



SLHydro Sounder Software User Manual

V2.4.0

Software Revision

Revision Date	Revision Level	Description
Jun., 2025	2.4.0	SLHydro Sounder Software V2.4.0
Oct., 2024	2.3.0	SLHydro Sounder Software V2.3.0
Jun.,2024	2.2.1	SLHydro Sounder Software V2.2.1
Dec., 2023	2.2.0	SLHydro Sounder Software V2.2.0
Nov., 2022	2.1.0	SLHydro Sounder Software V2.1.0
Feb., 2022	2.0.0	SLHydro Sounder Software V2.0.0

Version Description

Jun., 2025 V2.4.0

Applicable Sounders: HydroBeam S2, HydroBoat USVs

Update Points:

- 1.KML, TIFF map support global zoom function
2. Software can output 2 decimal digits of water depth output accuracy.
3. Add negative correction to the draft correction of sounder software.
4. Optimize the reading of PPK correction files.
5. Add marking number export in customized format.
6. Add the function of deleting the resultant survey line
7. Add soft registration
8. Default open attitude correction
9. Remove 640m, 1280m and 2000m from the automatic range, and support up to 320.
10. Repair known bugs

Oct.,2024 V2.3.0

Applicable Sounders: HydroBeam S2, HydroBoat USVs

Update Points:

1. Support calculating the precision of internal conformity, and add statistical function.
2. Contours support the output of PDF file format.
3. The export of result data adds EXCEL format output.
4. Add section line function.
5. Bathymetry output adds anomalous bathymetry judgment mechanism.
6. Marker export function adds CSV and TXT formats.
7. Support automatic calculation of track length
8. Results View interface supports viewing imported kml/dxf vector base map.
9. Support importing tiff format as base map.
10. Intelligent processing support for the export function to select a custom line export result
11. Intelligent processing supports position + attitude correction function at the same time.
12. Support the simulation of echo printing and saving as PDF function.
13. Repair known bugs

Jun.,2024 V2.2.1

Applicable Survey: HydroBeam S2, USVs, Data Processing

Update Points:

1. Add PPK correction and point check correction module.
2. Support USV project import.
3. Support large area wiring operation.
4. New preview image png/tiff/jpg format is added in the result preview module.
5. Repair known bugs

Dec., 2023 V2.2.0

Applicable Survey: HydroBeam S2, HydroBoat USVs

Update Points:

1. Add to adapt HydroBeam S2 sounder.
2. Add intelligent data processing module.
3. Add attitude correction function
4. Add transverse Mercator projection in Utility Tools-Central Meridian.
5. Added support for KMZ/KML/SHP format base map.
6. Add floating point solution filter for positioning state filtering;
7. Repair known bugs

Nov., 2022 V2.1.0

Applicable Survey: ES224

Update Points:

1. Add bathymetry sampling. Add elevation map in the interface, which can be linked with the bathymetry map.
2. Add the function of time searching survey line.
3. Add PPS access function.
4. Add serial port and network port combined for positioning equipment connection.
5. Repair known bugs.

Feb., 2022 V2.0.0

Applicable Survey: ES224

Update Points:

1. Add new output formats for bathymetric output (Knudsen 320M, OdomCV3, Bathy500, Bathy1500, EA500, Echologger, Echotrac, EchotracE20, Elac4300).
2. Add dual- frequency switching function

Preface

Introduction

Welcome to the SLHydro USV Software User Manual. This introduction describes how to use this product.

Experience Requirement

In order to help you use SatLab series' product better, we suggest you carefully read the instructions. If you are unfamiliar with the products, please refer to <http://www.Satlab.com.se/>

Tips for Safe Uses



Notice: The contents here are special operations and need your special attention. Please read them carefully.



Warning: The contents here are very important. Wrong operation may damage the machine, lose data, break the system and endanger your safety.

Exclusions

Before using the product, please read these operating instructions carefully: they will help you to use it better. SatLab Surveying Instrument Co., Ltd assumes no responsibility if you fail to operate the product according to the instructions, or operate it wrongly due to misunderstanding the instructions.

SatLab is committed to constantly perfecting product functions and performance, improving service quality and we reserve the right to change these operating instructions without notice.

We have checked the contents of the instructions the software and hardware, without eliminating the possibility of error. The pictures in the operating instructions are for reference only. In case of non-conformity with products, the products shall prevail.

Technology and Service

If you have any technical issues, please call SatLab's technology department for help.

Relevant Information

You can obtain this introduction by:

Logging onto the SatLab official website, downloading the electronic version introduction at "Download center" - "Partners" - "Partner center".

Advice

If you have any comments and suggestions for this product, please email info@Satlab.com.se. Your feedback will help us to improve the product and service.

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Chapter 1

Software Introduction

This chapter contains:

- Software Overview
- Technical Parameters
- Installation and Uninstallation

1.1 Software Overview

SLHydro Sounder is a bathymetry and navigation software, mainly used on HD-MAX and HD-Lite. It can work with GPS and other accessories. (such as attitude indicator, electric gyrocompass, surge compensator, etc.)

The functions of the software mainly include project management, coordinate parameters setting, instruments, and equipment connection, boat shape design, lane design, CAD base map import, sea chart import, marine surveying, sounding sampling, data correction, tide level correction, results preview and export, coordinate transformation parameters calculation, coordinate transformation, and software registration.

1.1.1 Parameter setting

- Supports importing the conversion parameters of Hi-RTK handbook.
- Support access to attitude meter, electric compass and other sensors, have attitude solving module for high-precision bathymetry.
- Supports smooth calculation of antenna height by inputting water surface elevation.
- Support serial port test with ASCII/HEX display, users can intuitively determine whether the serial port setup parameters are correct or not.
- Support boat design template auto-matching, support import *.dxf or *.shp boat template.

1.1.2 Plan lines

- Support many types of plan line design: Channel, Area, Parallel, Vertical, Semi.
- Supports plan line endpoint capture with powerful plan line editing function, and supports retraction and recovery function.
- Supports two ways of drawing plan lines with mouse and inputting coordinates, and can be operated in parallel; supports point library drawing.
- Supports importing or exporting plan lines in *.DXF format.

1.1.3 Surveying

- Support synchronized acquisition of geographic coordinates and water depth (the frequency of coordinate point collection is the same as the frequency of sounder output)
- Support ship position centering and bow direction mode.
- Supports displaying electronic charts and *.DXF engineering maps, and supports the function of searching features on electronic charts.

- Supports points, lines, fitted curves and surface markers, as well as common chart patterns of inland waterways, and can be exported to *.DXF format.
- The bathymetry points display supports various color modes such as monochrome, two-color, ribbon, and customized bathymetry color; The water depth point display mode supports various display modes such as square, pie, water depth value, etc.
- Supports displaying multiple views, including 3D view, navigation view, section view, etc. and you can turn on or off the corresponding view according to your needs.
- With shallow water alarm, speed alarm, collecting data abnormal alarm and other common alarm functions, and support text and sound prompts.
- With line management functions, you can export line data in a customized format and show or hide the lines.
- Supports the collection of track data without connecting echosounder.

1.1.4 Bathymetry

- Support manual and automatic adjustment of gain, threshold, power
- Support manual configuration color of echo, water depth line, draft line
- Support manual and automatic switching
- Automatic capture of underwater depth
- Support synchronized recording of echo and location
- Support synchronized playback of echo and location

1.1.5 Data Post-Processing

- Support manual collection of bathymetric points and manual editing of bathymetric points.
- Support multiple automatic filtering methods: median method, weighted average method, statistical method.
- Support Geodetic correction, delay correction, water surface elevation correction and draft correction.
- Support single-station correction, regional multi-station correction, fixed difference correction and other tide correction methods.
- Support previewing the contours and pseudo-color rendering map generated by the result data.

- Support the export of result data, currently support the export of XYZXYZ format, DAT format and other common formats, and support the export of customized formats.
- Support the function of editing bathymetry points according to the echo.
- Support the function of post-processing high and low frequency switching.

1.1.6 Others

- With Hi-Target GNSS receiver (RTK, Beacon, Positioning Direction Finder) parameter setting and main board command sending and other related functions.
- With coordinate conversion parameter calculation, distance and orientation calculation and other functions.

1.2 Technical Parameters

Running environment: PC or mini-PC, operating system for Windows 7 and above, Windows 7 and above, version 1.4.4 and above requires the dot NET4.0 framework.

Language environment: English.

1.3 Installation and Uninstallation

1.3.1 Software Installation:

The steps are as follows:

Step 1 Choose I agree to the terms of this license agreement item, and click [Next].

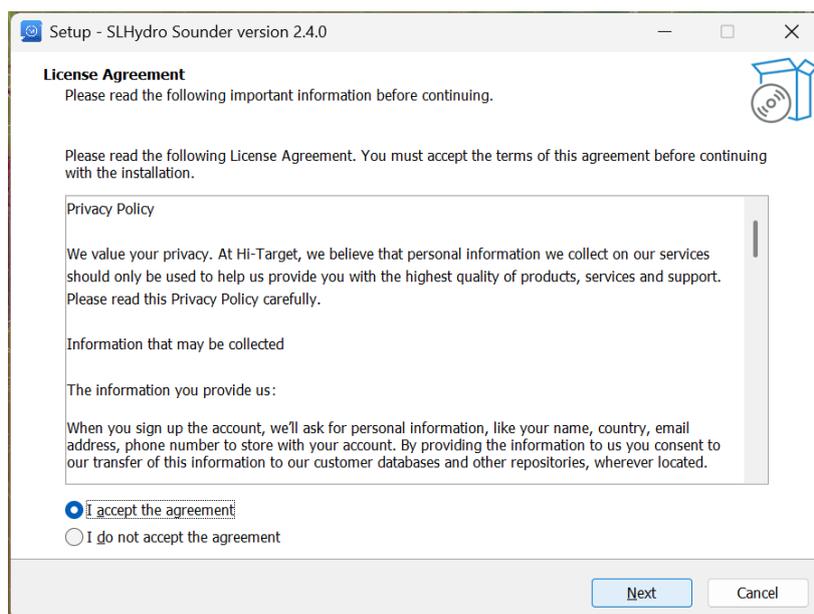


Figure 1-3-1 Steps of installation

Step 2 Click Create a desktop shortcut, click [Next]

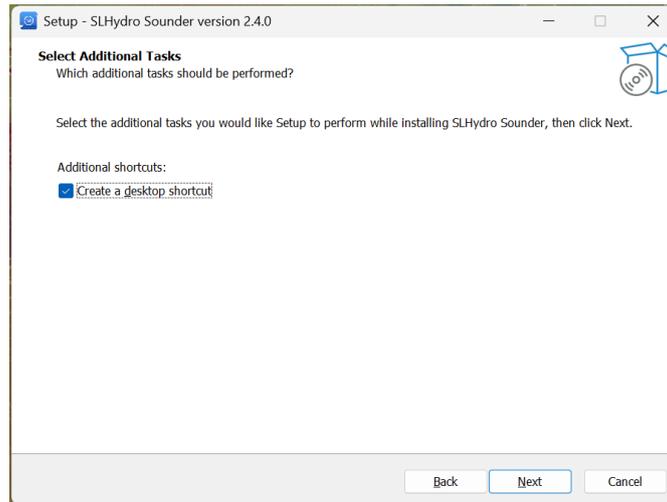


Figure 1-3-2 Steps of installation

Step 3 Click Install to start installation.

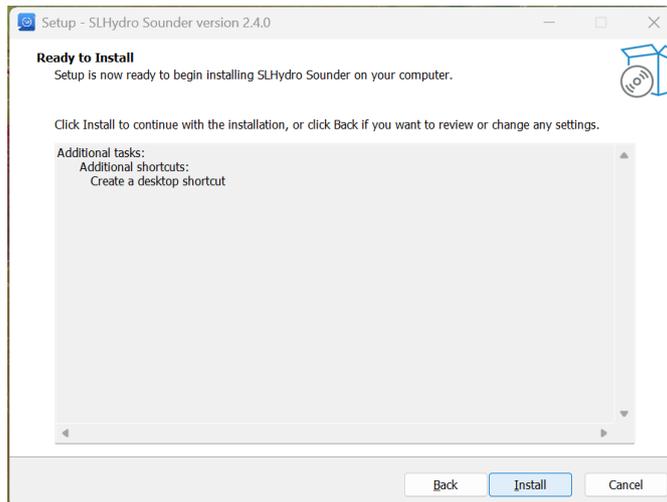


Figure 1-3-3 Steps of installation

Step 4 Successfully installed, Click Finish or install GrandDog.

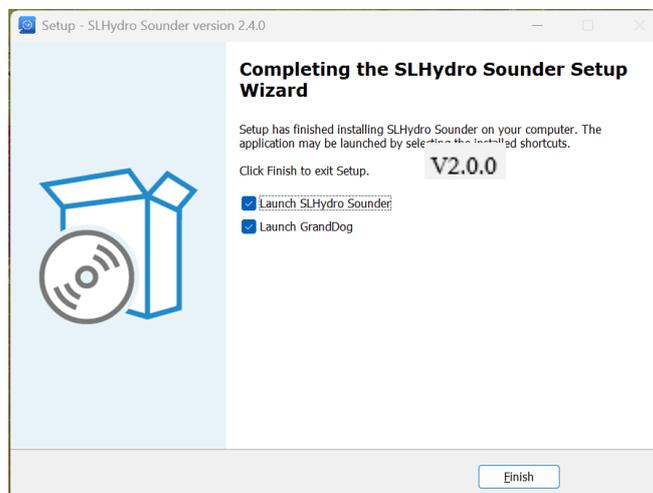


Figure 1-3-4 Steps of installation

1.3.2 Uninstall the software

There are two ways to uninstall this software, use your computer system's uninstaller or run the uninstaller that comes with SLHydro Sounder.

The following steps describe how to use the uninstaller that comes with SLHydro Sounder.

Step 1 Running self-contained unloading procedures. In the sub-menu of Satlab at the Start of the Windows OS, there is the shortcut icon for the uninstall program.

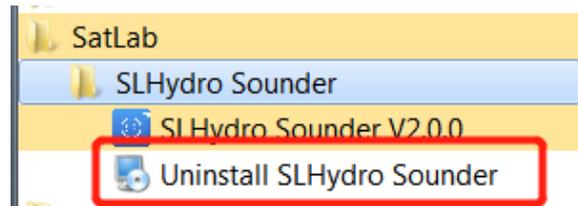


Figure 1-3-5 Uninstall the software

Step 2 Click [Next]

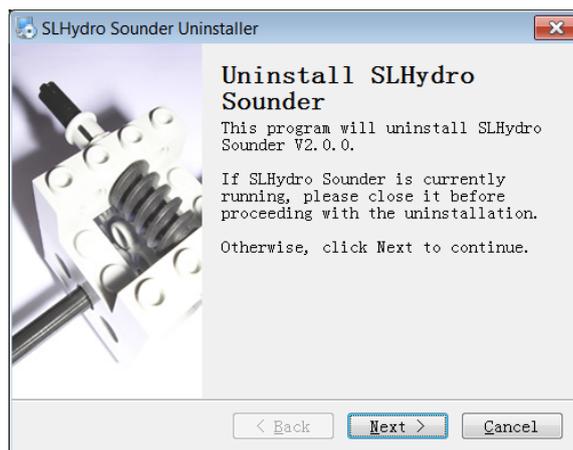


Figure 1-3-6 Uninstall the software

Step 3 Successfully Uninstalled.



Figure 1-3-9 Uninstall the software

Chapter 2

Easy Operation Workflow

This chapter contains:

- Main Interface
- Easy Operation Workflow
- Auxiliary functions

2.1 Main Interface

Run the software and enter the main interface. Where the main interface includes project name, module button, Chinese/English/Russian selection, version number, and select the module to be operated.

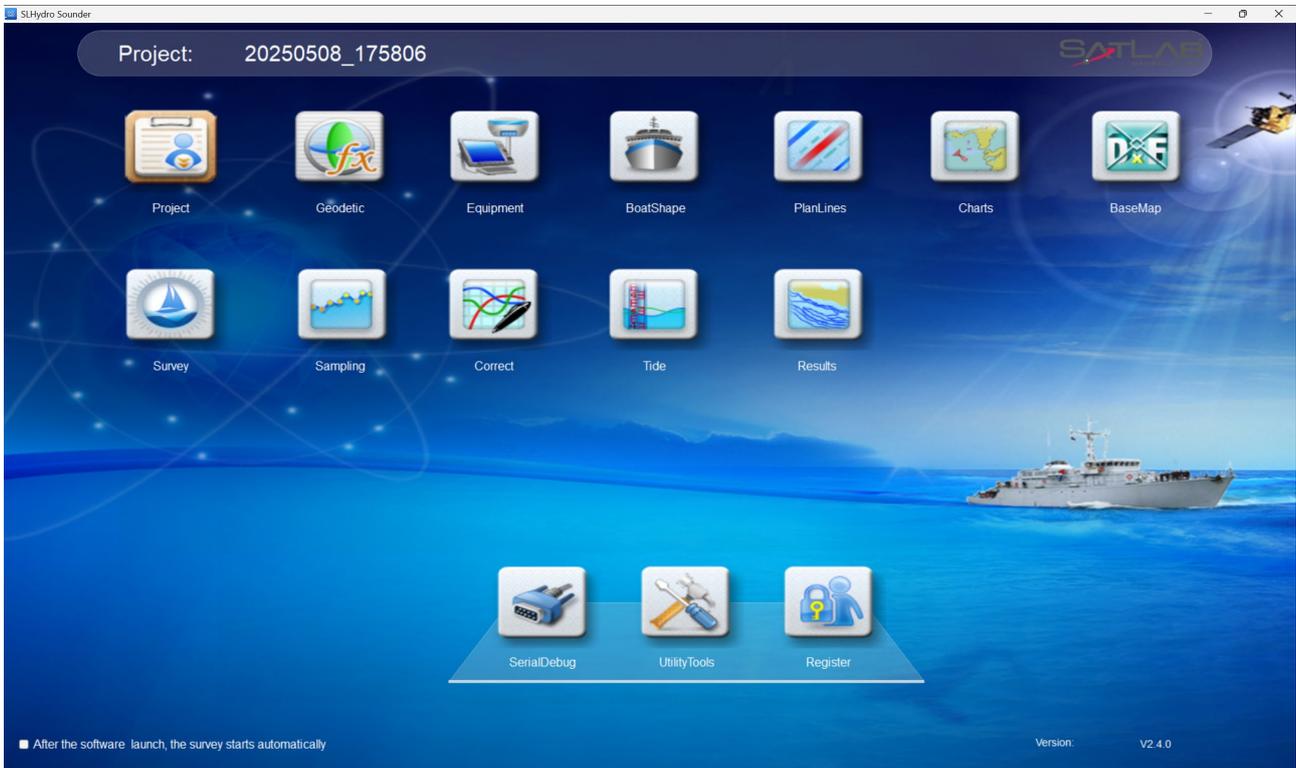


Figure 2-1-1 Main Page of SLHydro Sounder

On the top of the main page, the Project bar shows the name of the current project.

Check the option [*After the software launch, the survey starts automatically*], SLHydro Sounder automatically enters the survey interface after the next startup.

Choose Chinese, English, or Russian options, then the interface display will switch to the corresponding language.

The lower right corner is the current software version.

2.2 Quick Operation Flow

Step 1

Click [*Project*] to create a new job, and conduct other functions such as open, import, apply, and existing project delete. (Note: After the software starts, the previous project will be automatically opened. If the last project is opened, this step can be omitted).

Step 2

Click [*Geodetic*] to set the central meridian, and input Bursa-Wolf transformation parameters, Molodensky parameters, One-touch, and Polynoid. Regression according to actual needs.

Note: The *Utility Tools* module provides a coordinate parameters calculation function, and the results calculated can be applied to the *Geodetic* module. Users can import parameters by file format (*.dam file), and support the Hi-RTK controller project parameters import. If the user does not modify any of the current coordinate parameters, the step can be omitted.

Step 3

In the [*Equipment*] module, the user can connect various models of GPS equipment, echo sounder, compass, attitude meter, and surge meter.

Note: This software supports most models of GPS equipment, depth sounder, compass, attitude meter, and other equipment, the sounder data format can be customized, for a few unknown models, users can access the software in international common NMEA0183 standard format.

Step 4

In the [*BoatShape*] module, the user can configure boat shape, boat length, boat width, transducer and GPS position, etc.

Note: In this step, the most important factors for measuring results are offsets of transducer and GPS position, these parameters need to be accurately measured, and then input into the software, and other parameters can be roughly input.

Step 5

In the [*PlanLines*] module, the planned lines can be drawn by mouse, coordinate and coordinate library; and can be imported or exported by CAD DXF format.

Note: This software provides some quick pattern models, such as parallel wiring, vertical wiring, area wiring, sector wiring, and channel wiring to access the operation.

Step 6

In the [*Charts*] module, the latest channel electronic chart can be updated via the network, the encrypted S63 format electronic chart can be imported, and the unencrypted S57 format electronic chart can be imported.

Step 7

Click [*Basemap*] to import the engineering base map in DXF format. Users can also import the water depth data in custom format as the water depth base map.

Step 8

Click [*Survey*] to enter the surveying interface. Click the [*Record*] button to collect and record data automatically. In this process, users can also use the functions of chart query, planned line drawing, marking, ranging, and angle measurement.

Note: In the measurement module, you can switch mode between *NorthUp* and *HeadUp*, and you can also control whether the ship position is centered by switching between *Locked* and *Unlock*.

Step 9

Click [*Sampling*] to perform data processing such as error depth correction and data resampling.

Note: This software provides mathematical sampling models such as median filtering, weighted average, statistics, etc.

Step 10

In the [*Correct*] module, users can perform correction of coordinate conversion parameters, delay correction, and draft correction.

Note: If the coordinate conversion parameters are input incorrectly in the data collecting stage, the Correction function can be used to correct the data in the post-processing stage.

Step 11

Click [*Tide*] to enter the water level information of the tide station, and then correct the data proceed in the sampling.

Note: This step can be ignored when performing RTK jobs.

Step 12

Click [*Results*] View to generate a contour line and pseudo color rendering graphics for preview based on the result data processed by Sampling for water depth or Tide correction operation. For the results, if you are satisfied, you can export it and ends the whole process. If you are not satisfied, you can return to the Sampling or Tide correction steps to re-process.

2.3 Auxiliary functions

The above is a brief operation flow of the water depth measurement operation. The following are some software auxiliary functions.

- In the *[SerialDebug]* module, users can check the satellite information; configure the base station, set parameters about the rover, and send serial commands to the instrument mainboard.
- Click *[UtilityTools]* to calculate coordinate conversion parameters such as Bursa-Wolf transformation parameters, Molodensky parameters, and Height fitting parameters. It also has functions such as coordinate conversion calculation, distance azimuth calculation, and unit conversion.
- Click *[Register]* and input the registration code to register the dongle.
- Click *[Upgrade]* to upgrade the software online or offline.

If the user has selected the option *[After the software launch, the survey starts automatically]*, SLHydro Sounder will automatically enter the *[Survey]* module next time.

Chapter 3

Project Management

This chapter contains:

- Project Settings

3.1 Project Settings

On the main page, click [*Project*] to view the existing project tasks through the project list, and do open, create, apply, import delete, and other operations for the project.

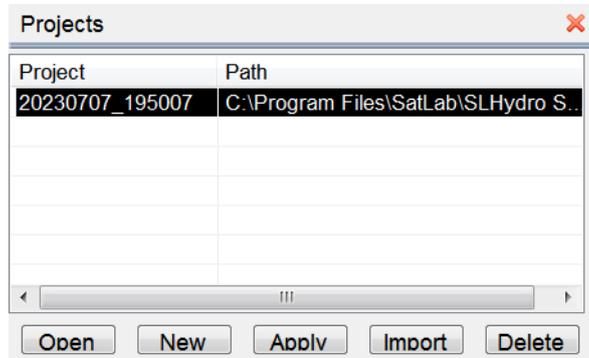


Figure 3-1-1 Create a new project

Open: Select the project in the list, click the [*Open*] button, or double-click the project to open the currently selected project.



