

# Field Guide to SonTek SL Software v3.0

With the discontinuation of the Argonaut platform, index velocity technicians are being required to learn new software and techniques for field service. Although this form is not a replacement for the user manual or proper instruction in equipment use; we hope it will serve as an aid to general setup and maintenance for field use.

As you begin to use this version of the software the HaWG would like to remind you that we are here to help you. We would also like to ask for your help as well. If you notice bugs, errors, or oddities in your workflow please let the HaWG know, we want to help make sure field work is as smooth as possible. If you have any questions at all you can reach us through the [HydroAcoustics Forum](#), at [gs-w\\_hawg\\_all@usgs.gov](mailto:gs-w_hawg_all@usgs.gov), or [directly](#).

To report potential software bugs or to make feature requests we would like to ask you to make use of [this Google Form](#) that has been developed to aid in request tracking. Thank you for your help in improving this software for everyone.

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## Important notes:

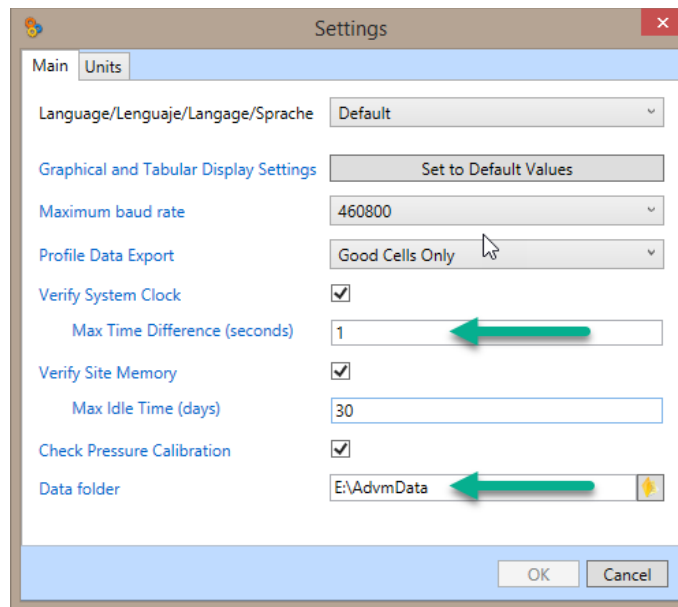
1. When moving from the Argonaut platform to a 3G deployment some sample volume parameters may change:
  - a. 3G setup requires that the start and stop locations for multi-cell data be equal to or greater than the range averaged/Index Velocity Cell (IVC) sample volume.
  - b. A change in how pulse lengths are computed may result in differences in the starting location of your sample volume. For instance a 3G collecting 10 1 meter cells will have a required cell begin of 1.2m or greater. An identical setup with an Argonaut would have allowed for a 0.5m cell begin.
  - c. The use of amplitude vs noise to reduce cell end is optional. Use of this feature can help to highlight questionable data due to increased noise or decreased return strength by showing a reduced cell end. Knowledge of the gaging location should be used to determine the need for this functionality.
  - d. Integrated velocity filters should not be used to smooth data prior to logging.

## Initial Software Setup:

Setup preferences for file download location, preferred units, and Max Time Drift should be set on first software run.

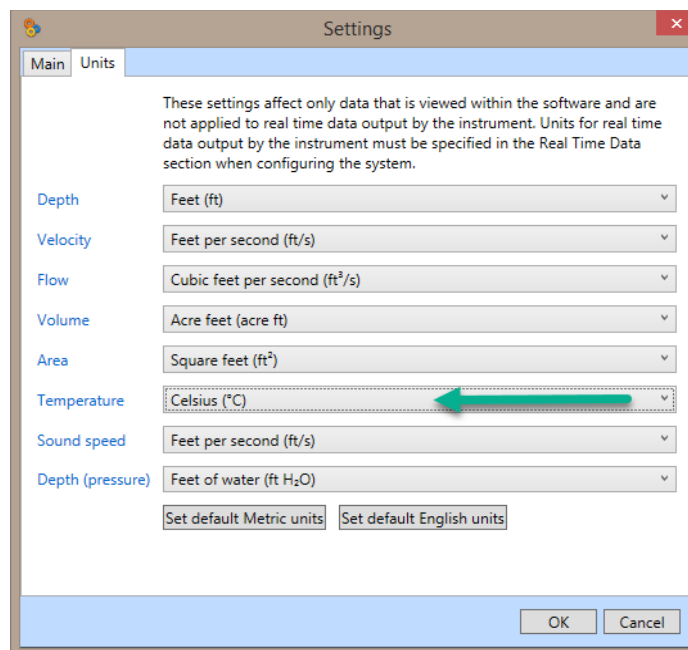


a. Main:



- o Modify Max Time Difference from default of 120 to a smaller value ie 1s.
- o Define preferred data download/load location.

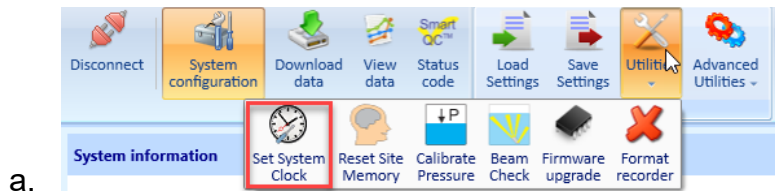
b. Units:



- o These settings are only for data display within the SL software.
- o Units reported to the DCP will be handled in a later section.

