



Multibeam Editor Guide for MBMAX64

By Joe Burnett

For almost 20 years, I have been collecting and processing multibeam data, and have done my best to find the 'best way' to process all of the billions of data points collected. By the 'best way', I mean the method that is the simplest, easiest, quickest way that will produce the most accurate, cleanest, and complete final data set.

When I give a Multibeam Training Course, and reach the 'Editing' portion of it, I always explain to the attendees, that multibeam editing is, in reality, performing 'data interpretation'. If I were to provide everyone in the course with the same RAW multibeam data set, and ask each attendee to edit the data, it would be an extremely rare coincidence that any two or more of the attendees would produce exactly the same final XYZ data set. This is due to the fact that each attendee would look at the data points from their previous experience and knowledge and use their own interpretation of which points are 'bad' or 'good'.

With the introduction of the HYPACK® 64-bit HYSWEEP® EDITOR (MBMAX64), just a little over 2 years ago, multibeam processing has made significant leaps and bounds towards making this a much easier and visually understandable process.

The main focus and purpose of this guide is to provide you with a good fundamental approach to processing multibeam data. I have set it up in an outline as a step-by-step walk-through of how you might use MBMAX64. It will not go over every aspect of MBMAX64. From this guide, I hope that you will be able to modify, adapt, and expand on its premise, and create a guide of your own.

In the outline, the *Prep Work* section walks through loading the data, selecting corrections and devices, verification of the offsets and calibration values, and how the data from some specific devices will be applied to the soundings. Continuing into Stage 1, the time sequence data from each device is verified and modified for *all* of the currently loaded files.

In *The Heart of the Beast* section, filters are selected and applied to individual files, groups of files, and/or *all* files. Here is where your experience and knowledge of multibeam surveying and processing will come into play. After the filters have been applied, manual editing cleans up the remaining 'spikes' and 'bad' data points.

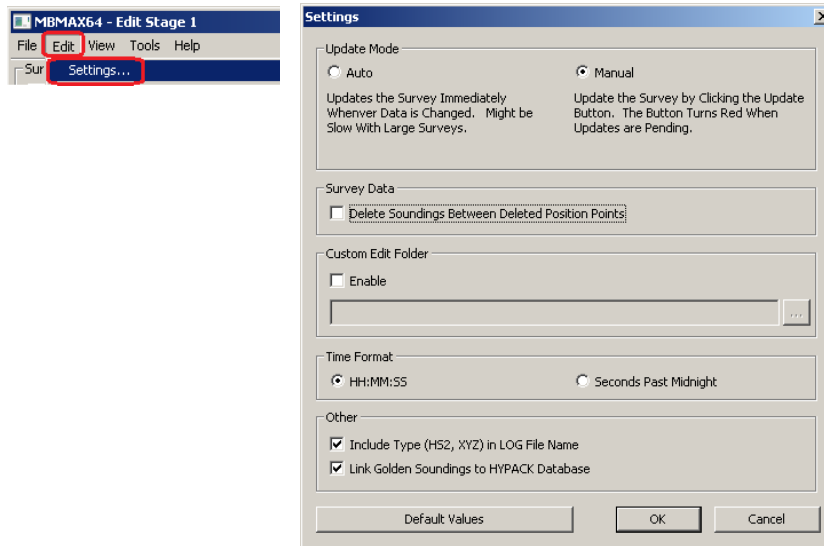
When you reach *The Finish Line*, you will be ready to save all of your hard work into the predefined outputs.

Again, this is just the outline. I am working on a detailed version, with screen captures and in-depth explanations and reasoning of all the steps contained within the outline. Until the detailed version is ready, you can get most of the details from the *MBMAX64* Powerpoint presentation on our 2014 and 2015 Training DVDs.

LOADING YOUR DATA IN MBMAX64

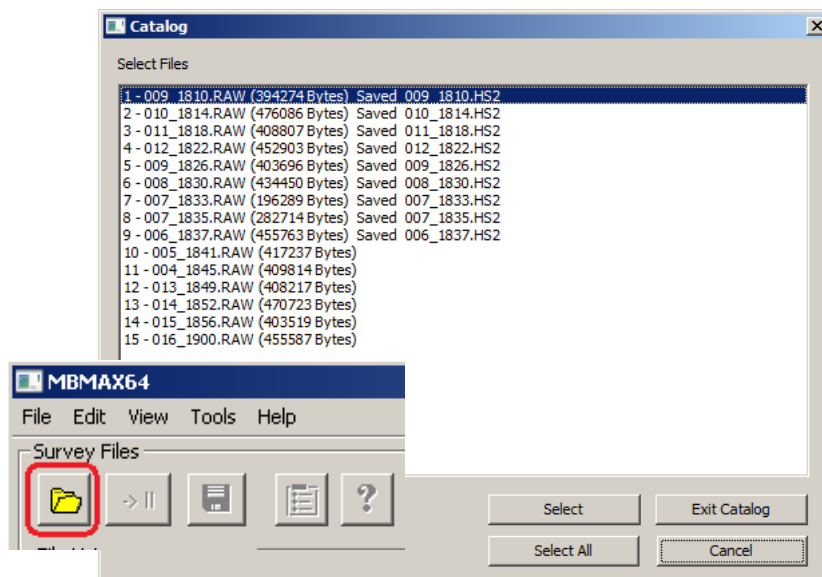
1. **Open MBMAX64.**
2. **Configure your settings.**