Notice: When the software starts, it will automatically open the last project; when you need to open other projects, use the function of "Open Project"; if it is the first time to run the software, the software will automatically create a default project, which is named according to the time.

New: Click the [*New*] button, and the creation interface will appear, enter the name of the new project, then click OK to create a new project or click [*Cancel*] to exit the new project operation.



Figure 3-1-2 Name your project

Apply: First, select the item in the list, and then click the [*Apply*] button, the new project name interface will appear, enter the name of the new project, click [*OK*] to create a new project, and the created project will automatically apply the selected project parameters in the list, click [*Cancel*] to exit the operation.

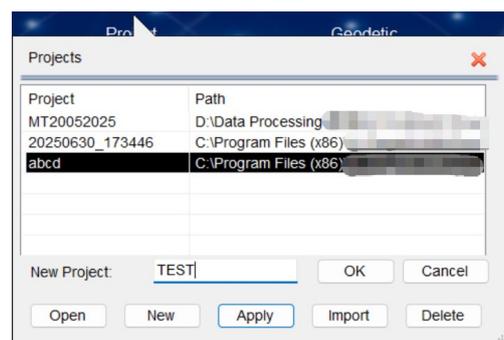


Figure 3-1-3 Apply your project



Notice: The difference between "Apply Project" and "New Project": "Apply Project" is to copy the parameters of the selected project to create a new project; "New Project" is to create a project with all parameters as default values. "Project Import" only imports projects from other storage locations into the project list, and does not move the data storage location of the imported project.

Import: Click the [Import] button, and a dialog box for opening the project file (*.pgm) or unmanned ship project (*.xml) will pop up, select the project file to be imported, and open it.

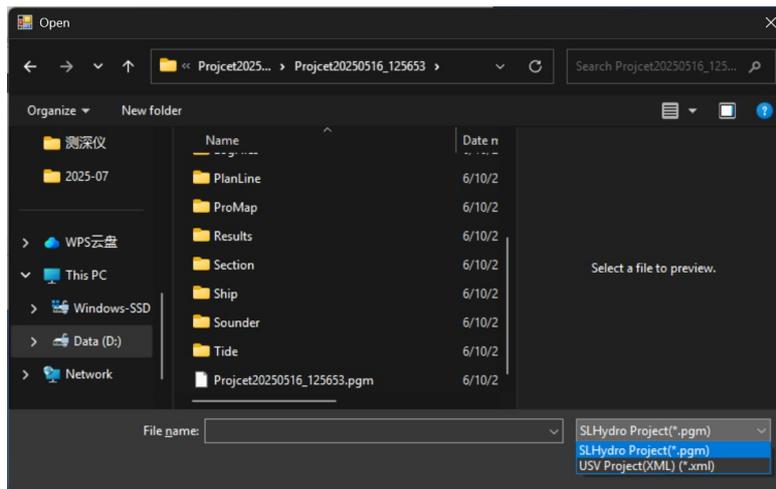


Figure 3-1-4 Import your project

Delete: First, select the item in the list, and then click the [Delete] button to delete the currently selected item from the list. To avoid data loss caused by misuse, the delete function simply deletes the item from the list without deleting the corresponding data.

Chapter 4

Coordinate Settings

This chapter contains:

- Coordinate Transformation Work Flow
- Ellipsoid Settings
- Projection Settings
- Ellipsoid Transformation
- Plane Transformation
- Height Fitting
- TruckPoint
- Parameter Configuration

4.1 Coordinate Transformation Work Flow

On the main page of the software, click [Geodetic] to enter the coordinate conversion interface. You can quickly import the existing coordinate transformation parameters in other projects by importing the existing coordinate transformation parameter file. Users can select the coordinate transformation parameters used for the current project.

Users can set or modify the coordinate transformation parameters of the current project, including ellipsoid parameters, projection parameters, ellipsoid transformation parameters, plane transformation parameters, height fitting parameters, truck point parameters, and 2D grid parameters.

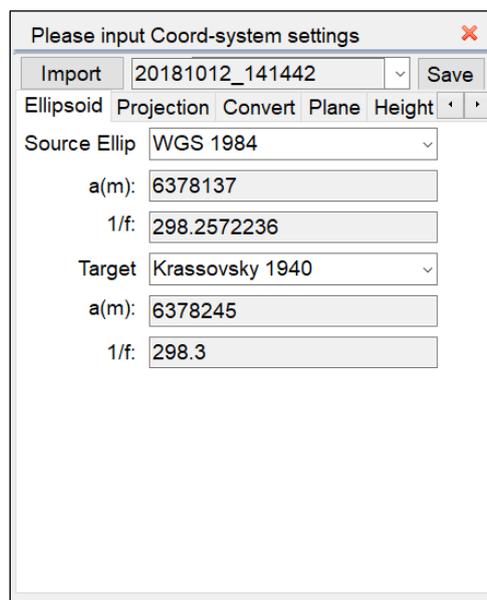


Figure 4-1-1 Coordinate System Settings

Step 1 Import conversion parameters.

Click the [Import] button to pop up the open file dialog box, select the file type (*.dam) or (*.Prj), and then open the parameter file. This function supports opening the existing Hi-RTK project file (*.Prj), and other coordinate transformation parameter files (*.dam).

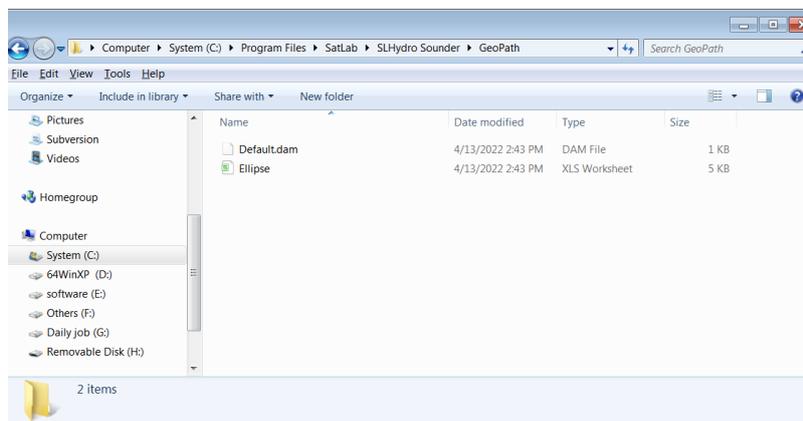


Figure 4-1-2 Import Parameter File

Step 2 Set/modify coordinate transformation parameters.

The coordinate transformation parameters include ellipsoid parameters, projection parameters, ellipsoid transformation parameters, plane transformation parameters, Height fitting parameters, truck point parameters, and 2D grid parameters.

Step 3 Save coordinate transformation parameters

After completing the import, selection, and setting/modification of coordinate setting options; click the icon  in the upper right corner, and the software will automatically save the current settings.

4.2 Ellipsoid Settings

The ellipsoid parameters include the source ellipsoid and the local ellipsoid. The source ellipsoid is generally WGS84, and the local ellipsoid can be set according to user needs.

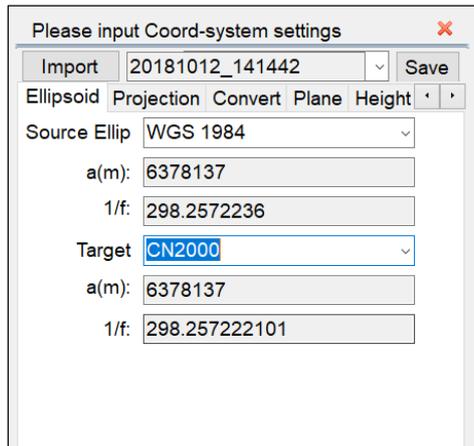


Figure 4-2-1 Ellipsoid Parameters

4.3 Projection Settings

The function of the projection parameters is to complete the transformation from the space rectangular coordinate system to the plane rectangular coordinate system.

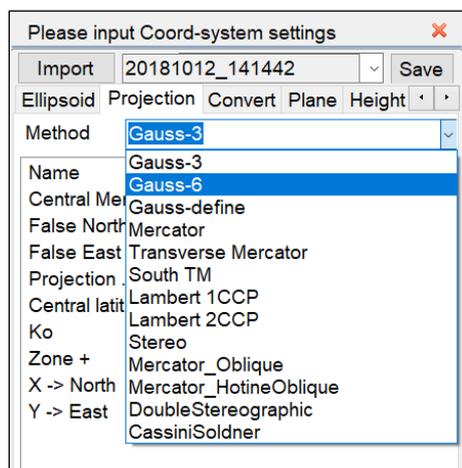


Figure 4-3-1 Projection Settings

The setting of projection parameters mainly includes the Central Meridian, the False East, the False North, and the Scale (K0).

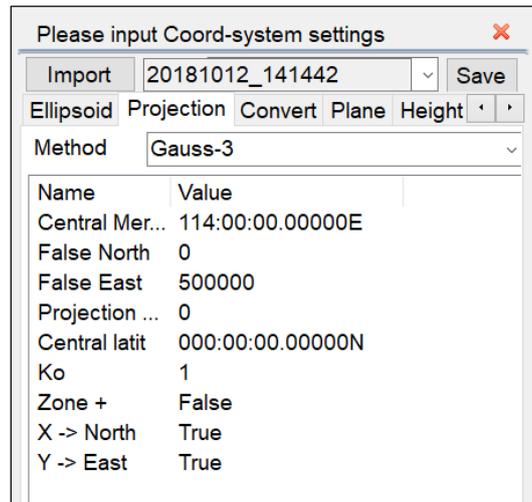


Figure 4-3-2 Projection Settings

4.4 Ellipsoid Transformation

The software provides some ellipsoid transformation models: Bursa-Wolf 7-parameter, Molodensky 3-parameter, one-touch method, and so on.

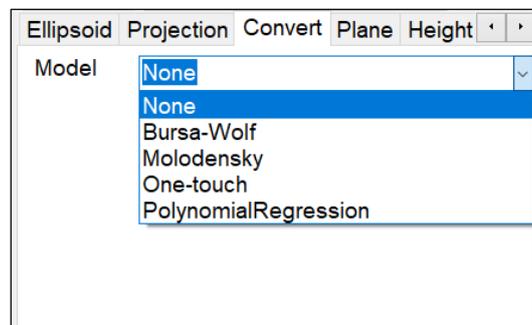


Figure 4-4-1 Convert Settings

According to the selected ellipsoid conversion model to set parameters or through the UtilityTools ellipsoid transformation to calculate. For instance, the Bursa-Wolf 7-parameter.

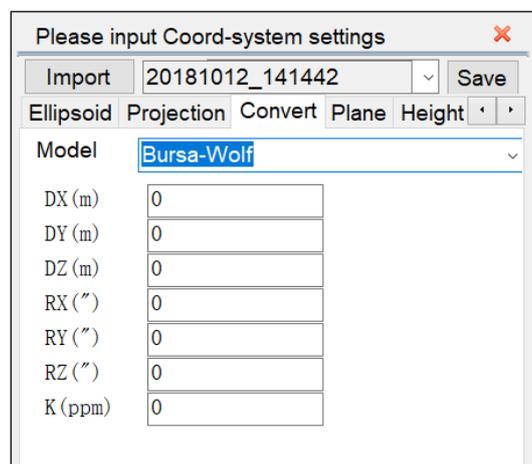


Figure 4-4-2 Bursa-Wolf 7-parameter

Description of several common ellipsoid conversion parameters:

- Bursa-Wolf 7-parameter

The translation, rotation, and scale parameters between the two ellipsoids on the space vector, and the rotation angle are very small. It is a more rigorous conversion model, which requires at least three known points to calculate. It's suitable for transformation from WGS-84 to the national coordinate system.

- Molodensky 3- parameter

It's a simplification model of the Bursa-Wolf 7-parameter, and only needs translation parameters on the space vector. It is a lower precision conversion method, which can be solved by only one known point, which is suitable for the conversion between WGS-84 and the national coordinate system.

- One-Touch

The combination of translation, rotation, scale, and plane transformation parameters between the two ellipsoids on the space vector; the rotation angle can be any value and at least three points are needed for solving, which is suitable for the conversion between WGS-84 and the national coordinate system.



Notice: The user should pay attention to the relevant units of the seven parameters, especially the "K" value scale unit is ppm (parts per million).

4.5 Plane Transformation

After projection, users should do the plane transformation from the source ellipsoid to the local ellipsoid plane coordinate system. There are some transformation models: 2D Helmert, TGO, Grid, FreeSurvey, and Polynomial Fitting.

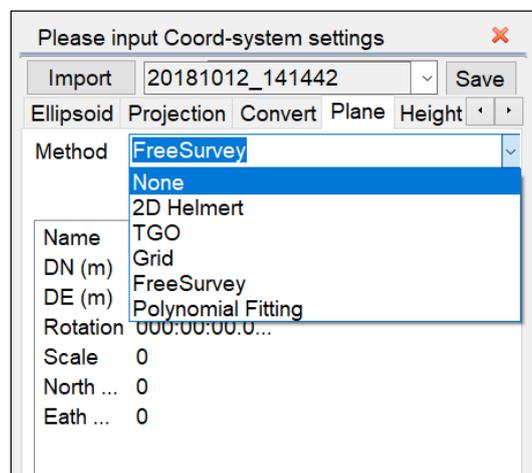


Figure 4-5-1 Plane Transformation

According to the selected conversion model to set parameters or through the Utility Tools plane conversion to calculate, like 2D Helmert.

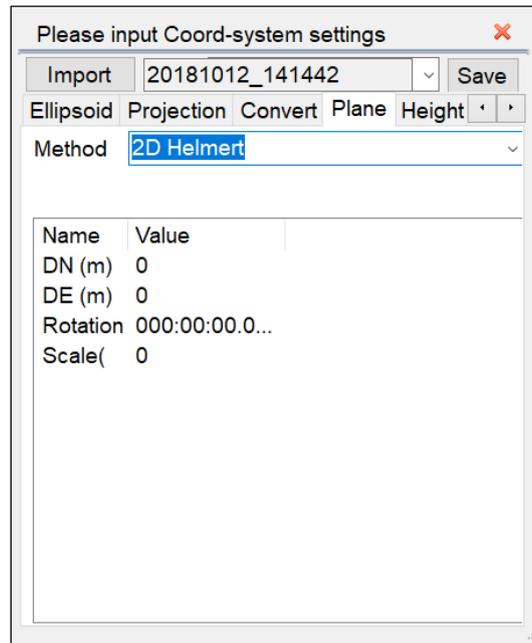


Figure 4-5-2 2D Helmert Transformation

Description of several common plane conversion parameters:

- 2D Helmert.

The translation, rotation, and scale parameters between the two plane coordinate systems. It is suitable for most common engineering users. Only two coordinates of the arbitrary coordinate system are needed to solve the parameters.

- TGO

A plane transformation method of TGO software. Compared with 2D Helmert, there are two extra two parameters: North Point and origin East

- Grid

The edited grid file can be transferred into WGS-84 grid coordinates.

- Free Survey

Thales's custom method of plane conversion is more than four parameters, multiple origins, North Point, and origin East parameter.

4.6 Height Fitting

Height fitting is the parameter correction of elevation information, usually used together with plane conversion parameters. The commonly used elevation fitting parameters are Geometric surface fitting, TGO vertical adjustment, geoid grid fitting, Free Survey height fitting, and so on.

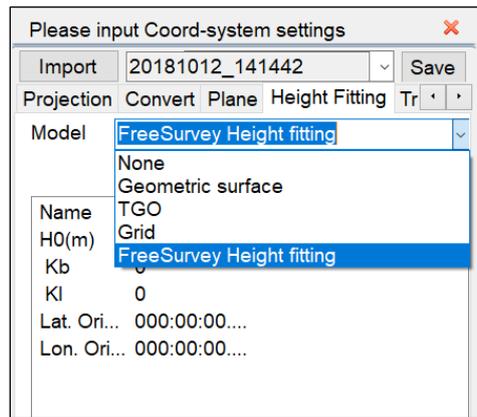


Figure 4-6-1 Height Fitting Model

Description of several height fitting parameters:

- Geometric surface fitting

Fixed error correction: Measured height with a fixed constant as the corrected height, which requires at least one starting point.

- Plane fitting

Corresponding to elevation anomalies at several leveling points, an optimal fitting plane is generated according to the three starting points. When the plane is parallel to the horizontal plane, the plane fitting is equivalent to the fixed error correction.

- Surface fitting

Corresponding to elevation anomalies at multiple leveling points, an optimal fitting paraboloid is generated according to at least five starting points. Surface fitting requires high initial data. If the fitting degree is too poor, it may cause divergence of the elevation correction value in the working area.

- TGO

The elevation conversion model of Trimble TGO software includes five parameters: constant adjustment, North slope, East slope, North origin, and East origin.

- Grid

Grid fitting needs to select fitting files, which support three formats: Trimble (ggf), Satlab (zgf), and Geoid99 (bin). They are compatible with the EGM-96 model.

- Free Survey height fitting

The elevation conversion model from Thales includes five parameters: constant HO, North slope, East slope, origin latitude, and origin longitude.

4.7 TruckPoint

Point translation usually refers to the coordinate correction needed to ensure the measurement accuracy when there is only one known point in the operation area and the user uses the GPS differential mode as code difference (beacon or SBAS) and there are no other conversions parameters. It is similar to the fixed error correction of the old ocean survey software, except that the input values are positive and negative.

Point translation parameters can be directly inputted into dx, dy, dh, or precise translation parameters can be obtained through the calculation tool of point translation parameters.

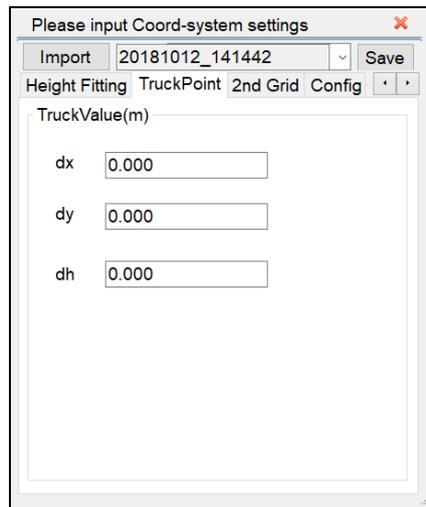


Figure 4-7-1 TruckPoint

4.8 Parameter Configuration

Choose the seven-parameter formula in a simplified or complete format. When the rotation angle is too large, the complete formula is recommended.

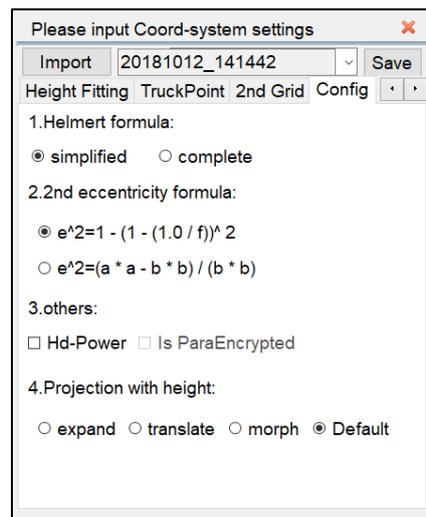


Figure 4-8-1 Parameter Configuration

Chapter 5

Equipment Connection

This chapter contains:

GNSS Settings

Echo Sounder Settings

Auxiliary device settings

GNSS TCP/UDP Settings

5.1 GNSS Settings

This *Equipment* function it's for configuring the communication parameters of GNSS equipment, auxiliary sensors, etc. And set the antenna height of your GNSS equipment.

5.1.1 Set Serial Ports

Select the corresponding COM port and baud rate to connect the receiver, or use the icon  to detect the baud rate automatically.

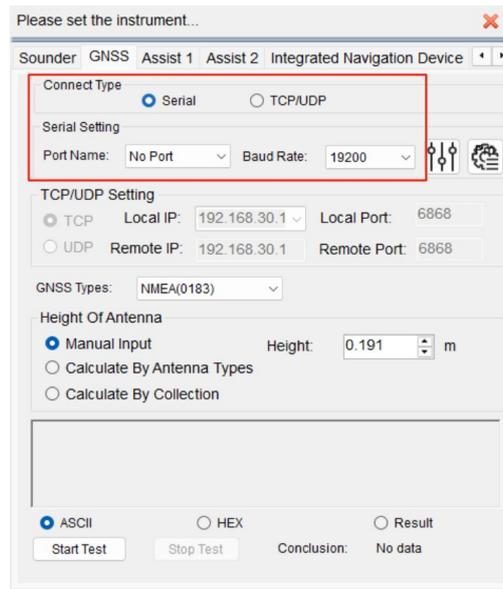


Figure 5-1-1 Select Port and Baud Rate

5.1.2 Antenna Height Settings

For SLHydro Sounder, there are three methods to input the antenna height.

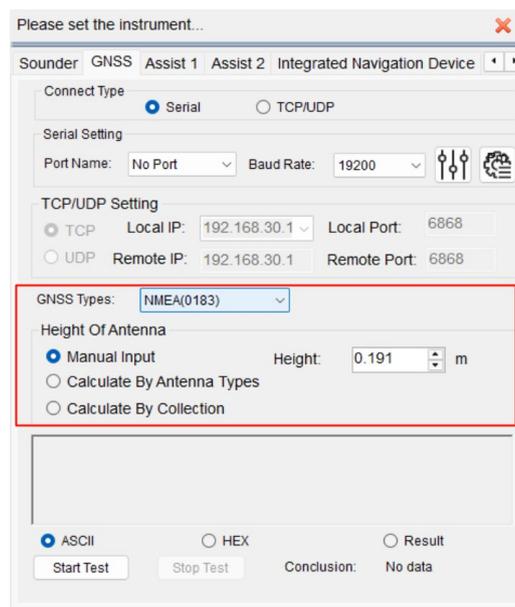


Figure 5-1-2 Set Antenna Height

- Input antenna height

In the antenna height configure box, you can directly input the antenna height value. (The antenna height is the height of the receiver to the water surface)

- Calculate by antenna type

Select *Calculate by Antenna Type* to enter the calculation interface.

Select the antenna type according to your device, input the antenna high value (Result), and select the antenna measure position and the antenna height type. The antenna radius (Radius-R) and phase offset (Deviation-P) have fixed values according to different instrument models.

If it is customized, the user needs to input it by himself. After the setting is completed, click [Apply].

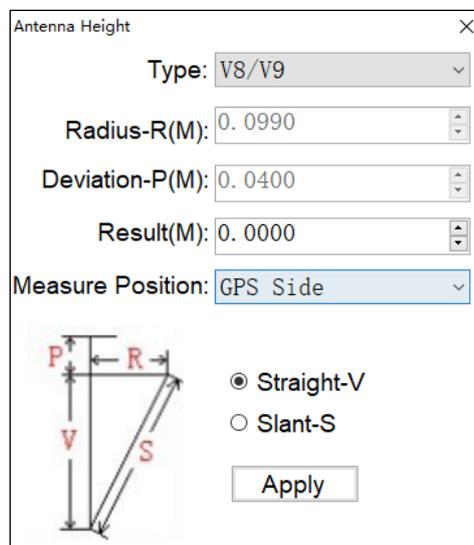


Figure 5-1-3 Calculate by antenna type

- Automatic measurement of antenna height

Select *Calculate by Collection* to enter the measurement interface.

Input the current height of the water level, click [Start], and collect the effective GPS antenna elevations 10 times to automatically calculate the average antenna height. Click [Apply] to apply the currently calculated antenna height for SLHydro Sounder.

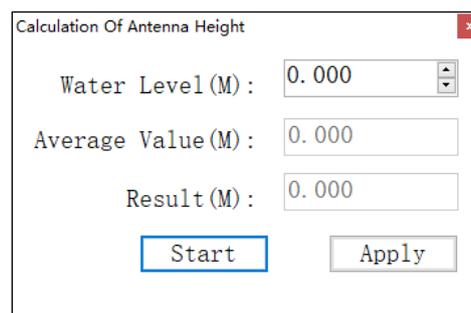


Figure 5-1-4 Calculate the antenna height



Notice: Firstly, try to measure the height of the water level when the water surface is calm. Secondly, try to keep the water surface elevation synchronized with the GPS acquisition time, and avoid a large time gap

5.1.3 Communication Test

Click [Test Start], the serial port will be opened to start receiving and parsing data, the text box will display the received data, and the comprehensive evaluation of the test result will be displayed at the bottom. About test results, there are three states:

- **No data:** The serial port does not receive any data.
- **Data correct:** The Port Name and the GPS Types selected are correct. The port received data.
- **The data is abnormal:** the serial port receives the data, but the data cannot be collected.

