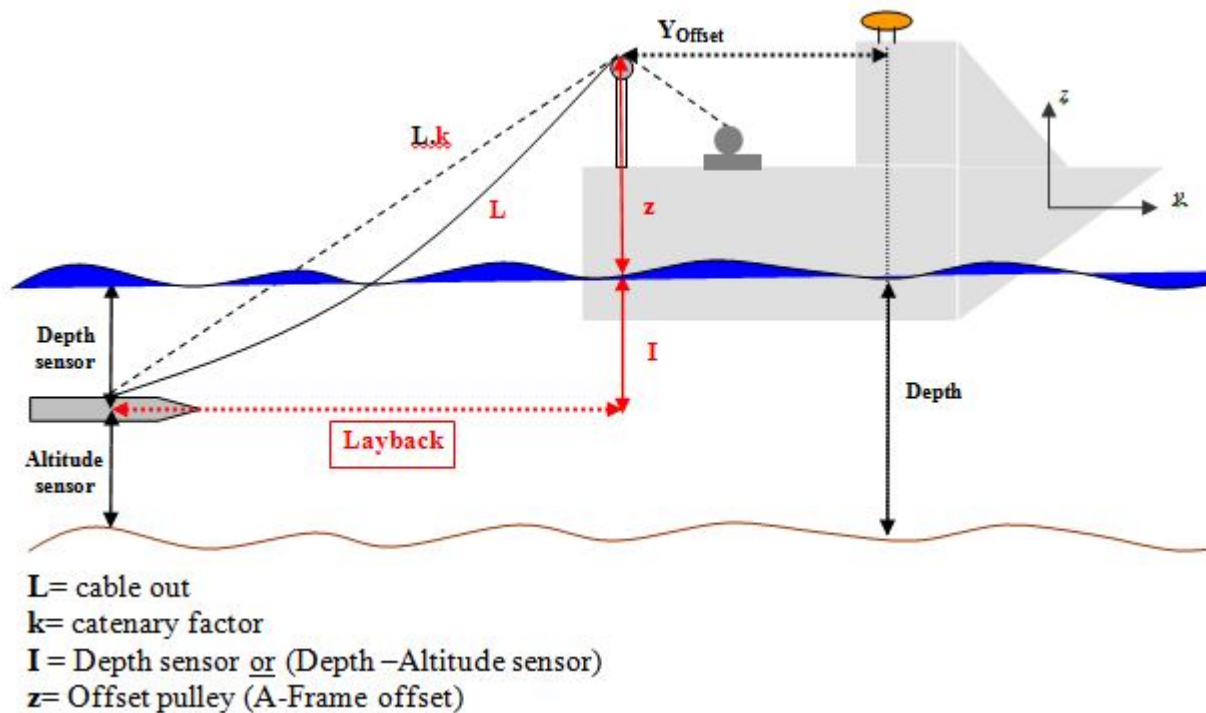
Remember to enter the vertical offset as a negative number because, in HYPACK®, the Z-axis is positive downward from the waterline.

TOWFISH WITH SIMPLE LAYBACK

In certain surveys, you need to position devices, such as a side scan towfish, by using a simple layback formula.

The following figure provides details on configuring the HARDWARE and SURVEY programs for this operation. We have used a towfish as an example, but the same procedure is applicable to other types of mobiles.

FIGURE 22. *Towfish Offsets and Measurements*



Devices carried by a towfish are configured in the same manner as if they were on a survey boat. Offsets for the *devices on your towfish* should be relative to the attachment point of the cable to the towfish. Side scan configurations typically use zero.

HYPACK® uses the towfish depth, Z-offset and corrected cable length to calculate the horizontal distance from the A-frame connection point to the towfish. That distance is added to the Y-offset to calculate the layback.

A cable counter device driver, the towfish driver, calculates the corrected cable out. Additional information in the driver setup completes the formula to calculate a position for your towfish.

TOWFISH DEVICE SETUP IN HARDWARE

1. **Create the towfish as a mobile.** Right-click on HYPACK Configuration and select 'Add Mobile'.
2. **Name your mobile.** (Optional) This name will be used to identify the mobile in both the HARDWARE and the SURVEY programs.
3. **Load the HYPACK® towfish driver as one of the devices on the towfish mobile.**
 - > **Specify the X, Y and Z offsets in the driver setup dialog, not in the Offsets tab.**
 - > **Select Manual Layback** from the drop-down list.
 - > **Select HYPACK Standard** from the drop-down list.
 - > **Select Mobile Depth** as the Depth Source.
 - > **Select Shallow Fish** as the Fish Depth
 - > **No Connect options** are required for Manual Layback mode.

(Please refer to the *Common Driver Notes* document found in your HYPACK 2020\Help folder for full details on all driver options.)

FIGURE 23. Towfish Driver Setup

Setup Device

Manual Layback Cable Counter Setup

Layback Method

- ☒ HYPACK Standard
- ☐ P.T Math Method
- ☐ SHOM (Basic)
- ☐ SHOM (Classic)
- ☐ SHOM (Zero Surface)

Correction Factors

Catenary Factor 0.81

Device Factor 1

Depth Source

- ☒ Mobile Depth
- ☐ Sidescan Interface

Without the Depth Sensor the sidescan depth is computed:
SS Depth = Water - Altitude

Map Display

Number of Segments 5

Cable Color

A-Frame Offsets

X Offset -3

Y Offset 10

Z Offset 0

Z Offset is positive downward

Fish Depth

- ☒ Shallow Fish
- ☐ Altitude Sensor
- ☐ Depth Sensor
- ☐ Deep Fish

Fish Depth Channel 0

Error Recovery

- ☒ Go to Manual Mode
- ☐ Keep the last value

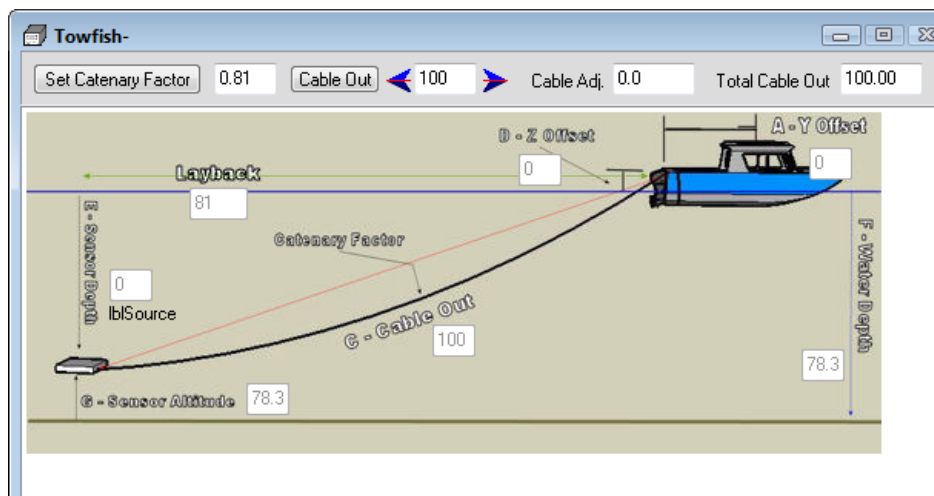
OK Cancel

4. **Save this configuration.** (Optional) Select FILE-SAVE AS and naming the configuration. The information will be saved with an INI extension to your project directory.

SPECIFYING CABLE OUT IN SURVEY

When you enter SURVEY, the cable count dialog appears for you to enter your cable length in survey units.

FIGURE 24. Specifying the Cable Out in the Towfish.dll Device Driver



In the example, we have specified the cable out as 200. Once you have specified the Cable Out, click [Set]. The program will calculate the layback using a NOAA concatenation formula.

CONFIGURING YOUR SIDE SCAN

SIDE SCAN SONAR DRIVER SETUP

Each side scan sonar has model-specific settings. Please refer to the *Sidescan Interfacing Notes* document found in your HYPACK 2020\Help folder for full details.

SIDE SCAN SONAR CONNECTION

Side scan sonar come with many different interface connections. Please refer your sonar manual and to [Configuring Connections for HYPACK® Devices](#).

SIDE SCAN SONAR OFFSETS

Towed side scan sonar gets its position from the towfish. Typically, all offsets for the side scan driver are zero. HYPACK® does not correct side scan data for rotation or latency.

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.

Additionally, planned lines may be exported to a selection of third-party plan files.

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.

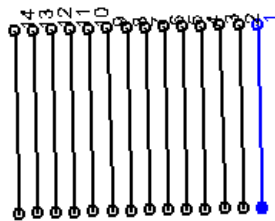
OFFSET PATTERNS FOR PLANNED LINES

Planned lines can be created in any one of several patterns using the Offsets function. All of the following patterns are available when you generate lines in the LINE EDITOR.

TABLE 5. Sample Planned Survey Line Offset Patterns

Parallel Offsets

Parallel lines on either side of the initial line.