FIGURE 1. Configuring MBMAX Settings



3. **Load the survey data.**

FIGURE 2. Loading Survey Data



THE PREP WORK

Read Parameter Windows

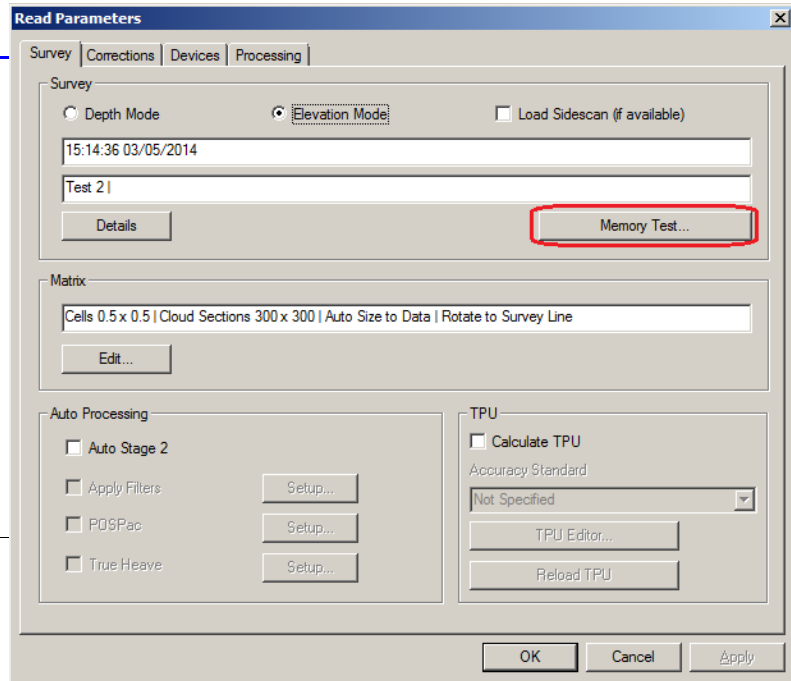
4. Enter your read parameters.

- **Survey Tab:**

FIGURE 3. *Read Parameters—Survey Tab*

- Perform Memory Test.** (Don't exceed 100% of your computer's RAM.)
- Select Survey Mode** (Vertical Reference).
- Set up/Select Matrix and Cloud Sections** (per your scope of work).

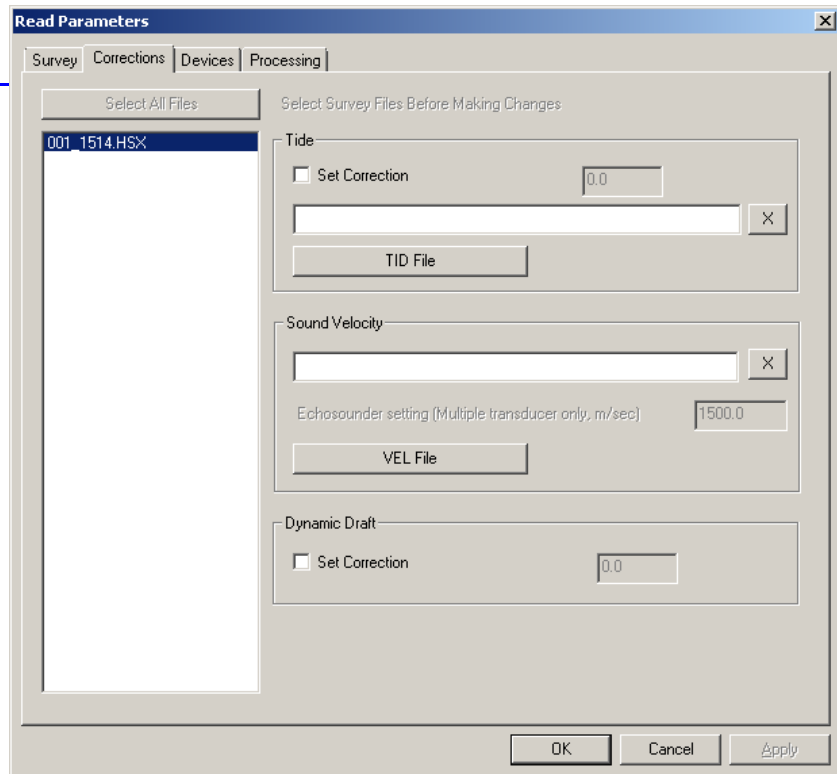
NOTE: Auto-Processing and TPU are not applicable for this outline.