The possible causes are as follows:

- **The baud rate is incorrect.**
- **The selected instrument type does not match the connected GPS device.**
- **The time information of the GPS device is not output.**

Select *ASCII*, the serial port data will be displayed in characters, you can view the current GPS output statement information, such as GGA information and ZDA information.

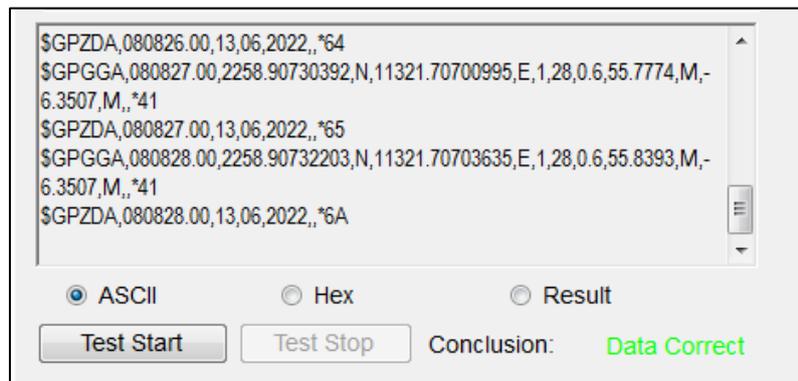


Figure 5-1-5 ASCII Display

Select [*Hex*], the serial port data will be displayed in hexadecimal digits, you can view the binary information of the GPS output.

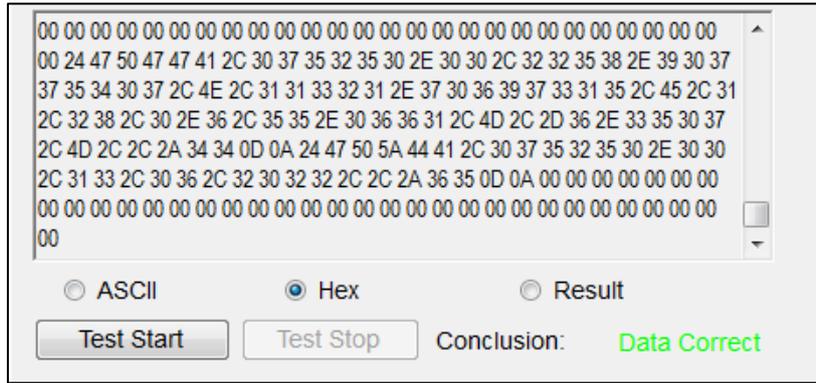


Figure 5-1-6 HEX Display

Select [*Result*] to analyze the serial port data and directly display the parsed results, including date and time, latitude and longitude, elevation, solution, and satellite number.



Figure 5-1-8 Result Display

5.2 Echo Sounder Settings

You can choose the Satlab echo sounder model or configure your IP and port.

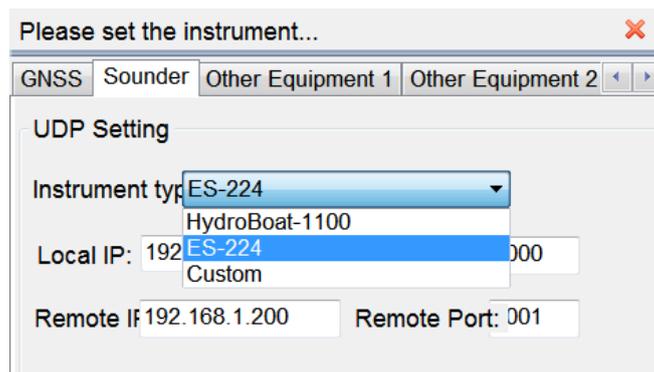


Figure 5-2-1 Connect Echo Sounder

5.3 Auxiliary device settings

It can connect two auxiliary devices. Click the [*Other Equipment 1*] tab, the auxiliary device can access auxiliary measuring sensors such as gyrocompass, sound velocity equipment, attitude meter, and heading GNSS. After setting the serial port and baud rate, you can select the type of sensor to access.

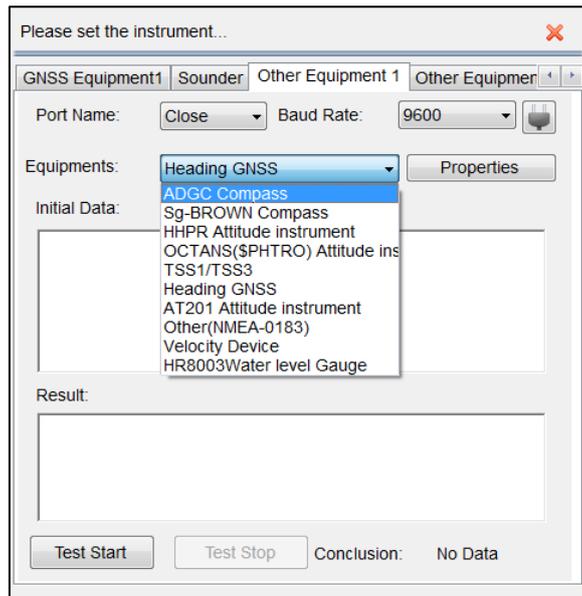


Figure 5-3-1 Connect Auxiliary Device

5.4 GNSS TCP/UDP Settings



Notice: This function is for the case that GNSS data can not be retrieved via the COM port, it is a way to access the GNSS data via UDP network, if the user can connect to GNSS via the COM port, it is not suggested to use this function.

Click [GNSS], select TCP/UDP Connection , set IP, port, antenna height, and then test the data.

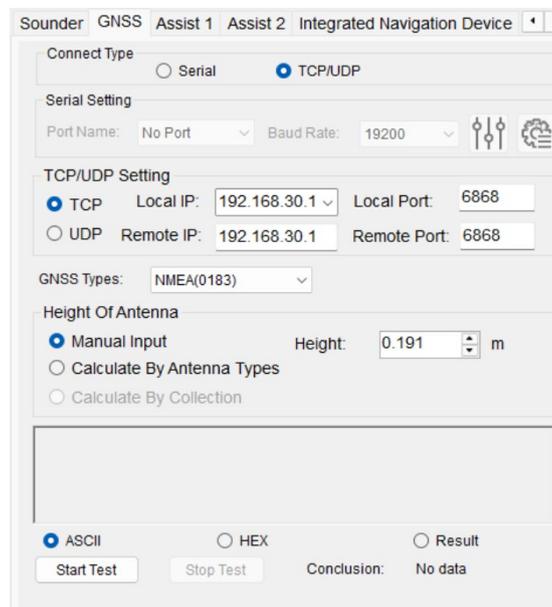


Figure 5-4-1 GNSS TCP/UDP Settings

Chapter 6

Boat Ship Design

This chapter contains:

Boat shape design

6.1 Boat Shape Design

6.1.1 Communication Test

On the main page, click [*BoatShape*] to enter the design page, the outline of the boat can be designed here, and some settings like GPS Antenna offset and Color.

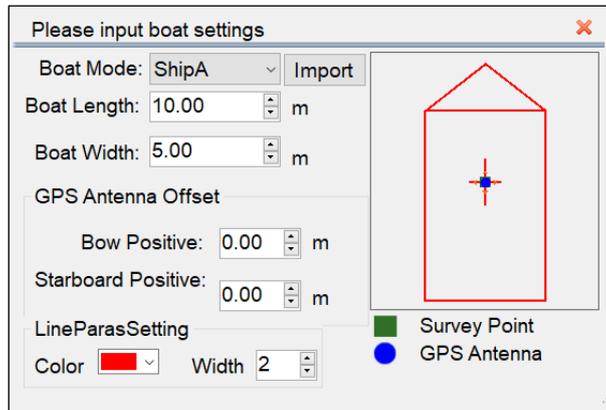


Figure 6-1-1 Boat Setting

- Design boat outline

After selecting the existing mode or importing DXF, and setting the length and width of the boat, SLHydro will generate the boat outline according to the boat mode and size. Users also can change the display color and line width of the boat outline if needed. The outline of the boat is just for the shape display, with no effect on the results of the collected data.

The boat shape can be deleted by right click.

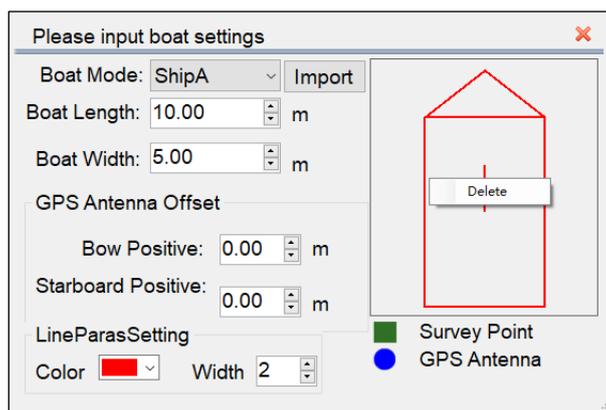


Figure 6-1-2 Delete Boat Shape

- Set the instrument installation parameters

Select the transducer installation position, can select the left or right side of the shipboard or User-defined, User-defined means moving the green square on the boat.

The next step is to set the offset between the transducer and the GPS antenna. Instrument installation parameters will affect the final measurement data, accurate measurements are needed.

The relative position of the GPS antenna to the measuring point is the distance between the phase center of the GPS antenna and the phase center of the transducer.

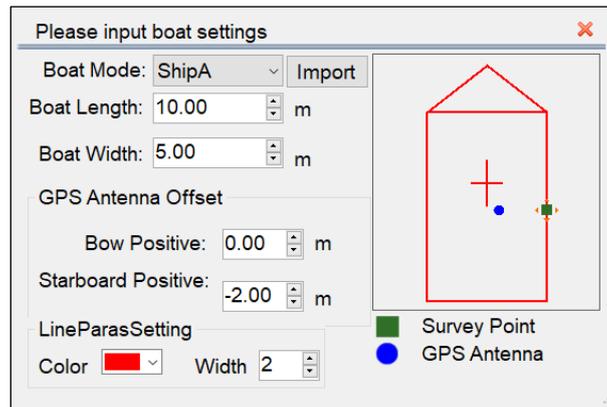


Figure 6-1-3 Delete Boat Shape

Parameter Description:

- (1) Relative position of GPS Antenna to Survey Point: refers to the coordinate offset of the phase center of GPS antenna to the phase center of the transducer in a plane.
- (2) The color and line width of the ship type set here will be applied to the ship type in the bathymetric survey.



Notice: Because there are number of waves and bubbles near the bow, the sounder will be greatly disturbed. Similarly, the propeller on the stern will generate a lot of waves and bubbles, which also affects the transducer working.

So the best position for the transducer installation is near the middle of the hull. Generally, the transducer is anchored on the port or starboard. If the actual installation position is in another position, close to the port side, please select [Left ship side], close to the starboard side, and please select [Right ship side].

Chapter 7

Planned Lines Design

This chapter contains:

- Planned lines Design
- Plan Line Block Cabling
- Edit PlanLine Block
- Import and Export PlanLines
- Shortcut Keys
- Other Features
- Common problem

Click the [PlanLines] on the software main page to enter the design interface. Users can draw the planned lines with a mouse or input coordinate to generate, and support the planned lines editing. This software also supports some other methods to generate planned lines, such as Channel, Area, Parallel, Sector, and Semi, and also imports planned lines data in DXF format.

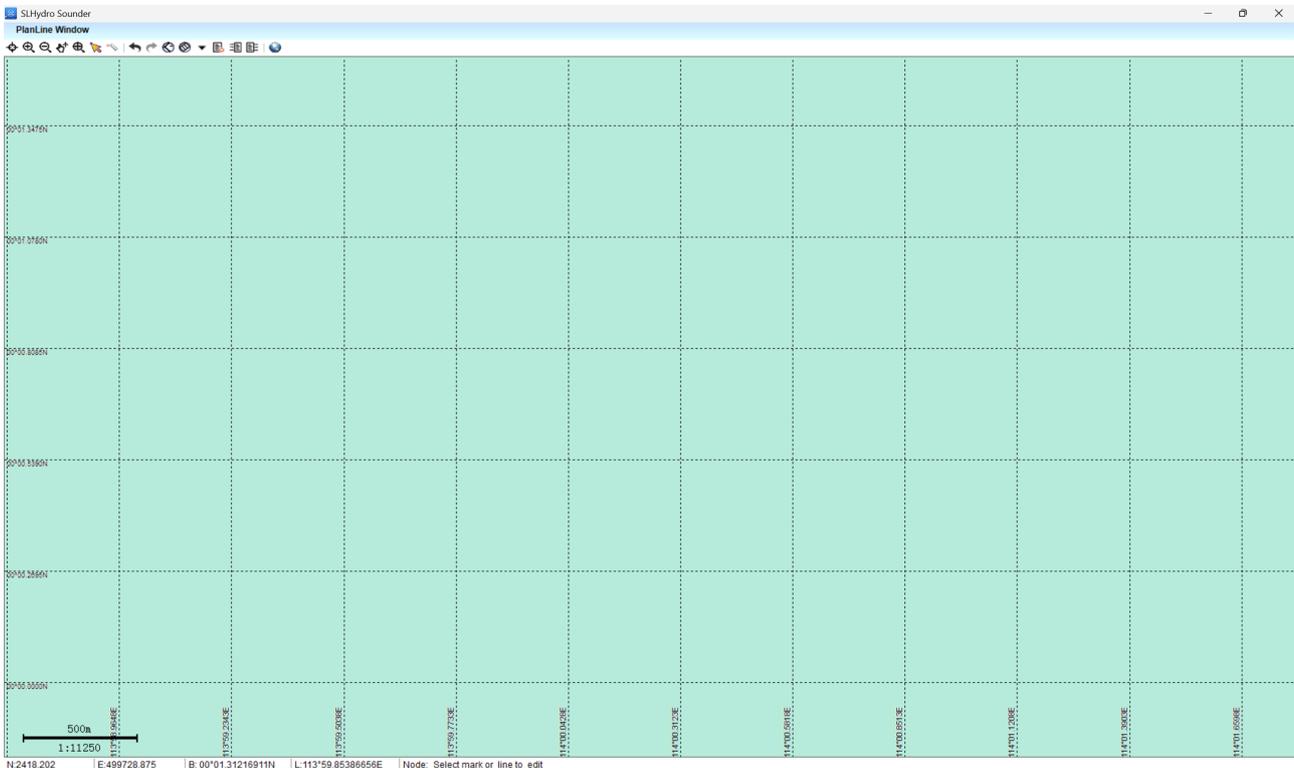


Figure 7-0-1 PlanLines Drawing Interface

7.1 Planned lines Drawing

In the plan line drawing mode it provides two ways to draw plan lines: [Mouse/Coordinate Drawing] and [Select Line with Mouse].

- Mouse/Coordinate Drawing

Mouse drawing or coordinate drawing a baseline.

Click the left mouse button to determine the vertex position of the plan line. The coordinates of the mouse click position are automatically added to the coordinate list. Click the right mouse button to end the drawing of the current plan line and exit the plan line drawing mode.

Coordinate drawing is done by adding coordinates through the simple mode menu.

- Selected Line with Mouse

Select an existing plan line. All the vertex coordinates of the plan line will be added to the baseline coordinate list. Editing the coordinate points in the list will not change the selected plan line.

7.2 Plan Line Block Cabling

Plan Line Block Cabling can easily and quickly generate a large number of planned line blocks. Common cabling models include Channel, Area, Parallel, Vertical, Point Sector and Line Sector. Users can select the appropriate cabling model according to the needs of the actual measurement area for quick cabling.

7.2.1 Planned Lines Drawing

Click the **[PlanLines]** button  to enter the Simple display mode. Click **[Complex]** to switch to the advanced display mode. Users can draw point by point in Mouse mode, or use CoordDraw to enter the coordinates in the top coordinate list, then click **[Add]** to draw. Mouse drawing and CoordDraw drawing can be performed simultaneously. Click **[Complete]** to save the current operations.

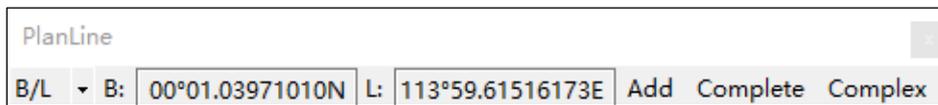


Figure 6-3-1 Simple Display

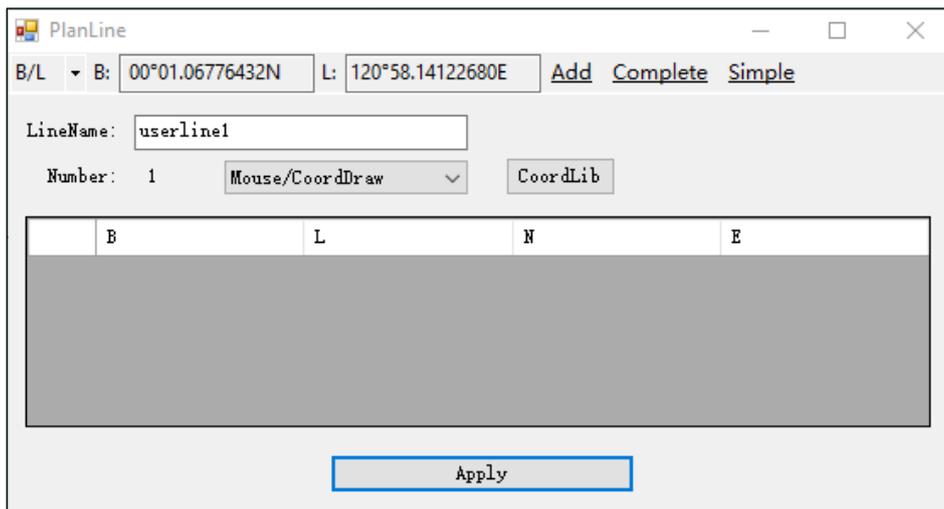


Figure7-2-1 Complex Display

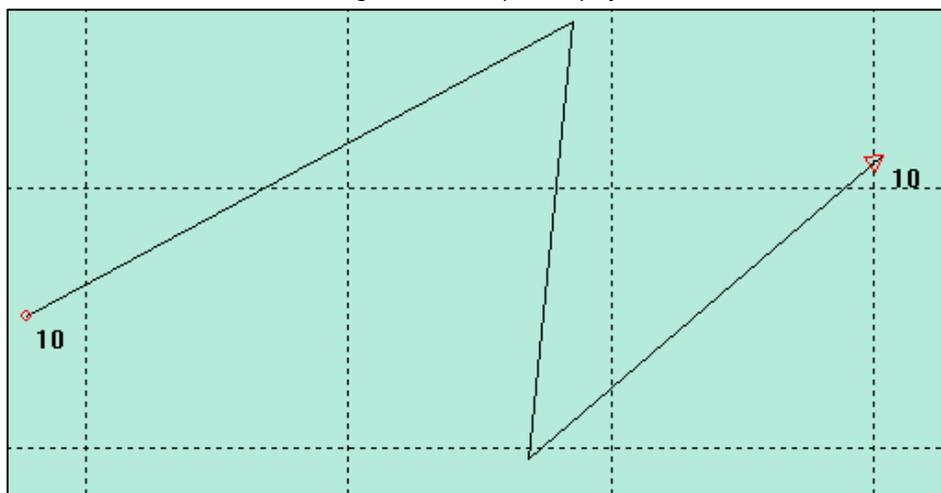


Figure 7-2-2 Common planning line block

7.2.2 Area Drawing

Click the [Area] button  on the toolbar and enter the Complex display mode. Area drawing requires three or more coordinate points to complete the line drawing.

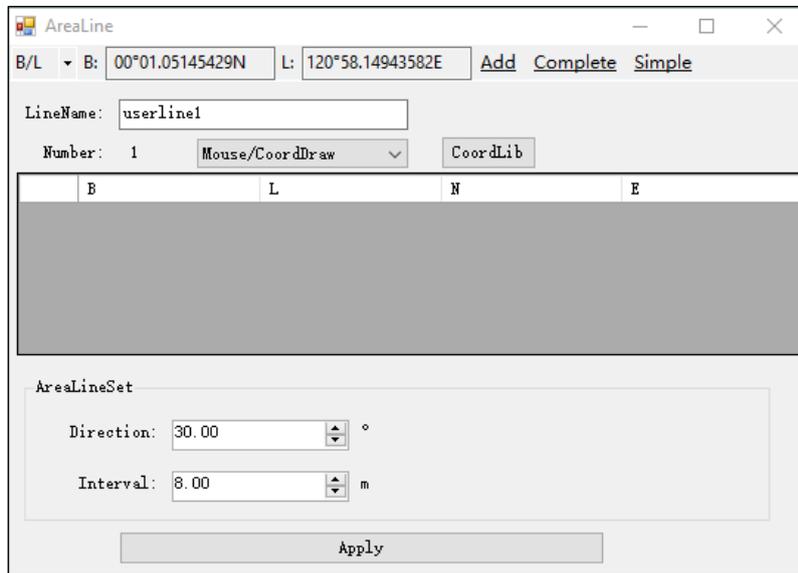


Figure 7-2-3 Area Drawing

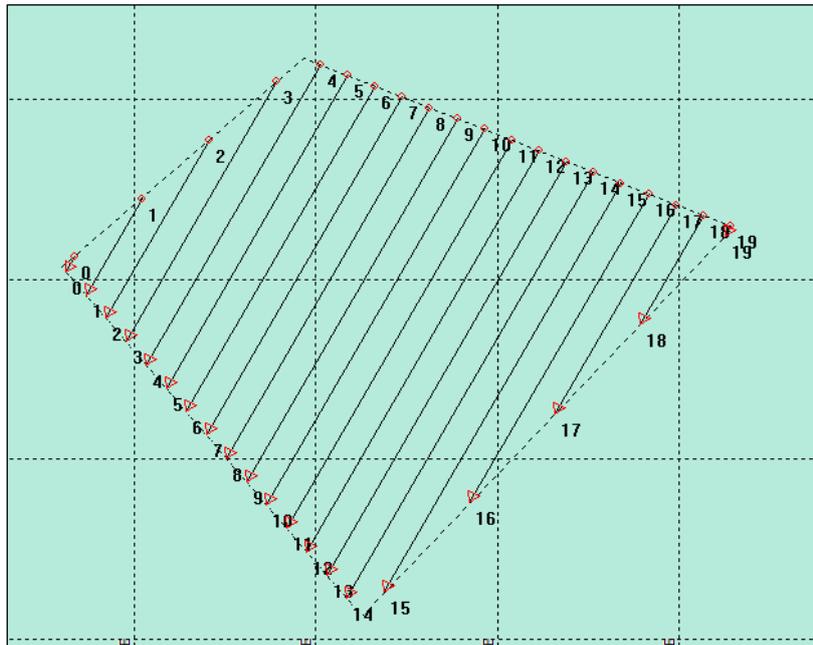


Figure 7-2-4 Area Drawing

Direction: The angle between the direction of generated planned lines and the true north direction.

Interval: The interval between the generated planned lines.

7.2.3 Parallel Drawing

Click the *[Parallel]* button  on the toolbar to draw a baseline with Mouse/CoordDraw or Selected Lines with Mouse as the baseline, then set the drawing parameters, click the right mouse button, and the system will generate a planned line based on the baseline and parameter settings and then save it.

