

Side Scan Operations in HYPACK® 2008 – What's New for 2008?

by Harold Orlinsky

In the latest release, HYPACK has added the ability to simultaneously log both channels of a dual frequency sidescan sonar. Previously, collection of sidescan data from dual frequency sonars required the operator to select the frequency to be logged. This new feature has been implemented for the Edgetech 4200 series, and will be integrated into the other sonar models throughout the year as needed. Additionally, our file format is now capable of logging full 24-bit resolution, an improvement over the previous 12-bit data. This will greatly enhance the resolution of the data stored in the HSX file.

Logging Data

During collection, a second waterfall window can show the second frequency. All functions, including targeting, image capture and scale lines for example, can be performed in either window. Inside the HSX file, a new flag (0 or 1) is recorded in the RSS line to indicate whether the data is from the first or second frequency.

As with any sonar, the data stored in the HSX file is raw data; any image enhancements made in the waterfall window in Survey are only for viewing purposes, and will not affect the data. It is always best to get the best image from the sonar using the sonar controls for gain, to minimize any adjustments needed in processing. The exception is the bottom track which is stored during acquisition. During acquisition, be aware of the bottom track and adjust as needed. This will definitely save time in processing.

Most side scan sonar interfaces in HYPACK® have side scan controls that are dedicated to the individual side scan. In the case of the Edgetech4200, you have the option to select range, mode and coupling method. In this sonar you can select different ranges for each frequency; this can be set in the sonar control dialog box.

Processing Data

The processing of side scan data remains similar to previous versions; however, in the read parameters dialog, you can select which frequency to process. The two frequencies may require different gains and TVG to be applied, so creating both mosaics simultaneously would not make much sense. Process each frequency as needed, and create the Geo-Tiff output file for viewing in HYPACK®.

The screenshot shows the 'Read Parameters' dialog box with the 'Selections' tab selected. The 'Sonar' dropdown is set to 'Edgetech 4200 System'. The 'Navigation' dropdown is set to 'Hypack Navigation'. The 'Snap to Line' checkbox is unchecked. On the right side, the 'Override Sound Velocity' checkbox is unchecked, showing a value of '1500.0 Meters/Sec'. The 'Heading' dropdown is set to 'COG'. The 'Select Frequency' section has two radio buttons, with '1' selected and '2' unselected. At the bottom, there are 'OK' and 'Cancel' buttons.

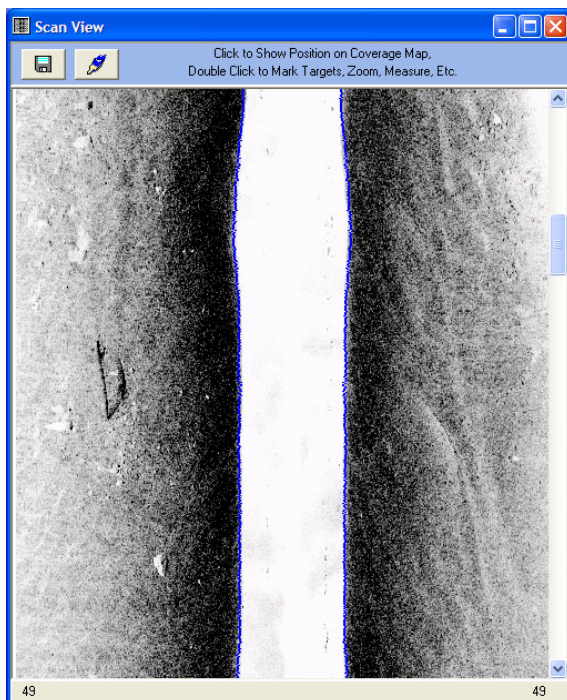
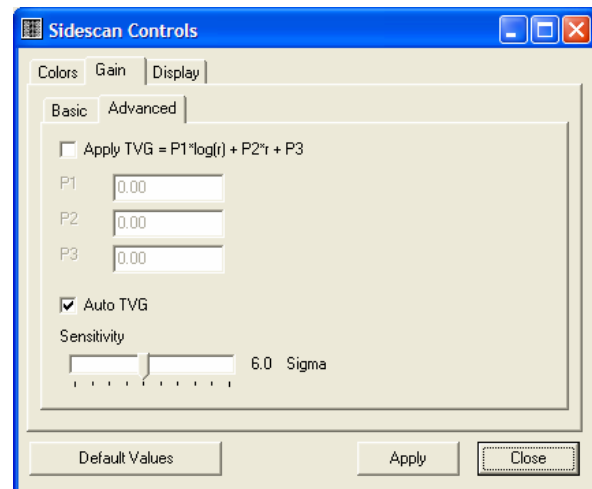
In HYSCAN, there is also an added feature to GAIN control. The basic gains are still in place, but in the HYPACK2008 release two additional methods are available:

- A TVG curve with user inputs for P1, P2 and P3.
- AUTOTVG methods with a user defined sigma level.

The following figures show the effect of this new AutoTVG method.

When no gain to TVG applied (left) the data shows saturation at the nadir region. This is typical for sidescan data.

Using the AutoTVG method (right) shows much less saturation at nadir and a more uniform image across the swath range. These advanced gain controls are only available in processing. During acquisition, only the basic gain controls are available.



No Gain



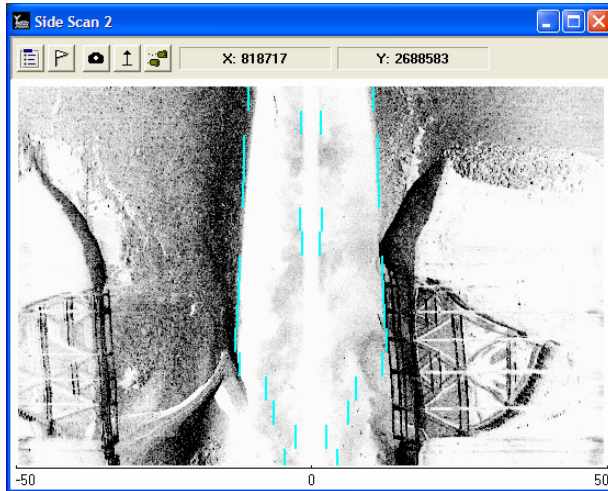
Auto TVG

Benefits of a Dual Frequency System

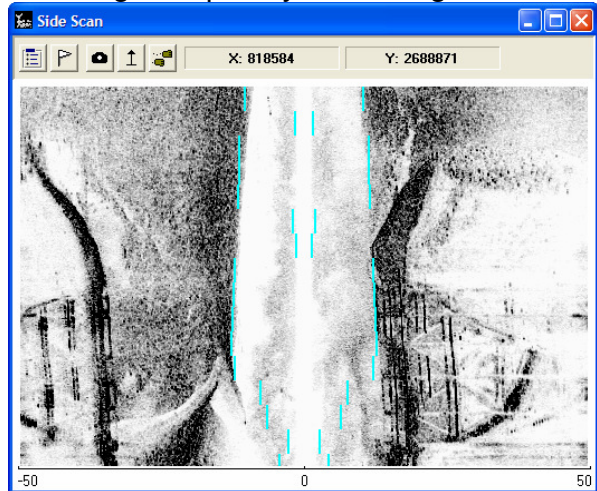
There's a trade off made when collecting data with a dual frequency system. A higher frequency will give better resolution and have a shorter range; conversely, the lower frequency will be able to detect objects at a far range, though the resolution is a bit compromised. A side scan sonar with both high and low frequencies enables you to get the benefit of both.

The manufacturers that make dual frequency systems try to span a large range (100/400, 300/600, 400/900 and even higher) to provide you with the ability to do a high resolution survey, but also provide a long-range swath for completing a large area fairly quickly.

In the images below, we can see differences between a high and low frequency. Note the underwater obstruction is much clearer in the high frequency data image.