Select Offset Method - Meter

Center Line | Parallel | Radial | Search Pattern | Stair Step | Extend Lines

Lines left of center: 5

Lines right of center: 8

Distance between lines: 25 e.g. 100, 50, 30 etc to create pattern

☐ GeoNav Naming

☐ Append offsets to single line

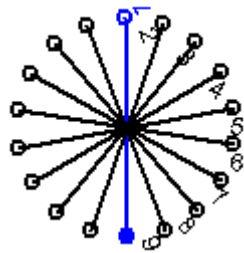
☐ Automatically calculate curve radius for segments

☒ Allow Line Renaming

OK Cancel

Search Offsets

Pivot your planned line about the midpoint of the first segment.



Select Offset Method

Center Line | Parallel | Radial | Search Pattern | Stair Step | Extend Lines

Additional Lines: 8

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.

FIGURE 25. *Sample Background File*



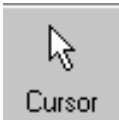
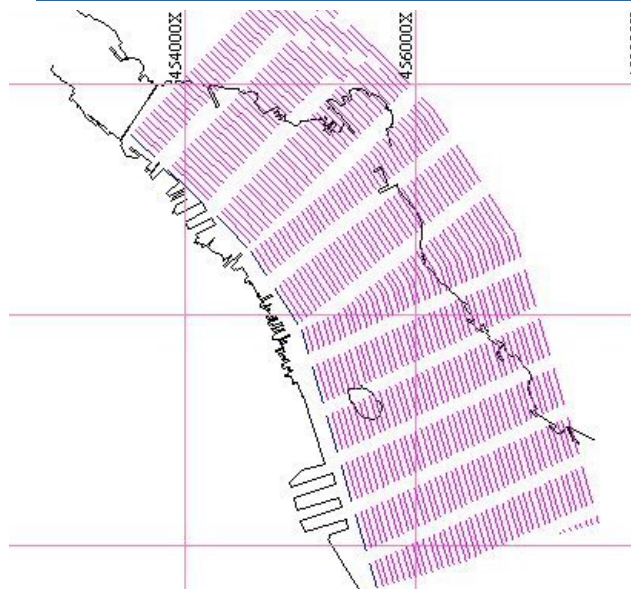
2. **Open the LINE EDITOR.** Select PREPARATION-EDITORS-LINE EDITOR.
3. **Create your initial planned line.** Click the Cursor icon and the LINE EDITOR will minimize. 
4. **Click in the area map to mark each waypoint in the initial line.**
5. **Restore the LINE EDITOR** by clicking [Line Editor] in the toolbar. You can review the points of your first line, and then continue.
6. **Create your Offset Lines.**
 - 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. 

FIGURE 26. *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.

CHAPTER 3

Survey

HYPACK® 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 and magnetometer data. In side scan surveys, HYPACK® SURVEY runs simultaneously with SIDE SCAN SURVEY to provide the navigational data while SIDE SCAN SURVEY collects the side scan 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:

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.

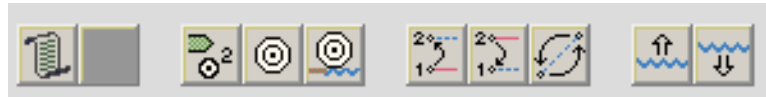


The HYPACK® SURVEY program loads the information from the current project. The program reads geodetic information and hardware information from the project initialization files. It loads the most recently used planned survey line file (*.LNW) from the

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.

FIGURE 1. *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.

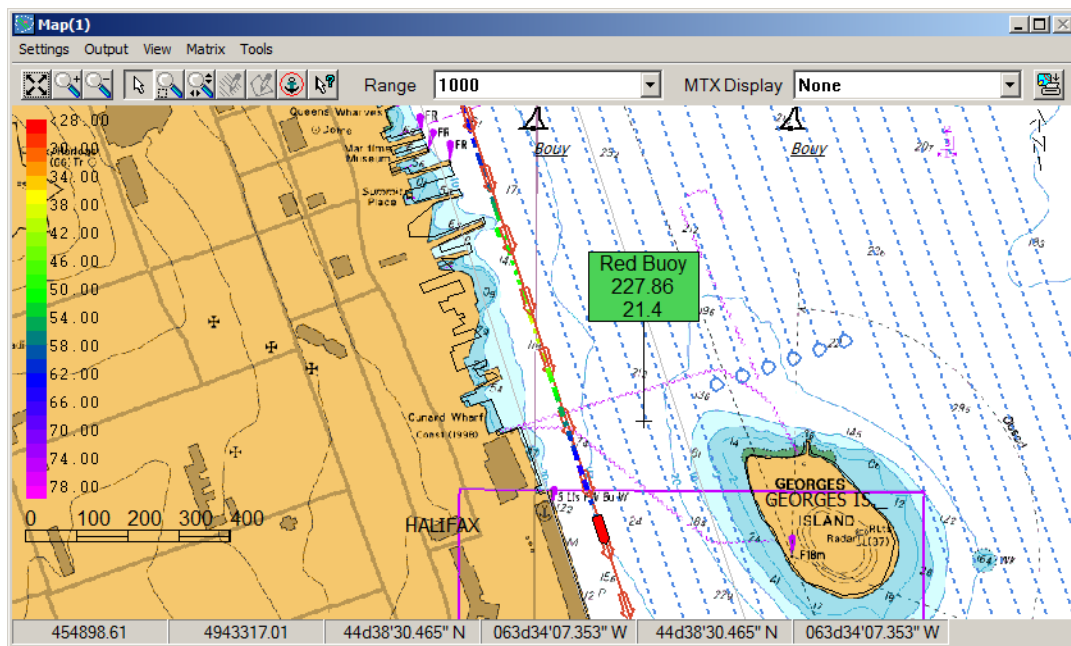
You may reposition and size all windows, in one or more monitors, using the cursor to drag the title bars and window edges.

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

FIGURE 2. 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

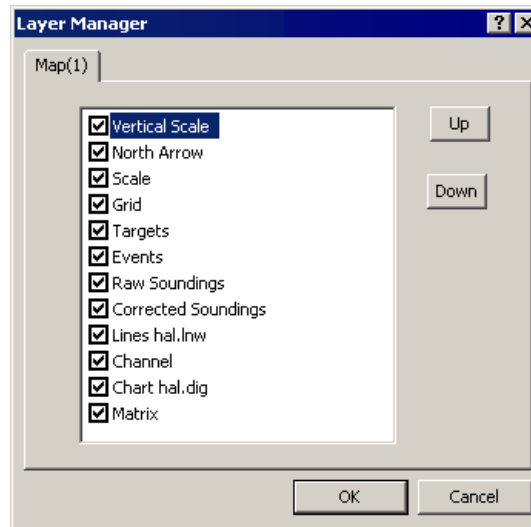
In addition to your project files, you may also include chart features, such as a legend, scale, north arrow, and projection and lat./lon. grids, in your area map display.

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].**

FIGURE 3. *A Sample Area Map*

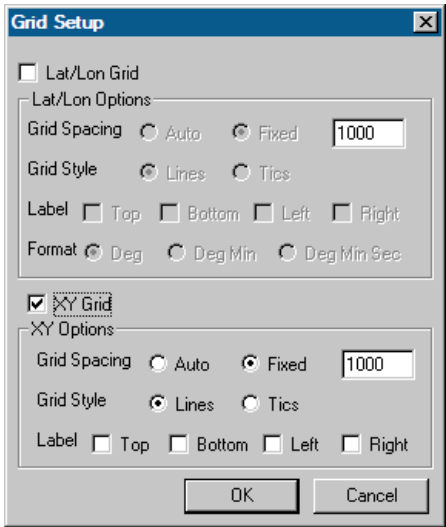


AREA MAP GRID PROPERTIES

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.

FIGURE 4. Grid Setup Dialog

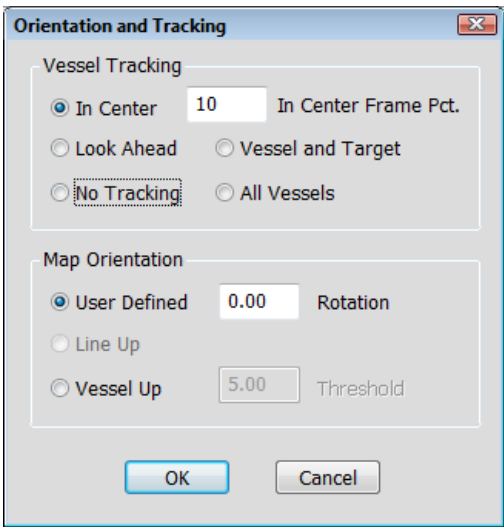


AREA MAP
TRACKING AND
ORIENTATION
OPTIONS

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.

FIGURE 5. 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

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:

TABLE 1. *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.

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

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).