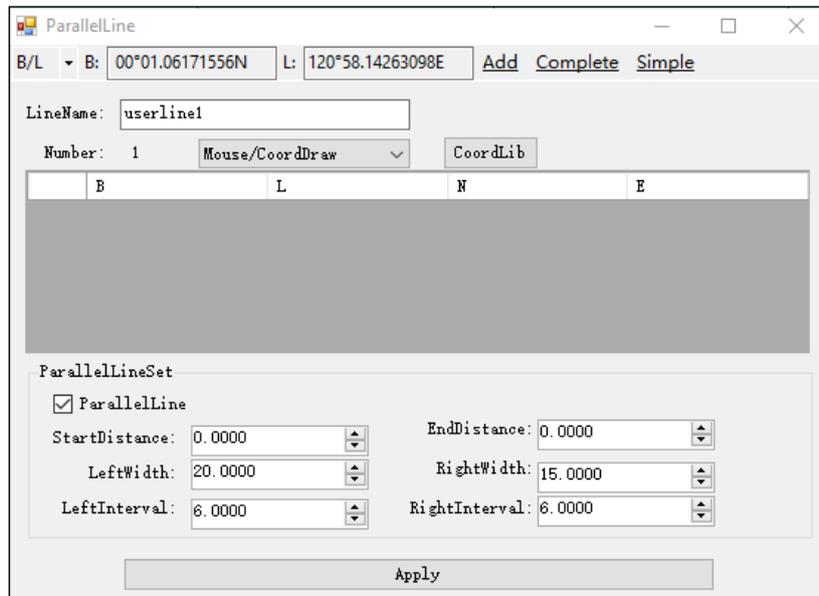


Figure 7-2-5 ParallelLine Settings

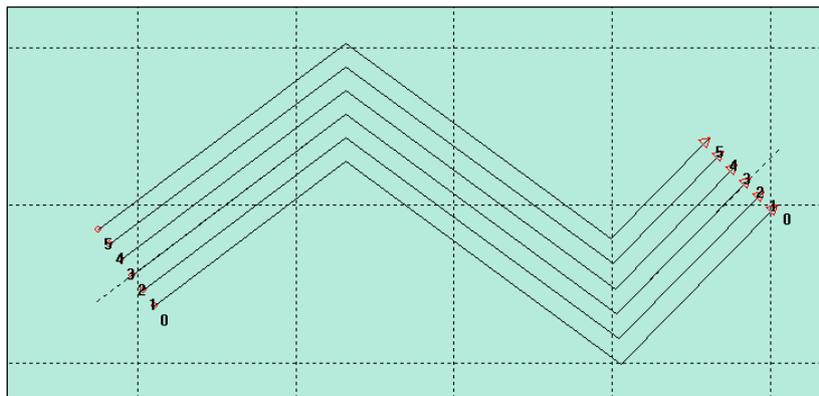


Figure 7-2-6 Parallel Drawing

StartDistance: The distance of starting point between the generated parallel line and baseline.

EndDistance: The distance from the end of the generated parallel line to the starting point of the baseline.

LeftWidth: The range of planned lines width on the left of the baseline.

RightWidth: The range of planned lines width on the right of the baseline.

LeftInterval: The interval among the planned lines was laid on the left of the baseline.

RightInterval: The interval among the planned lines was laid on the right of the baseline.

7.2.4 Vertical Drawing

Click the [Vertical] button  on the toolbar to draw a baseline with Mouse/CoordDraw or Selected Lines with Mouse as the baseline; then set the drawing parameters, right-click, and the system will generate a planned line based on the baseline and parameter settings and then save it.

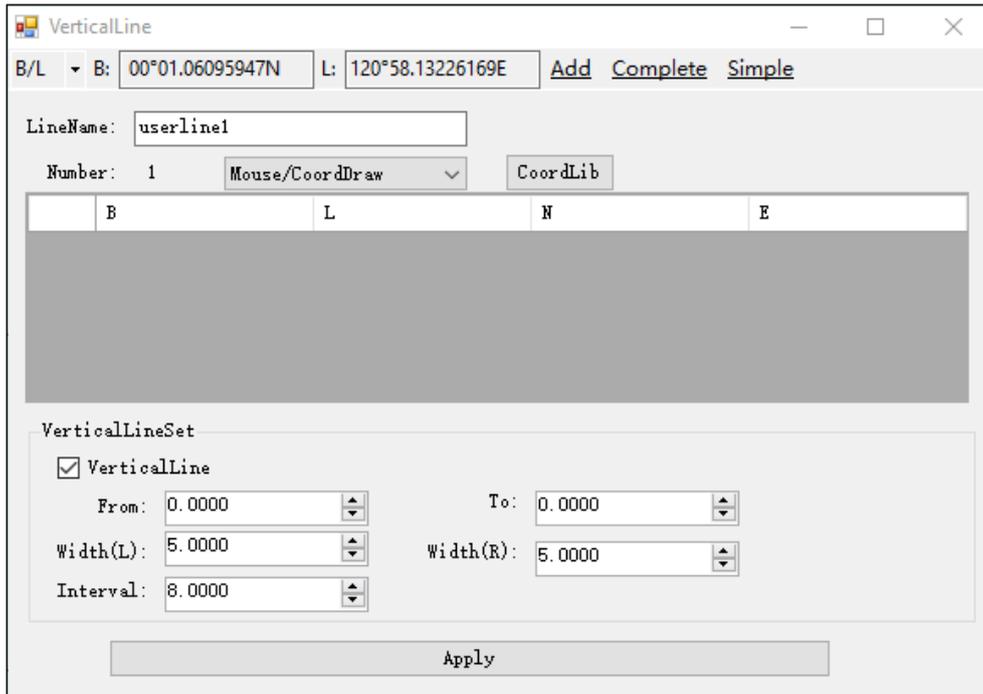


Figure 7-2-7 VerticalLine Settings

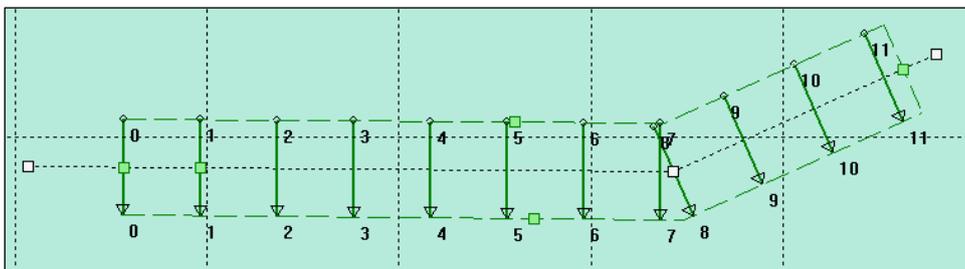


Figure 7-2-8 Vertical Drawing

Interval: The interval among the generated planned lines.

Width(L): The length of the generated planned lines on the left of the baseline

Width(R): The length of the generated planned lines on the right of the baseline

From: The distance of starting point between the generated parallel line and baseline.

To: The distance from the end of the generated parallel line to the starting point of the baseline.

7.2.5 Channel Drawing

Click the Channel button  on the toolbar to open the channel drawing window; draw a baseline with Mouse/CoordDraw or Selected Lines with Mouse as the central axis of the channel, then set the drawing parameters, right-click, and the system will generate the channel planned lines based on the baseline and parameter settings and then save it.

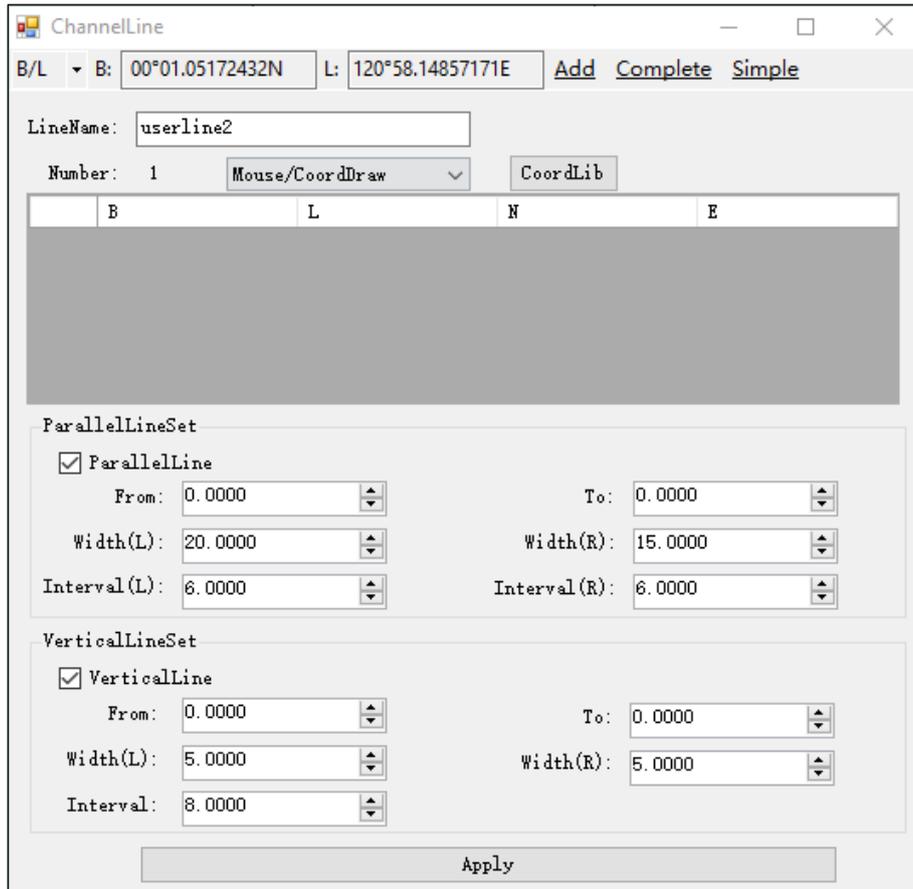


Figure 7-2-9 ChannelLine Settings

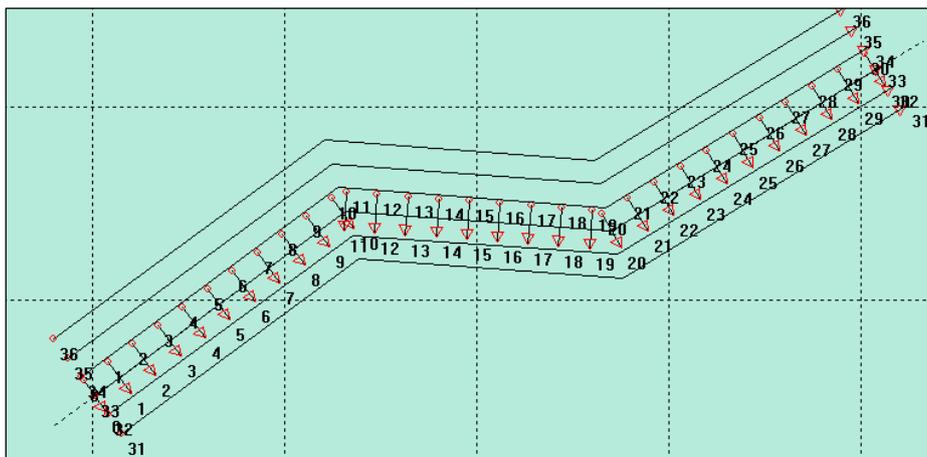


Figure 7-2-10 Channel Drawing

The drawing method and related parameter settings can refer to in the Parallel Drawing and Vertical Drawing sections.

7.2.6 Point Sector Drawing

Click the **[Point Sector]** button on  the toolbar. Users can select a point by mouse or input a coordinate as the central point of the sector, then set the drawing parameters, and click the right mouse button, the system will generate the channel planned lines based on the baseline and parameter settings and then save it.

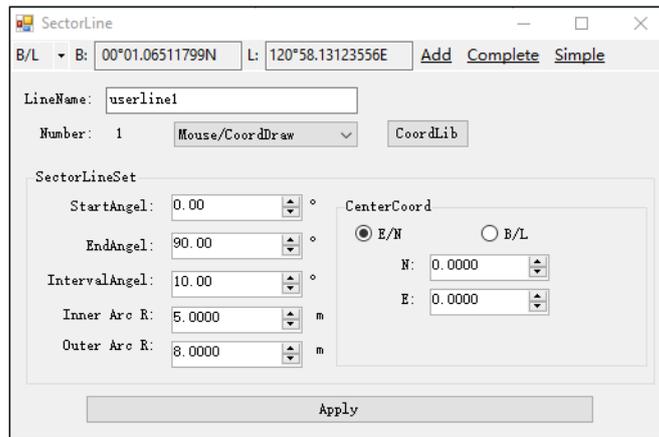


Figure 7-2-11 Point Sector Settings

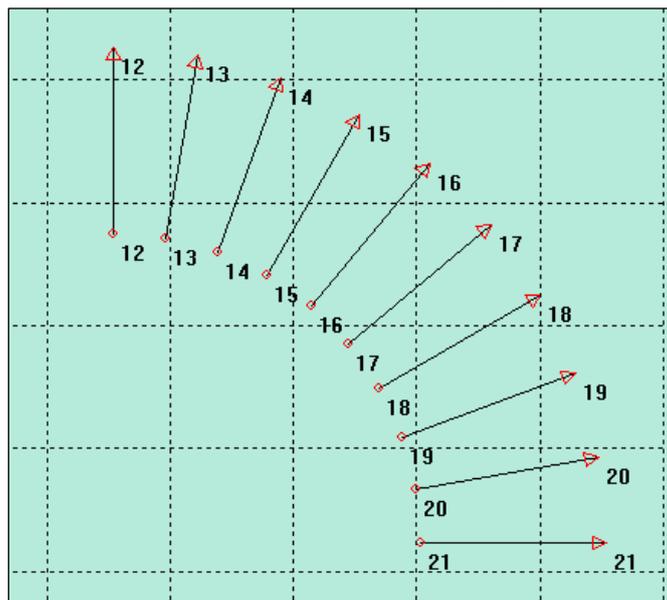


Figure 7-2-12 Point Sector Drawing

Centercoord: The central point coordinate of the vector, which can be selected by mouse, or input plane coordinates or WGS84 latitude and longitude

StartAngle: The angle between the first planned lines and the true north direction

EndAngle: The angle between the last planned lines and the true north direction.

IntervalAngle: The angular separation between the planned lines.

Inner Arc R: Radius of the inner arc.

Outer Arc R: Radius of the outer arc radius.

7.2.7 Line Sector Drawing

Click the *[Point Sector]* button  on the toolbar, users can take two points by mouse or input 2 point coordinates, then set the drawing parameters, right-click, and the system will generate the channel planned lines based on the baseline and parameter settings and then save it.

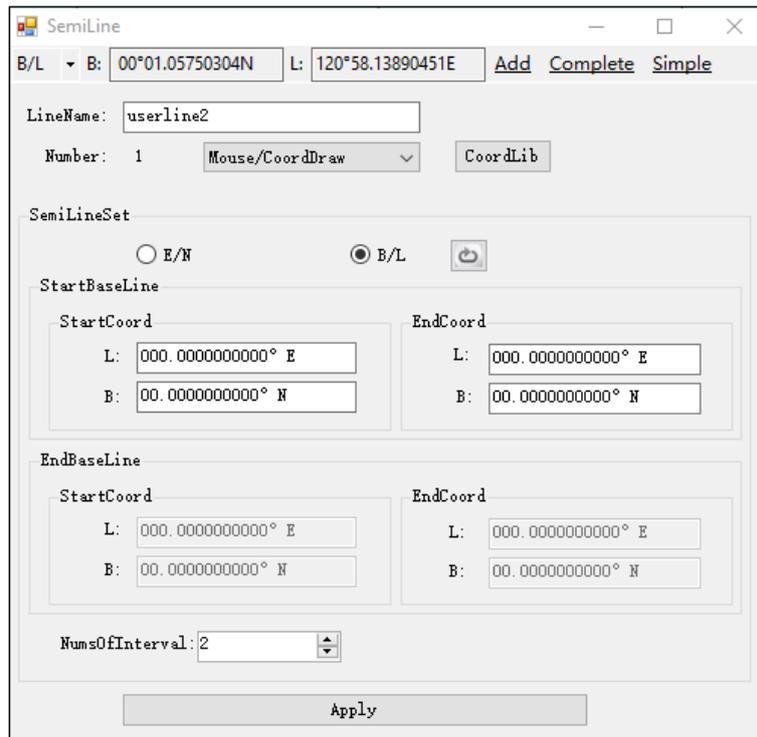


Figure 7-3-13 Line Sector Settings

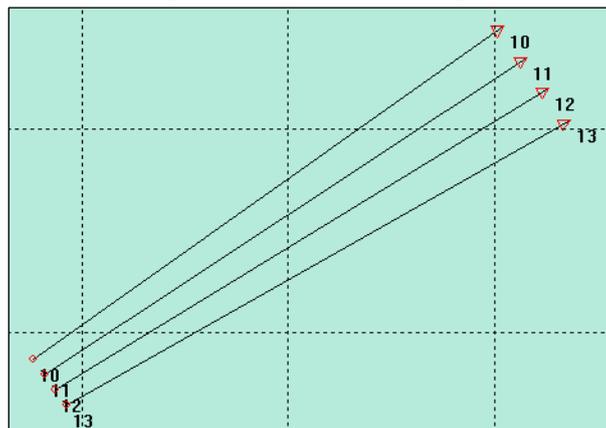


Figure 7-3-14 Line Sector Drawing

FirstLine: The first line on the left of the Semi line. The Start and End points can be selected by mouse, or input plane coordinates or WGS84 latitude and longitude

LastLine: The first line on the right of the Semi line. Its coordinates can be entered manually only when editing the planned lines. The Start and End coordinates of LastLine are automatically generated according to the internal algorithm.

NumsOfInterval: The number of drawing lines between the FirstLine and LastLine.

7.3 Edit PlanLine Block

Edit plan line blocks can modify the parameters of the scheduled line block in real-time, or you can drag the mouse directly for line editing. Mainly includes Removing, Deleting, and modifying vertex coordinates, deleting plan line blocks and Adjust parameters of lines as well as deleting plan lines.

When multiple plan line blocks overlap, click the plan line block to open the plan line block selection interface. As shown in the following figure. The parallel plan line block and the regional wiring plan line block overlap. Click to open the plan line selection interface, click the line of the plan line block you want to display, and click [OK] to select it.

7.3.1 Edit PlanLine Block

There are two ways to edit a Planline block.

- Edit with PlanLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

The screenshot shows the 'AreaLine' window with the following fields and table:

LineName:

Number:

	B	L	N	E
▶ 1	00° 01.10453885N	120° 58.03002843E	2035.4583	496345.2455
2	00° 01.01486507N	120° 58.03623662E	1870.2063	496356.7631
3	00° 01.01658956N	120° 58.18592285E	1873.3842	496634.4659
4	00° 01.10591844N	120° 58.19558003E	2038.0006	496652.3822
5	00° 01.14178705N	120° 58.18822054E	2104.1014	496490.4056

AreaLineSet

Direction: °

Interval: m

Figure 7-3-1 PlanLine windows

- Mouse drag adjustment block to adjust

After the mouse selects the Planline turns red, when you move the mouse into the white square, click the left mouse button to drag, to the target position, and release the left button.

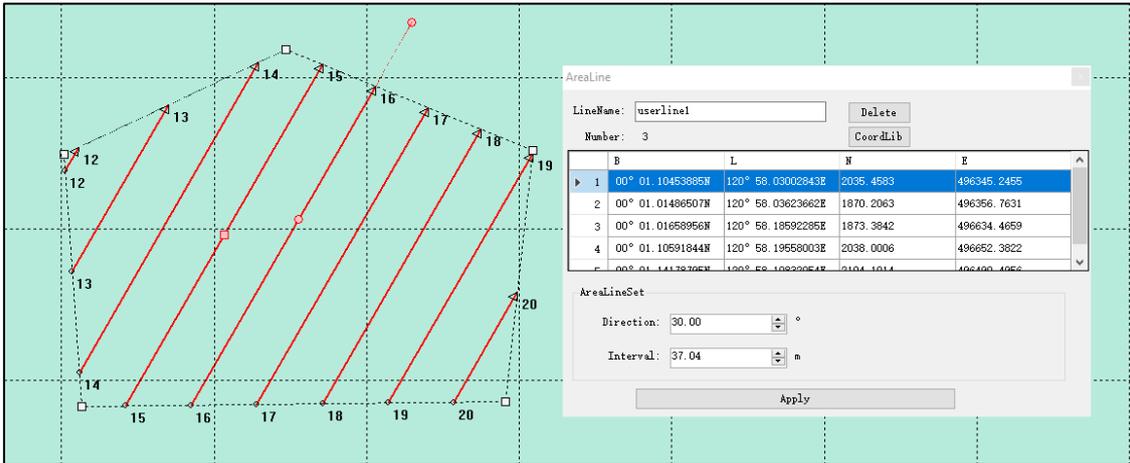


Figure 7-3-2 Selects PlanLine Turns Red

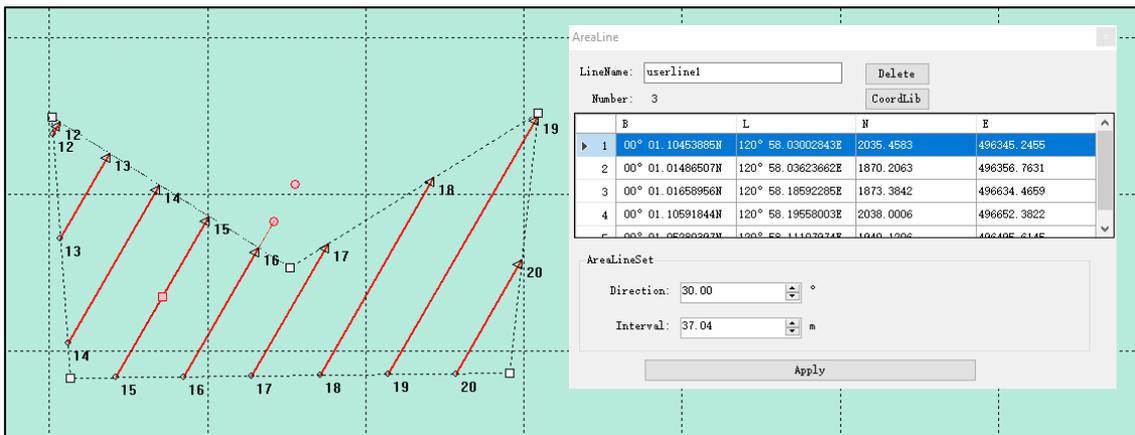


Figure 7-3-3 Move the square

Delete: That can delete Planlines.

Edit Current Row: That can switch coordinate types and changes the coordinate display format of the PlanLines.

Delete Current Row: That can delete current coordinates.

Insert New Row: That can insert a new coordinate.

Line Name: That can change the current name of Planlines.

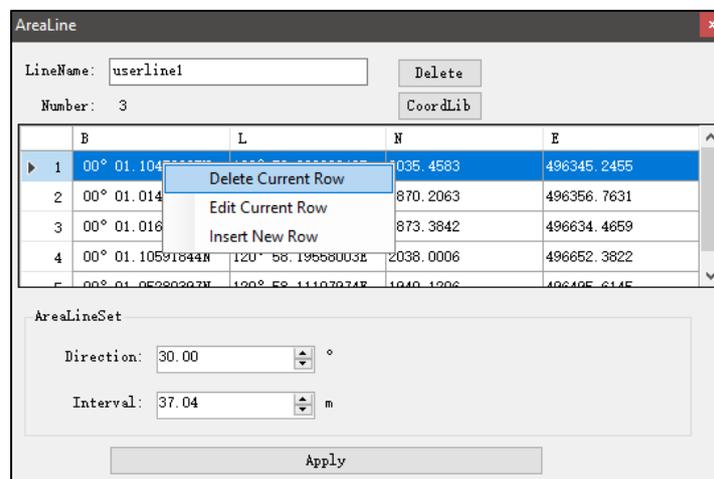


Figure 7-3-4 Delete Current Row

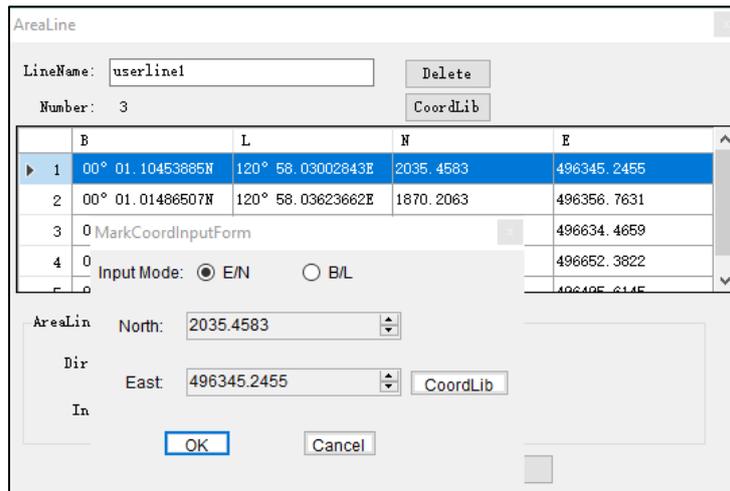


Figure 7-3-5 Change Coord Type

7.3.2 Edit ParallelLine Block

There are two ways to edit a ParallelLine block.