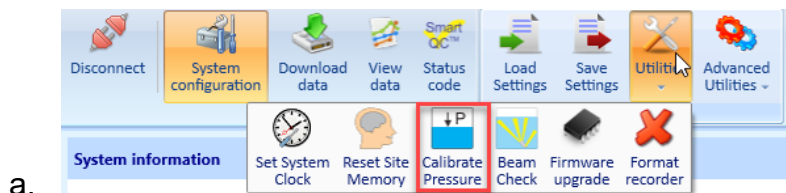
## Initial Site Setup-Detailed:

### 1. Synchronize ADVM time with PC:



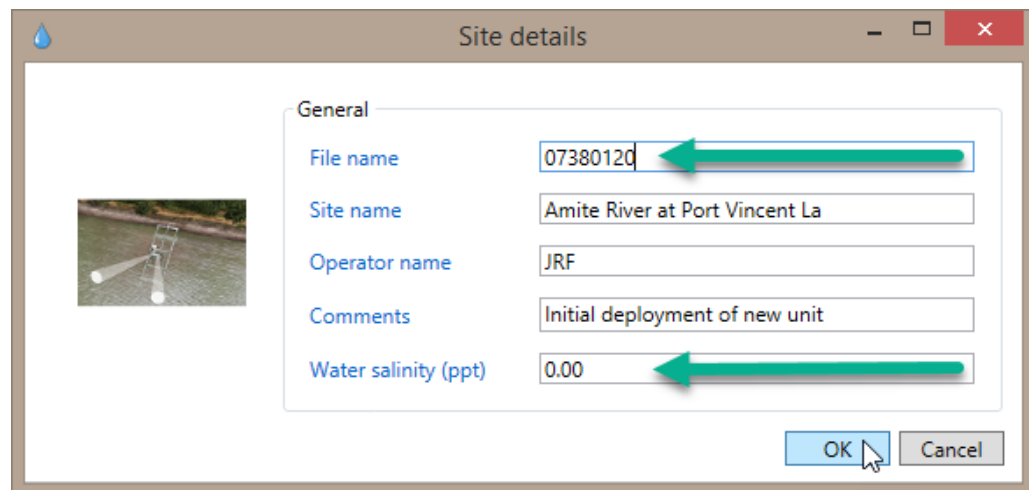
- i. Software may prompt for this at connection.
- ii. It is good practice to force a time reset if not prompted.

### 2. Calibrate the Pressure Transducer:



- i. Software may prompt for this at connection.

### 3. Setup Site details:



- i. Using the “Change” button modify the Site Details to include a default file name and mean salinity value. Additional information can be used to define file details.

### 4. Define a Data Collection schedule to evaluate ADVM orientation prior to final setup



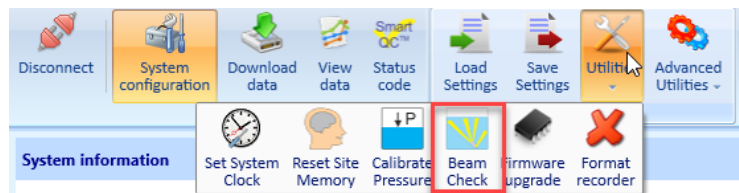
Recorder

Sample duration (sec)	10
Sample interval (sec)	10
Record diagnostic beam check data	96
Align sample to hour	Sample starts at the top of an hour
Days remaining	75
Maximum file size (MB)	20

b.

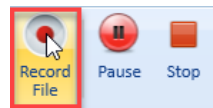
- Notice that this setup will collect a 10s average every 10s. This will allow for adjustments in ADVM setup to be seen relatively quickly. If these values are too noisy expand the sample interval accordingly.

## 5. Run a Beam Check to evaluate proper sample volume.



a.

b. Select the Record File button to begin saving data.

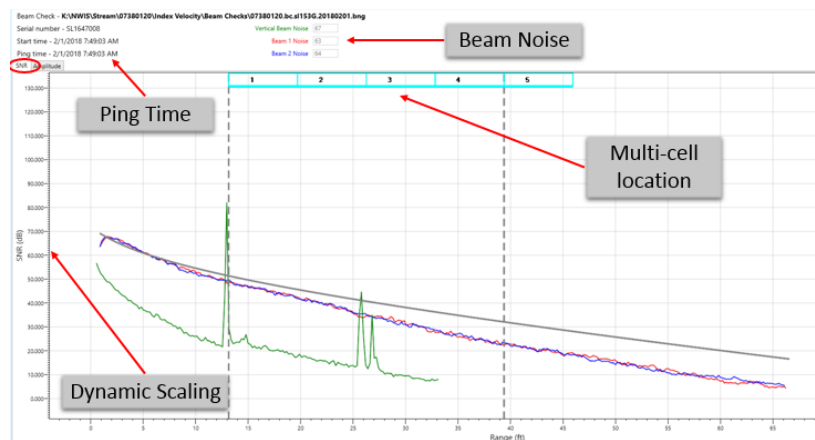


i.

c. Name the file according your office policy.

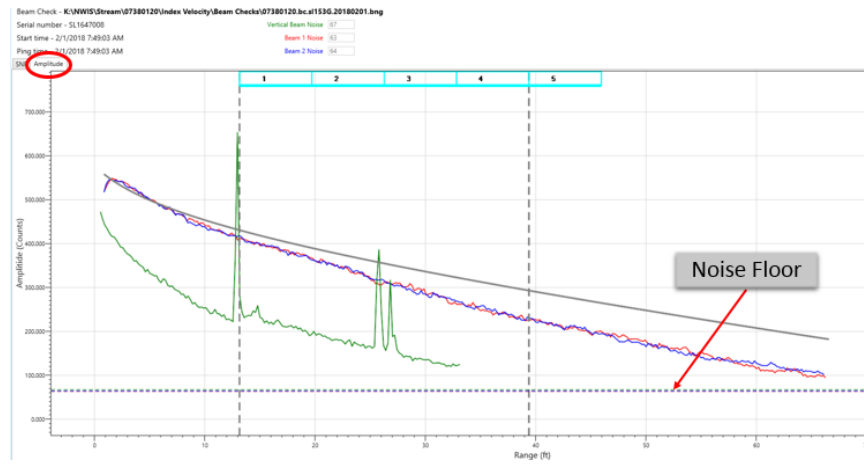
- ie StationNumber.BC\_SL15003G.YYYYMMDD

d. Beam checks consist of two tabs SNR and Amplitude:



i.

ii.



## 6. Configure Velocity sampling setup.

- a. Range averaged(IVC) and multi-cell (MC) sample volumes will be defined using methods identified in Appendix 3 of T&M 3-A23 based on beam check results and cell velocity data.

b.

