

Section-Half Multisensor Logger (SHMSL): Quick Start Guide

(Ver.1.0, 20130527; Approved DJH: 8/21/2013)

Introduction

The SHMSL is a multisensor logger that makes contact measurements of magnetic susceptibility and color reflectance on the split surface of cores. It also archives the laser profile of each section's surface for use in other applications such as routines to cull data from other loggers collected from voids.

Getting Started

Open the SHMSL application by double-clicking the icon on the desktop. IMS will begin by initializing the Acuity AR200 laser, the Bartington MS2E point source susceptibility probe, and the Ocean Optics USB4000 spectrometer. Please ask the PP Tech for assistance in changing the instrument's measurement parameters. Once initialized, the logger is ready to measure a section.



Making a Measurement

1. Bring the endcap of the section half (A or W) to be measured to the SHMSL.
Use the endcap rather than the label on the bottom of the section to scan the barcode for sample information to prevent accidentally dropping the section half.
2. Place the archive section in the core tray with the blue endcap up against the benchmark (Fig. 1). The benchmark is the white square at the head of the rails that hold the section halves.
3. Adjust the section so that it is as flat as possible with respect to the plane of the benchmark. There is a limit to how much the sensor heads can float when they land on a tilted section.
NOTE: Do not wrap the cores yet. The Acuity AR200 laser cannot reliably see through the plastic to measure an accurate profile of the section half surface.
4. Click the **Start Scan** button to open the *Section Information* screen (Fig. 2).
5. Place the cursor in the **SCAN** text field so that the barcode information will be parsed appropriately. At the beep, the information automatically fills for Expedition, Site, Hole, and so on.
6. Enter **User** (your last name) and **Comments** fields (both fields are optional).
7. If material is missing from the top of the section, enter the distance in the **Missing Top** field (circled in Fig. 2).
Note: If material is missing at the top of the section, position the section half all the way up to the top of the rail. The software adds the missing top interval to all of the measurements in the database. For example, if a 150 cm section half is missing 10 cm at the top, the yellow endcap should be placed against "0 cm" at the top of the instrument rails. The user should enter 10.0 in the **Missing Top** (cm) field. The logger measures the section, and all measurements are placed at the correct offsets in the database.

8. Additional intervals can be specified for omission from measurement by clicking the **Exclude Interval** button. Enter the top and bottom offsets of the areas to be excluded during the measurement pass. The excluded intervals apply to all enabled sensors.
X341S Note: The “Specify Positions” and “Measure a Control Set” functions are not available as of this writing and should be avoided.
9. When the required minimum sample information has been entered, the **Start Measurement** button becomes active. Click it to start the measurement.
If the USB4000 does not require calibration (see [USB4000 Calibration](#)), proceed to the next step.
10. The sensor assembly moves down the track while the laser acquires a profile of the split surface of the section. Detected gaps that will not be measured by the sensors are shown on the screen in red. (Gap detection parameters are configurable; ask the PP tech for assistance in modifying them.)
Acquisition of this profile is why the section is not yet wrapped in plastic wrap—sometimes the laser profiles the wrap rather than the sediment beneath it and gives incorrect heights to the gap detection routine.
11. After the surface profile is completed (Fig. 3), the measured section length as determined by the laser is displayed (Fig. 4). Apply Glad Wrap to the surface of sediment cores as demonstrated by the PP Tech. Adjust the displayed length if needed in the **Section Length** field and click **GO** to start the section measurement.
IMPORTANT!!! Before pressing GO, it is necessary to cover the core section with Glad Wrap in order to avoid damage to the integration sphere. Any mud that gets inside the sphere will ruin it!
12. The measurement sequence begins. For efficiency, measurements begin at the bottom of the section and move upcore. Results are displayed during acquisition on instrument graphs on screen (Fig. 5).
Note that the USB4000 has several tabs that display different views of the color reflectance data. Tabs can be changed during the measurement sequence. The **Normalized Spectra** tab shows the corrected percent color reflectance being measured at each point.
13. After the section has been measured, the logger takes measurements using the MS2E and white standards as check standards.



Figure 1. The Benchmark.

