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Sounding Better!

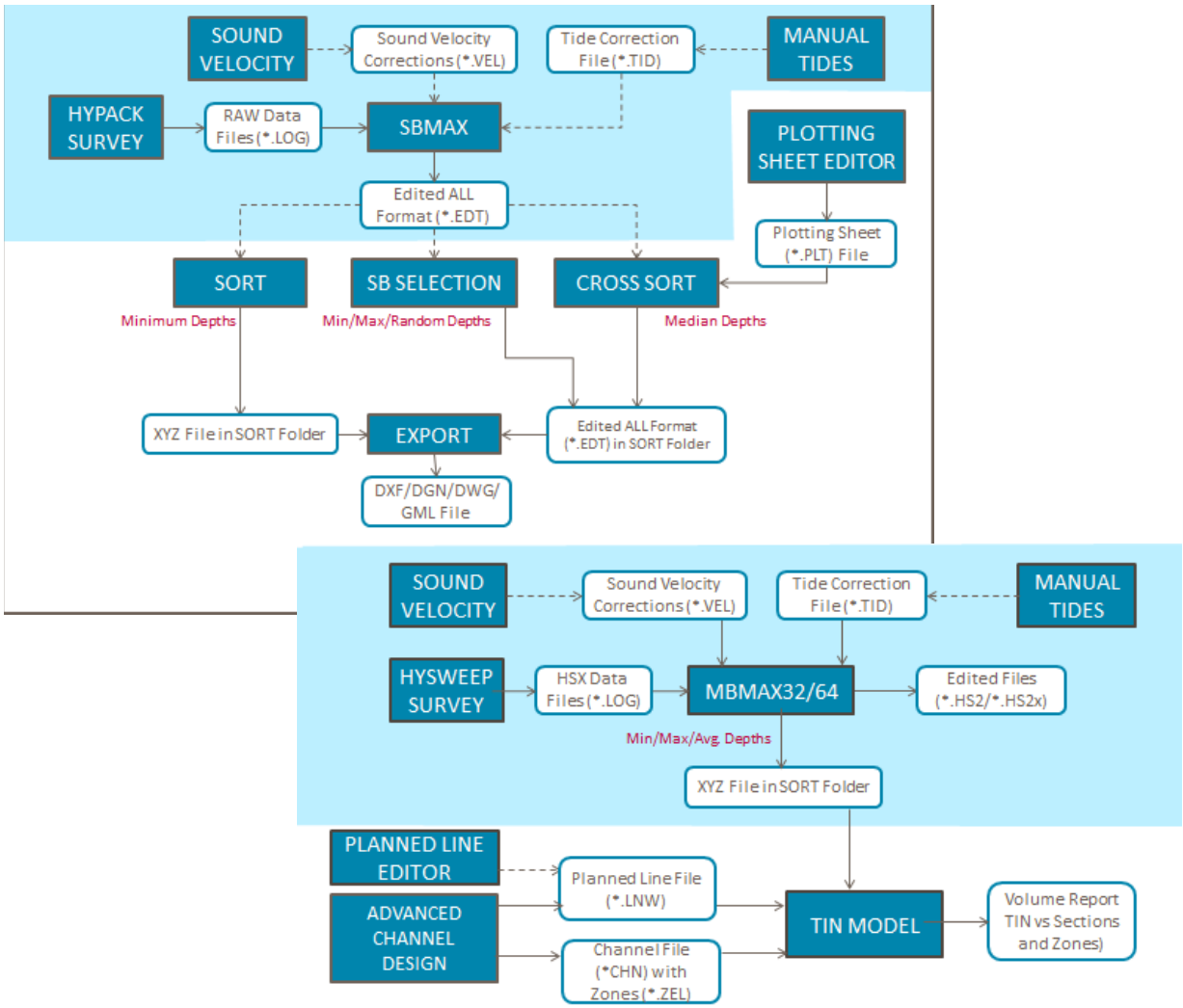
# Flowcharts Hands On Part I: Corrections

By Judy Bragg

With so many editors, sounding selection programs and final products, it can be a bit confusing, at first, to work out just what your task sequence should be between your raw data and your final product. The flow charts provided in the HYPACK® Help menu (HELP-WORK FLOW GUIDES) should guide you along your way.