**Velocity configuration** [Change](#)

Multi-cell settings

Number of multi-cells

Multi-cell begin (m)

Multi-cell size (m)

Integrated velocity cell begin (m)

Integrated velocity cell end (m)

Velocity settings

Reverse flow direction ☒

Use velocity filter ☐

Use SNR to adjust sample volume ☒

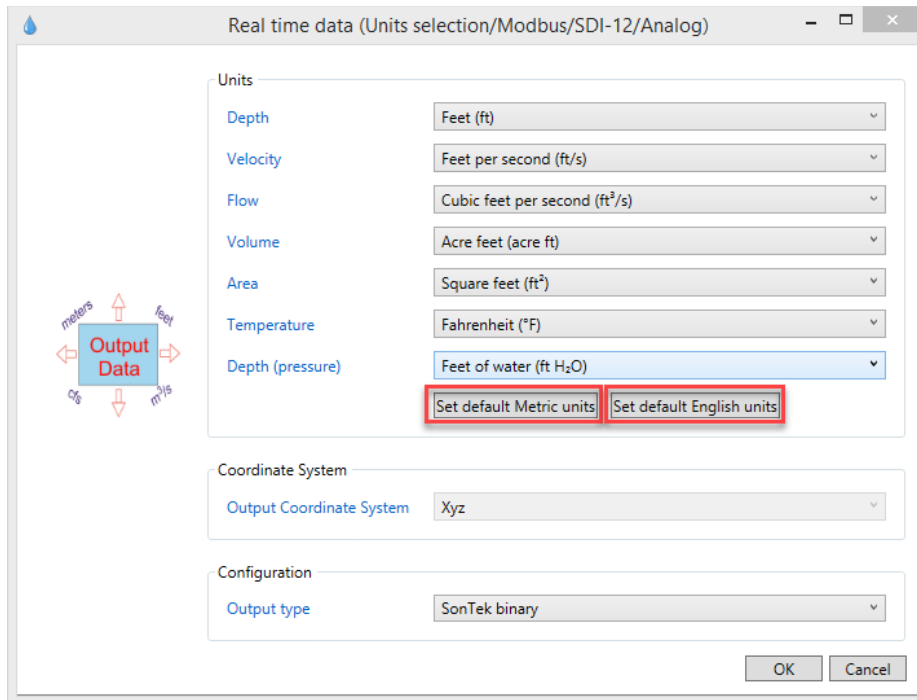
c.

- i. Set Reverse X Velocity if needed.
- ii. Selecting “Use SNR to adjust sample volume” will result in a cell end that is dynamic based on amplitude vs noise. This is consistent with historically collected Argonaut data. Technician knowledge of the site should be considered when deciding to use this feature.
- iii. Do NOT use velocity filters or SmartPulse for indexing applications.

## 7. Setup Output data to to evaluate ADVN orientation.

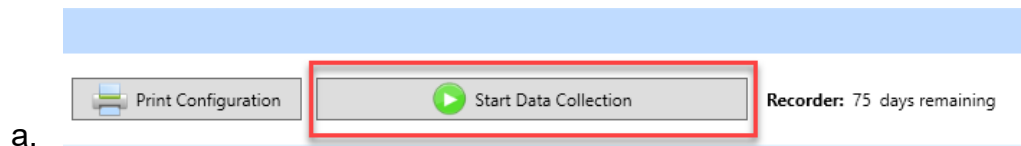
a.

**Output data** [Change](#)



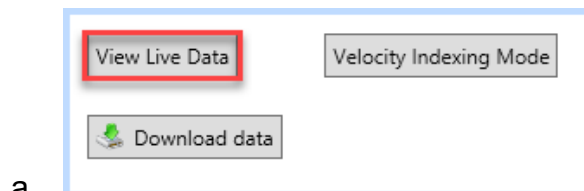
- b.
- All units can be quickly set using the two highlighted buttons. Parameter units can be set individually.
  - In order to view “Live” data for adjustment format must be Sontek binary.

8. Start data collection.



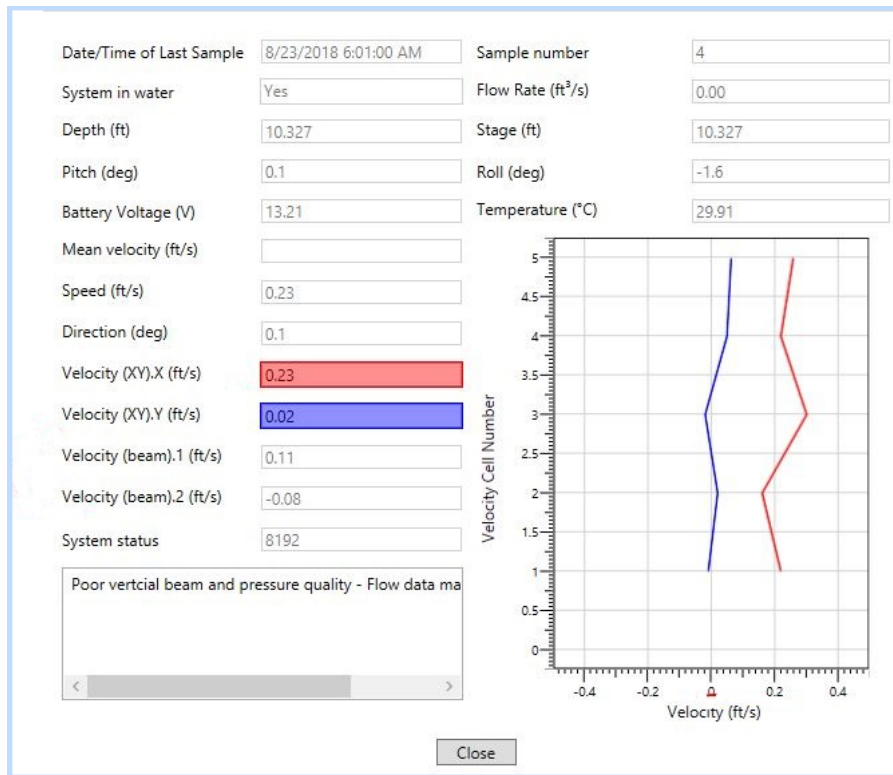
a.

9. Examine live data readings for proper Pitch/Roll/Y-Velocity/Cell Velocities.



a.