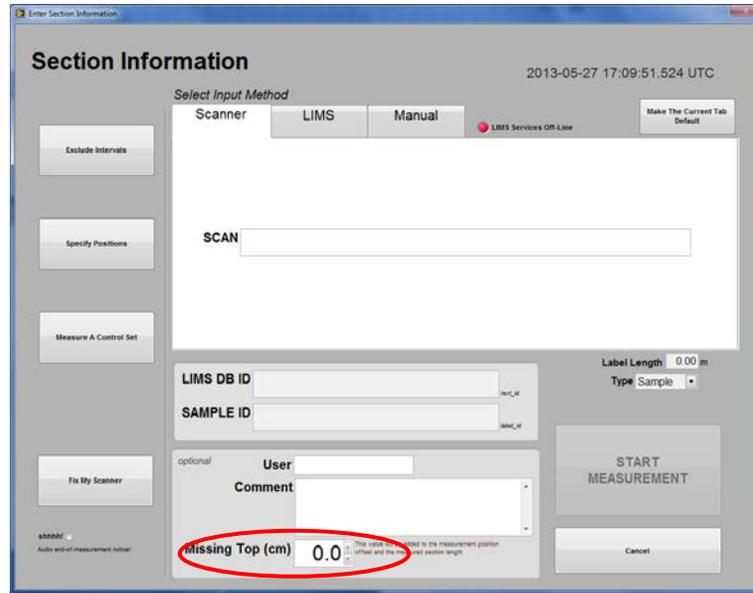


Figure 2. Section Information Screen.

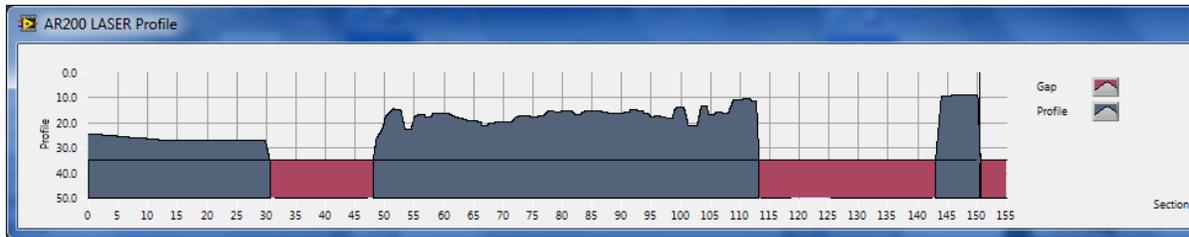


Figure 3. Laser Profile Screen.

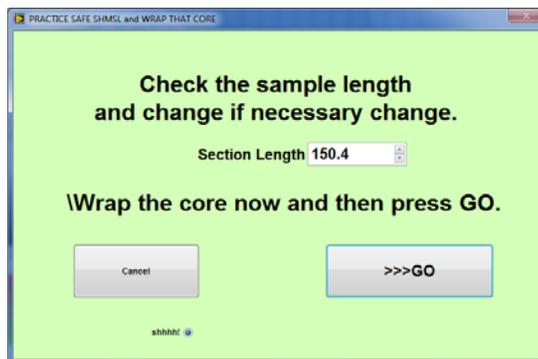


Figure 4. Section Length Window.