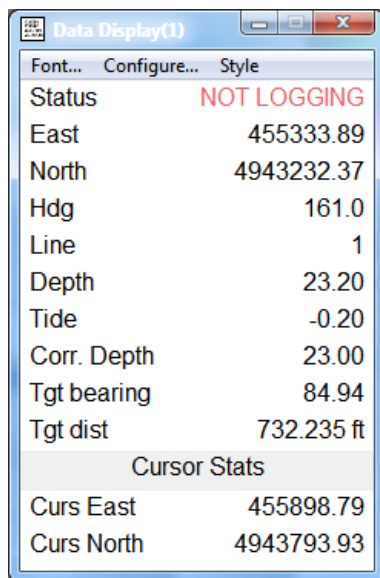
When this setting is changed, all other Cross Track Error displays update accordingly.

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.

FIGURE 6. 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.

ALARMS IN SURVEY

Alarm windows are located along the bottom of the 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 program can generate the following alarms:

TABLE 2. *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 Draft 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
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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”.

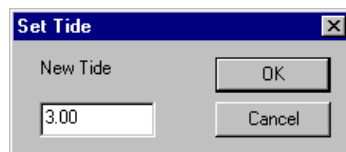
You can display one or more of the following data affected by tide in the Data Display:

- 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.

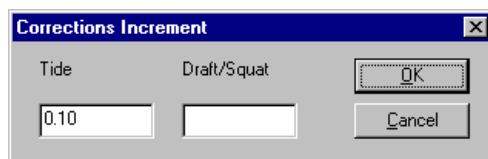
You can set the initial value of the tide correction by clicking the TIDE–SET menu item. This value will be assigned to all soundings logged until you set a new value. Update this value often, especially if the tide level is changing quickly.

FIGURE 7. *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.

FIGURE 8. *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 program 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

In HYPACK®, $\text{Final Depth} = \text{Raw Depth} + \text{Static Draft} + \text{Dynamic Draft} (+ \text{Tide, SV and Heave corrections})$

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 DREDGEPAK®) and interpolates a draft correction based on the Speed Over Ground.

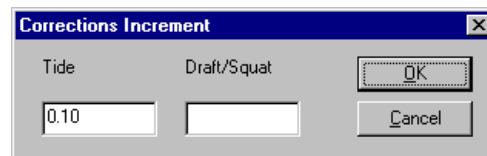
NOTE: On a river, your speed through the water column may not equal your speed over ground. This could cause some significant errors in the Dynamic Draft correction being assigned by the driver.

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".

FIGURE 9. 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.

FIGURE 10. DraftTable Driver Setup

Setup Form

Interpolation
☒ Linear ☐ Spline

Dual Draft Corrections
☒ Enable Separate Corrections
 For Shallow and Deep Water
 Shallow Depth Limit: 0
 Deep Depth Limit: 2

Generic Speed Over Water Reader
☒ Enabled
 String ID:
 Multiplier: 1
☒ Fixed Length Offset ☐ Field Number
 Position: 0
 Length: 6
 Field: 0
 Delimiter:
☐ CR Only ☒ CR/LF

	Speed	Shallow Draft	Deep Draft
1	0	0	0
2	1	0.4	0.3
3	3	0.8	0.5
4	5	1	0.8
5			
6			
7			
8			
9			

Draft vs. Speed

Graph OK Cancel

3. Click **[OK]**.

NAVIGATION PARAMETERS

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**.

FIGURE 11. *Navigation Parameters Dialog*

Navigation Parameters

Start line gate Feet Offset Feet

☐ Disable end line gate

Approach Line Distance Feet

XTE Alarm limit Feet

Next Event

Event interval

Event Increment

Next Line

Line increment

LOG Backup Time Minutes

MTX Backup Time Minutes

Depth Alarms

Min Feet

Max Feet

☒ Reset Events on Startup

☐ Time Events on Even Intervals ☐ Heading Input is Geodetic

☐ Connect Events with Segments ☐ Event on Segment Switch

Event basis

☐ Manual

☐ Time

☒ Distance

Automatic leg switch

☐ While logging

☒ Always

☐ Never

Line Direction Mode

☒ Closest Point

☐ Origin point

☐ Terminus point

☐ Alternate points

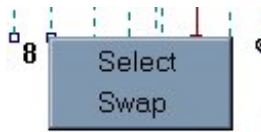
NAVIGATING PLANNED LINES IN SURVEY

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.

FIGURE 12. *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.

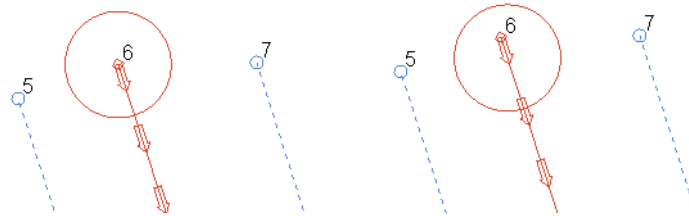
The automated Start Line Gate feature begins logging automatically if the vessel tracking point passes within the specified distance of the start line point.

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.

FIGURE 13. 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.

FIGURE 14. Negative Start Line Gate

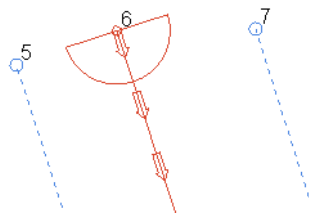
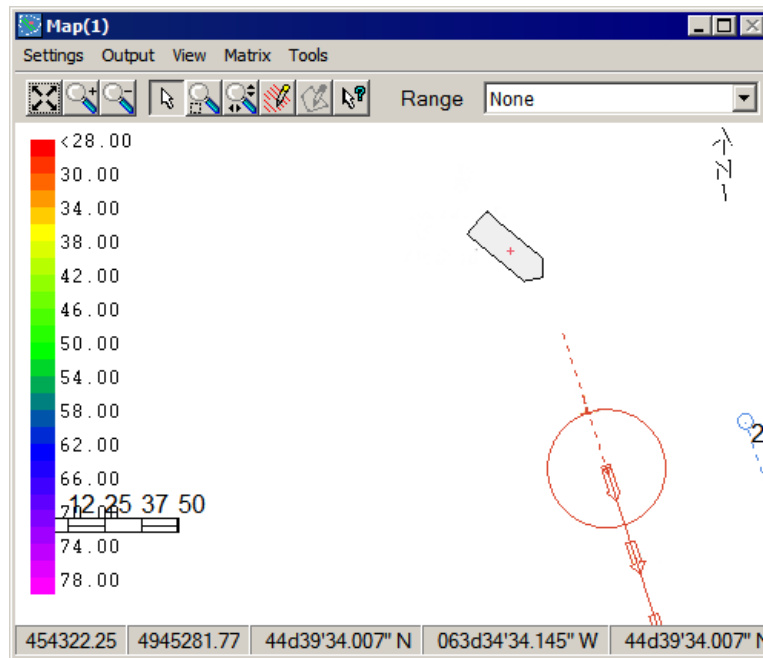


FIGURE 15. Approach Line Extends 50 Meters from the Start Line

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.

HYPACK® programs use the data from the RAW files to position the data in the corresponding multibeam or side scan HSX files.

HSX format files store side scan data. Each time you log data, SIDE SCAN SURVEY generates a file with the same root name as the RAW file from HYPACK® SURVEY and the HSX extension. HSX files are listed together in catalogs separate from the RAW files: HSX_Raw catalog root name.LOG. HYPACK® programs use the data from the RAW files to position the data in the corresponding side scan HSX files.

SURVEY KEYBOARD SHORTCUTS

TABLE 3. 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
	Increment line segment by 1	Ctrl+F
Logging Functions	Start Logging	Ctrl+S
	Pause Logging	Ctrl + U
	Resume Logging	Ctrl + R
	Manual Event Mark	Ctrl+N
	Abort Logging	Ctrl + A
Target Commands	End Logging	Ctrl+E
	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

SIDE SCAN SURVEY

SIDE SCAN SURVEY is a side scan data collection and logging program. The displays give real-time information on your survey area.

Digital or analog side scan data is logged to the HYPACK® HSX format. This data can then be imported by the SIDE SCAN MOSAIC program for viewing and targeting. HSX-formatted side scan data can also be used to create a mosaic. This mosaic may then be saved as a geo-referenced TIF file, which can be displayed in your project as a background file.

The playback mode replays the raw HSX files giving the same view seen on the selected survey vessel.

The HYPACK® SURVEY and SIDE SCAN SURVEY programs run simultaneously. HYPACK® SURVEY provides navigation and single beam data collection while SIDE SCAN SURVEY provides the side scan data. The logging status of SIDE SCAN SURVEY is controlled by SURVEY. Each time SURVEY begins or stops logging, it stores the logging status to shared memory. SIDE SCAN SURVEY monitors shared memory and matches its logging with SURVEY.

NOTE: If you are collecting multibeam data with your side scan data, you may only need HYSWEEP® SURVEY program, instead of SIDE SCAN SURVEY, which supports side scan devices.

SIDE SCAN SURVEY provides a scrolling display of its data. You can create targets here in real-time or in the post-processing TARGETING AND MOSAICKING program. You can also capture a TIF file of areas of interest as you progress.