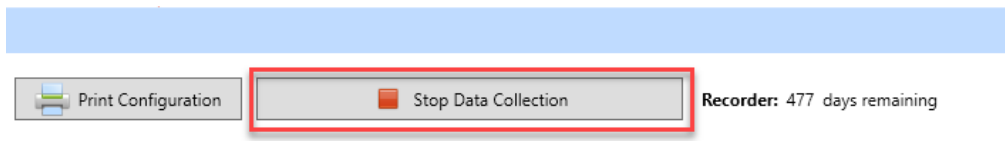
10. Make any required mount adjustments and redeploy unit.



- a. This data is being populated based on the previous data collection schedule setup and the system being deployed.

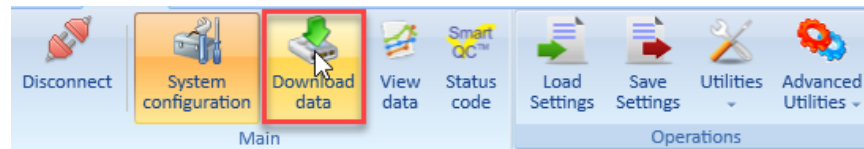
11. Repeat steps 9 and 10 until correct deployment orientation/setup is achieved.

12. Stop data collection.



- a.

13. Download data file collected during setup routine.



- a.

- i. After successfully downloading your file it will disappear from the list of files. It has not been deleted but will not redisplay as long as it is stored in your download folder.
- ii. In order to permanently remove files you must perform a recorder format.

- b. Files download with a default name structure, rename the downloaded file to match your office policy.

- i. le StationNumber\_SETUP\_SL15003G\_YYYYMMDD

14. Set your desired DEPLOYMENT Data collection schedule.

a. **Data collection schedule** [Change](#)

Recorder

Sample duration (sec)	600
Sample interval (sec)	900
Record diagnostic beam check data	100
Align sample to hour	Sample starts at the top of an hour
Days remaining	42,936
Maximum file size (MB)	10

b.

- i. Data should be aligned to top of hour to insure compatibility with IV synchronization tools.

15. Setup SDI-12 address and verify output units.

a. **Output data** [Change](#)

Units

Depth	Feet (ft)
Velocity	Feet per second (ft/s)
Flow	Cubic feet per second (ft <sup>3</sup> /s)
Volume	Acre feet (acre ft)
Area	Square feet (ft <sup>2</sup> )
Temperature	Celsius (°C)
Depth (pressure)	Feet of water (ft H <sub>2</sub> O)

Set default Metric units Set default English units

Coordinate System

Output Coordinate System Xyz

Configuration

Output type SDI-12 output

SDI-12 address 7

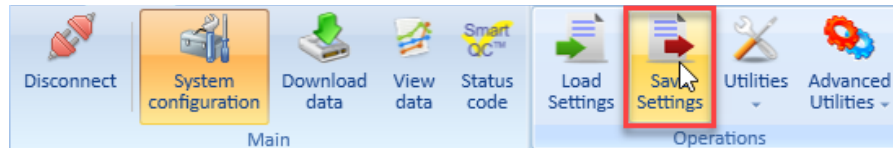
OK Cancel

b.

- i. Note that Flow, Volume, and Area are not used as part of the standard USGS IV method.

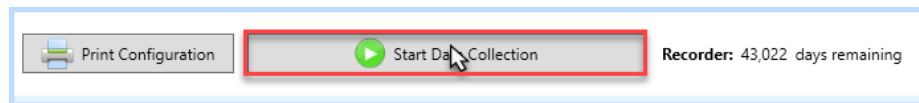


16. Save a settings configuration file.



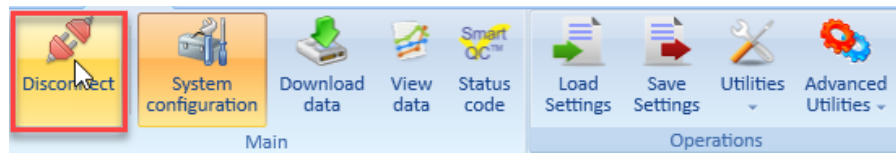
- a.
- b. This file can be used to restore the configuration following equipment replacement and to document correct settings upon departure. It should be archived according to your office policy.

17. If logging output type is NOT SDI-12, start data collection.



- a.
- b. When in SDI-12 mode the log is controlled by DCP commands and no software start is required.

18. Disconnect from ADVN and use your DCP to verify proper communication and data output.



- a.

## Initial Site Setup-Simple:

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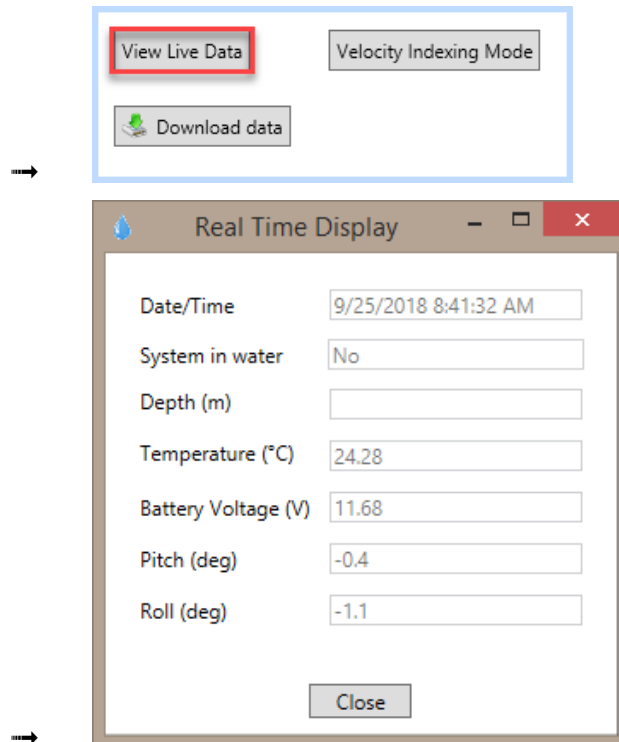
- ☐ Synchronize ADVm time with PC:
  - Software may prompt for this at connection.
  - It is good practice to force a time reset if not prompted.
- ☐ Calibrate the Pressure Transducer using the utilities button.
  - Software may prompt for this at connection.
  - Calibrating in air can improve reliability if issues are encountered.
- ☐ Setup Site details:
  - Using the “Change” button modify the Site Details to include a default file name and mean salinity value.
  - Additional information can be used to define file details.
- ☐ Using the Data collection schedule element, define a schedule to evaluate ADVm orientation prior to final setup.
  - The sample duration and interval should be relatively short to help see the changes made.
- ☐ Run a Beam Check to evaluate proper sample volume.
  - Beam checks are accessed using the Utilities menu.
- ☐ Using the Velocity configuration element, Configure Velocity setup.
  - Range averaged(IVC) and multi-cell (MC) sample volumes will be defined using methods identified in Appendix 3 of T&M 3-A23 based on beam check results and cell velocity data.
  - Selecting “Use SNR to adjust sample volume” will result in a cell end that is dynamic based on amplitude vs noise. This is consistent with historically collected Argonaut data.
  - Do NOT use velocity filters or SmartPulse for indexing applications.
- ☐ Using the Output data element, setup desired output format to to evaluate ADVm orientation.
  - All units can be quickly set using the two default buttons. Parameter units can be set individually.
  - In order to view “Live” data for adjustment format should be SonTek binary.
- ☐ Start Data Collection.
  - Located at the bottom of the system configuration page.
- ☐ Press View Live Data to open display of values being collected.