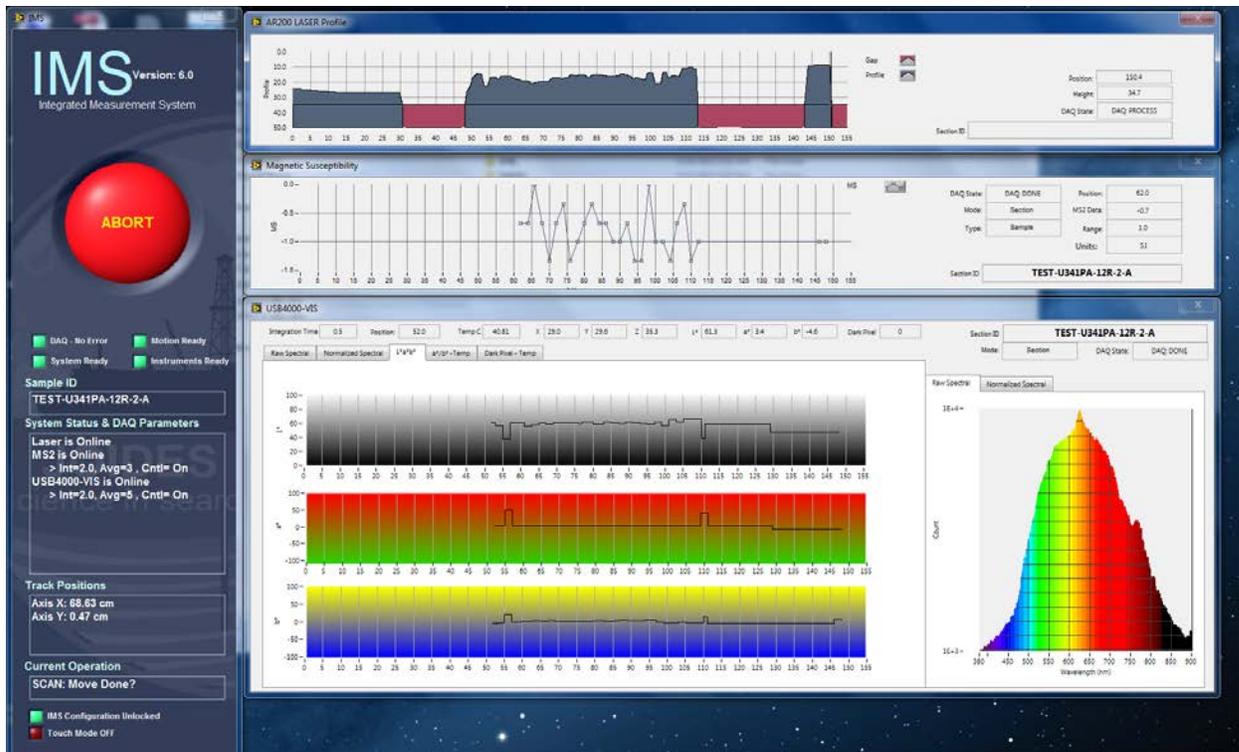


Figure 5. Data Acquisition Screen.

Data Storage and Format

C:\data\IN

- Section half $L * a * b^*$ and XYZ data
- MS2E check standard result
- MS2E (MSPOINT) data file
- USB4000 white check standard result
- Laser profile pointer file

C:\AUX_DATA\RSC\CALIB

- Laser profile data in 0.1 mm steps

C:\AUX_DATA\RSC\CALIB

- White and Dark calibration spectral data per wavelength (380–900 in 2 nm steps)

C:\AUX_DATA\RSC\CNTRL

- Raw spectra and normalized (% color reflectance) spectral data per wavelength (380–900 in 2 nm steps) for the white check standard at the end of a run

C:\AUX_DATA\RSC\RUN

- Raw spectra and normalized (% color reflectance) spectral data per wavelength (380–900 in 2 nm steps) for the measured section

Uploading Data to LIMS

1. As with most laboratory data, uploading SHMSL data to the LIMS database is executed via the MUT application. Look for an icon on the bottom menu of the Desktop (shown by the red triangle below) or the more prominent “Puppy” MUT Icon (usually on the Desktop). Double-click on one of these application launchers.
2. Once the application is activated, it displays a table-like list of files in the C:\DATA\IN directory. Files are ready to be uploaded if they have a green check mark next to them. Log in using database credentials to use MUT.
3. Once the **Upload** button is clicked or the **Automatic Upload** option is checked, files will be transferred to the LIMS database via MUT and then moved to the *archive* folder. The presence of files in the *Archive* folder is the indication that they have been uploaded to the database.
4. Please ask a technician for help if you see these indications:
 - Purple question marks on files in MUT indicates that MUT cannot identify them.
 - Red and white X icons on files in MUT indicate errors associated with the files.



Figure 6. MUT Icons.

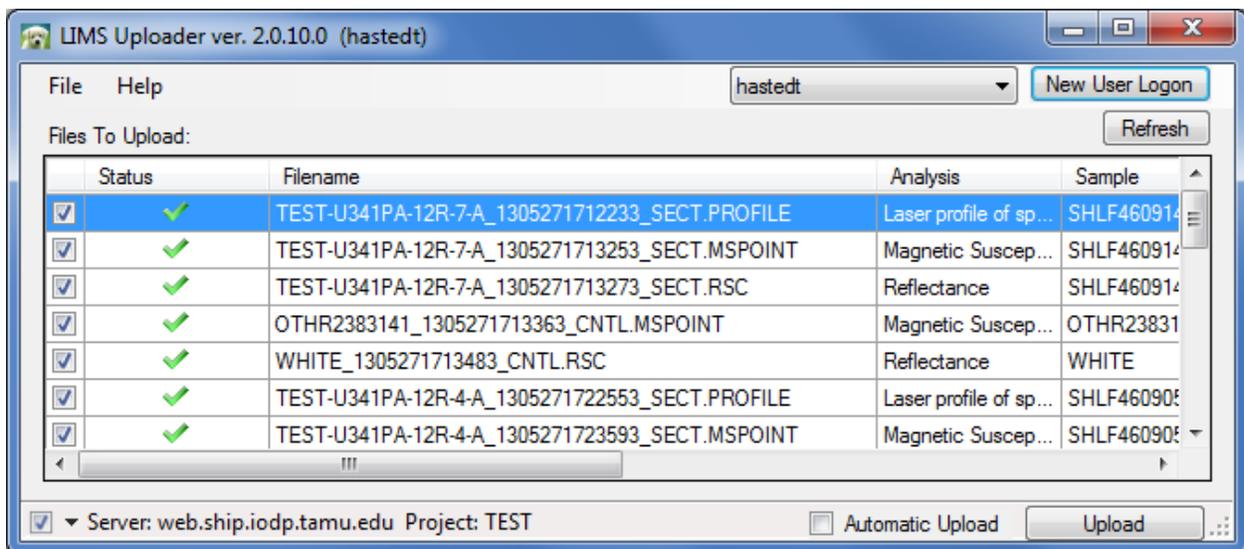


Figure 7. Uploader Screen.