To launch SIDE SCAN SURVEY, select SIDE SCAN - SIDE SCAN SURVEY.

SIDE SCAN SURVEY WINDOWS

SIDE SCAN SURVEY includes the Side Scan Survey window with a waterfall display, and alarm status indicators. Use the View menu to show or hide optional segments of the Side Scan window: survey information, toolbars and the signal display.

The View menu also provides access to existing windows, and options to generate (*VIEW-NEW-WindowName*) additional Waterfall, Towfish Altitude and Towfish Sensors windows in your display. In this way, SIDE SCAN SURVEY can show multiple windows of the same type, but you can configure them to display data from different devices (selected in the toolbar for each window) or the same data with different display options.

Most windows have a toolbar at the top, providing shortcuts to window configuration. Pass the mouse pointer over a tool to see a hint as to what the tool does. Toolbars are toggled on and off with the F10 key.

Each window can be resized and moved around the screen, retaining it's size and position until changed. VIEW-TILE WINDOWS arranges the currently open windows in a manner that attempts to optimize your viewing in each window.

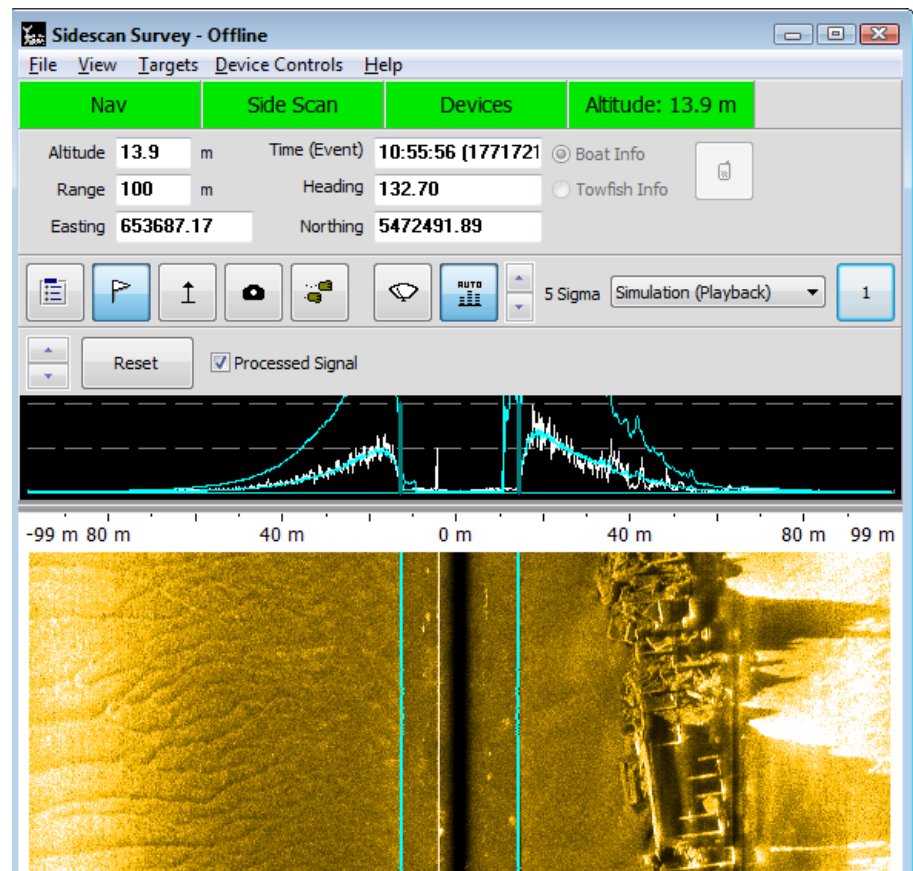
SIDE SCAN SURVEY WINDOW

The Side Scan Survey window is the traditional side scan waterfall display (forward looking and without slant range corrections). It updates at 1Hz, regardless of how quickly your GPS or side scan is updating.

You can control bottom tracking, and adjust the reflection brightness and contrast through the side scan controls. The status bar shows the cursor position in either X/Y or lat./lon.

In SIDE SCAN SURVEY, use the View menu to control the survey information, toolbar and side scan signal displays. Resizing the window affects resolution of the waterfall already drawn, but swaths drawn thereafter draw accurately.

FIGURE 16. Side Scan Survey Window



If you have dual frequency side scan, use the frequency icon toggle between frequency displays.

You can **control your sonar settings** from SIDE SCAN SURVEY. The Device Controls menu and controller icon access the full device controller window. (These tools are unavailable in playback mode.)



SIDE SCAN SURVEY is configured to continuously check for and notify you of data errors or loss of data input. The alarm indicators show green (OK), yellow (careful) or red (no good) depending on status. Click the indicator to show status history.

The **Nav** and **Sidescan** alarms turn red when no data has been received from the corresponding device for 10 seconds.

The **Devices** alarm turns red when no data has been received for a period longer than the Time Out Interval that you set for each device in the hardware setup.

SIDE SCAN SIGNAL WINDOW

The Side Scan Signal graphs amplitude vs. time for each sonar ping. Reflection amplitude is in units of A/D converter count. While this display has no particular value for bottom imaging, it is quite useful for verifying sonar operation.

You can choose to draw:

- **Processed Signal:** The raw signal with HYPACK® scaling and gains applied. The range can be adjusted using the arrow buttons. When unselected, the window displays the raw signal as received directly from the sonar.
- **Amplitude Range** can be adjusted using the arrow buttons.
- **Color Saturation:** The sliders above and below the signal graph set high and low color saturation limits. Signal above the upper sliders will appear white in the waterfall window. Signal below the lower sliders will appear black. This method provides better results than using the side scan controls.

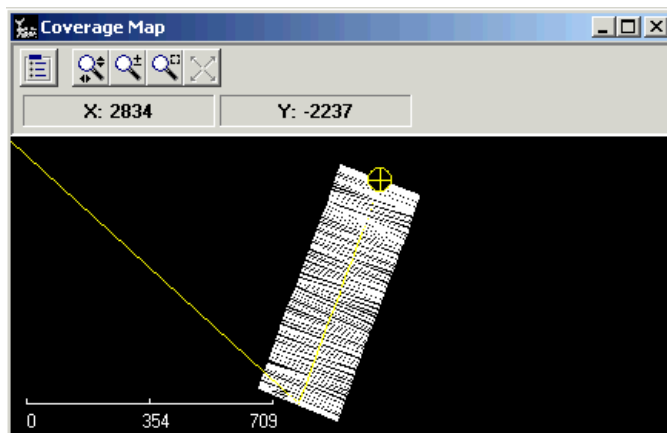
Toggle the side scan signal display with the Side Scan Signal icon.



SIDE SCAN COVERAGE MAP

The Side Scan Coverage Map is an overhead view of your vessel and, when logging, the area covered by your side scan sonar.

FIGURE 17. Side Scan Survey—Coverage Map



In this window you can:

- **Target contacts** by double-clicking the object of interest.
- **Monitor coverage** using a HYSWEEP® type matrix file.

- **Display grid position** by moving the cursor across the window. To display in lat/lon, check the 'Display Positions in Lat/Lon' option in the View Options dialog.

SIDE SCAN ALTITUDE WINDOW

Many of our users tow the side scan device on a towfish with an altitude sensor and it is handy, if not required, to know the towfish altitude during data collection. If your device outputs bottom tracking you can display the current towfish altitude in the Altitude window.

You may configure this window to display a red background if the altitude returned by the sensor falls below a user-defined limit.

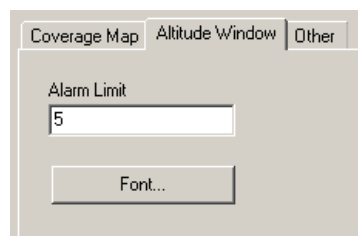
To configure this window, select VIEW OPTIONS(F9). In the Altitude Tab, set the alarm limit to display a red background if the altitude returned by the sensor falls below this limit.

In the following example, the alarm limit was set to 36 survey units. At 37, the background is green but red at altitudes less than 36.

FIGURE 18. Side Scan Altitude Window



FIGURE 19. Setting the Side Scan Altitude Window Alarm Limit



VIEW OPTIONS IN SIDE SCAN SURVEY

The view options determine what data appears in the display windows and how the windows should be configured to optimize the display. They *do not affect data logging*.

To access the Side Scan Options dialog, use any of the

following methods:

- Select VIEW-OPTIONS from the shell menu.
- Press Shift + F9.
- Click the Options icon in the toolbar where available.