- Examine live readings for proper Pitch/Roll/Y-Velocity/Cell Velocities.
- ❑ Perform any required mount/alignment adjustments and redeploy unit.
- ❑ Repeat steps 9 and 10 until correct deployment orientation/setup is achieved.
- ❑ Stop Data Collection.
  - Stop Data Collection button is located at the bottom of the system configuration page.
- ❑ Using the Download data button, Download data file collected during setup routine.
  - After successfully downloading your file it will disappear from the list of files. It has not been deleted but will not redisplay as long as it is stored in your download folder.
  - In order to permanently remove files you must perform a recorder format.
- ❑ Using the Data collection schedule element, set your desired DEPLOYMENT sample interval and duration.
  - Data should be aligned to top of hour for historical compatibility.
- ❑ Using the Output data element, setup Output type, Units, and SDI-12 address.
  - Stand alone logging will use SonTek Binary.
  - DCP logging will use SDI-12 or RS-232 depending on site configuration.
  - Note that Flow, Volume, and Area are not used as part of the standard USGS IV method.
- ❑ Using the Save Settings button, save a configuration file.
  - This file can be used to restore the configuration following equipment replacement and to document correct settings upon departure. It should be archived according to your office policy.
- ❑ If not using SDI-12 start data collection.
  - This step is not necessary when using SDI-12 protocols as data collection is controlled by the DCP commands.
- ❑ Using the Disconnect button, disconnect from ADVN.
- ❑ Verify proper communication and data output with the DCP.

## Site Maintenance-Detailed:

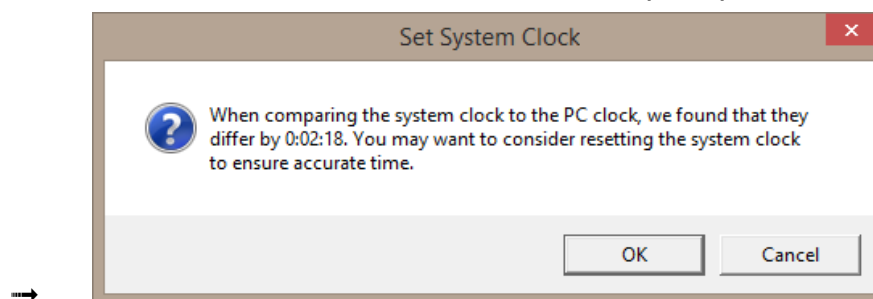
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1. Verify ADVN sensor readings using the View Live Data button.
  - a. Document temperature verification, Pitch, Roll, Battery.

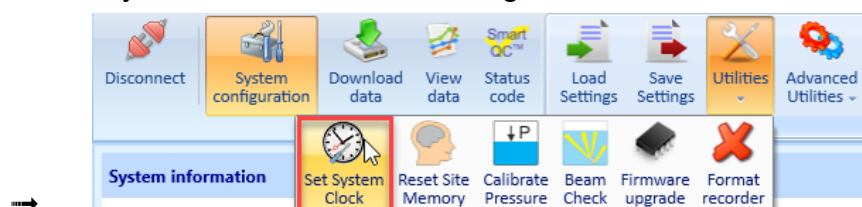


1. Since the unit is in SDI-12 mode, only the sensor data can be polled. A current reading will be pulled each time “View Live Data” is pressed.

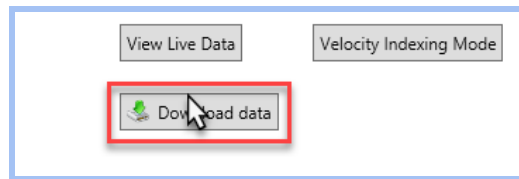
2. Reset system clock to insure data synchronization.
  - a. If ADVN vs PC drift exceeds threshold SL will prompt for reset.



- b. Manual sync can be accessed through the Utilities menu.



### 3. Download Data file.



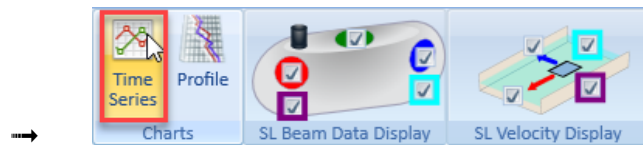
- a.
- b. After successfully downloading your file it will disappear from the list of files. It has not been deleted but will not redisplay as long as it is stored in your download folder.
- c. In order to permanently remove files you must perform a recorder format.
  - It is recommended that the recorder be formatted once you are certain data is properly downloaded..
- d. Navigate to download directory and rename the downloaded file to match your office policy.
  - ie StationNumber\_EDL\_SL15003G\_YYYYMMDD

### 4. Review Downloaded Data according to standard field practices and methods. see Appendix 4 of T&M 3-A23 for details.