- Edit with ParallelLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

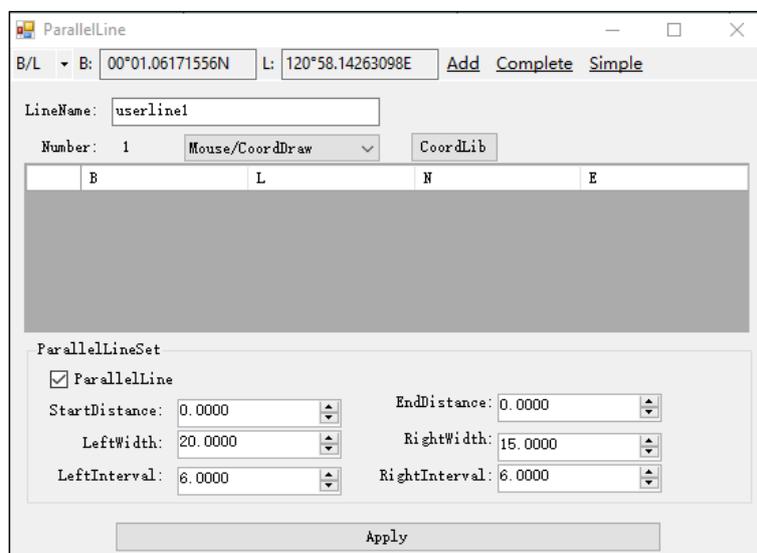


Figure 7-3-6 ParallelLine Windows

- Mouse drag adjustment block to adjust

After the mouse selects the ParallelLine turns red, when you move the mouse into the white square, click the left mouse button to drag, to the target position, and release the left button.

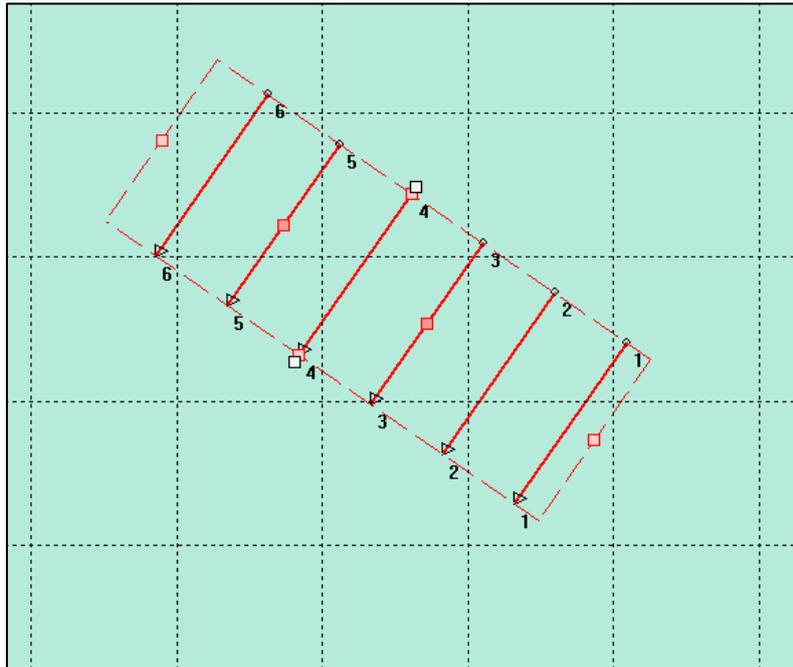


Figure 7-3-7 Move the ParallelLine

7.3.3 Edit VerticalLine Block

There are two ways to edit a VerticalLine block.

- Edit with VerticalLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

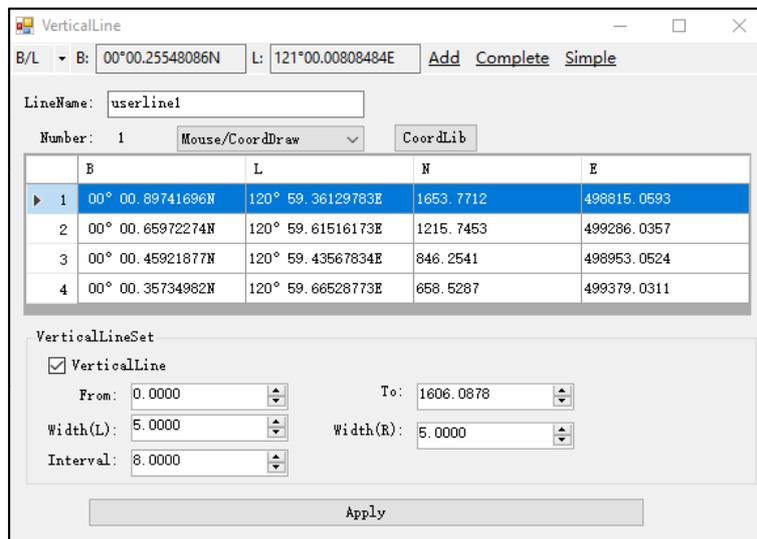


Figure 7-3-8 VerticalLine Windows

- Mouse drag adjustment block to adjust

After the mouse selects the VerticalLine turns green, when you move the mouse into the white square, click the left mouse button to drag, to the target position, and release the left button.

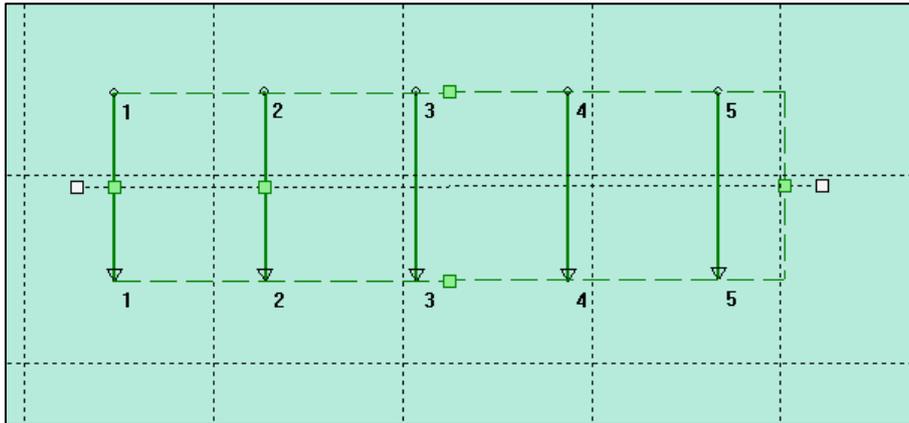


Figure 7-3-9 Move the VerticalLine

7.3.4 Edit ChannelLine Block

There are two ways to edit a ChannelLine block.

- Edit with VerticalLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

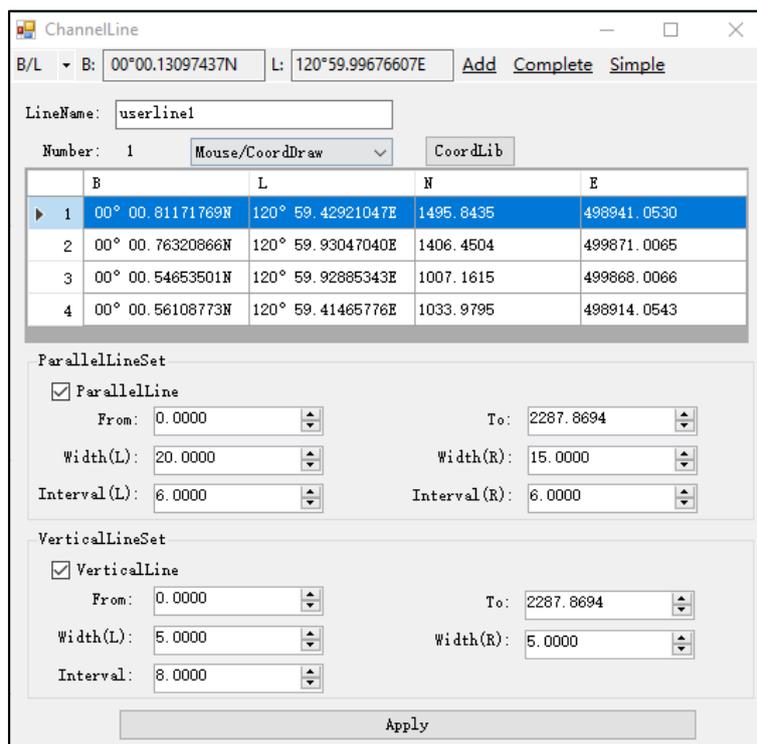


Figure 7-3-10 ChannelLine Windows

- Mouse drag adjustment block to adjust

After the mouse selects the ChannelLine turns red and green, when you move the mouse into the white square, click the left mouse button to drag, to the target position, and release the left button.

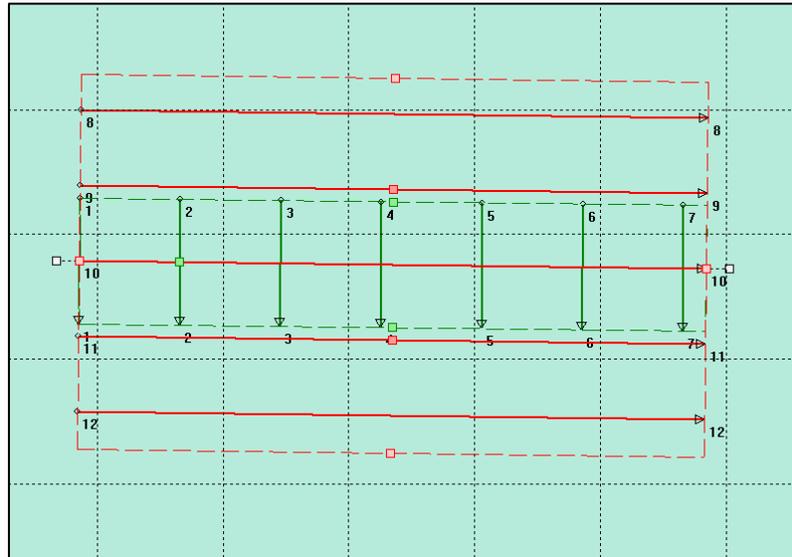


Figure 7-3-11 Move the VerticalLine

7.3.5 Edit SectorLine Block

There are two ways to edit a SectorLine block.

- Edit with SectorLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

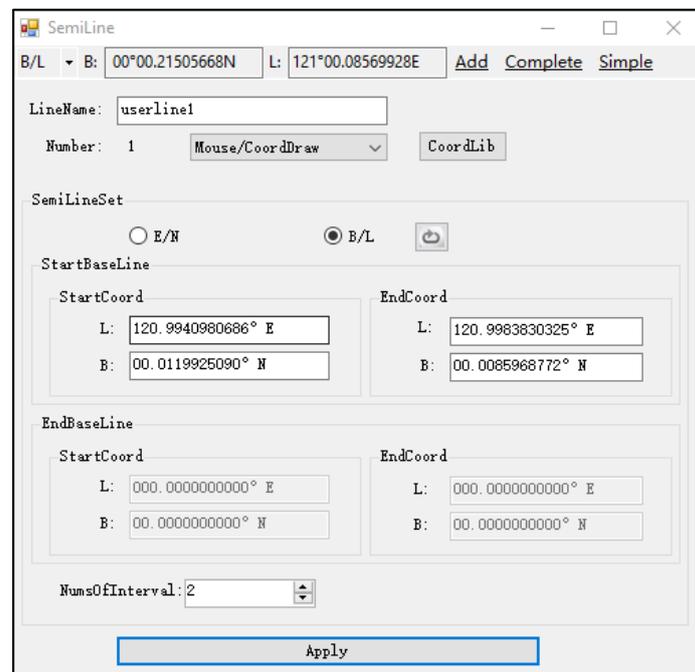


Figure 7-3-12 SectorLine Windows

- Mouse drag adjustment block to adjust

After the mouse selects the SectorLine turns red, when you move the mouse into the white square, click the left mouse button to drag, to the target position, and release the left button.

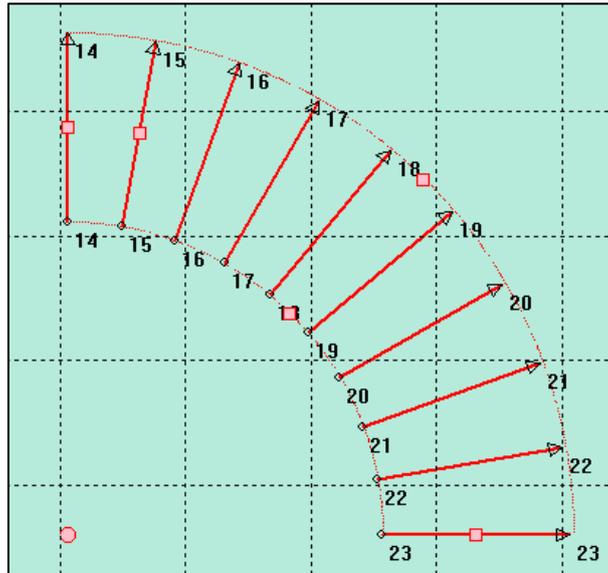


Figure 7-3-13 Move the SectorLine

7.3.6 Edit AreaLine Block

There are two ways to edit an AreaLine block.

- Edit with AreaLine windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

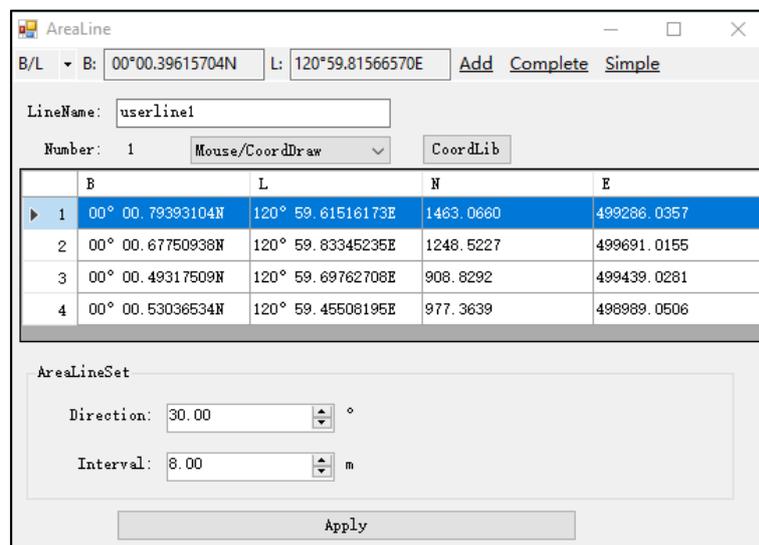


Figure 7-3-14 AreaLine Windows

- Mouse drag adjustment block to adjust

After the mouse selects the SectorLine turns red, when you move the mouse into the white or red square, click the left mouse button to drag, to the target position, and release the left button.

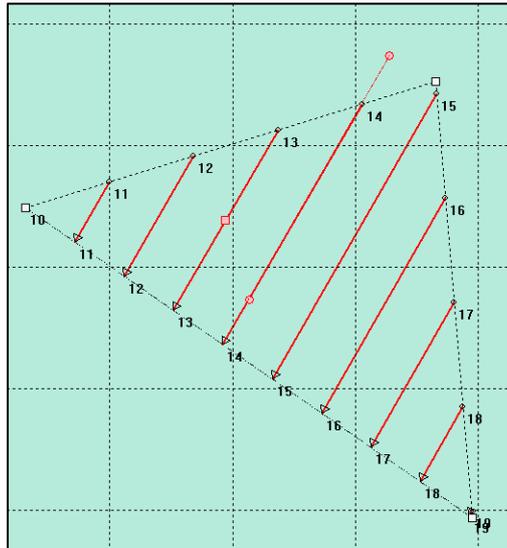


Figure 7-3-15 Move the AreaLine

7.3.7 Edit Line Sector Block

There are two ways to edit Line Sector block.

- Edit with Line Sector windows

Select a plan line to enter the plan line edit mode, and click [Apply] to complete the edit after editing.

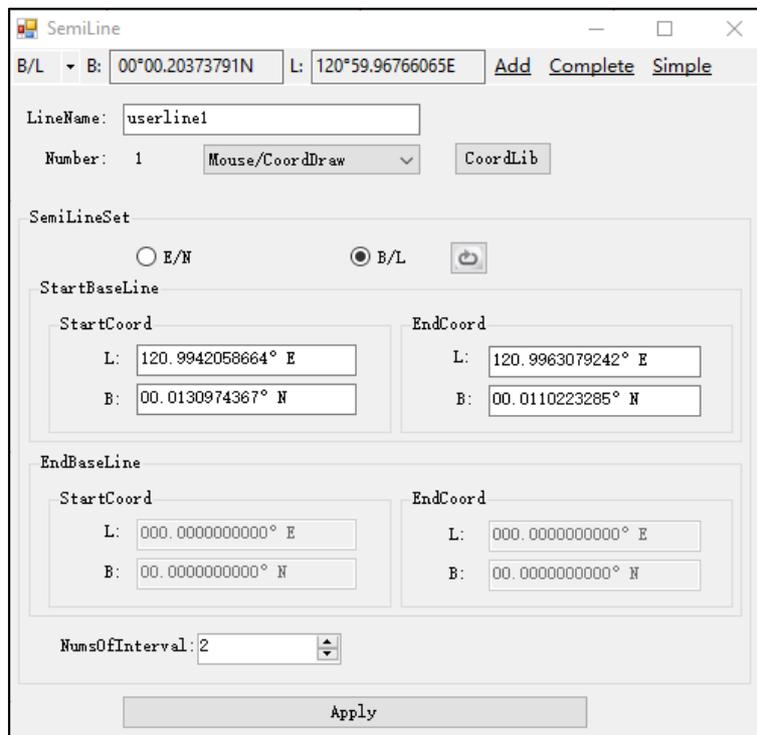


Figure 7-3-16 Line Sector Windows

- Mouse drag adjustment block to adjust

After the mouse selects the Line Sector turns red, when you move the mouse into the red square, click the left mouse button to drag, to the target position, and release the left button.

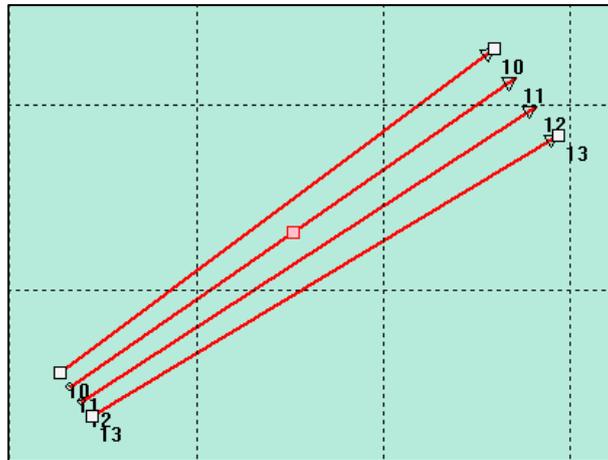


Figure 7-3-17 Move the Line Sector

7.3.8 Delete the planned line

There are three ways to delete the PlanLines: Selective deletion, Frame-select deletion, and Batch deletion.

-Selective deletion

Use the selection tool to select a plan line, edit the form on the corresponding plan line, and click [*Delete*].

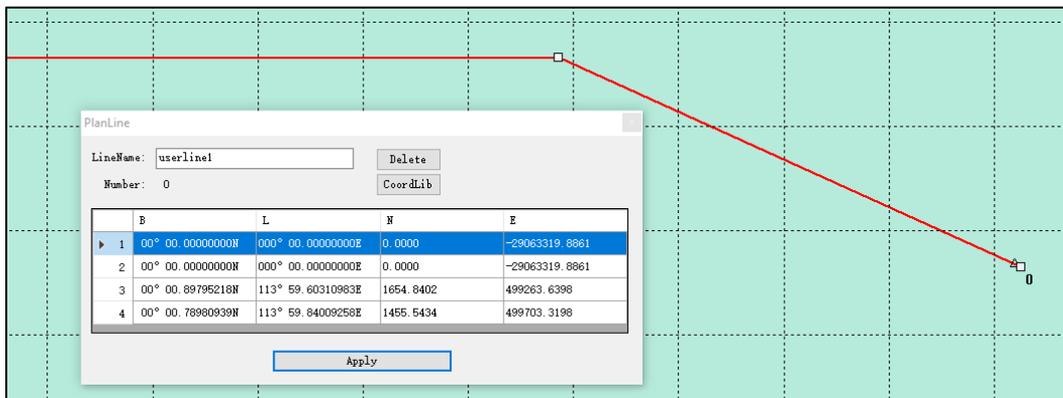


Figure 7-3-18 Selective Deletion

- Frame-select deletion

Use the selection tool to draw multiple plan lines, and then a bubble box for deleting the plan line will pop up. Click [*Delete*] to delete the selected plan line (highlighted in red).

When you select from the upper left corner to the lower right corner, you need to include the entire plan line block to pop up the delete bubble box. When you select from the lower right corner to the upper left corner, the bubble box will pop up whenever you intersect the planned line block.

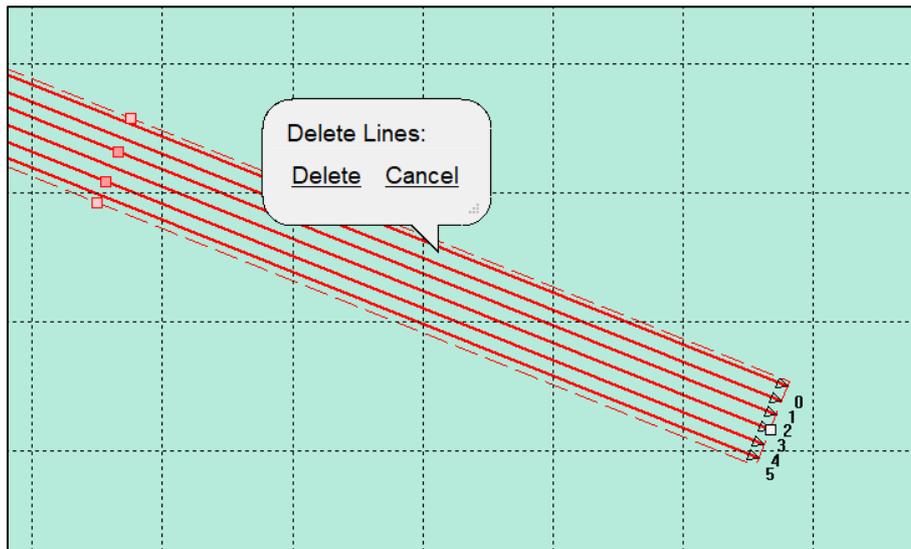


Figure 7-3-19 Frame-select Deletion

- Batch deletion

Click the [Delete] button  in the tools bar, it will display the deletion window, which scopes the deletion of the PlanLines.