- **Corrections Tab:**

FIGURE 4. Read Parameters—Corrections Tab

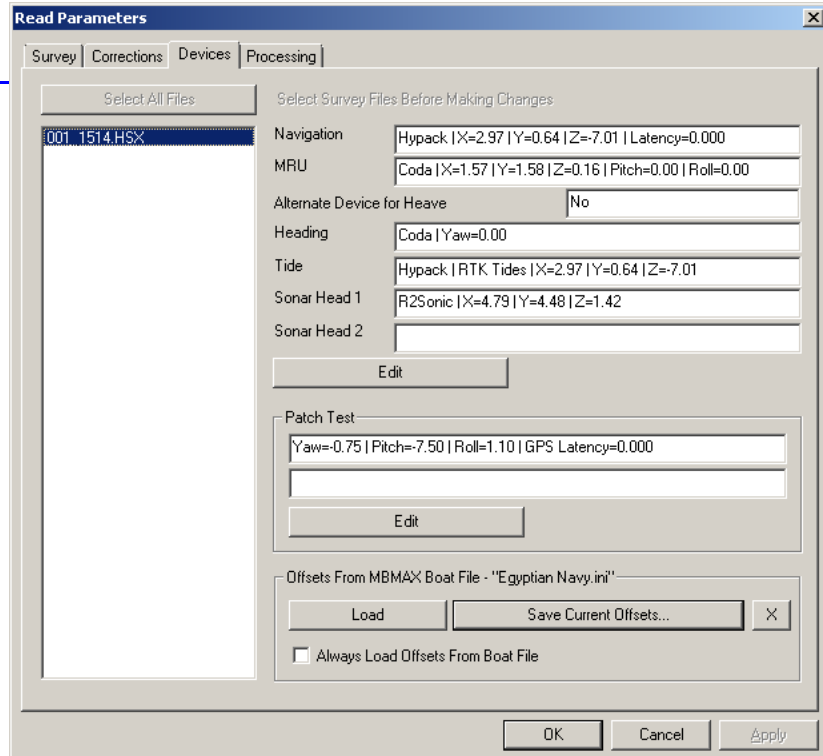
- i. **Set or Select Tide.**
- ii. **Select Sound Velocity Profile(s).**
- iii. **Set Dynamic Draft.**



- **Devices Tab:**

FIGURE 5. Read Parameters—Devices Tab

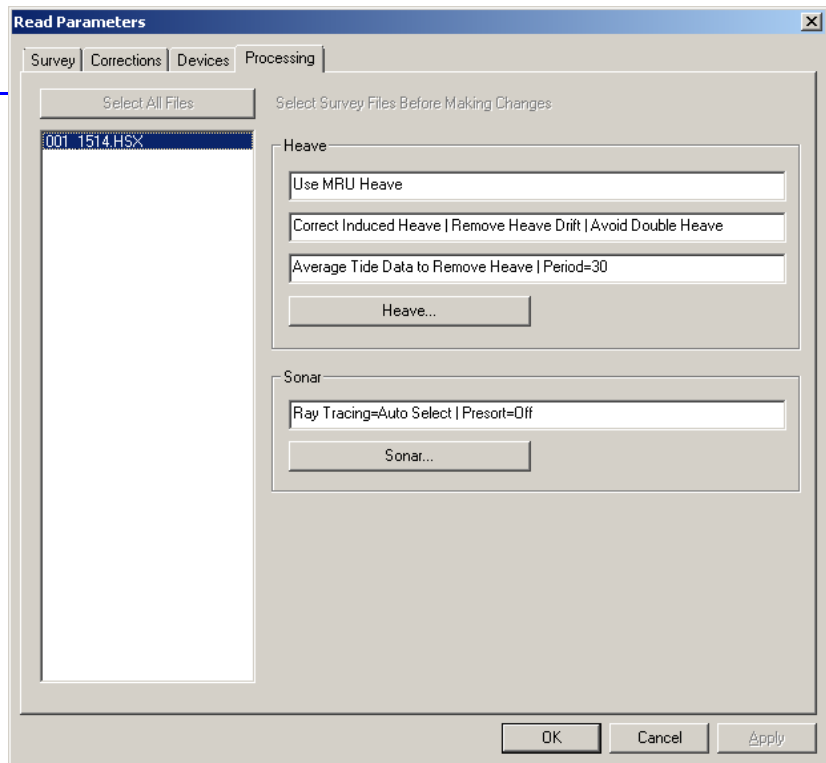
- i. **Verify/Modify Device Offsets.**
- ii. **Verify/Modify Patch Test Offsets.**
- iii. **Save Offsets to a 'BoatOffsets.ini' file.**