- a. Navigate to View data menu.

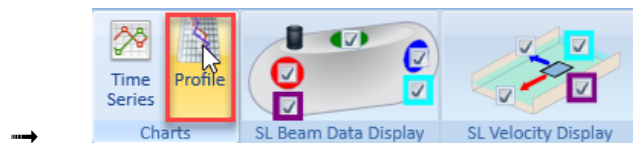


- b. Select charts of interest.



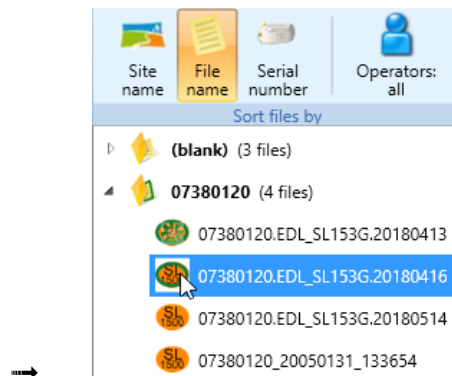
1. Velocity(XY), SNR, Cell Velocity, Velocity(beam), etc.

- c. Select data profile of interest.

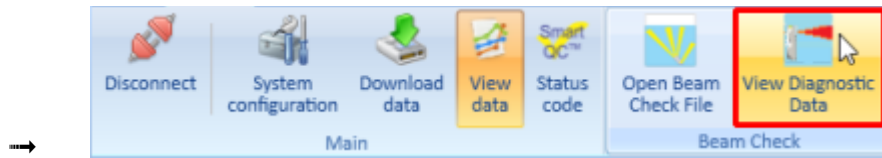


1. Vel(X-Obs), SNR, Beam Velocity, etc.

- d. Select file of interest, multiple files can be viewed at once.

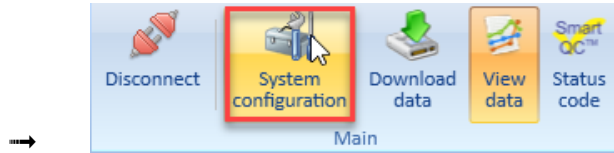


- e. Review internal beam check files using “View Diagnostic Data.”

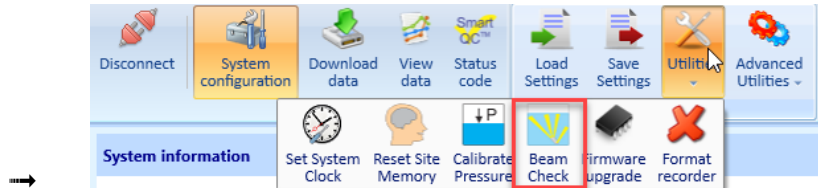


5. Collect a real-time beam check to verify current conditions.

- a. Return to System Configuration menu.



- b. Use the Utilities button to open beam check interface.



- c. Select the Start button to begin collecting data.



- d. Select the Record File button to begin saving data.

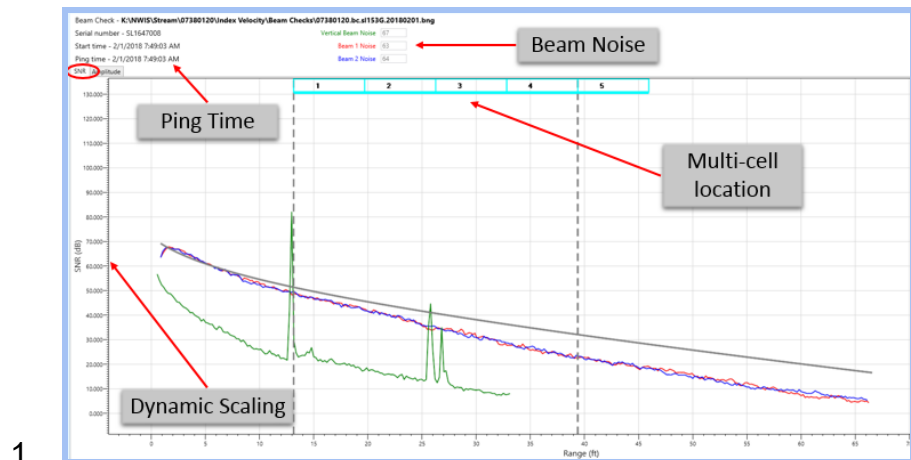


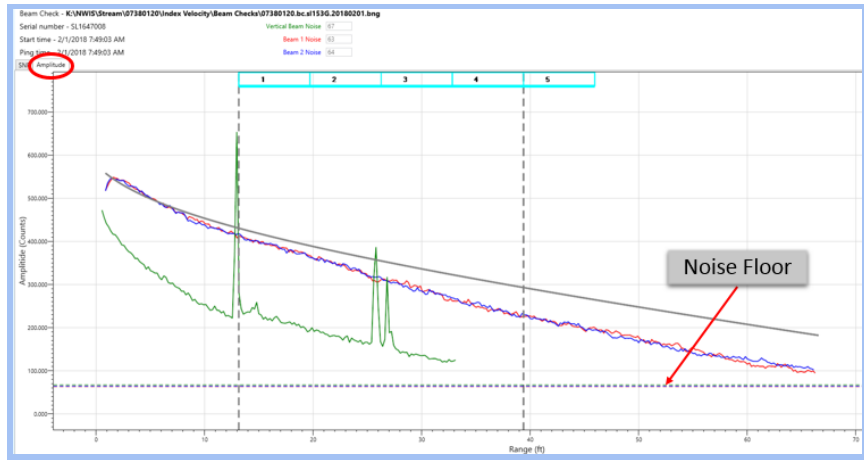
- e. Name the file according your office policy.

→ ie StationNumber.BC\_SL15003G.YYYYMMDD

- f. Review for potential issues and document your findings in SVMaq.