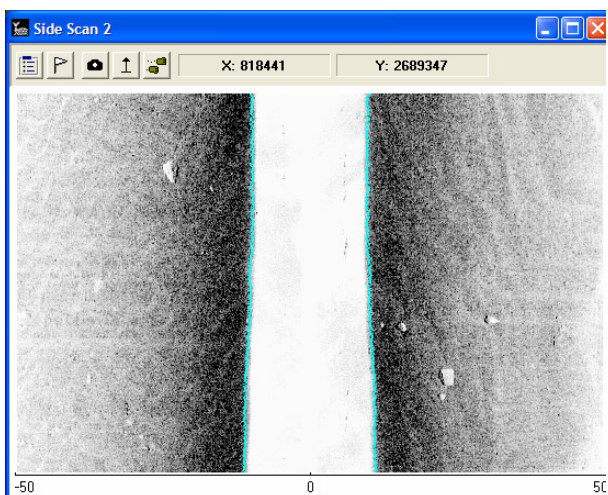


HIGH Frequency

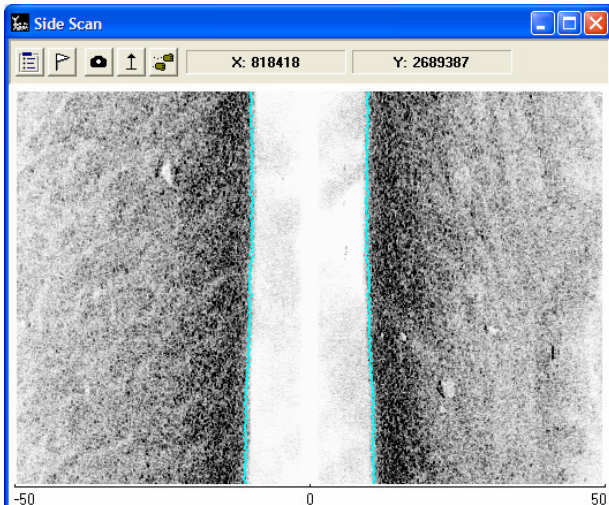


LOW Frequency

Here are two examples of small features that are easily detected by the high frequency, but the low frequency has some trouble finding them

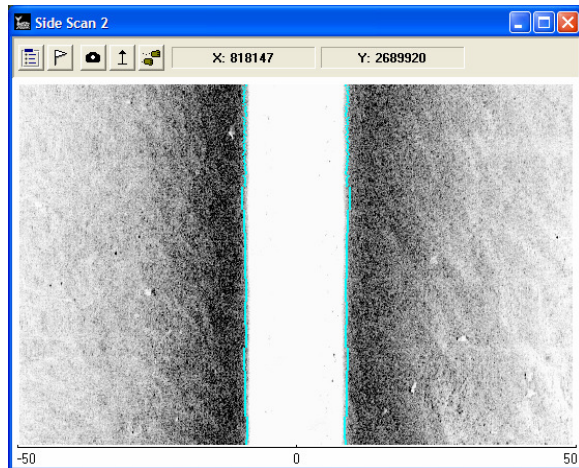


HIGH Frequency

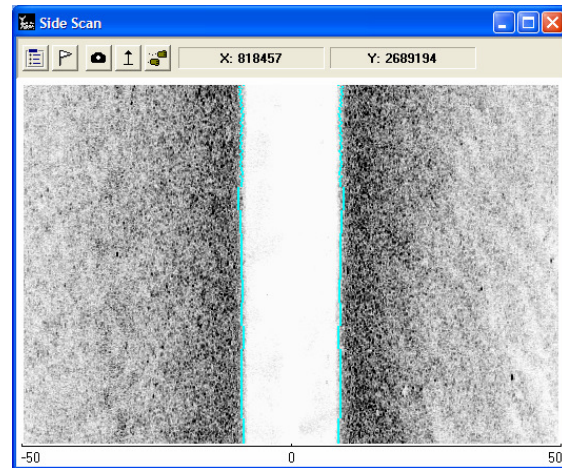


LOW Frequency

Finally, in this case, the small rocks at a close range are completely lost at the low frequency.