This article is the beginning of a series that will provide brief, illustrated explanations of each process in those flowcharts. (More exhaustive descriptions and procedures are found in the HYPACK® User Manual.) The project data used will be available on the HYPACK website to provide you with hands-on experience.

***FIGURE 1.*** *Sample Flowcharts*



## CLEANING SINGLE BEAM AND MULTIBEAM RAW DATA

In all single beam, multibeam and multiple transducer projects, regardless of your final product requirements of your project, you should first run data through the appropriate editing program to apply tide and sound velocity corrections that may not have been applied during the survey, and to edit out bad data.

The resulting output file type depends, in part, on which editor you are using:

| Editor | Output Format |
|---|---|
| **32-bit SINGLE BEAM EDITOR** | • All format,<br>• XYZ |
| **64-bit SINGLE BEAM EDITOR** | • HS2X,<br>• All format,<br>• XYZ |
| **32-bit HYSWEEP® EDITOR** | • HS2,<br>• XYZ<br>• Filled matrix (*.MTX),<br>• GSF |
| **64-bit HYSWEEP® EDITOR** | • HS2 or HS2X format files,<br>• XYZ<br>• Filled matrix (*.MTX),<br>• GSF |

***Tip:*** When you can, we recommend that you save your data first to the HS2 or HS2x format to preserve all edited data. These formats retain all data should it be needed for further editing, or correction of offsets, mounting angles, sound velocity, etc. Once this is saved, you can save it again to your choice of other output formats.

After the initial editing, you have some choices.

The Sounding Selection programs (SB Selection, SORT, CROSS SORT) are optional programs that reduce single beam data in an attempt to speed your final product calculations without adversely affecting the accuracy of the results. Similarly, the 64-bit HYSWEEP® EDITOR includes options to reduce the number and spacing of XYZ soundings, if appropriate. Choose which of these programs is best for you based on which selection methods you like the best and which file format you need to input to your final products program:

HYPLOT, TIN MODEL and EXPORT can all read either XYZ or All format files, so any of the sounding selection programs are options if you want to reduce your data.

The CROSS SECTIONS AND VOLUMES program requires the channel template information found only in All format files. In multibeam projects, we have to convert the XYZ format to All format by loading it, with a planned line file, into the TIN MODEL program and cutting sections where the TIN model and planned lines intersect.

**NOTE:** It is not recommended to use thinned data for volumes calculations in CROSS SECTIONS AND VOLUMES as it can adversely affect the accuracy of the results.

## CORRECTIONS

HYPACK® enables you to apply tide and sound velocity corrections to your data during acquisition, or during processing.

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

If you have not logged corrections during data acquisition, or if you want to apply a different set of corrections, you may do so as part of the editing process. In this case, you must create tide and sound velocity corrections files with the data you want to apply before you begin your editing session. When you load these files in the editing program, the corrections they contain override the logged corrections. *The raw data remains unchanged.*

### TIDE CORRECTIONS

**Tide Correction Files (*.TID)** are created in the HARMONIC TIDES and MANUAL TIDES programs. They contain corresponding tide levels (in survey units) and time information that can be used in post-processing programs to apply water level corrections to your sounding data. For each day included in the file, there is one correction value for every minute in the 24 hr. period for a total of 1,440 records per day. A multiday file marks the beginning of each day with its date.

In the editors, any soundings collected before the first time of your *.TID file get the correction value of that first time. Any soundings collected after the last time of your *.TID file get the correction of that last time. When you load a tide corrections file in the editor, it overrides any tide data that may have been recorded in the raw data during data collection.

**To use tide data logged during SURVEY**, leave the Tide File field in the Corrections dialog blank.

### SOUND VELOCITY

**Sound Velocity Corrections** files are generated in the SOUND VELOCITY program and contain depth vs sound velocity data. They are used to correct soundings for variations of sound in the water column. In most shallow-water, small-boat surveys, the echosounder is calibrated for the range of soundings encountered and no sound velocity corrections are needed. For multibeam surveys and deep-water surveys, sound velocity corrections are used to provide more accurate soundings. Typically, you will perform one or more sound velocity casts in your project area. You can import the data to the SOUND VELOCITY program which generates the sound velocity corrections (*.VEL) file for post-processing.