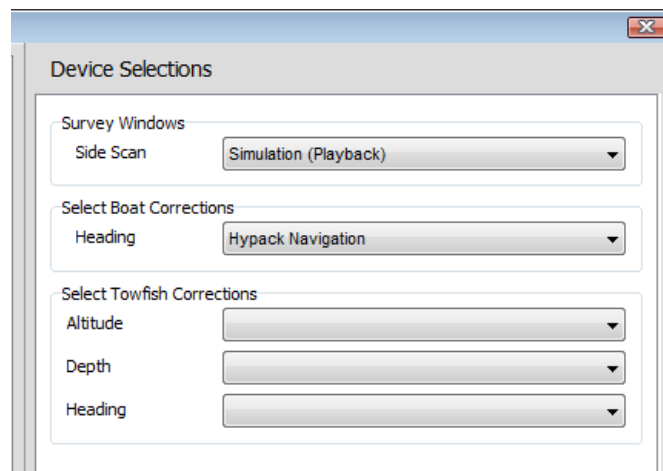
The settings in the Side Scan Options dialog determine how the data should be displayed. Each of the windows is configurable to a certain extent. Range settings are adapted to expected bottom depths, display styles are selected to the operators personal preference and need.

The Device Selections determine the source for each type of data displayed.

DEVICE SELECTIONS IN SIDE SCAN SURVEY

The Device Selections drop-down listings are populated based on your hardware configuration.

FIGURE 20. Side Scan Options—Device Selections Tab



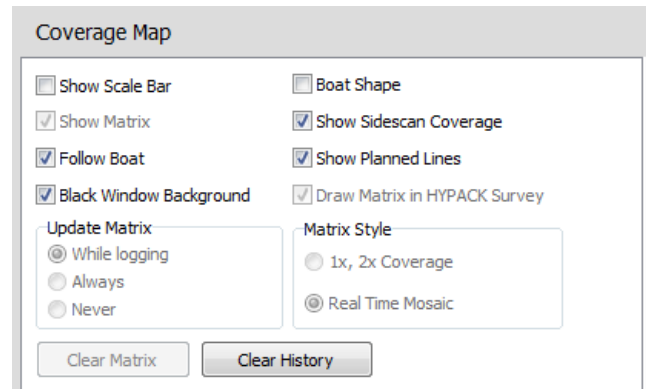
[Default Values] sets each field to the first device of each description in your device list.

- **Survey Windows:** Select the device from which your displayed data should be read.
- **Boat Corrections** apply to the survey boat (first mobile) in your hardware configuration.
- **Towfish Corrections** apply to the second mobile in your hardware configuration.

SIDE SCAN COVERAGE MAP VIEW OPTIONS

The Coverage Map View Options (F9) allow you to define which objects are displayed in your coverage map.

FIGURE 21. Coverage Map View Options



Show Scale Bar displays the distance scale bar.

Show Matrix displays the matrix enabled in your project in the Coverage Map.

Follow Boat re-centers map when the boat leaves the screen.

Black Window Background displays the data on black. The alternative is a white background with black display.

Boat Shape shows a generic boat shape vs the circle boat symbol.

Show Side scan Coverage displays lines extending outward from the transducer to indicate the coverage area.

Show Planned Lines displays the survey lines.

[Clear History] removes side scan coverage lines that have drawn to that point.

SIDE SCAN WATERFALL CONTROLS

The Side Scan Controls enable you to adjust the display settings for the Side Scan Survey window. Additional tools appear in the toolbar.

To access the side scan controls:

- Right-click on the side scan waterfall and select Side Scan Controls.

- Click the icon .
- Shift + F9



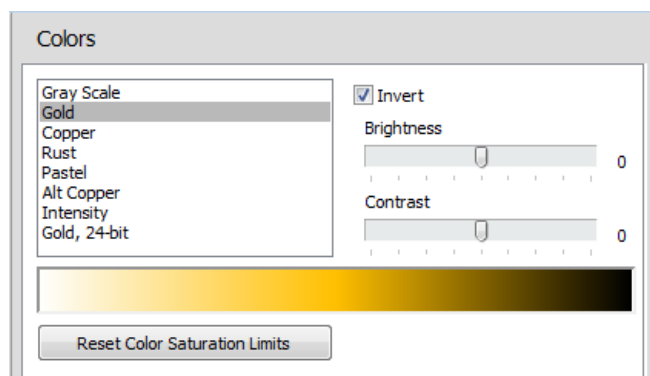
SIDE SCAN COLOR CONTROLS

The side scan data is colored based on the intensity of the acoustic signal. The Color tab allows you to adjust all of the color properties in the display. The same options affect the waterfall display in SIDE SCAN SURVEY and the displays and output mosaics in TARGETING AND MOSAICKING.

There are several default color options for which you can adjust the brightness and contrast using the corresponding sliders. In each case, low amplitude is light and high amplitude is dark (the traditional display method), but you can also reverse amplitudes represented by the dark and light color by checking the **Invert** checkbox. This is a more natural display because it emulates light and shadows.

[Reset Color Saturation Limits] resets the average amplitude value. The color schemes are all based on this value so, if your display looks light or dark and the Brightness control doesn't help, try this button to correct it.

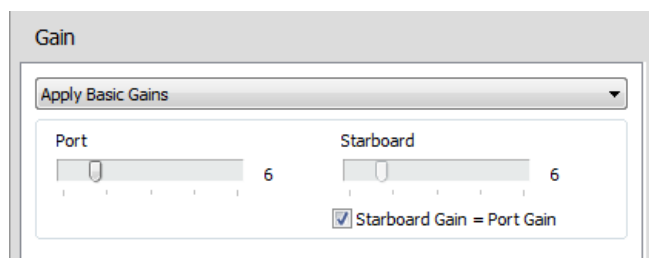
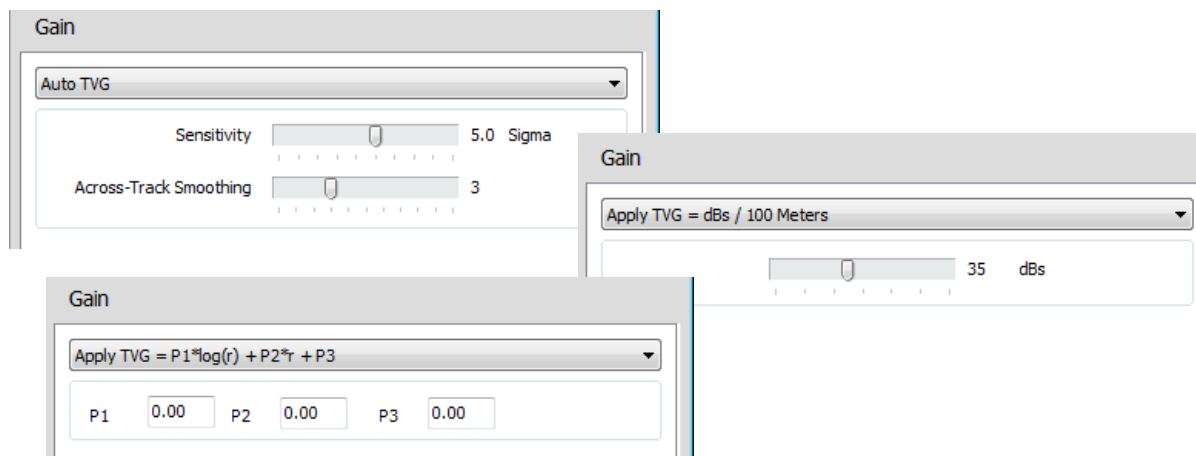
FIGURE 22. Side Scan Controls Dialog—Colors Tab



SIDE SCAN GAIN CONTROLS

There are multiple choices to modify gain settings across your swath.

For multiple frequency data, configure each frequency separately: Select a frequency, then set the appropriate gain options.

FIGURE 23. Side Scan Controls - Gain Tab—Basic Gains**FIGURE 24.** Side Scan Controls - Gain Tab—TVG Options: AutoTVG

The **basic gain** controls are available separately for port and starboard transducers. Check 'Apply Basic Gains' and use the sliders to optimize your displays.

SIDE SCAN DISPLAY CONTROLS

The Display Tab contains options which determine the method to calculate the displayed data.

FIGURE 25. Side Scan Controls Dialog—Display Tab

Range Lines draws reference range lines at the user-defined Spacing Interval and color from the water column outward.

Display Optimal Fish Altitude draws a red line at 10% of the sonar ping range—typically the height at which you can record the best quality data.

The **Side Scan Channel options** enable you to view both channels (recommended) or the Port or Starboard channel alone.

Display Range can be used to limit the data *for display purposes only*. For example, the side scan might be set to scan 100m, but you only wish to view 50m. The SIDE SCAN SURVEY program still logs all of the side scan data for post processing. **To see the full extent of the data**, set this value to 0.

Remove Water Column shows the side scan data corrected for slant ranges.

BEWARE!

During acquisition, this is dangerous as you lose the indication of how high the towfish is above the bottom. It is not recommended for normal operations.

In post-processing, the same option is used to omit the water column from your output mosaic. Failure to remove the water column will result in a dark strip down the TIF which will affect the accuracy of the georeferencing.

IMPORTANT: Your towfish altitude must be accurately measured.