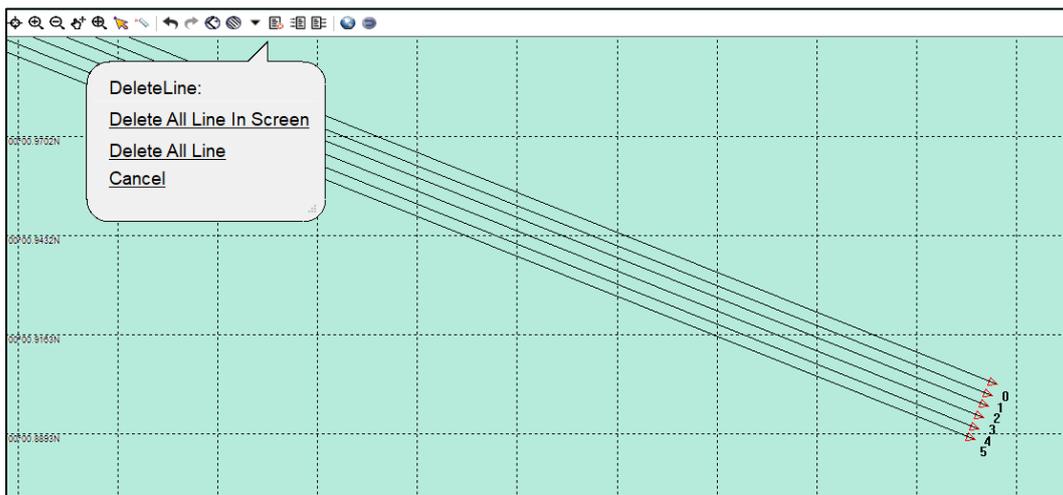


Figure 7-3-20 Batch Deletion

Delete All Line in Screen: Delete all schedule lines within the current screen range, including only partially displayed within the screen range.

Delete All Line: Delete all of PlanLines.

7.3.9 Translation Planlines

If the relative position in the plan line block is not changed, but only the translation operation is performed, the translation function of the plan line block can be used.

Ordinary plan line block After selecting the plan line block, click the left button (non-white square area) and drag it, and release the left mouse button to the target position.

For non-ordinary plan line blocks, after the plan line block is selected, when the mouse is within the range of the dotted line of the plan line block (non-white, red, green operation adjustment block area), click the left button of the mouse, hold and drag, and release to the target position Left mouse button.

7.4 Import and Export Planlines

Click the [Import] button  in the tools bar, which will display a dialog, and then select the DXF file you need. Click Open to import. Import the plan line into the system, you can edit this plan line.

Click the [Export] button  in the tools bar, which will display a dialog, and then select save path. That is can export the current plan line in DXF format.



Notice: When you export the DXF file, the plan lines will be scattered into a single plan line. When you import the DXF, the plan line will be a common plan line.

7.5 Shortcut Key

- Up, down, left, and right buttons of the keyboard

When drawing a graphic with the mouse, press the key up and down left and right, you can move the viewpoint of the background view up and down.

- Mouse wheel button

Slide the mouse mid-mouse pulley to zoom the view around the mouse position. Drag in the mouse to pan the view.

- Right mouse button

When zooming in, zooming out, panning, drawing, editing plan lines, and so on, you can immediately exit these operations by pressing the right mouse button.

7.6 Other features

- Chart queries and chart management can be performed.

- Ranging and angle measurement.

- Undo and Redo.

As the picture , click [Undo] or [Redo] that can undo the last operation, and click [Redo] that can restore the operation.

7.7 Common problem

- PlanLine block number and Line number

PlanLine blocks have their block numbers. Each plan line in the PlanLine block also has its line number, which corresponds to the total number of all PlanLines for the current project.

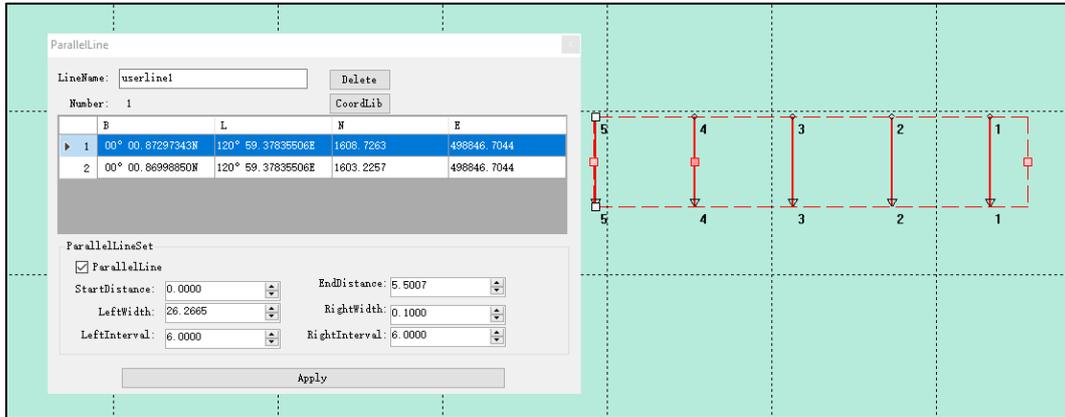


Figure 7-7-1 PlanLines number

- Coordinate display of planned line block editing form

The baseline or area coordinates are displayed in the plan line editing form. For parallel, channel, vertical, and plan line blocks, the corresponding edit form displays the baseline coordinates. For area routing blocks, it displays the coordinates of each vertex of the area. For the common plan line, it displays the coordinates of each vertex of the plan line.

Chapter 8

Electronic Charts

This chapter contains:

Loading Charts

Electronic Charts Display

Chart Inquiry

Charts are a kind of maps to show the marine area, which is an indispensable reference basis for navigation, and the main contents include: shore shape, islands, reefs, water depth, navigational markers and radio navigation stations, and so on.

In the main menu interface of the software, click **[Charts]** to enter the chart management interface, you can import S63 encryption charts and S57 unencryption charts, and you can also display, hide, delete and other operations on the imported charts.

8.1 Loading Charts

SLHydro Sounder system is certificated by International Hydrographic Organization (IHO) and supports importing chart data from different countries.

Imported charts will be shown in the existing charts list, and can be displayed as the background in the PlanLines and Survey modules.

8.1.1 S63 Encryption Chart

S63 is an International Hydrographic Organization (IHO) standard format for encrypting, securing, and compressing electronic navigational charts (ENC).

Choose Permit File and choose chart in Dictionary to load.

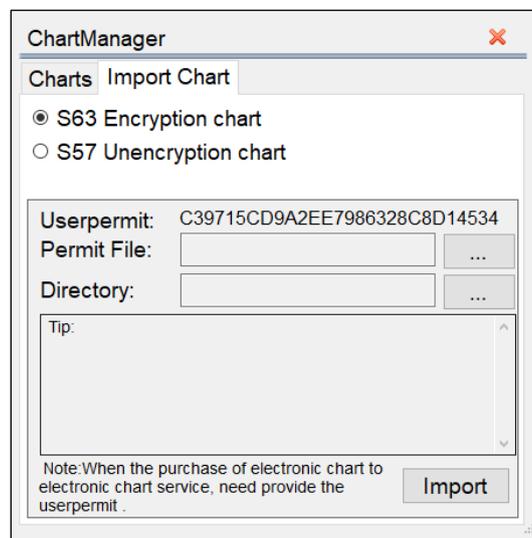


Figure 8-1-1 Load the encrypted charts

Userpermit: The user should provide a unique user permit of the current device to the electronic chart data service provider to purchase a chart.

Permit File: Key to decrypt the file.

Dictionary: The storage path of the S63 chart.

8.1.2 S57 Unencryption Chart

S57 is an unencrypted chart. Select S57 in the directory and it will be showing on the list with tree form. Click **[Import]** to load S57.

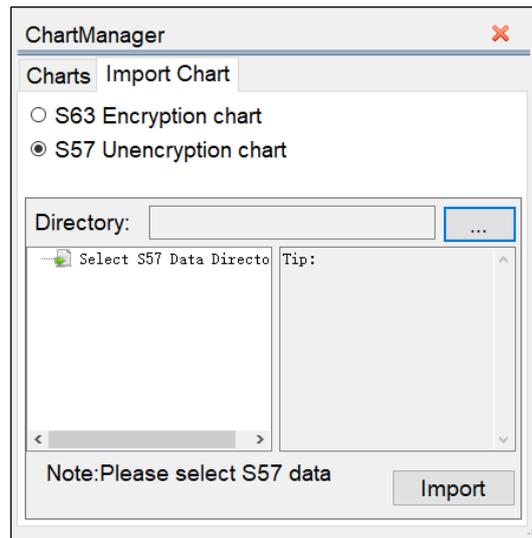


Figure 8-1-2 Load the unencrypted charts

8.1.3 Chart information

On the Charts page, you can check the basic information of the imported chart, including chart number, block name, scale, publication, version, publication date, update date, and publisher number.

Block names can be edited, and charts can be marked, displayed, hidden, or deleted. If the chart is set to be hidden, the electronic chart will not be shown as a background map in PlanLine and Survey module.

8.2 Electronic Charts Display

On PlanLines and Survey page, click the [Chart] button  to control the display and the configurations of charts.

8.2.1 Chart list

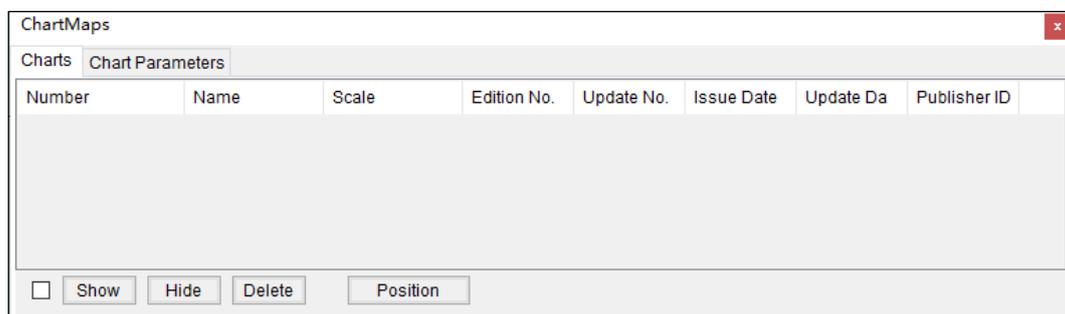


Figure 8-2-1 Chart list

- : Choose the chart file and click the button [Show] to display.
- : Choose the chart file and click the button [Hide] to hide.
- **Delete**: Choose the chart file and click the button [Delete] to delete.

- **Position:** Click the chart and it will be highlighted, then click [*Position*] and the background view will automatically jump to the selected chart.

8.2.2 Display settings

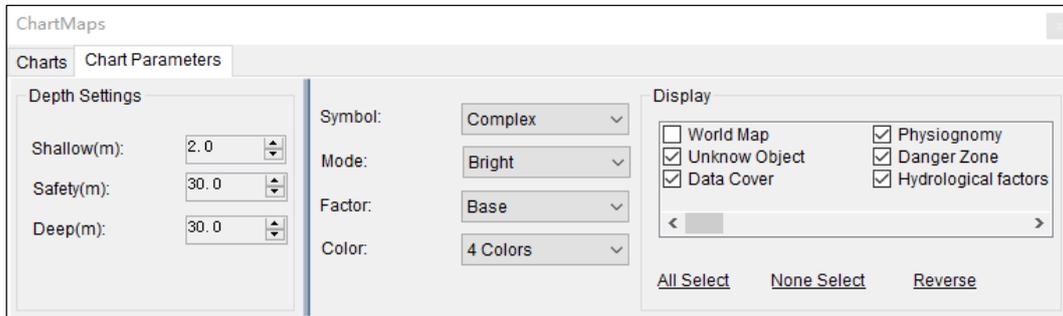


Figure 8-2-2 Chart display parameters

Depth Settings: For example, the water depth of fewer than 2 meters is defined as a shallow area, which will be displayed with dark color. The water depth of more than 30 meters is defined as the navigation safety area, which will be displayed in a light color.

Symbol: There are two sets of graphic symbol libraries displayed on electronic charts. One is the symbolic graphic used in traditional paper electronic charts, and another is simplified symbol graphics.

Mode: Different display modes to suit various weather conditions.

Factor: The electronic chart contains icons, symbols, and texts, and the information displayed is classified. Some information is necessary and treated as the basic element.

Color: Support setting different colors for different water depth areas.

Display: There is a lot of information included in the electronic chart, and information which is not needed to be displayed can be hidden.

8.3 Chart Inquiry

On the PlanLines or Survey page, Click the [*Inquiry*] button  in the toolbar, then click on the features to be viewed, and query results will be showing up. If the feature information included in the bubble box is selected, the corresponding object is highlighted in the chart.

Chapter 9

Base Map

This chapter contains:

BaseMap Management

BaseMap Display

9.1 BaseMap Management

On the main page of the software, click [*BaseMap*] to enter the engineering base map settings interface, Users can import the DXF format BaseMap. And you can also import Points (The water depth points of DAT format), and you can display whether to display or not.

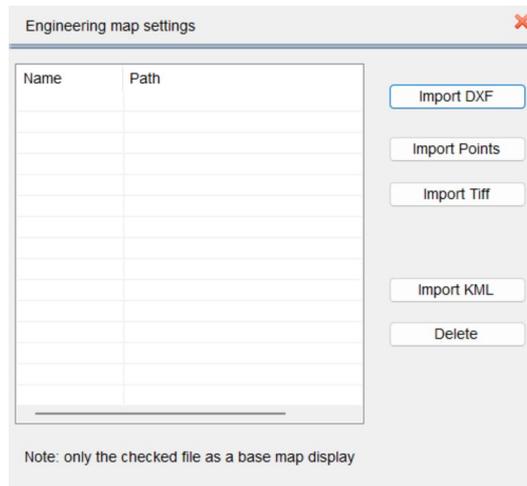


Figure 6-13-1 Base Map Settings

- Import DXF

Click the [*Import DXF*] button then pop up the Open file dialog box, select the file type, then select the base map file, and click [*Open*]. If the import is successful, the file will be displayed in the file list.

- Import Points (The water depth points)

Click [*Import Points*], and it can import Hypack (.XYZ) or other custom format files. Select the file format, and import the file.

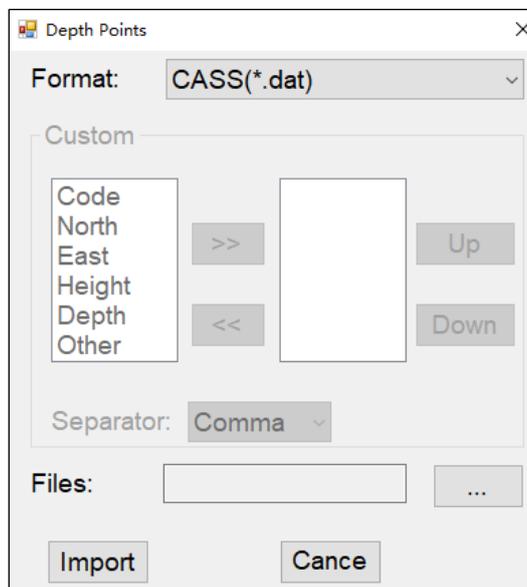


Figure 6-13-2 Water Depth Points Import

9.2 BaseMap Display

In the Engineering Map Settings interface, select the map you want to display, quite this page, and enter the Survey or PlanLine interface. The system will automatically show the selected base map on the background layer.

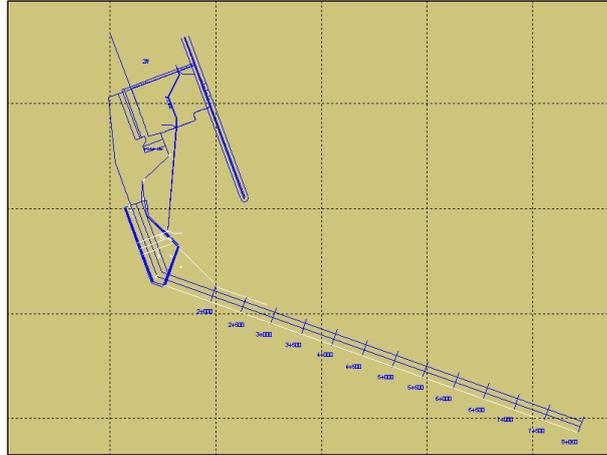


Figure 6-13-3 BaseMap Layer

Chapter 10

Survey

This chapter contains:

- Functions Introduction、
- Parameters Setting
- Real-time Information Display
- Record
- Sounding information
- Data Playback
- Sounding Parameters Setting
- Common Problems and Solutions

On the main page of the software, click [Survey] to enter the marine survey page.

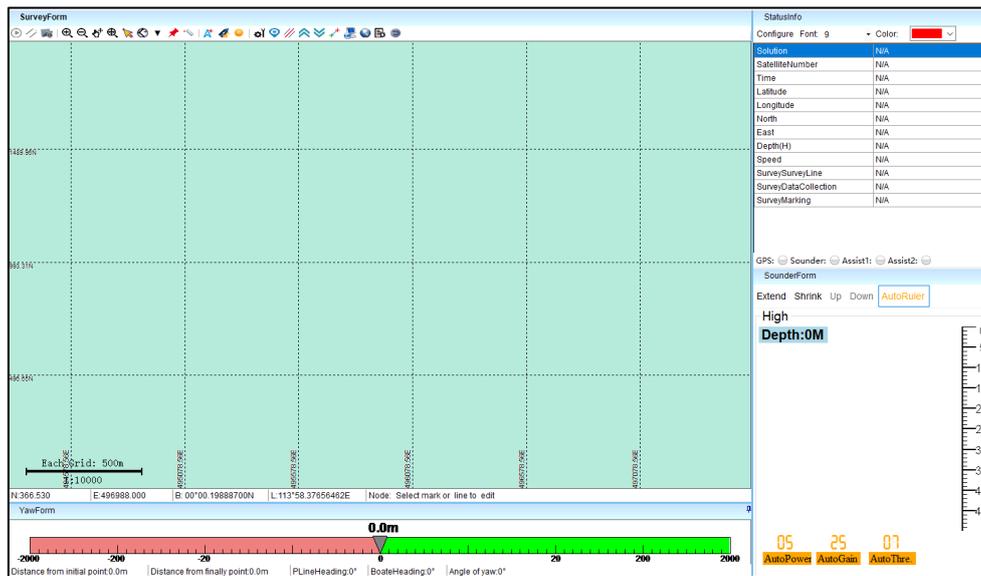


Figure 10-1-1 Survey page

After entering this page, the system will automatically perform the following operations:

- (1) Automatically connect to the serial ports and read the serial port data.
- (2) Automatically load the boat shape data.
- (3) Automatically load planned line data.
- (4) Automatically load the chart and engineering map.
- (5) The YawForm window and StatusInfo window will be automatically displayed.
- (6) Automatically display the solution status, speed, and water depth status information

10.1 Functions Introduction

10.1.1 Zoom and Pan

(1) View zoom

View zoom can be achieved in three ways:

- Zoom in and zoom out tools
- Global zoom
- Mouse pulley

(2) View Pan

View Pan can be achieved in three ways:

- Translation tool
- Mouse middle key

- Shortcut key

10.1.2 Setting for the display of the boat position

- Boat position lock

When surveying, the background of the view can be moved to keep the ship always displayed in the screen center, just like the ship is locked in the center of the screen.

(1) Lock the ship: Click the [*Locked*] button  to switch to the ship lock mode, then the button icon changes to .

(2) Unlocking the ship: Click the [*Unlock*] button  to switch to the parking unlock mode, then the button icon changes to .



Notice: In the ship position locking mode, the system will automatically translate the view to keep the ship position in the center of the screen. It is recommended to switch to the ship position unlocking mode when browsing the view, drawing the plan line, drawing the mark, etc.

- Positive direction of the boat

The bowing function refers to rotating the background image so that the direction of the bow is pointing toward the top of the screen. When measuring water depth according to the planned line, the bowing direction can give an intuitive visual experience which is very helpful for navigation.

(1) The bow is up: Click the [*NorthUp*] button  to switch to the bow up mode, then the button icon will change to . If the position is locked, the view will automatically rotate, keeping the bow towards the top of the screen.

(2) True north: Click the [*Headup*] button  to switch to true north up mode. At this time, the button icon will change to , and the view will rotate so that the true north direction is toward the top of the screen.

10.1.3 PlanLine Drawing

Click the [*PlanLine*] button  to start drawing planned lines.

Clicking the drop-down menu of the [*PlanLine*] button, users can select different drawing methods.

10.1.4 Graphic Mark

During the survey, it may need to mark something like the measured area or the water facility. Frequently-used graphic markers like point, line, and area are all supported.

Clicking the button  , a mark dialog box will appear below the view. It can be added by mouse, add coordinates to the mark, edit and delete. It also can be exported to DXF files.