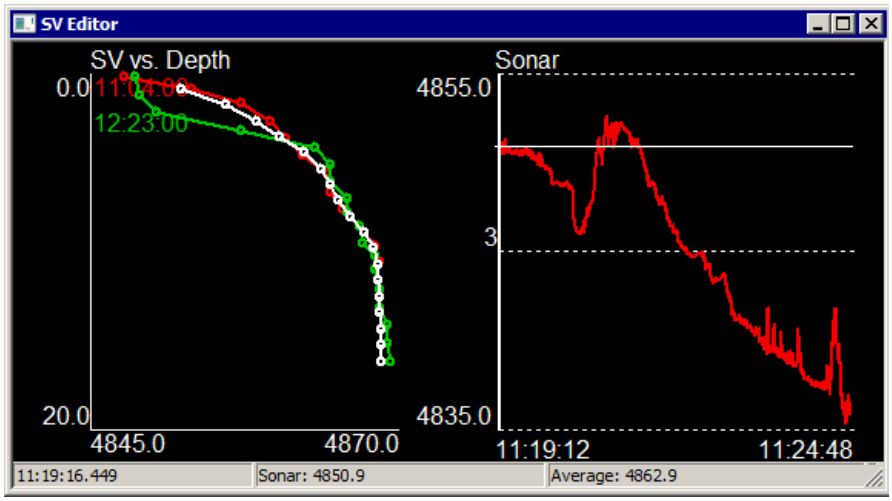
For multibeam surveys, HYSWEEP® SURVEY includes a sound velocity corrections table where you should enter (or import) the sound velocity profile information after each cast. This information is recorded to the header of each multibeam raw file (*.HSX).

When you take multiple casts during acquisition in either single beam or multibeam projects, you can store the data from each cast to a sound velocity corrections file (*.VEL) then interpolate corrections between casts in post-processing.

The editing programs assign a sound velocity correction to each sounding record based on the depth value, and the depth ranges and correction values specified in one or more sound velocity profiles. The editors calculate ray-bending corrections to sounding data as it is read into the program.

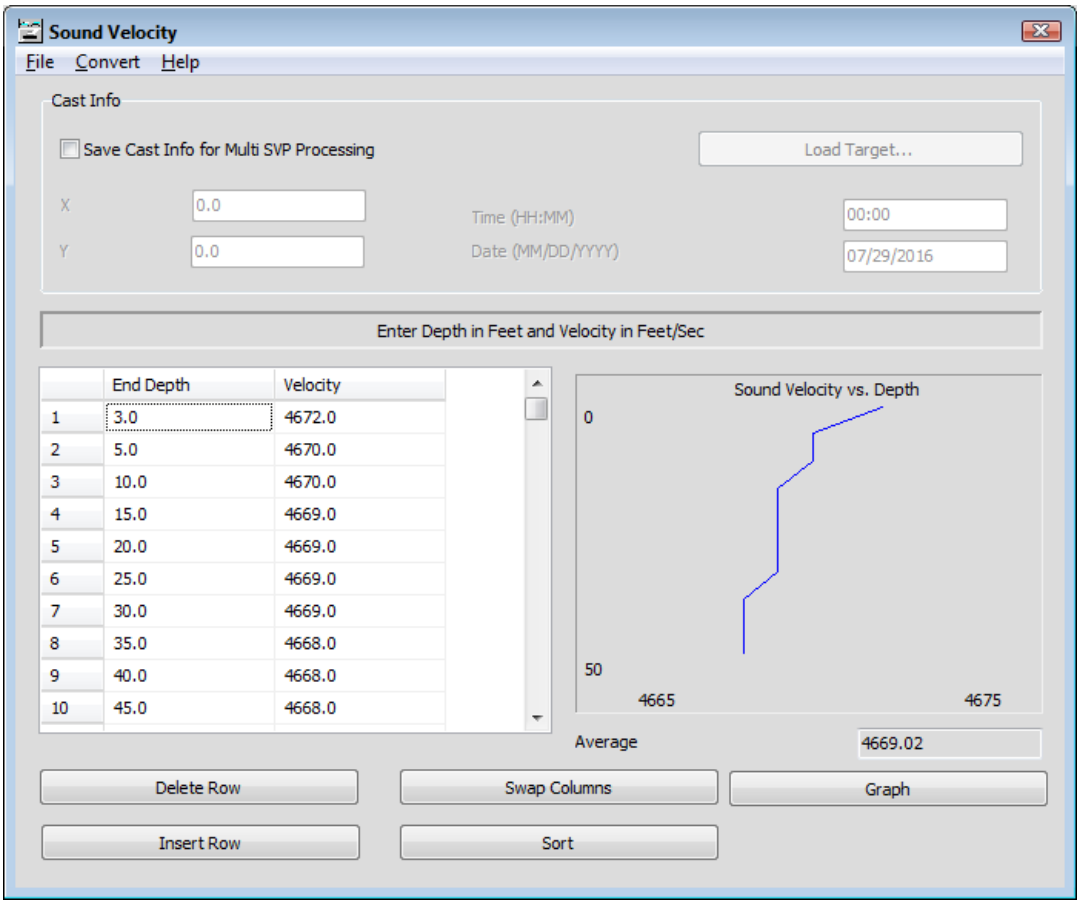
When you load multiple sound velocity files the HYSWEEP® EDITOR (either the 32-bit or 64-bit version) calculates interpolated values based on the time tag, or time and position of each ping. The Sound Velocity Profile window draws each sound velocity profile in a different color and graphs the interpolated values in white.[1]