- **Processing Tab:**

FIGURE 6. *Read Parameters—Processing Tab*

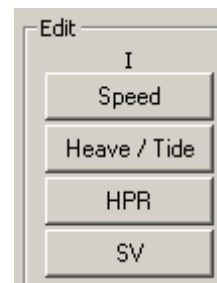
- i. **Select Heave Device.**
 - ii. **Select additional Heave Options.**
 - iii. **Select the Sonar ID for Geocoder processing.**
 - iv. **Select the Sound Velocity Method.**
 - v. **Select a Presort Option.**
- **Proceed to Stage 1 of the MBMAX64 Editor.**



STAGE 1 EDITING

FIGURE 7. *Use the Buttons to Open MBMax Windows*

5. Open the **Speed** window and verify/ modify the speed of each file.
6. Open the **Heave/Tide** window and verify/ modify the heave and tide of each file.
7. Open the **HPR** window and verify/ modify the heading, pitch, and roll of each file.
8. Open the **SV** window and verify/ modify the sonar probe's speed of sound for each file.
9. **Proceed to Stage 2.**



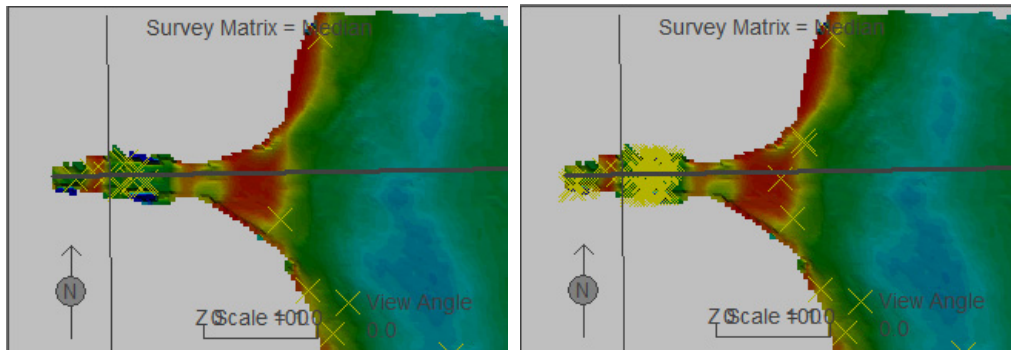
“THE HEART OF THE BEAST”: STAGE 2 EDITING

10. **Run Filters in the Search and Filters dialog.**

NOTE: Depending on how ‘clean’ your initial raw data is, using the filters can potentially remove 80 – 90+% of your unwanted, incorrect data, making your manual editing a much easier task.

Tip: When the **Filter Preview** option is selected in the toolbox, the soundings that fall outside of the criteria set in the Basic, GPS, Sweep and Matrix tabs of the Search and Filter dialog (filtered soundings) are marked with a yellow 'X'. Each time you set your filters, click **[Update Filter Preview]** to update your display according to your changes.