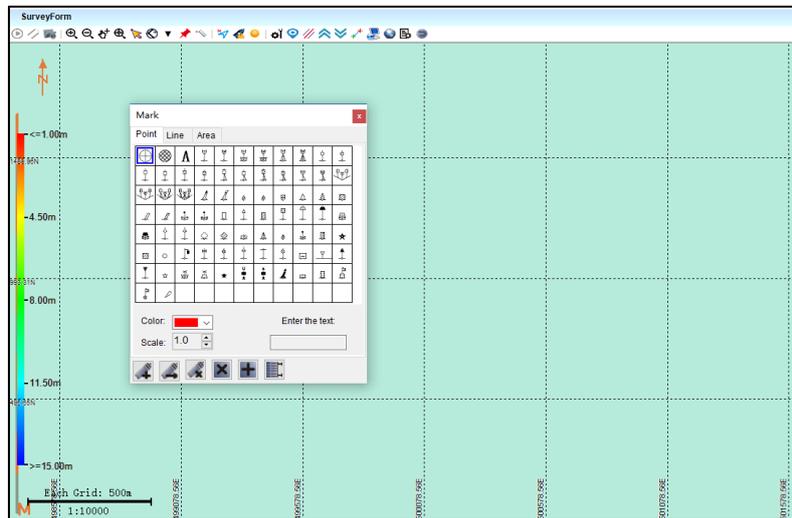


Figure 10-1-2 Mark window and dialog

- Point Mark

The attributes of the point mark include shape, color, and display scale. The operations that usually need to be performed include:

- (1) Drawing by mouse (2) Drawing by coordinate
- (3) Edit the mark point (4) Delete mark
- (5) Delete all mark (6) Export mark

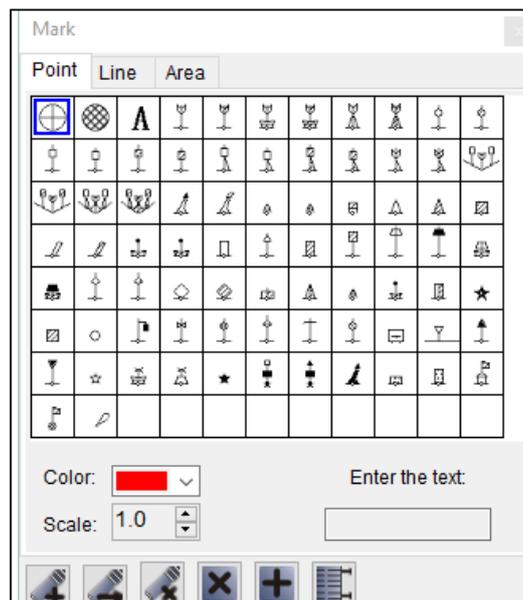


Figure 10-1-3 Point mark list

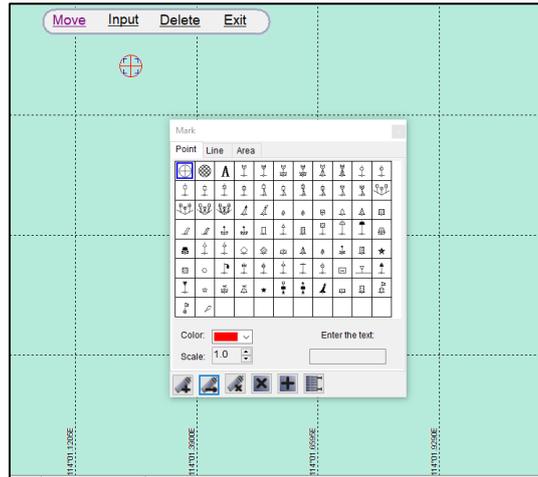


Figure 10-1-4 Edit the mark point

- Line mark

Attributes including: type, mode, color, width, and the operations that usually need to be performed include:

- (1) Draw line mark
- (2) Edit the line mark

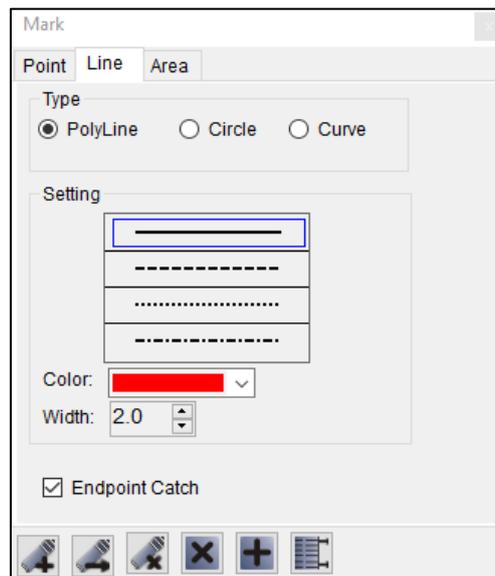


Figure 10-1-5 Line Mark

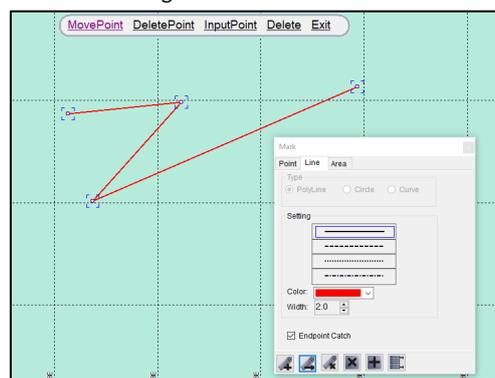


Figure 10-1-6 Line mark editing

- Area Mark

Attributes include: type, mode, color, line width, and fill. The operations that usually need to be performed include:

- (1) Mouse add mark
- (2) Edit mark
- (3) Delete mark
- (4) Export mark

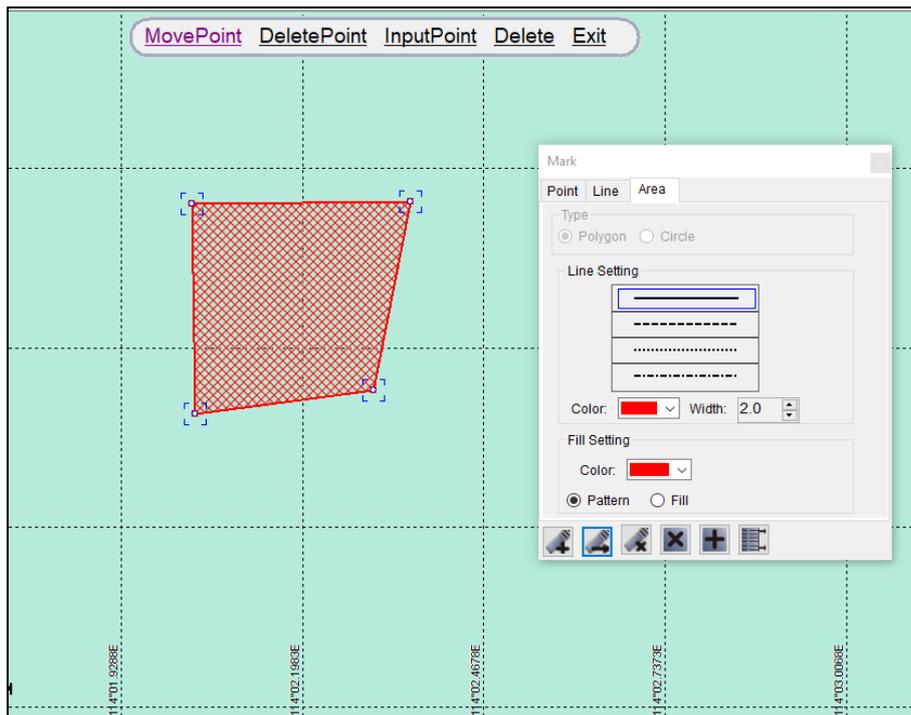


Figure 10-1-7 Area mark editing

10.1.5 Graphics editing

The planned line and marks can be edited. Using the Select Tool , select the planned line or mark to edit mode.

Select Tool also supports frame selection and deletion. Press the left mouse button to pull out a rectangular box, select planned lines and marks, and then the dialog will pop up:

- Delete Marks
- Delete Plan Lines
- Delete All

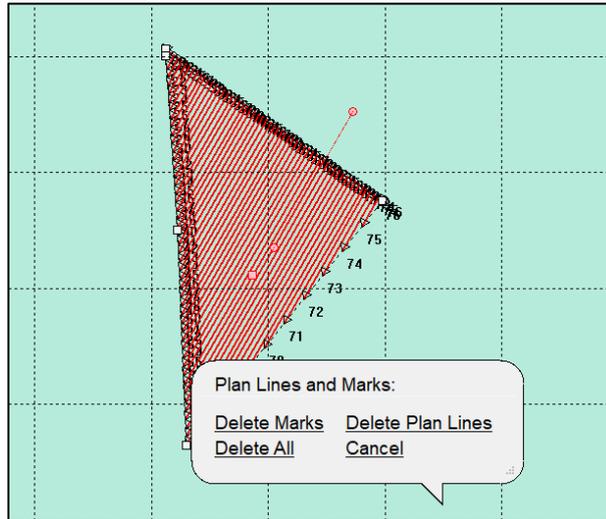


Figure 10-1-8 Frame-select deletion

10.1.6 Ranging angle measurement

Click the [Measure] button , you can use the mouse to continuously measure the angle, distance, and area. After double-clicking the mouse to end the measurement, the sum of the distances of the multi-segment lines will be displayed. Click the right mouse button to exit.

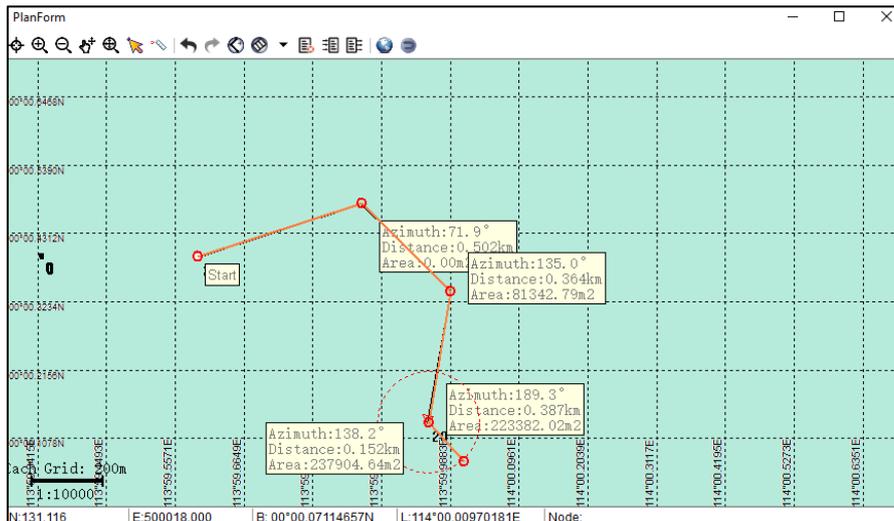


Figure 10-1-9 Ranging angle measurement

10.1.7 Survey lines management

SurveyFiles				
File Name	Line Name	Start Time	End Time	Count
<input checked="" type="checkbox"/> Ln1208	Ln1208	2018-12-05 13:35:40.494	2018-12-05 14:27:43.156	42068
<input type="checkbox"/> Ln1209	Ln1209	2018-12-05 14:27:53.740	2018-12-05 14:37:55.309	8405

Show

Figure 10-1-10 Survey lines management

Show/Hide: Select a survey line and click the Show or Hide button, the selected line can be set to show or hide.

Position: Check the line and locate it.

Export track map: Select the line and choose the properties you want to export. It will export the track map of the boat generated in DXF format.

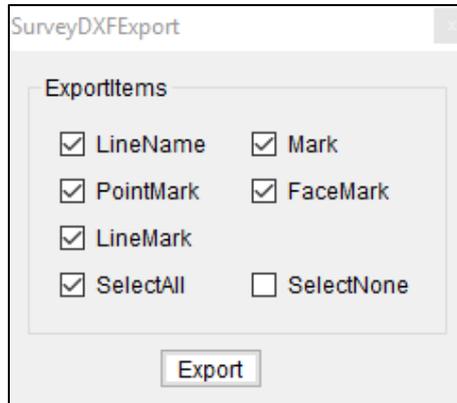


Figure 10-1-11 Export track map to DXF

10.1.8 Day and night display mode

Click the  [Day] button and the  [Night] button to switch display mode.

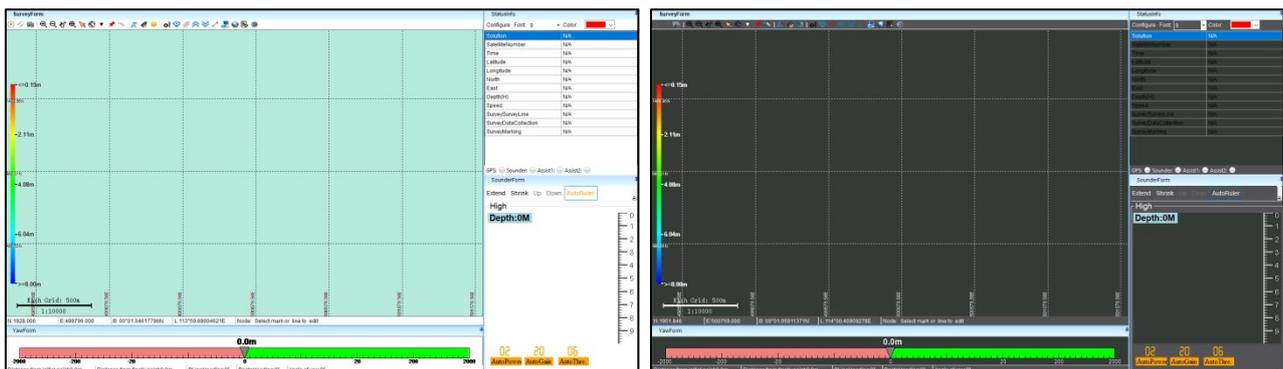


Figure 10-1-13 Day and night display mode

10.1.9 Change the icon size

In the measurement window toolbar, right-click to pop up the following dialog to customize the setting of the icon display.

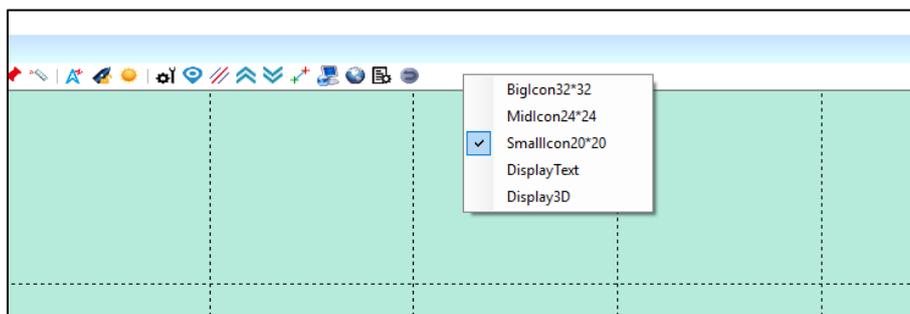


Figure 10-1-14 Change the icon size

10.1.10 Fixed point navigation

Click the [NavigationCoordSet] button , there will appear a setting dialog.

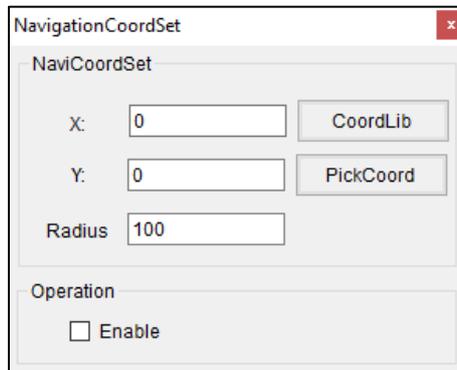
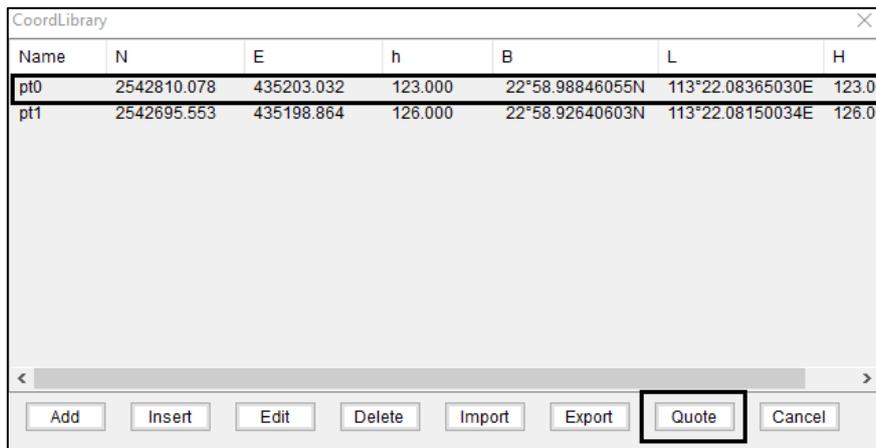


Figure 10-1-15 Navigate to fix the point

X means Northing and Y means Easting. There are several ways to enter specific coordinates:

(1) Select from the coordinate library:

Click the [CoordLib] button to pop up the CoordLibrary dialog box. Select a row and click the [Quote], the coordinates are added to the fixed-point navigation window.



Name	N	E	h	B	L	H
pt0	2542810.078	435203.032	123.000	22°58.98846055N	113°22.08365030E	123.0
pt1	2542695.553	435198.864	126.000	22°58.92640603N	113°22.08150034E	126.0

Figure 10-1-16 Add the navigation coordinate from the coordinate library

(2) Input manually

Input the coordinate in the following dialog.

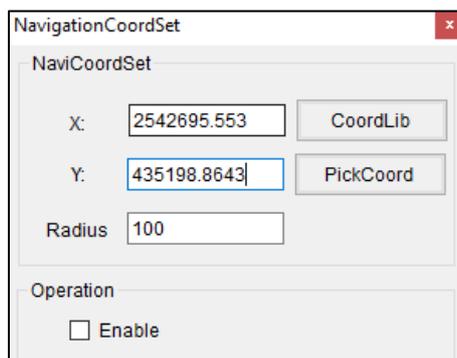


Figure 10-17 Input the coordinate

(3) Add coordinate from the library

In coordinate library, click [Add], [Ok] and [Quote] button sequentially to add a coordinate.

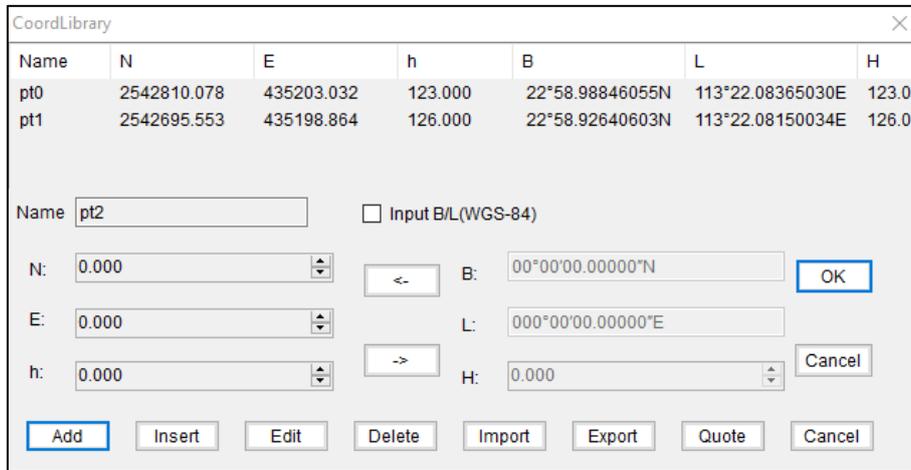


Figure 10-1-18 Add in the coordinate library

(4) Add coordinate by picking

Click the [CoordPicking] button, and select a point in the surveying area with the mouse as the navigation coordinate.

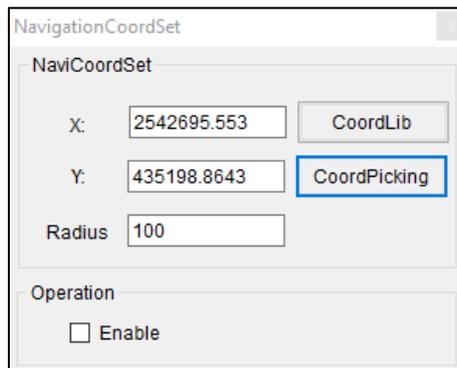


Figure 10-1-19 Pick a point as a navigation point

Round Radius: Take the navigation point as the center of a circle, this circle will assist to display for users.

After setting, click [Enable]. It will show information like distance, azimuth, and arriving time.

10.1.11 Block/Line Selection Mode

The plan line can be operated differently by switching the line selection mode and the block selection mode. The line selection mode is mainly used to select the plan line in the yaw window. Block selection mode is mainly used to edit plan line blocks.

Block selection mode: Click the [line selection mode] button  to switch to the block selection mode, and the button icon changes to .

Line selection mode: Click the [block selection mode] button  to switch to line selection mode, and the button icon changes to .

In online selection mode, click the [plan line] to open the plan line selection dialog box. Users can view the plane coordinates of the planned line or extend the planned line according to their own needs. The extended planning line provides two modes: distance mode and proportion mode. Click [OK] after setting.

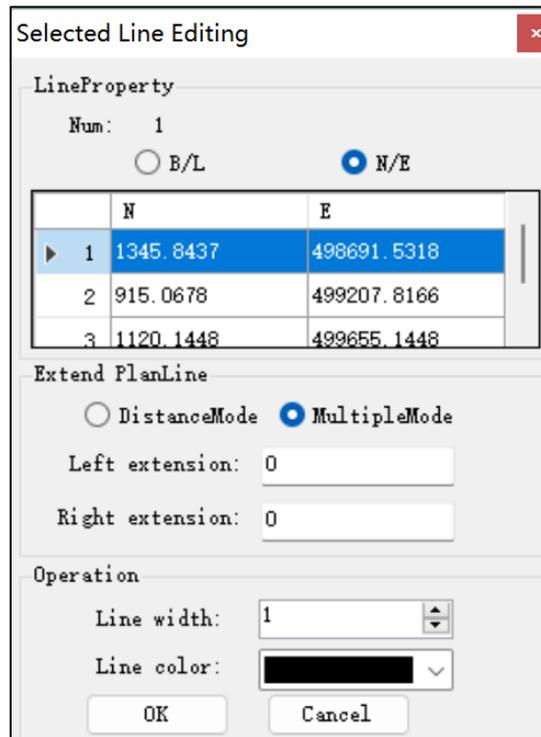


Figure 10-1-20 Selected Line Editing

10.1.12 Planning Line Operation

- The PreLine-

After selecting the plan line, click on the [PreLine] button , the system will select the previous plan line as the current plan line, and the yaw window will display its information simultaneously.

- The NextLine-

Click this button , and the system will select the next plan line as the current plan line.

- Reverse-

After selecting the plan line, click Reverse , the system will select the coordinates of the current plan line to process backward, and the information of the starting point distance and the endpoint distance in the yaw window will also be changed simultaneously.

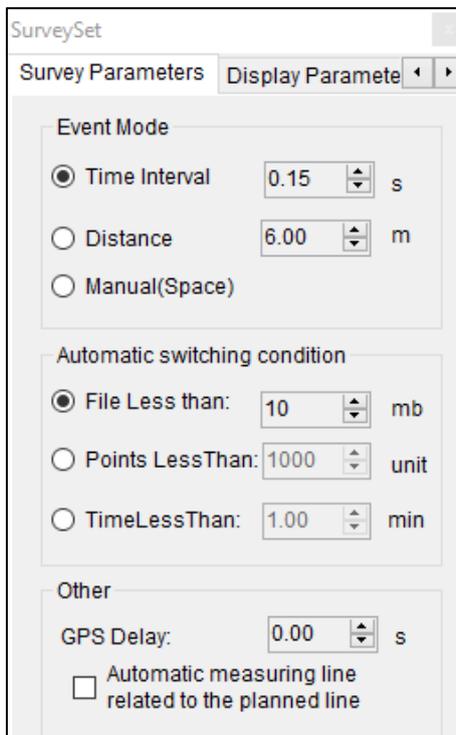
10.2 Parameters Setting

Including survey parameters, display parameters, system parameters and transmit parameters.

The display parameters mainly include the display way and color of water depth points and the display control of coordinate grids and trajectories.

The system parameters mainly include the unit of speed and distance display, longitude and latitude display format, alarm, time zone, and so on. Click on the [Survey] button , and there will be a parameter setting dialog box below the screen.

10.2.1 Survey Parameters



The screenshot shows a dialog box titled "SurveySet" with two tabs: "Survey Parameters" (selected) and "Display Parameters". Under "Survey Parameters", there are three sections:

- Event Mode:** Three radio buttons are present. "Time Interval" is selected, with a spin box set to 0.15 and the unit "s". "Distance" is set to 6.00 with unit "m". "Manual(Space)" is unselected.
- Automatic switching condition:** Three radio buttons are present. "File Less than:" is selected, with a spin box set to 10 and the unit "mb". "Points LessThan:" is set to 1000 with unit "unit". "TimeLessThan:" is set to 1.00 with unit "min".
- Other:** "GPS Delay:" is set to 0.00 with unit "s". There is an unchecked checkbox labeled "Automatic measuring line related to the planned line".

Figure 10-2-1 Survey parameters

(1) Event mode

Event mode is to control the marking, and there are three methods to control the marking commands: time interval, distance, and manual.

- **Time interval:** Every certain time, send a marking command to the serial port of the echo sounder, generally set as 1-3 seconds.

- **Distance:** According to the set distance of moving, it will send a command to the serial port of the echo sounder, generally the distance interval is set as 5-10 meters.

- **Manual:** Every time pressing the space bar, it will send a command to the serial port of the echo sounder to collect the data.

(2) Other settings

- GPS delay

It means the time from the antenna received the satellite signal to the software receiving the positioning data. There are 3 ways to reduce it.

-Sending the motherboard commands to let GPS output the position and time data only, so that it can reduce the amount of data transmitted through serial ports.

-Installing GPS antenna as much closer as to survey position to reduce the length of GPS antenna cable.

-Choose a thick antenna cable with small resistance.

At present, the best solution is using hard synchronization PPS which can effectively reduce GPS delay.

- Survey line file size

If the current survey line record file exceeds this value, it will automatically create a new line file to record.

- Amount of marking points

If the number of marking points of the current survey line file exceeds that value, it will automatically create a new line file to continue recording.

10.2.2 Display Parameters

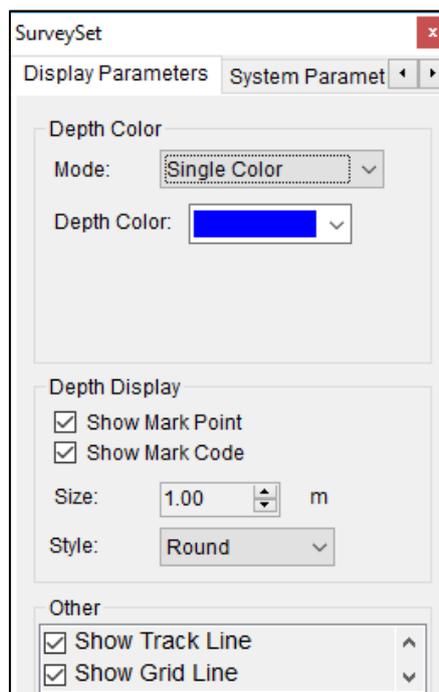


Figure 10-2-2 Display parameters

(1) Depth color

- **Single Color:** All the depth points will be displayed with the same color.
- **Double Color:** The depth value under the threshold is marked with Shallow Color; the depth value that exceeds the threshold is marked with Deep Color.
- **Gradient:** The water depth point is shown by the color gradient from shallow to deep in the range.