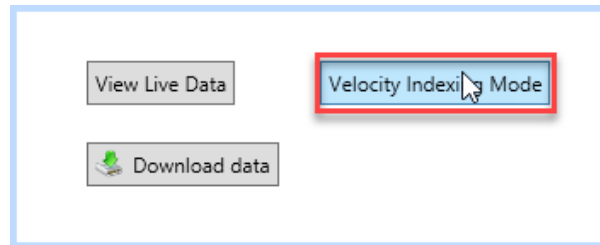
→ Beam checks consist of two tabs SNR and Amplitude:





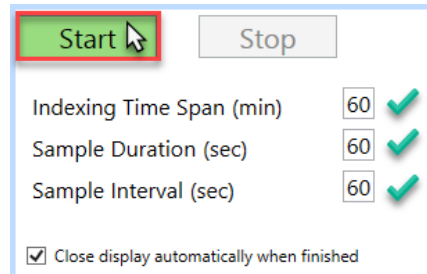
2.

6. Raise ADVM for cleaning and physical inspection.
7. Redeploy ADVM and use View Live Data to verify proper orientation.
8. If making a measurement:
  - a. Initiate Velocity Indexing Mode for data synchronization.



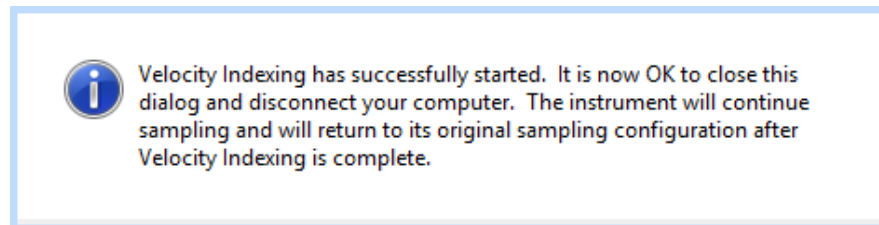
→

- b. Set the maximum minutes for index mode (Time Span) and verify SD and SI are each set to 60 seconds.
- c. Press Start.



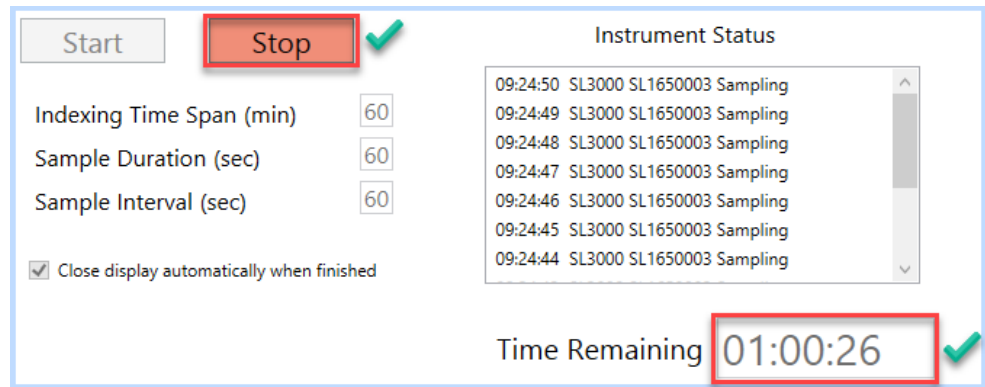
→

- d. Press OK on the PopUp dialog verifying that data collection has begun.

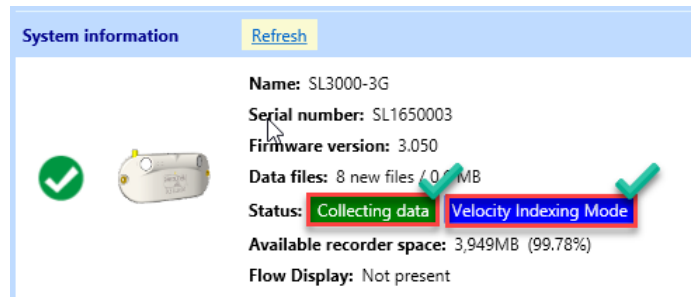


→

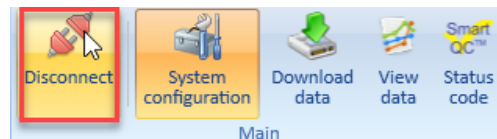
- e. Verify that Stop is now highlighted in red and the Time Remaining has begun to countdown.



- f. Close the Velocity Indexing window using the Close button (not Stop).
- g. Insure that **Velocity Indexing Mode** is now visible in the System information tab.

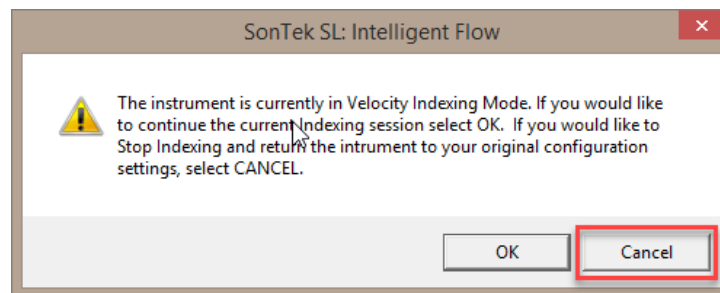


- h. Disconnect from the ADVN using the Disconnect button.



9. After completing measurement, reconnect to the ADVN.

10. STOP Velocity Indexing mode by pressing Cancel.



- a.
- b. ADVN will be reprogrammed to the pre-measurement setup.

11. Download QM data file using the Download data button.



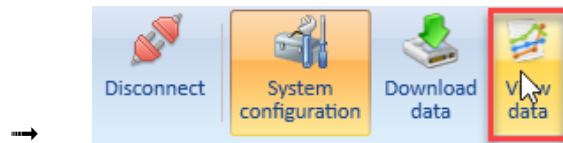
- a.
- b. Navigate to download directory and rename the downloaded file to match your office policy.