USB4000 Calibration

1. If the USB4000 is out of calibration, the **Instrument Calibration List** screen will appear.
2. Click the **Calibrate ALL CHECKED Instruments** button to begin the calibration process (Fig. 8). The logger moves the USB4000 integrating sphere over the white calibration standard and lowers it until it touches. It will take some preliminary measurements to establish the integrating time based on an 80% saturation level of the total response. These measurements take about 0.45–0.55 seconds for the current dual-light source configuration, assuming the light bulbs are new.
Note: if integration times increase to more than 1 second, alert the PP tech. The halogen bulbs in one or both of the light sources may need replacing. If one light source is being used, the expected integration time is 1.0 to 1.8 seconds, and bulb problems are indicated if the integration time rises to more than 2 seconds.
3. Click **Accept** to accept the suggested integration time (Fig. 9). The logger will then take 20 measurements of the white standard at the automatic integration time (Fig. 10).
Note: If overriding the automatic time be aware that this manual value only applies to the actual section measurement, not the calibration itself. Although the application asks you to click **Manually Set**, there is no button for that option (old feature). Enter the manual value into the dialog window and observe it being applied during the measurement phase. Manually-set integration times are not presently denoted in the files—put it in your sample comment field if you want it to be recorded. Manual integration times are not recommended.
4. After the white measurements are completed, the logger will raise the integrating sphere, position it over the dark standard, and lower it on the dark standard. The shutters on the light sources will close and the dark measurement will acquire 20 measurements, as above (Fig. 11).
5. The final screen shows the normalization of spectra that will occur with the just-acquired calibration (Fig. 12). If this was a mandatory calibration the laser profile will start automatically, followed by the normal measurement sequence.
Note: a calibration may be run at any time outside of the mandatory calibration period.

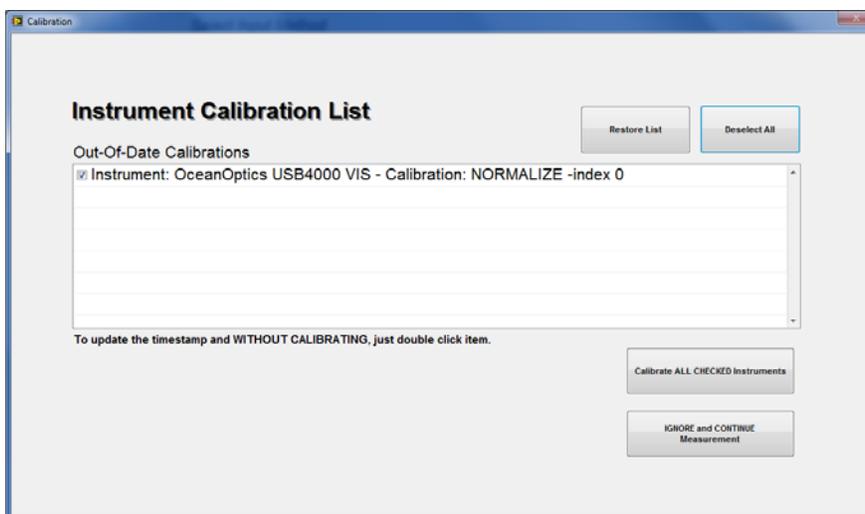


Figure 8. Calibration Prompt Screen.

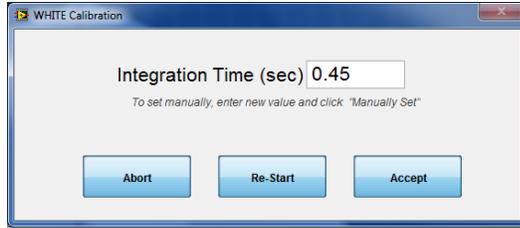


Figure 9. Integration Time Display.