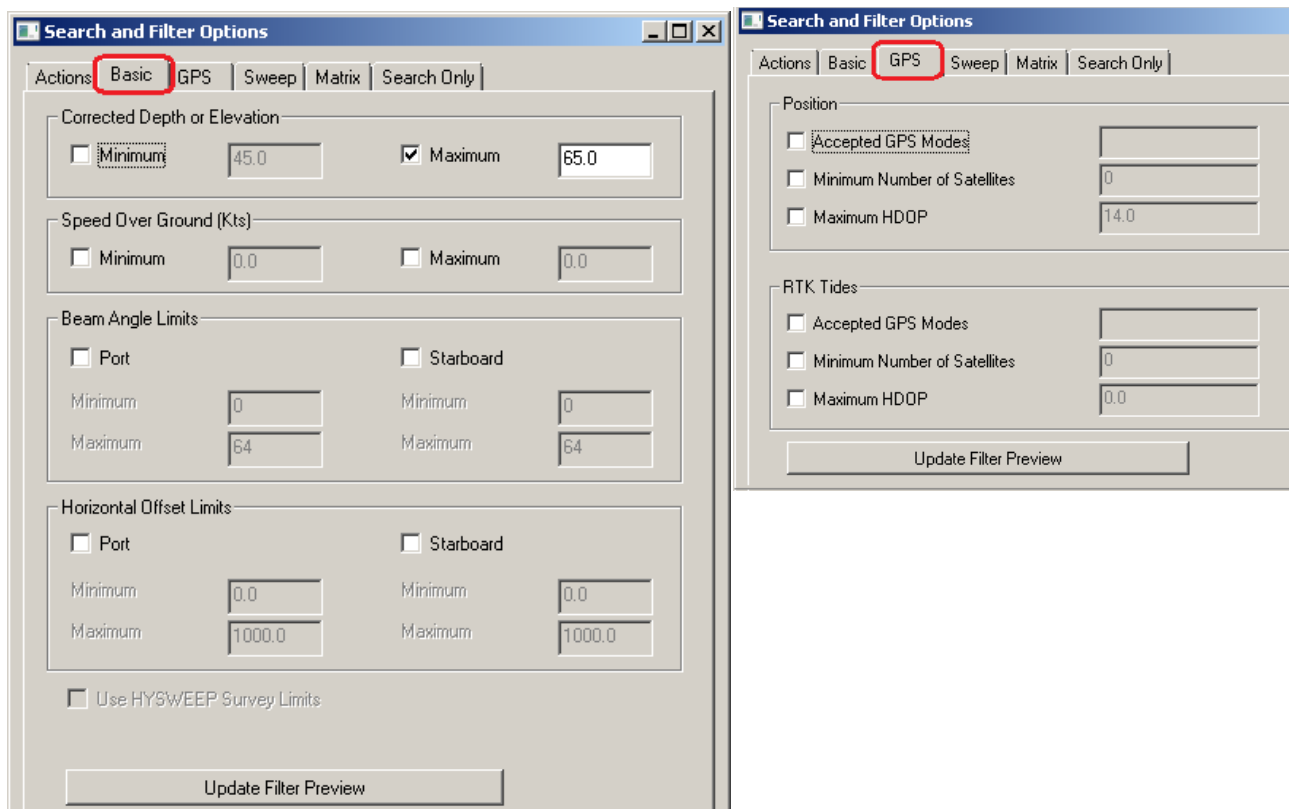
FIGURE 8. Depths Filtered at Maximum Depth of 15 (left) and 12 (right) Marked with Yellow X's



- **Basic and GPS Tabs**

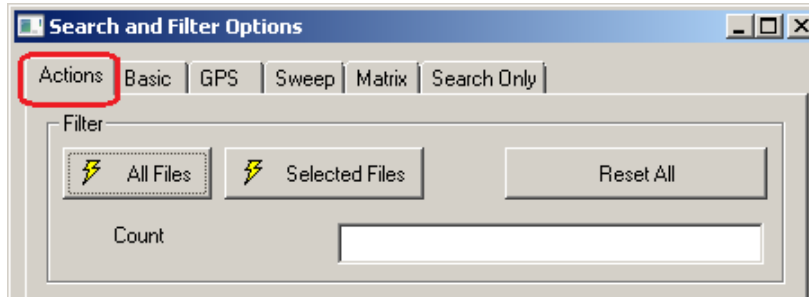
- Select a filter from the Basic or GPS (Only 1 !! This allows you to visualize how each filter affects the data.)**

FIGURE 9. Search and Filters—Basic Tab (left) and GPS Tab (right)



ii. **Reset Filters.**

FIGURE 10. Apply Filter in Actions Tab and Update Cells in the MBMAX64 Toolbox



iii. In the **MBMAX64 Main Window**, update the matrix cells with the changes made by filter.



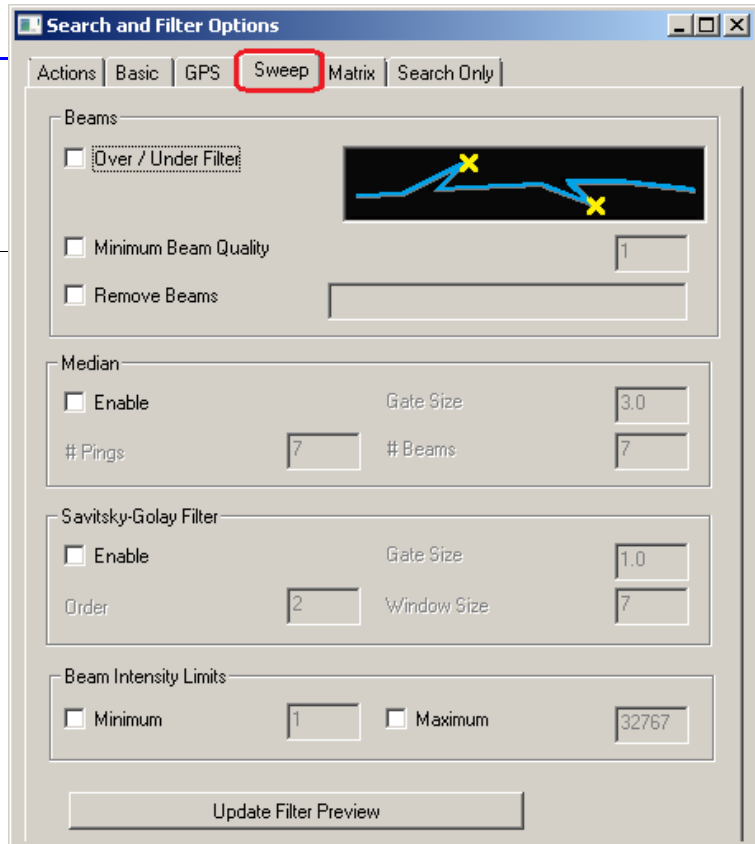
iv. **Repeat the above steps until you have used all of the filters you wish to apply from each tab.**