***FIGURE 2.*** *Interpolating Between Multiple VEL Files*




1. Sound Velocity interpretation is also supported in the 64-bit SINGLE BEAM EDITOR for processing SonTek M9 HydroSurveyor data. Typically, single beam surveys would not warrant sound velocity correction.

*FIGURE 3. Sample Sound Velocity Correction Configuration*




## DRAFT CORRECTIONS

Draft corrections are typically logged during data acquisition and little or no further editing is performed during postprocessing; however, the editors for single beam and multibeam data do provide routines with which you can apply a constant draft correction, apply a new draft table, or smooth existing draft corrections over a user-defined time interval.

Since technology advances over time, the tools available depend on which editor you are using:

*TABLE 1. Single Beam Draft Corrections*

| Task | 32-bit SINGLE BEAM EDITOR | 64-bit SINGLE BEAM EDITOR |
|---|---|---|
| **Constant Draft** | • EDIT-FILL SURVEY: All lines<br>• In the Spreadsheet window: Fill Column from the currently selected record to the end of the line. | • Read Parameters: All lines<br>• In the Spreadsheet window:<br>  • Fill Column (the current line)<br>  • Fill Selection (selected records in the current line) |
| **New Draft Table** | • TOOLS-DRAFT ADJUSTMENT | • TOOLS-DRAFT ADJUSTMENT-SQUAT SETTLEMENT TABLE |
| **Smooth** | • Block Edit[a] | • TOOLS-DRAFT ADJUSTMENT-SMOOTH DRAFT |

a. If you delete draft data, the program interpolates the data across the range deleted.

*TABLE 2. Multibeam Draft Corrections*

| Task | 32-bit HYSWEEP® EDITOR | 64-bit HYSWEEP® EDITOR |
|---|---|---|
| **Constant Draft** | • In the Tide/Draft window: Fill Draft (for the current line). | • Read Parameters<br>• In the Heave/Tide/Draft window: Fill Column (lines currently selected in its Survey Files list) |
| **New Draft Table** | • TOOLS-DRAFT ADJUSTMENT | • TOOLS-DRAFT ADJUSTMENT-SQUAT SETTLEMENT TABLE |
| **Smooth** | • Point and Block Edit[a] | • TOOLS-DRAFT ADJUST-SMOOTH DRAFT |

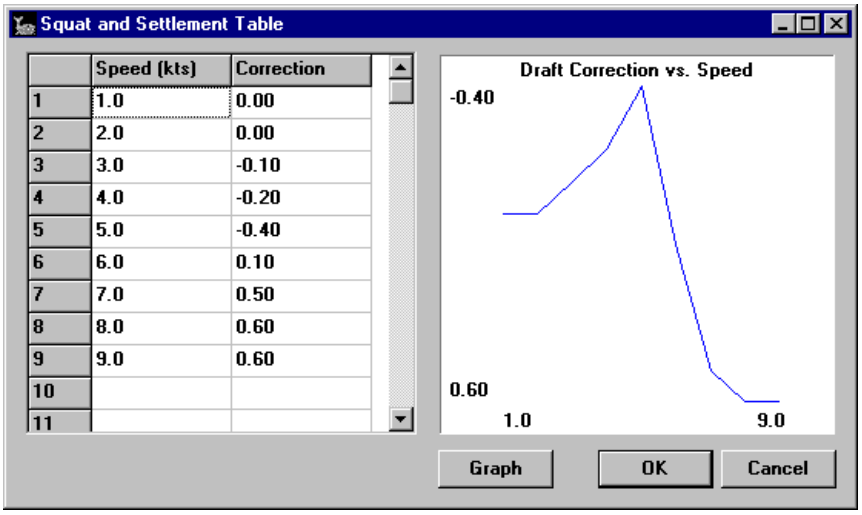
a. If, at any time, you delete draft data, the program interpolates the data across the range deleted.