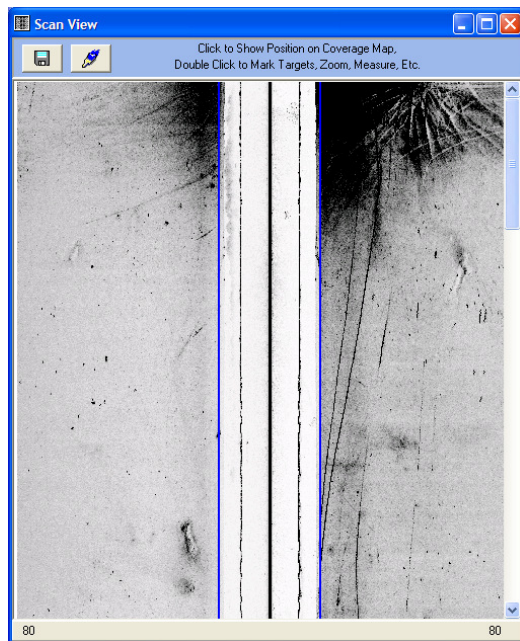


HIGH Frequency



LOW Frequency

Advocating the low frequency, the following is an example of data that benefits more from the lower frequency. Note the scour marks on the outer portion of the data set. In the high frequency mode, they were washed out, but the low frequency was able to detect them at the farther range.



HIGH Frequency



LOW Frequency

The ability to have both frequencies collected provides the benefit of both the longer range for surveying and the higher resolution at the near range.

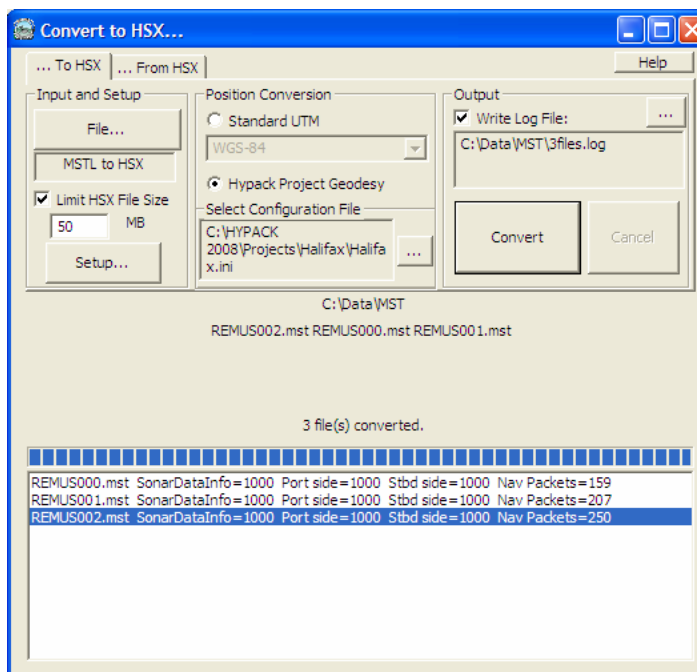
HSX Converter in HYPACK2008

In the HYPACK2008 release, the HSX converter program has been enhanced, and now converts 9 different manufacturers' native formats to the Hypack file format.

Side Scan Data:	• Edgetech JSF • Klein SDF • Cmax CM2 • Marine Sonic MSTL
Bathymetry Data:	• Benthos C3D XTF • Qincy QPS XTF • Elac XSE • Imagenex 83p • GSF files with Reson data.

Some Special Features:

- Ability to split large files at user-defined HSX file size.
- JSF conversion provides options for layback and navigation smoothing.
- Multiple Marine Sonic files can be combined to a single HSX file.
- Side scan files with dual frequency can create either a single HSX file holding all the data or 2 separate files, each with a single frequency.
- You can convert the HSX files created by HYPACK in acquisition to XTF format files. This feature will support most multibeam and sidescan sonars.
- The Side Scan Reformatter program supports any geodesy in HYPACK®, reading the project.ini file for the geodesy information.
- The output files (whether HSX or XTF) can be in easting/northing or latitude/longitude.



The Side Scan Reformatter program is part of standard HYPACK®.

If there are other native formats you wish to convert, drop me a note at Harold@Hypack.com and we'll see about adding them in the future.