Show Bottom Tracking (recommended) superimposes a blue line that represents the bottom tracking in the Survey window.

Draw Center Line draws a line vertically between the port and starboard channels in the waterfall display.

Clip Range to NOAA Guidelines reduces the range of the mosaic produced when the towfish gets too close to the bottom. When it is less than the 8% of the device range scale from the bottom, the range of the mosaic created is 12.5 times the towfish altitude. For example, at a 100 meter range scale with the towfish at 5 meter altitude, the mosaic will extend only to 62 meters (5×12.5).

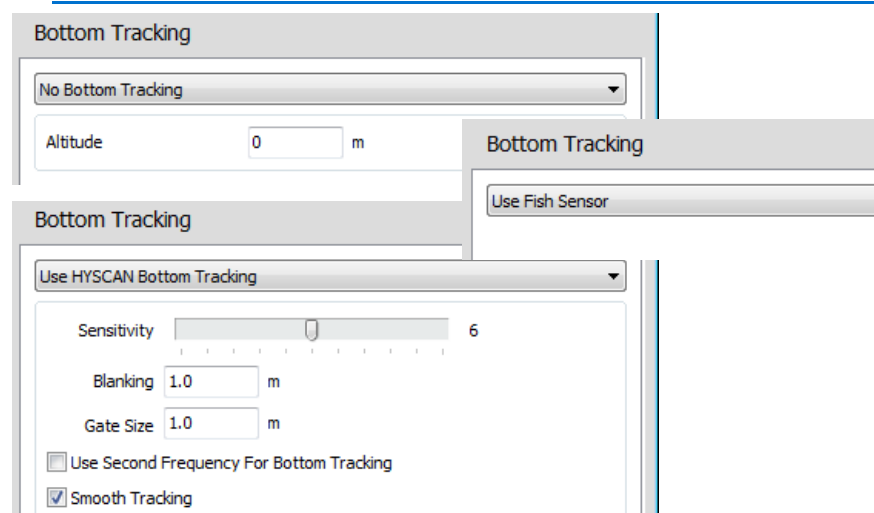
Display Positions as Lat/Long: All SIDE SCAN SURVEY windows that display position information can do so in projection grid coordinates (default) or in lat/lon.. To display position in lat/lon, check the 'Display Positions as Lat/Long' option in the View Options dialog.

Show Events: Draws event marks in the Side Scan Waterfall

The Bottom Tracking options draw a blue line in your side scan display at the position where SIDE SCAN SURVEY recognizes the bottom. This position is also recorded to your file and used as the assumed bottom by TARGETING AND MOSAICKING in post-processing, but you can override this setting at that time if you wish.

BOTTOM TRACKING CONTROLS

FIGURE 26. Side Scan Controls Dialog—Bottom Tracking



Choose the source from which you want to read the depth or select "No Bottom Tracking" and set a constant value that approximates the depth.

- **If your side scan sonar has a function to determine the bottom track**, select “Use Fish Sensor”.
- **If you want SURVEY to detect the bottom**, select “Use HYSCAN Bottom Tracking”, then adjust the Blanking, Gate Size, Sensitivity and Smoothing settings to lock onto the bottom.

NOTE: You must also select the Show Bottom Tracking option and clear the Remove Water Column option in the Display tab.

- > **Blanking** tells the program to ignore all signal down to this depth.
 - **0** is the same as no bottom tracking.
 - **Low setting** eliminates the effects of backscatter to help find the true bottom.
 - **Very high setting** can actually set the bottom tracking at a depth greater than the true depth.
- > **Gate Size** tells SIDE SCAN SURVEY the amount the bottom track can change vertically per second before adjusting the bottom tracking. This helps to filter bad soundings from the bottom tracking records. Leave it set to 1.0 except in extreme cases
- > **Sensitivity** sets the level of intensity at which the bottom is classified. Try it with a couple of different settings.

Click the ‘Bottom Tracking’ icon, then click on the waterfall display at the approximate level where you think the bottom should be. SIDE SCAN SURVEY then begins searching for the bottom at that level, and continues to search based on the other settings in the Bottom Tracking tab until it detects the actual bottom.



OTHER SIDE SCAN SURVEY VIEW OPTIONS

The normal speed of the Side Scan Waterfall is constant, but the speed of your vessel generally is not.

To adjust the speed to match the speed of the survey vessel, click the **Speed Compensation** icon. It displays objects and shapes in the scan in more realistic proportions (i.e. round objects look more round), but the display is not as smooth.



LOGGING DATA IN SIDE SCAN SURVEY

Data logging may be controlled by HYPACK® SURVEY or SIDE SCAN SURVEY. Logging commands are passed between the two programs to keep them in the same mode.

Data logging is controlled through options in the Navigation Parameters dialog, as well as through a series of keyboard shortcuts:

TABLE 4. *Logging Methods*

FILE-HYPACK® Commands	Keyboard Shortcuts
Start Logging	Ctrl + S
End Logging	Ctrl + E
Suspend Logging	Ctrl + U
Resume Logging	Ctrl + R
Increment Line	Ctrl + I
Decrement Line	Ctrl + D
Swap Line	Ctrl + W
Mark Event	Ctrl + N

Raw data is logged, by default, to the project Raw folder.

More Information

- [Real-time Mosaic in SURVEY on page 3-34](#)

SIDE SCAN DEVICE CONTROLS

You can **control your sonar settings** from SIDE SCAN SURVEY. Device controls in the interface directly control sonar pinging, and can change the sonar range. For more complex setting changes, select DEVICE CONTROLS-*DeviceName*, or use the controller icon to access the full device controller window from your survey computer instead of using the device controls and without exiting the survey programs. (These tools are unavailable in playback mode.)



FIGURE 27. *SIDE SCAN SURVEY Device Controls (from right to left) —Start/*

Stop Pinging, Range Controls, Device Controller Access

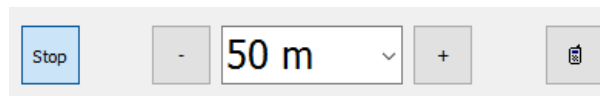
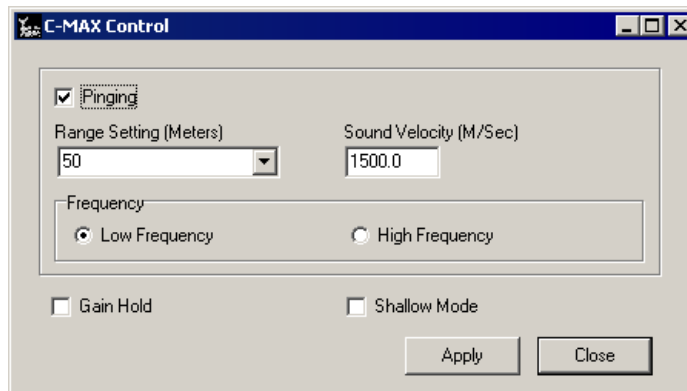


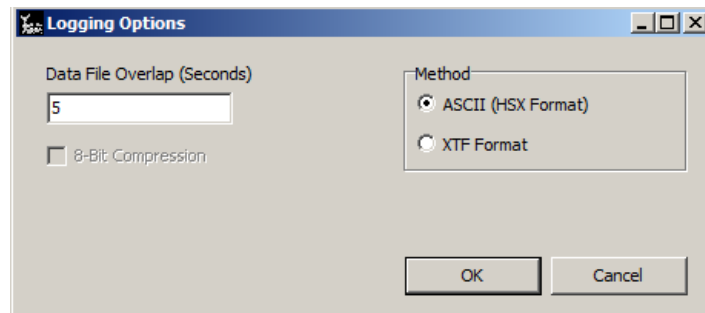
FIGURE 28. Side Scan Device Control for C-Max CM2 Side Scan



LOG BACKUP AND DATA FILE OVERLAP IN SIDE SCAN SURVEY

Long survey lines are often broken into smaller segments using the Log Back Time (in the HYPACK® SURVEY Navigation Parameters). **Log Backup Time** starts logging a new data file every 'n' minutes. It is easier in processing to have a lot of smaller files than just a few overly large files.

Data File Overlap prevents data gaps, by continuing to log to the previous (Raw) HSX file after a new one has been opened. Overlap is selected in the Logging Options dialog of SIDE SCAN SURVEY (FILE- LOGGING OPTIONS).

FIGURE 29. *Logging Option Dialog*

There's no harm in too much overlap, but too little will lead to data gaps.

Record Method: SIDE SCAN SURVEY can save your data to the HYPACK® HSX format or to XTF format.

REAL-TIME MOSAIC IN SURVEY

For side scan surveys only, real-time mosaic is a series of georeferenced TIF (GeoTIF) images (tiles) of your side scan data, generated by SURVEY based on your real-time mosaic options and the frequency specified in the first Side Scan Waterfall display.

When you enable the Side Scan Mosaic (CHARTS-SIDE SCAN MOSAIC), HYPACK® SURVEY paints a preview of the real-time mosaic tiles at the vessel location. As the vessel moves through the project area, the program continuously loads and unloads the individual tiles according to the vessel location and logs the data to a binary file in the project \Autoscan folder.