• **Sweep Tab**

FIGURE 11. Search and Filters—Sweep Tab

v. **Open the Sweep Tab and select a filter. (ONLY 1 !!)**

IMPORTANT: In the Sweep Tab, you may need to run each of its filters several times. (Five or more times is not uncommon.) Each time the Main window is updated, the filter reruns with the current selection and may find additional 'bad' points after extraneous points have been removed by the previous run. Pay close attention to the following order of Steps.



vi. **In the Actions tab**, apply the filter to 'All' or 'Selected' files.

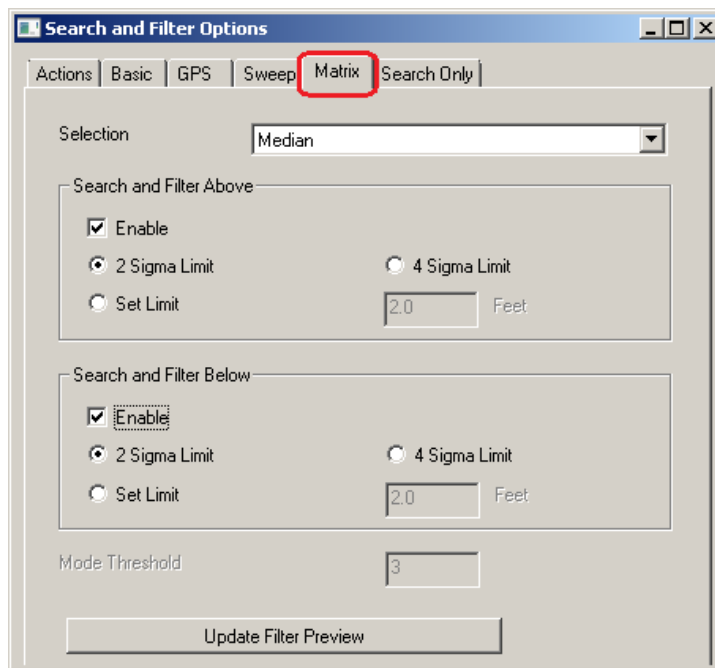
vii. **In the Main window**, Click **[Update Filter Preview]**.

If additional yellow X's appear on main window, repeat the Actions Tab.

- When no additional Yellow X's appear on the main window, go to next step.*
- viii. **In the Actions tab**, reset the filters.
 - ix. **Repeat the Sweep tab steps until you have used all the filters you wish to apply from the Sweep tab.**
- **Matrix Tab:**

IMPORTANT: The Matrix Tab and its filters can **ONLY** be used if you have the proper tide, sound velocity cast, device offsets, and patch test information entered. This is because a matrix filter acts on overlapping files (not individual files) like the filters on other tabs.

FIGURE 12. Search and Filters—Matrix Tab



- x. **Select the Vertical Option.**
- xi. **Enable Above, Below, or Both.**
- xii. **Select the Vertical Tolerance.** (2 Sigma = 95% Confidence, 4 Sigma = 99.994% Confidence, Set Limit)
- xiii. **In the Actions Tab, apply the filter to all or selected files then click [Reset Filters] to clear all filter criteria.**
- xiv. **In the MBMAX64 Main window, update the display for the changes made by filter.**
- xv. **In the Matrix tab, select the next filter option.**
- xvi. **Repeat the Matrix tab steps until you have used all the vertical tolerances that you wish to apply.**

11. **Manually Edit remaining spikes** using the Manual editing Tools (Lasso, Block, Line, Eraser, etc.):

FIGURE 13. Manual Editing Tools for Stage 2 Windows

- **Sweep 1 and 2 Windows:** Edit remaining spikes from files, individually.
 - **Cloud Sections:** Edit and Mark as 'Checked'.
 - **Profile Window:** Edit and Mark as 'Checked'.
- When all cloud sections and/or profiles have been 'checked', you are ready to save your data.