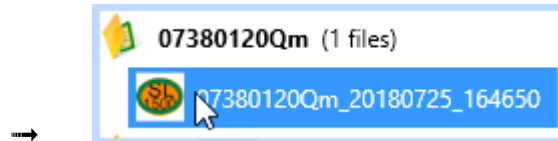
→ ie StationNumber\_ADVMMmt\_SL15003G\_YYYYMMDD

12. Export range averaged and multi-cell data for QM synchronization.

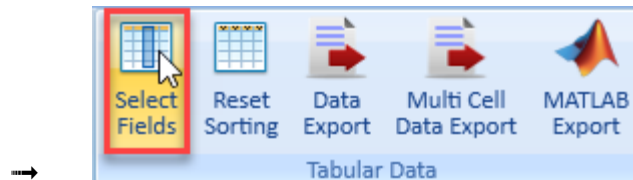
a. Open View data.



b. Load QM file downloaded in step 11.

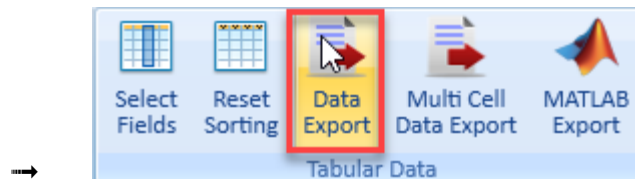


c. Define data type(s) that should be included in the range averaged output using Select Fields.



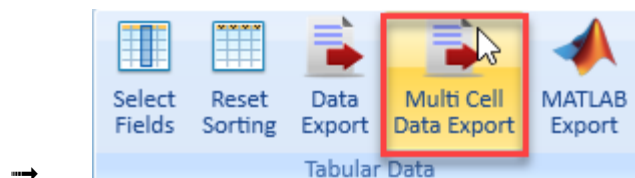
→ Sample time and Velocity (XY) are minimum required for QM synchronization.

d. Use the Data Export button to export a .csv and .dat file containing your selected parameters.

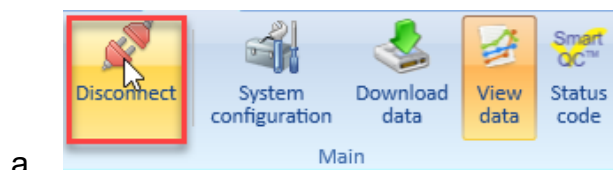


→ The column Velocity X-IVC will normally be used for data synchronization.

e. Select Multi Cell Data Export to create a \_vel.csv file containing all multi cell data.



13. Disconnect from the ADVM and complete standard index velocity site maintenance routines.



## Site Maintenance-Simple:

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- ❑ Verify ADVm sensor readings using the View Live Data button.
  - Document temperature verification, Pitch, Roll, Battery.
- ❑ Reset system clock to insure data synchronization.
  - If ADVm vs PC drift exceeds threshold SL will prompt for reset.
  - Manual sync can be accessed through the Utilities menu.
- ❑ Using the Download data button, download autonomously collected data files.
  - After successfully downloading your file it will disappear from the list of files. It has not been deleted but will not redisplay as long as it is stored in your download folder.
  - In order to permanently remove files you must perform a recorder format
    - It is recommended that the recorder be formatted once you are certain data is properly downloaded.
  - Navigate to download directory and rename the downloaded file to match your office policy.
    - ie StationNumber\_EDL\_SL15003G\_YYYYMMDD
- ❑ Review Downloaded Data according to standard field practices and methods, see Appendix 4 of T&M 3-A23 for details.
  - Navigate to View data menu.
  - Using the Time Series button, select charts of interest.
    - Velocity(XY), SNR, Cell Velocity, Velocity(beam), etc.
  - Using the Profile button, select data profile of interest.
    - Vel(X-Obs), SNR, Beam Velocity, etc.
  - Using the left menu pane, select the site and file of interest.
    - multiple files can be viewed at once.
  - Using View Diagnostic data, review internal beam check files.
- ❑ Collect a real-time beam check to verify current conditions.
  - Return to System Configuration menu.
  - Use the Utilities button to open beam check interface.
  - Select the Start button to begin collecting data.
  - Select the Record File button to begin saving data.
  - Name the file according your office policy.
    - ie StationNumber\_BC\_SL15003G\_YYYYMMDD
  - Review for potential issues and document your findings in SVMaq.
- ❑ Raise ADVm for cleaning and physical inspection.

- ☐ Redeploy ADVM and use View Live Data to verify proper orientation.
- ☐ If making a measurement:
  - Using the Velocity Indexing button, initiate Velocity Indexing Mode for data synchronization.
  - Set the maximum minutes for index mode (Time Span) and verify SD and SI are each set to 60 seconds. Then press Start.
  - Close the Velocity Index window using the Close button (not Stop).
  - Insure that **Velocity Indexing Mode** is now visible in the System information tab.
  - Disconnect from the ADVM using the Disconnect button.
- ☐ Collect discharge measurement.
- ☐ STOP Velocity Indexing mode:
  - Reconnect to the ADVM.
  - Pressing "Cancel".
  - ADVM will be reprogrammed to the pre-measurement setup.
- ☐ Download QM data file using the Download data button.
  - Navigate to download directory and rename the downloaded file to match your office policy.
    - ie StationNumber\_ADVMmmt\_SL15003G\_YYYYMMDD
- ☐ Export range averaged and multi-cell data for QM synchronization.
  - Open View data.
  - Load QM file downloaded in step 11.
  - Define data that should be included in the range averaged output using Select Fields button.
    - Sample time and Velocity (XY) are minimum required for QM synchronization.
  - Use the Data Export button to export a .csv and .dat file containing your selected parameters.
    - The column Velocity X-IVC will normally be used for data synchronization.
  - Select Multi Cell Data Export to create a \_vel.csv file containing all multi cell data.
- ☐ Using the Disconnect button, disconnect from the ADVM and complete standard index velocity site maintenance routines.

## Basic SDI-12 Output:

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The Standard aM!, where a is system address, command can be used to acquire the following parameters through the SDI-12 interface:

Parameter Number	Parameter
1	Mean Water Temperature
2	Mean Pressure (adjusted)
3	Stage
4	Multi-Cell End Location
5	IVC X (Range Averaged X-Velocity)
6	IVC Y (Range Averaged Y-Velocity)
7	Velocity Magnitude (Speed)
8	IVC Mean SNR
9	Calculated Flow

Additional values can be collected using aMx!, where x is a value of 1-8, and aC! Commands. Full details of how to use these commands can be found in the SL manual on pages 86-92