NOTE: The real-time mosaic draws only in HYPACK® SURVEY.

When you close the SURVEY program, HYPACK® generates a series of GeoTIF files from the binary data, stores them to your

project \Real Time Mosaic folder and enables them as background charts in your project.

Real-time Mosaic in the HYPACK® SURVEY Map Window (left) and Side Scan Waterfall (right)

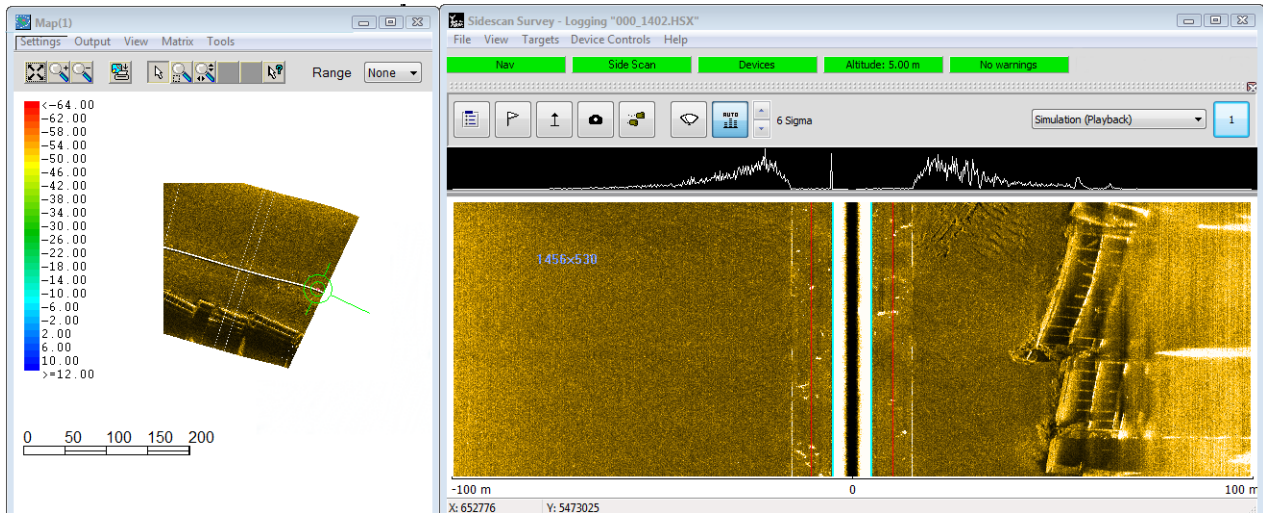
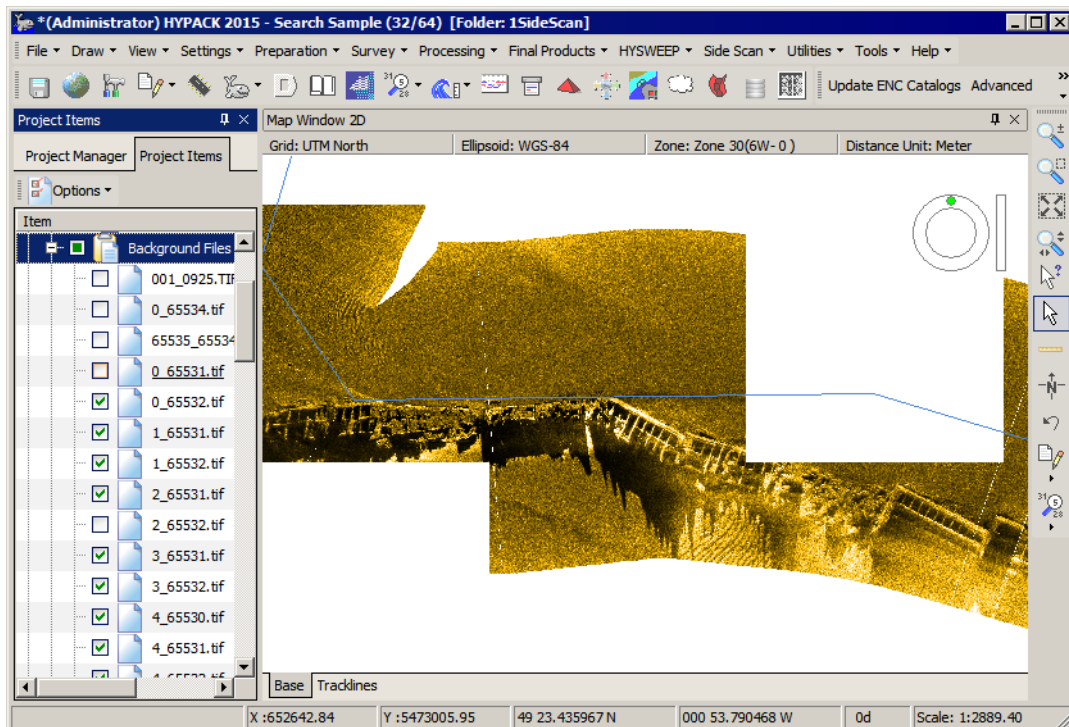


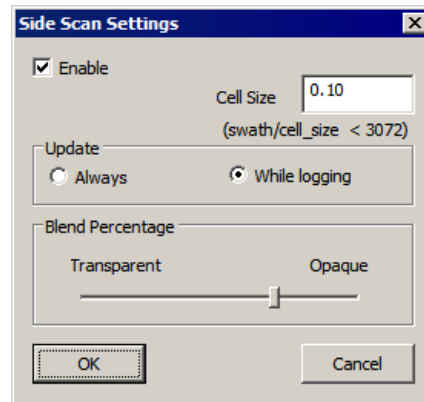
FIGURE 30. Sample Mosaics from Real-Time Mosaic—Two Tiles Disabled in the Display to Illustrate Tiling



REAL-TIME MOSAIC DISPLAY OPTIONS

1. Open the real-time mosaic settings dialog select CHART-SIDESCAN .

FIGURE 31. Real-Time Mosaic Settings



2. Select the Enable option and configure the options and click [OK].
 - > **Enable:** Check this option to start drawing the real-time side scan mosaic.
 - > **Cell Size:** The distance per pixel in the real-time mosaic. It defaults to 0.15m per pixel for metric grids and 0.50 ft per pixel for foot grids.

Tip: For high resolution sonars, you probably want to reduce these values. If your cell size is too small, a message box appears instructing you to increase the Cell Size.

IMPORTANT: *Changing cell size erases all previously logged real-time mosaic data. If you want to change the cell size and you have already logged real-time mosaic data, exit HYPACK® SURVEY to generate the GeoTIF files for your logged data, then return to HYPACK® SURVEY, change the cell size and resume your survey.*

- > **Update** determines when the SURVEY program updates the real-time mosaic.
- > **Always** updates the mosaic regardless of your logging status.
- > **While Logging:** SURVEY only updates the mosaic when you are logging survey data.
- **Transparency:** When set to **Opaque**, you won't be able to see anything underneath the mosaic as it draws. As you move the slider to the left, the new mosaic lines will become more transparent.

NOTE: This does not affect the resulting GeoTIF files.

MANAGING REAL-TIME MOSAIC DATA

The binary files with the data for the real-time mosaic remain in your project, even after the GeoTIF files have been created. If you want to resurvey an area, you have some choices:

- **Erase all the real-time mosaic (BIN) data:** Select CHART-CLEAR SIDE SCAN . If you logged data using start/end logging, you still have a permanent copy of that data for post-processing, but *SURVEY will generate no GeoTIF charts of the cleared data.*
- **Erase select mosaic tiles:** Close the survey programs and delete the selected GeoTIF files from the Project Items list (right-click-DELETE FILE). This also deletes the corresponding BIN file so the mosaic tile can not be displayed in SURVEY or regenerated as a GeoTIF until you resurvey the area. *It does not affect your raw data files.*
- **Resurvey the area.** HYPACK® SURVEY overwrites the BIN files and updates the real-time mosaic display with the new data as you go. When you finish logging and exit SURVEY, all new GeoTIF files are generated according to the current BIN files.

TARGETING IN SIDE SCAN SURVEY

SIDE SCAN SURVEY has multiple methods for marking targets:

- **Double-click in the waterfall or coverage map display.**
 - > **When you mark the target in the waterfall display,** a red circle with an X marks the spot in the waterfall display and the Targets dialog appears with the target information and a screen capture of the waterfall display. Not only is the image stored with the other target information for future reference, but it enables you to measure a targeted object and store that information as well.
 - > **When you mark the target in the Coverage Map display,** the Targets dialog appears with only the default timestamp name and the X,Y location.
- **Take a screen capture.** SIDE SCAN SURVEY automatically generates a target centered in the captured area and named like the target.