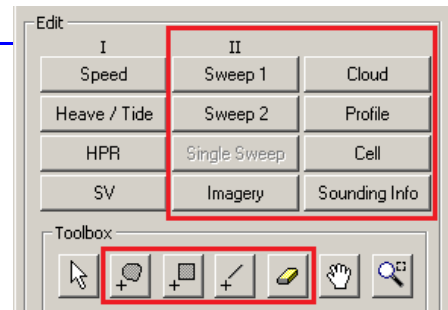


FIGURE 14. Checking Cloud Sections

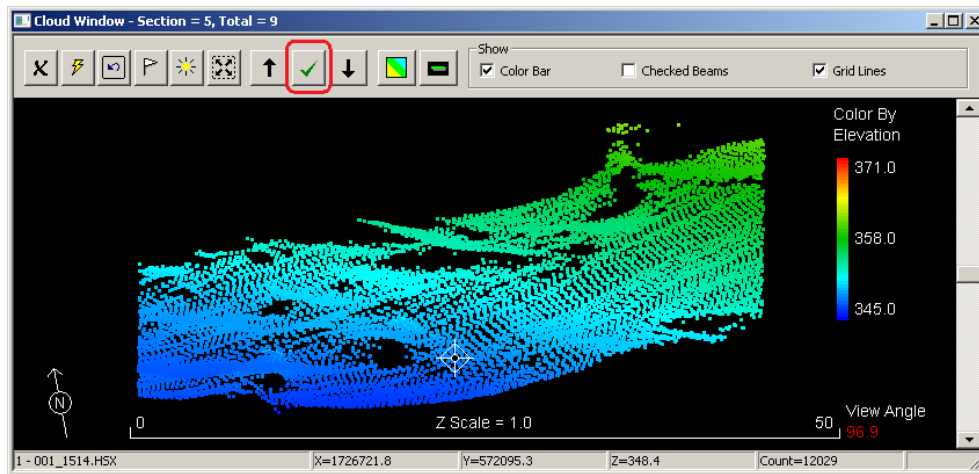
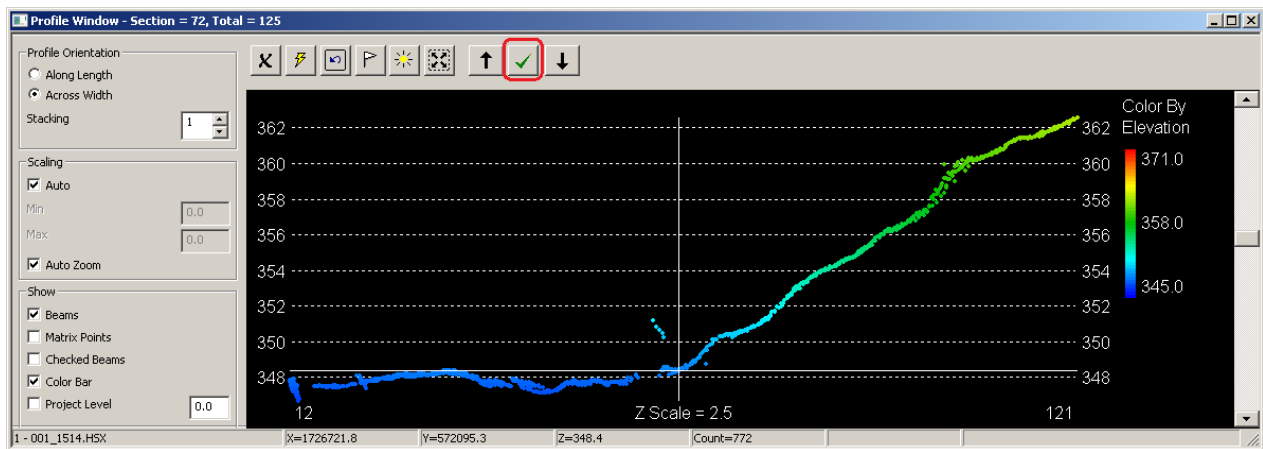