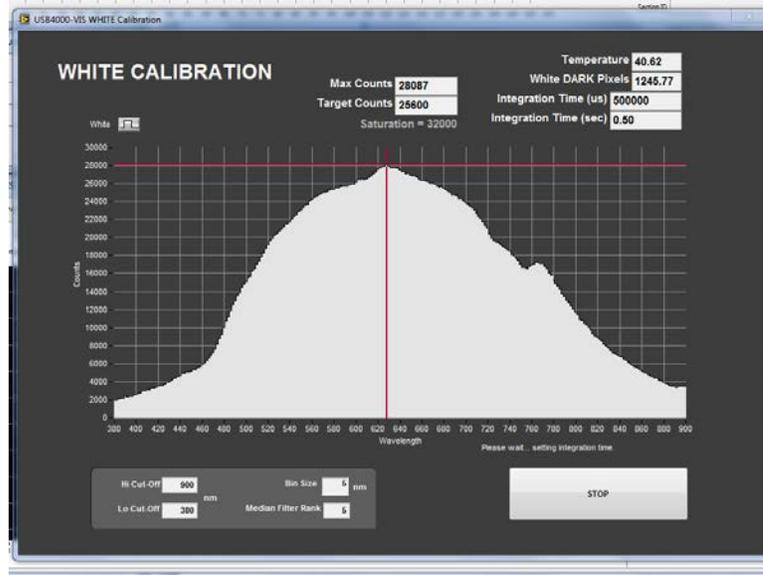


Figure 10. White Calibration Spectrum.

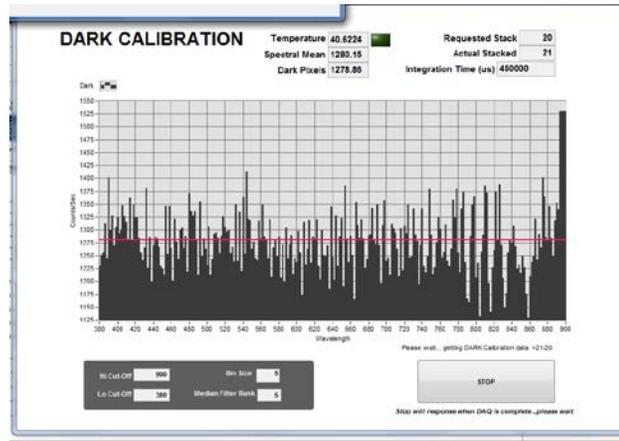


Figure 11. Dark Calibration Spectrum.

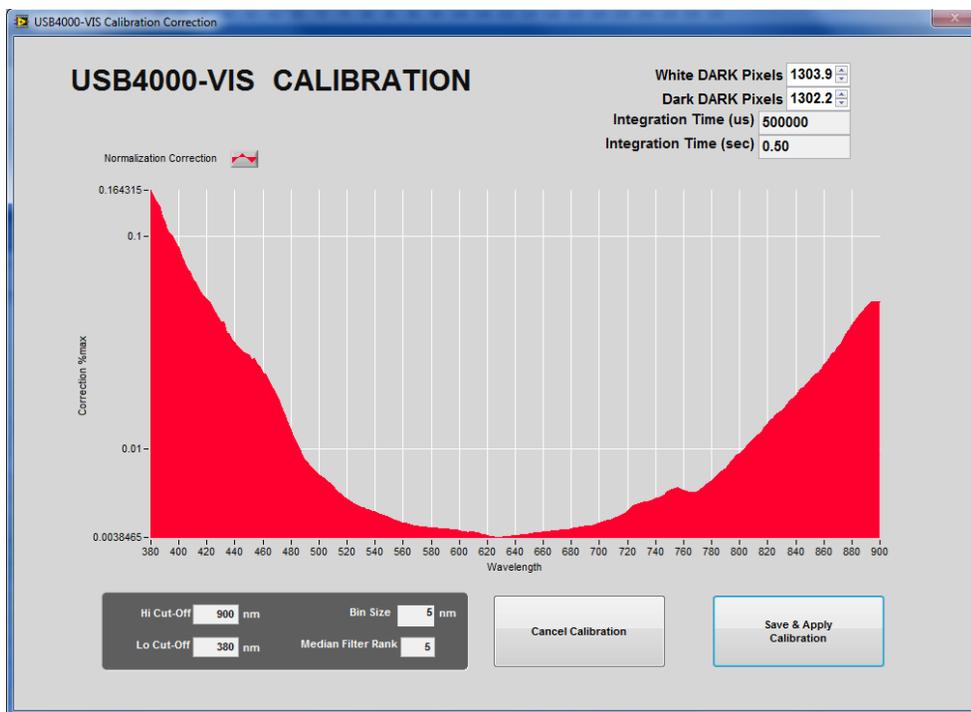


Figure 12. Calibration Correction Screen.