**Constant Draft:** Enters the same, user-defined draft correction throughout the data. You can see in the preceding table, some routines change draft for all currently loaded lines, some for the current line only, and other apply to select lines or records.

**New Draft Table:** Applies all new draft corrections based on the speed over ground.

**IMPORTANT!** It is best to edit bad positions as necessary before running the adjustment to provide the most accurate speed information for the adjustment.

*FIGURE 4. Sample Draft Settlement Table*



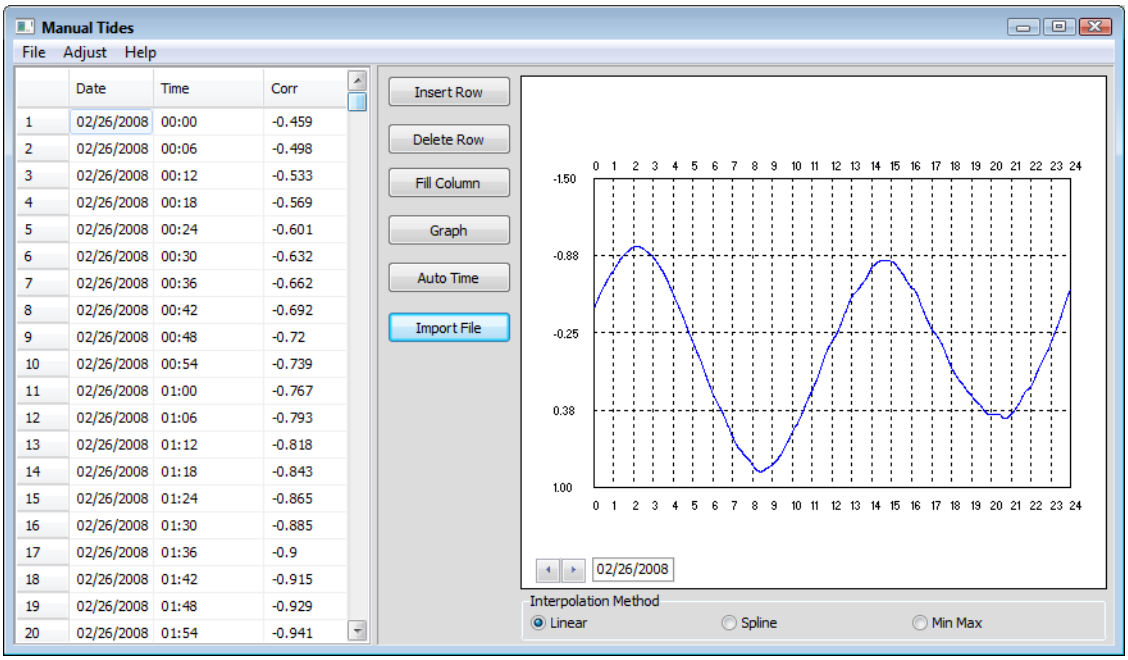

**Smoothing:** Earlier editors provide standard block editing in the draft graph where the draft values are interpolated across the range deleted. The later, 64-bit programs have a more sophisticated smoothing algorithm that progresses down the line averaging the draft over a user-defined Average Period.

## HANDS ON EXPERIENCE

### Hands On!

Download the NOAA 022608_022808 DelawareCity Tide Corrections.zip. Extract and load the NOAA 022608_022808 DelawareCity.TDX into the MANUAL TIDES program to see how it works.

***FIGURE 5.*** *NOAA 022608_022808 DelawareCity.TDX in MANUAL TIDES*




## *Hands On!*

Download the Multibeam Processing Sound Velocity Corrections.zip. Extract and load the Multibeam Processing.VEL file to the Sound Velocity program. The Depth/Velocity pairs appear in the table on the left and are graphed on the right. This file contains no time and date information to support interpolation between multiple VEL files in the editing programs.