FIGURE 15. Checking Profiles



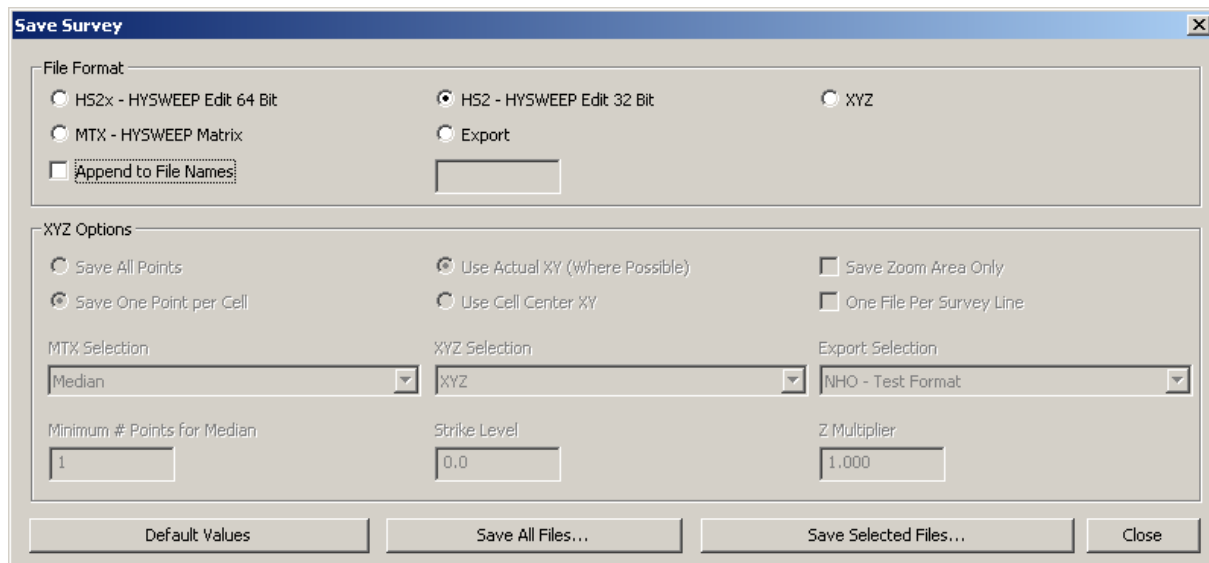
“THE FINISH LINE”: SAVING YOUR EDITED DATA

12. Save Files to one or more formats:

- **HS2 and HS2x formats** (Ability to modify incorrect Device offsets, SV Profiles, Tides, Patch Test values, etc.)

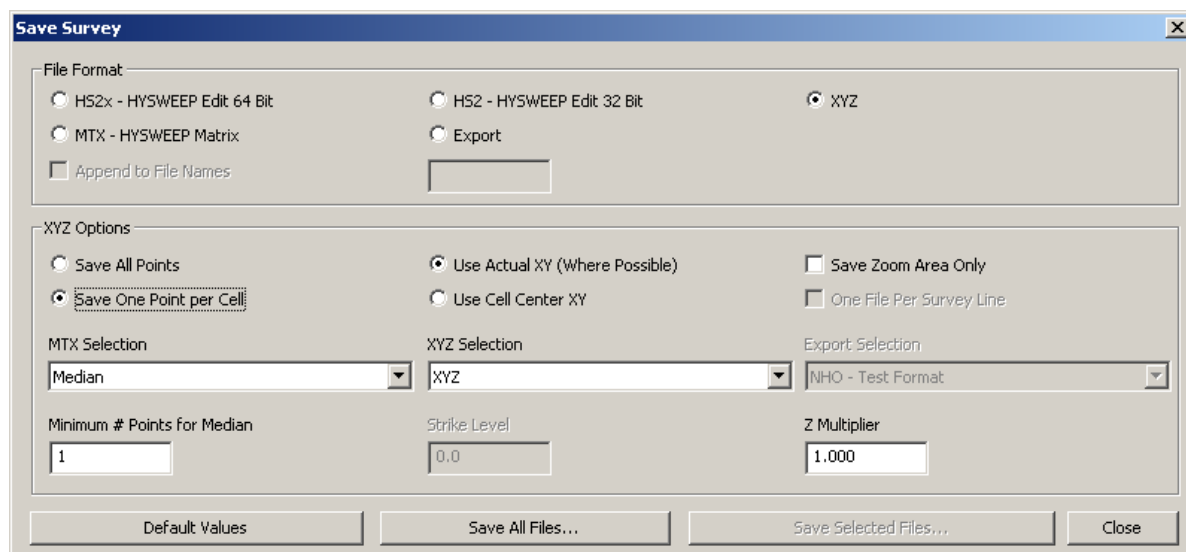


FIGURE 16. HS2 File Save Options



- **XYZ Format**

FIGURE 17. XYZ File Save Options



- Save Full data set. (Ability to create detailed subsets from it)
- Save One Point per Cell data sets.

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- i. Save with different Cell Sizes.
 - ii. Save with different Z-value Selection.



Examples of Selections: 1x1 Median, 1x1 Average, 1x1 Minimum, 1x1 Maximum, 3x3 Median, 3x3 Average, 3x3 Minimum, 3x3 Maximum, 5x5 Median, 5x5 Average, 5x5 Minimum, 5x5 Maximum, etc.

Tip: Name the File by its contents.

Example: Boat Name_Jobsite_Date_Cell Size_Z-value. XYZ
MV Simpson_St Louis Harbor_11112014_1x1_Median. XYZ

- **Other formats** as needed.