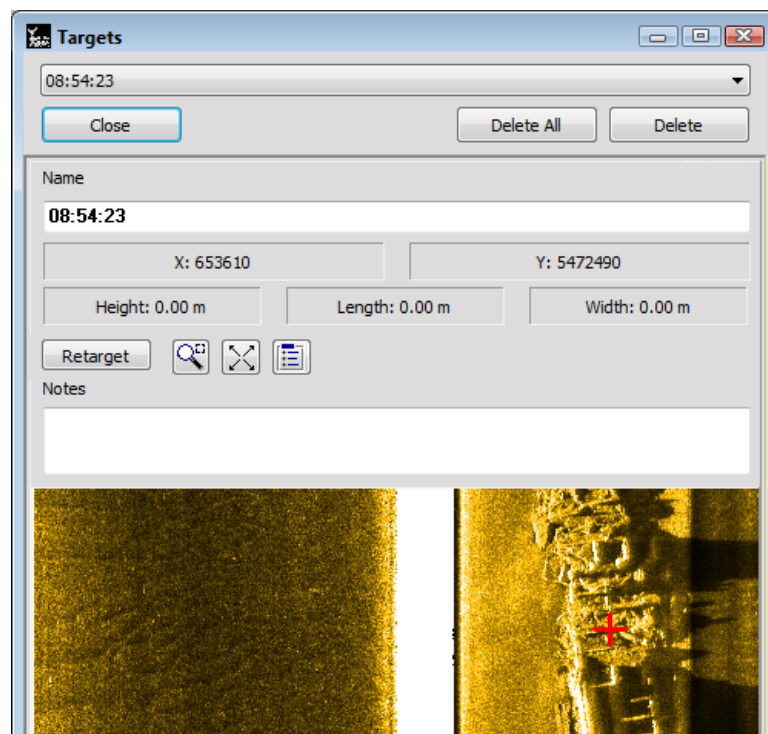
- **Use the Height Measurement tool** and mark a target at the location.

SIDE SCAN SURVEY stores all targets to the SS Survey target group. In addition, it stores the images of the target locations as a JPG images in the SS Images folder named like the target.

NOTE: Quickmark targets (F5) are considered HYPACK® SURVEY targets and are always stored in the Survey target group. No image is captured.

When you double-click to mark a target in SIDE SCAN SURVEY, the Targets dialog appears for you to inspect and edit the file entry, then save or delete the target.

FIGURE 32. Targets Dialog



Tip: To access the Targets dialog without marking a target select TARGETS-EDIT TARGETS.

More Information

- [Measuring Object Height with the Height Measurement Tools on page 3-40](#)
- [Saving Side Scan Waterfall Screen Captures on page 3-41](#)

EDITING TARGET PROPERTIES IN SIDE SCAN SURVEY

The Targets dialog shows the target position and default timestamp name with an image of the target area, if one has been captured.

To adjust the captured image display:

- > **Use the Zoom tools** to focus on a defined area or display the full swath.



NOTE: *For display purposes only.* It does not affect the captured image.

- > **Use the Side Scan Controls** to adjust color and gain in the image.



To shift the target position, click **[Retarget]** then click in the display at the new location.

You can edit the target properties using any number of the following methods:

- **Rename your target.** Replace the default timestamp name.
- **Add notes** about the target object.
- **Measure the length and width of your target object.** Click in the corresponding field for the target then click and drag across the target. The distance is then recorded in the selected field.
- **Measure the height of the target object.** Click in the Height field, then click on the top of the target and drag your cursor to the outer edge of its shadow.

SAVING OR DELETING TARGETS IN SIDE SCAN SURVEY

When you capture a target, you can save it, with the default properties or with your added target information, or you can delete it.

Saving Targets

To save your target, close the Targets dialog. SIDE SCAN SURVEY stores all targets to the SS Survey target group. In addition, it stores the images of the target locations as a JPG images in the SS Images folder named with the target name.

NOTE: The Project Items list includes *only the TIF* screen captures of your target area in the SS Images list.

Deleting Targets

You can delete one or all targets from the SS Survey group:

- To delete one target, select the target name in the target list at the top of the dialog and click [Delete].
- To delete *all* of the listed targets, click [Delete All].

MEASURING OBJECT HEIGHT WITH THE HEIGHT MEASUREMENT TOOLS

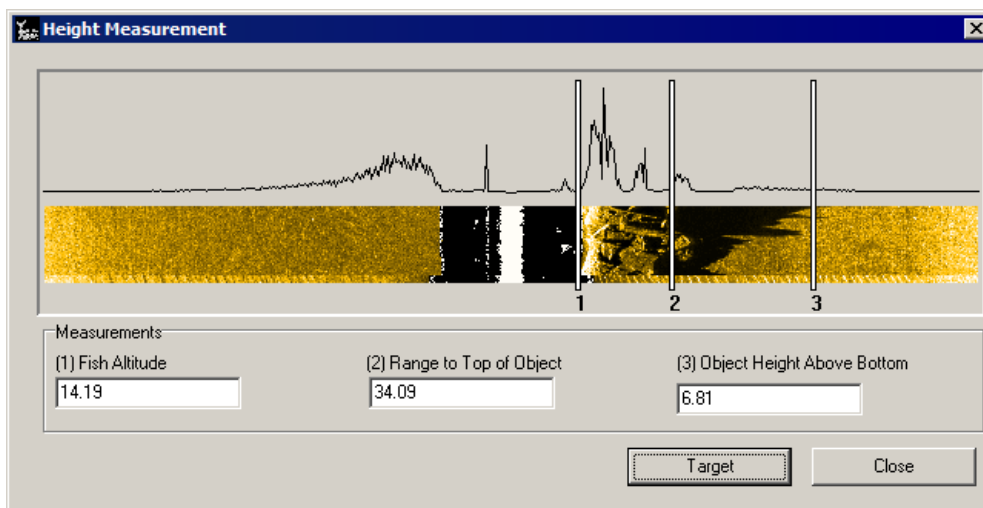
The Height Measurement feature enables you to make measurements of a potential target object in the waterfall window and, optionally, mark a target at the object location.

NOTE: This method is potentially more accurate than measuring an object in the Targets dialog. In the Height Measurement dialog, *you* define the bottom track instead of relying on the computer algorithms used in the Targets dialog.

1. Click the Height Measurement icon, then click on the object you want to measure. The Height Measurement window appears with a capture of the section of the scan containing the cursor location, the corresponding Side Scan signal profile and three vertical sliders.



FIGURE 33. Height Measurement Window



2. Select and drag the three sliders into place using the waterfall and signal capture as your guides:
 - > Place #1 on the first return.

- > Place #2 on the peak of the object.
- > Place #3 on the outer edge of the shadow.

SIDE SCAN SURVEY calculates:

- > The height of the towfish above the bottom
 - > The range from the towfish to the top of the object (assuming a flat bottom)
 - > The height of the object above the bottom
3. **Save the information to the Target Database.** (Optional)
Click [Target]. The program creates the target with the default name and position and the Targets dialog appears with the coordinates where you clicked to initiate the dialog, the measured height and an image captured from the waterfall display.
 4. **Add length and width measurements, and notes.** (Optional)
 5. **Click [Close]** to return to the SIDE SCAN SURVEY interface.

Tip:

To access this dialog without marking a target select TARGETS-EDIT TARGETS.

MEASURING HORIZONTAL DISTANCE IN THE SIDE SCAN WATERFALL

Click and drag your cursor across the distance to be measured.
The dialog displays the distance and azimuth of the cursor's track.

SAVING SIDE SCAN WATERFALL SCREEN CAPTURES

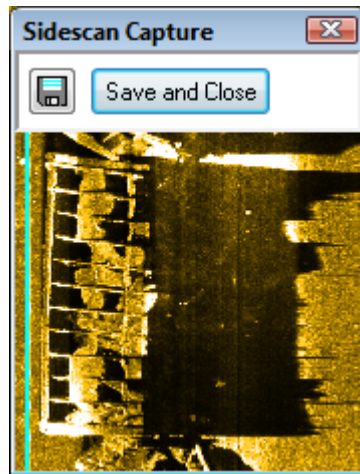
You can save JPG and geo-TIF screen captures of a user-defined area in the Side Scan Waterfall display, and generate a target centered in the defined area. These images are stored, by default, to the project \SS Images folder.

NOTE: The geo-TIF will not be exactly spatially correct, but it will be a clear representation of the area.
The JPG does not display with in the TARGET EDITOR.

1. **If the toolbar is not visible, select VIEW-SHOW TOOLBARS (F10).**
2. **Click the Capture Image icon, then click and drag the area that you wish to capture.** The described area will appear in a pop-up dialog for you to preview.



FIGURE 34. *Side Scan Screen Capture Dialog*



3. **Save the capture.** The program automatically generates the target named to match the screen capture.
 - > Click the **File Save icon**, set the output file type to *.TIF or *.JPG format, and name your picture.
 - > **[Save and Close]** automatically stores the geo-TIF named with the timestamp at the image location.

The program automatically generates the target named to match the screen capture.