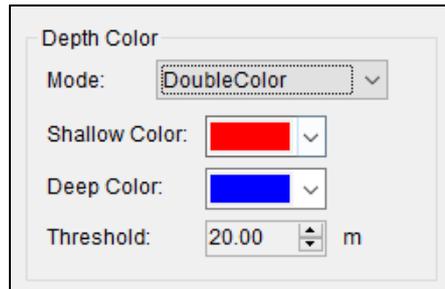


Figure 10-2-3 Double color display

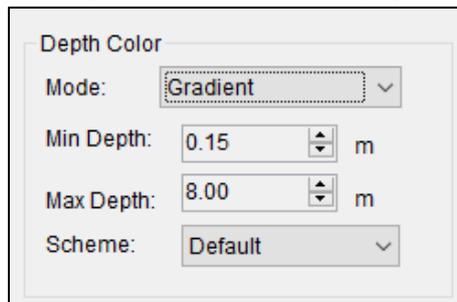


Figure 10-2-4 Gradient color display

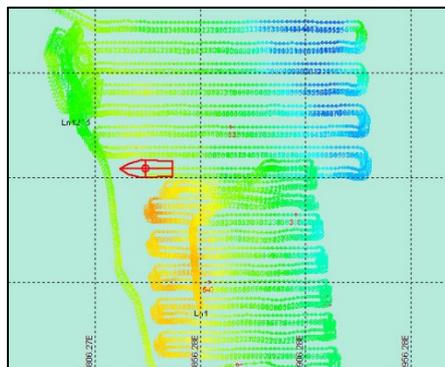


Figure 10-2-5 Visual effect at a gradient

(2) Display way

There are three ways to display the water depth point:

- Round cake
- Square
- Depth value

It also can set the display size, whether to display the calibration number, if the display size is set to 0, then display according to the minimum size.

10.2.3 System Parameters

(1) Unit

Set the unit for displaying data on the page

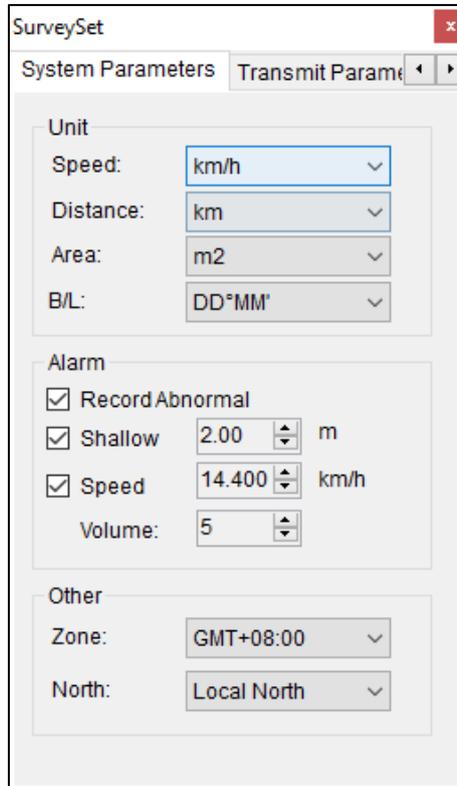


Figure 10-2-6 Unit setting

(2) Alarm

- **Record Abnormal:** It will alarm in case of any record anomaly, such as bad positioning data accuracy, no data coming from echo sounder, or others.
- **Shallow water alarm:** When the measured sounding is lower than the threshold, the software will alarm.
- **Ship speed alarm:** When the speed of the ship is faster than the threshold, the software will send out an alarm.
- **Alarm volume:** Set the volume size.

(3) Other

Time setting: The default time zone is GMT+08:00. GPS is UTC, and the time displayed in the system is the local time plus the time zone.

North setting: It can select the north axis of local coordinates or the WGS84 north axis.

Alarm volume: When the hardware device has speakers, it will affect the volume of speakers.

10.2.4 Transmit Parameters

Enable forwarding GGA to other COM ports.

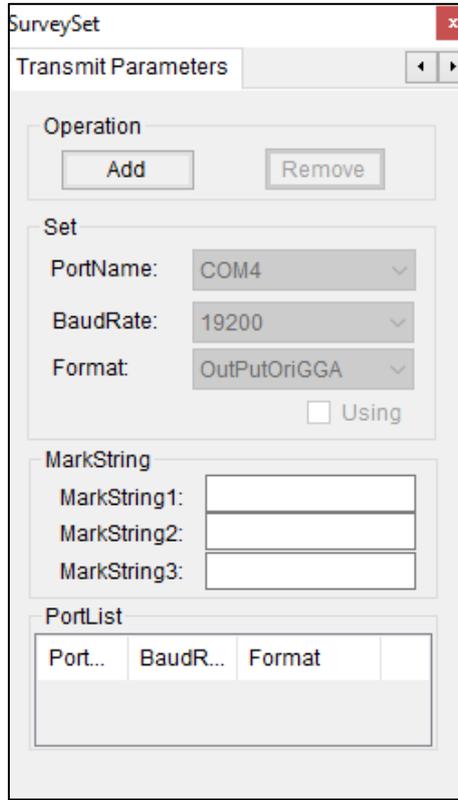


Figure 10-2-7 Remote control output

10.3 Real-time Information Display

10.3.1 Status Information

The status information is displayed on the right side by default, including solution status, satellite number, latitude, longitude, North coordinate, East coordinate, speed, depth (high frequency), speed, survey line name, acquisition status, and marking number.

The font size and color of status information can be changed by font and color drop-down box in turn.

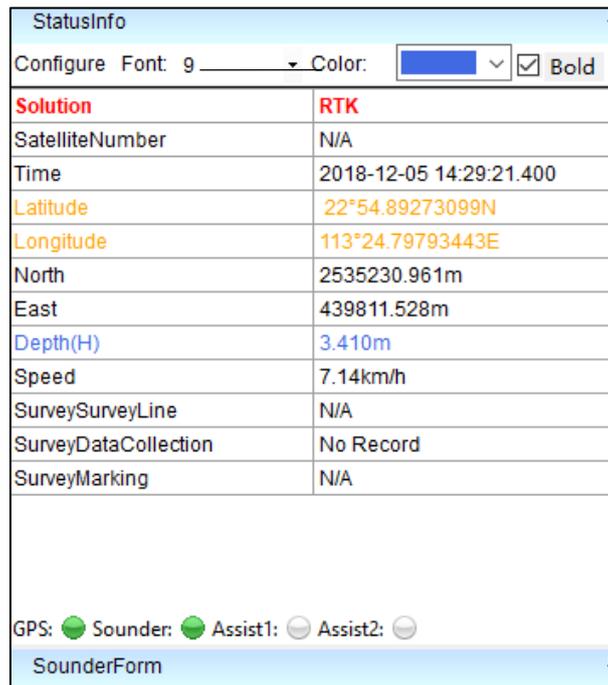


Figure 10-3-1 Status Information

Click the [Configure] button to customize the addition of real-time items to the status information window.

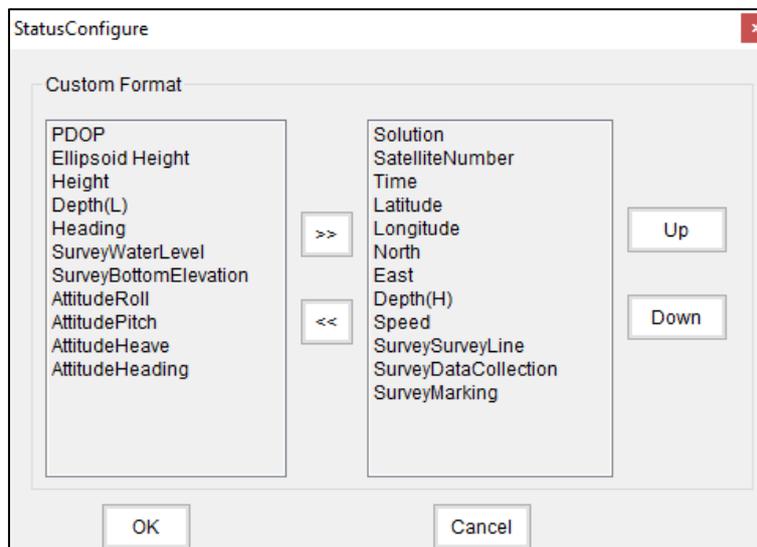


Figure 10-3-2 User-defined

10.3.2 Yaw

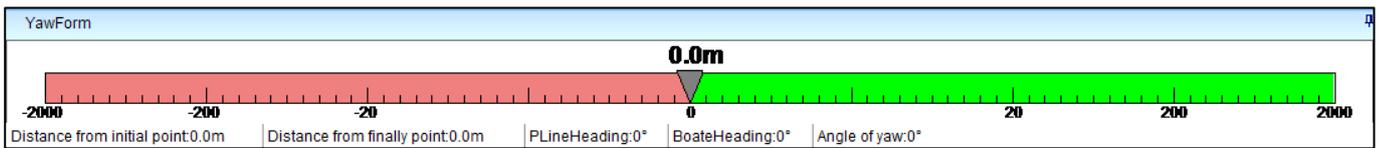


Figure 10-3-3 YawForm

Yaw distance: The shortest distance from the current locating point to the planned line

Starting point distance: The distance from the current anchor point to the starting point of the plan line

End distance: The distance from the current anchor point to the end of the plan line

Line direction: The angle between the current planned line and the true north direction

Measure the bow direction: The angle between the current bow direction and the due north direction

Yaw angle: The angle at which the current bow deviates from the planned line (if the ship is on the left side of the planned line, measure the bow minus the direction of the survey line; if the ship is on the right side of the planned line, measure the bow minus the direction of the survey line)

10.4 Sounding information

The sounding window is to show the current single or dual frequency echoes and water depth information.

Single-frequency echo sounder:

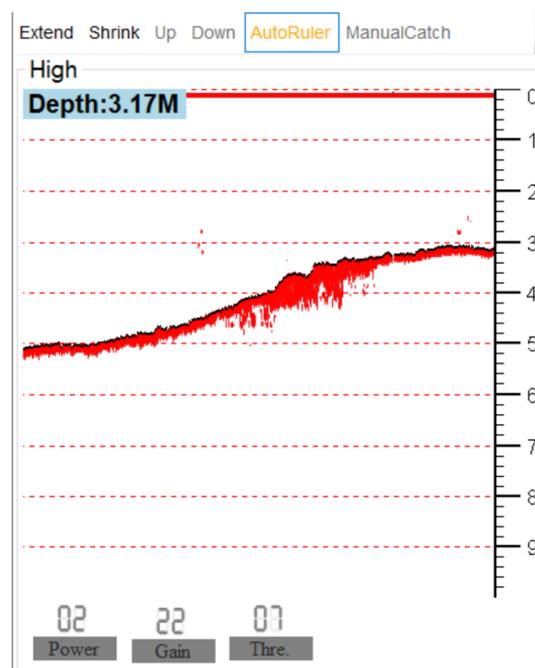


Figure 10-4-1 Sounding window

Extend and Shrink: Enlarging or reducing the measuring gear.

Up, down and AutoRuler: Adjust the display position of the echo image in the window. After canceling the automatic tracking, you can adjust the move up and down.

Voltage: Real-time voltage of battery.

Print: Used to set up connection or disconnection of thermal printers. After clicking [Print], the Print Settings dialog pops up. Users can choose whether to print echoes, mark lines, grids, and line names according to their needs. Make sure that the USB port is connected to the thermal printer before clicking on the connection. If the connection is unsuccessful, the printer connection will be prompted to fail. When the connection is successful, the echo data can be printed at the same time after the collection is started.

AutoPower, AutoGain, AutoThre: Click the button to switch between automatic and manual, yellow is automatic, and white is manual. Control parameters can be manually adjusted by the +-button. If it is in automatic mode, the software automatically calculates the automatic control parameters according to the received echoes through a certain algorithm.

Display Area: Area to show echo, bottom tracking, time gate, depth scale, and echo line.

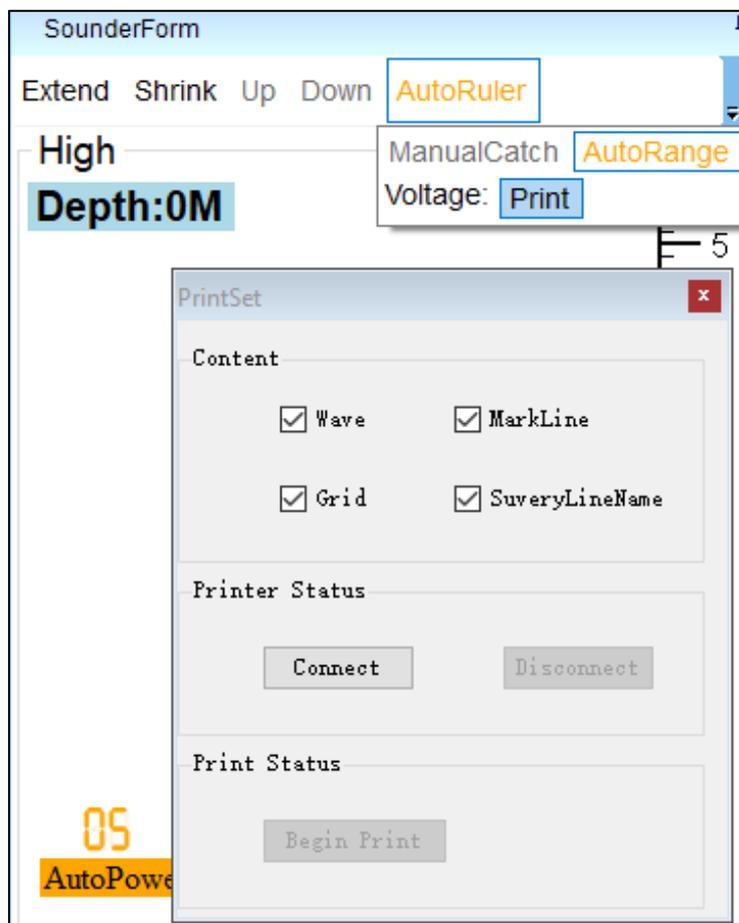


Figure 10-4-2 Sounding window

Dual-frequency echo sounder:

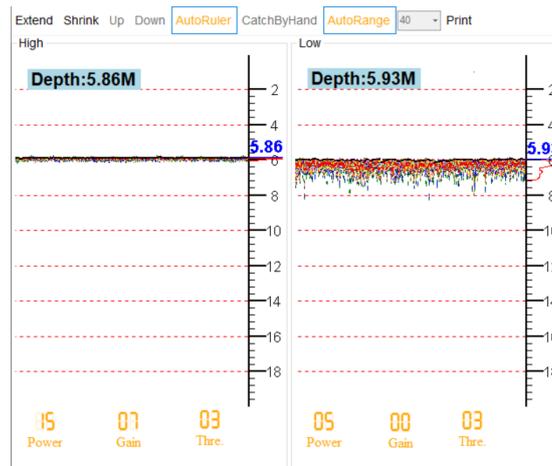


Figure 10-4-3 Dual-Frequency echo sounder

Extend/Shrink: Expand or reduce the measured gear.

Up/Down/AutoRuler: Adjust the display position of the echogram in the window. Move up and move down can be adjusted only after AutoRuler is canceled.



Figure 10-4-4 PrintSet

PrintSet: Used to set the connection or disconnection of the thermal printer. Click [*Print*] to open the print setting dialog box. Users can select [*High*] or [*Low*] according to their own needs, and then choose whether to print an echogram, marking line, grid, and line name. Before clicking [*Connect*], make sure that the USB port is connected to the thermal printer, and click [*Connect*]. If the connection is unsuccessful, you will be prompted "printer connection failed". After the connection is successful and the acquisition starts, the echo data can be printed at the same time.

AutoPower, AutoGain, AutoThre: click the button to switch between automatic and manual. Yellow is automatic and white is manual. The control parameters can be adjusted manually through the +/- button. In case of automatic mode, the software will automatically calculate the automatic control parameters according to the received echo through a certain algorithm.

Display area: the area where echo, bottom tracking, time gate, water depth scale and echo line are displayed.

10.5 Record

Press  to start recording, press  to stop recording.

The file name will be like: LnAA_YYYYMMDD_hhmmss

Field	Format	Description
Mark	Ln	Survey line mark
Code	AA	Code for survey line
Date	YYYYMMDD	Year, month, and day
Time	hhmmss	Hour, minute, and second

10.6 Data Playback

Click on the [Playback] button , select the file with the correct format, the software enters the data playback mode. The sounding data and the measurement data will be synchronized.

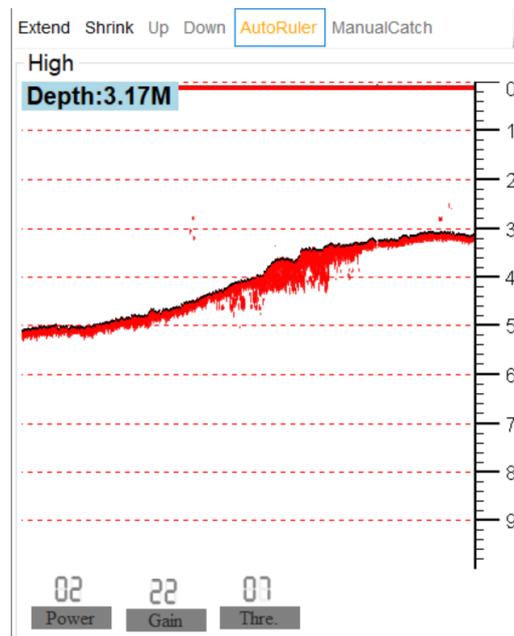


Figure 10-6-1 Data playback

Click the button  to set the playback mode, set by mark point or by time and range.

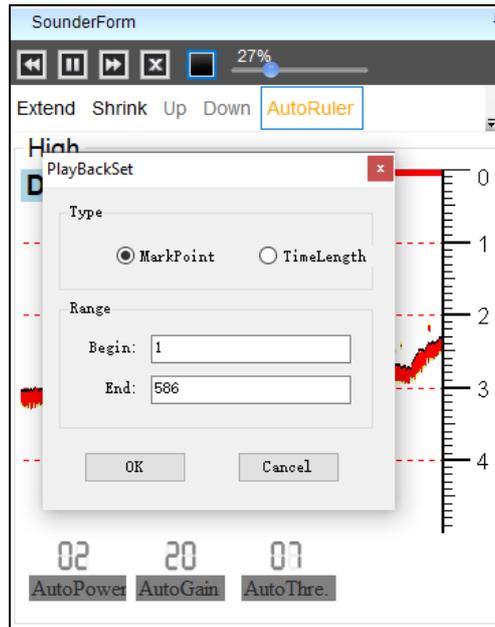


Figure 10-6-2 Playback way of choosing

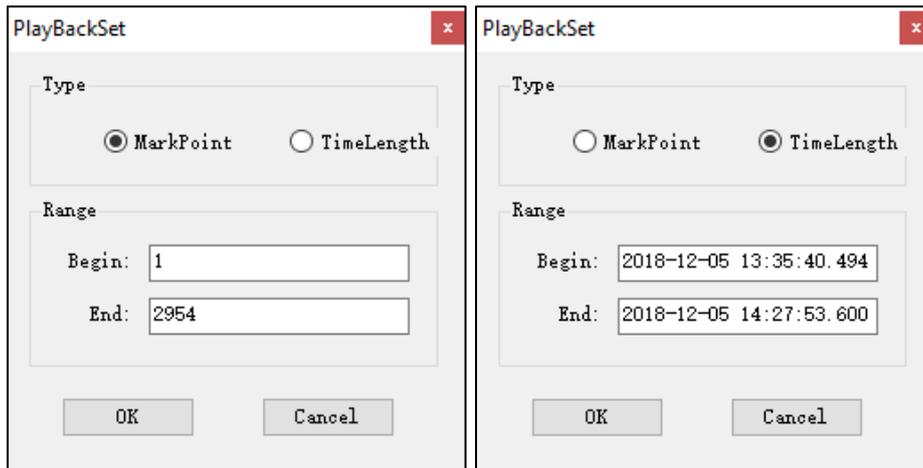
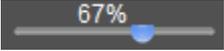


Figure 10-6-3 Two ways for playback

Click button  to slow down the playback speed, and click  to speed up the playback speed. Click  to pause. Mouse drag  to adjust the current playback progress.



Notice: During data recording, data playback will cause data recording to be suspended.

10.7 Sounding Parameters Setting

Click on the [Sounder] button  on the menu bar to enter the Sounding Settings page and set the parameters of the Sounding Instrument. The settings of the echo sounder include *Sounding, Display, Velocity, Mark, and Output*.

10.7.1 Sounding Parameters

Including high and low frequency, gain scheme, terrain, and pulse width setting.

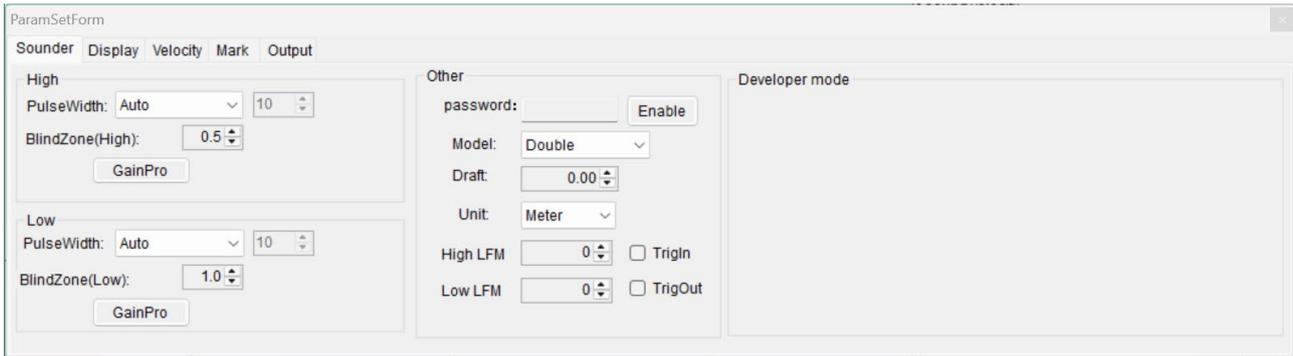


Figure 10-7-1 ParamSetForm of Single Frequency Sounding



Notice: Generally, the sounding parameters remain the default, and the parameters can be adjusted according to the situation in special waters (such as complex and changeable underwater terrain, especially poor echo).

10.7.2 Display Parameters

Display parameters for echo color, paper speed, and the information that users want to display in the sounding window.

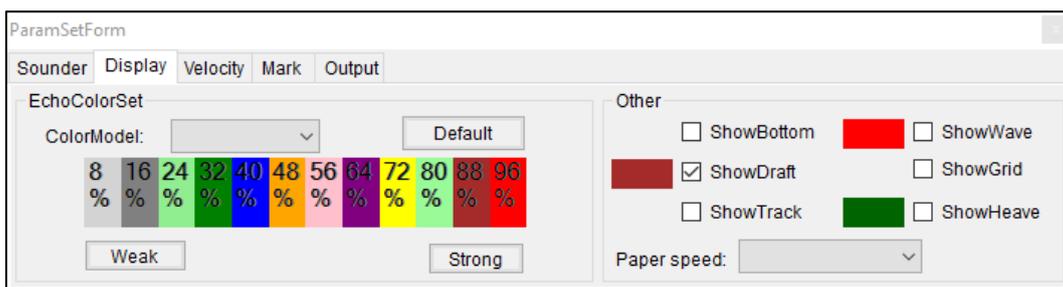


Figure 10-7-3 Display parameters setting

Color mode: Gradient mode and Manual mode are optional.

-Gradient mode: it can adjust the weakest echo display color and the strongest echo display color through the weak or strong button.

-Manual mode: it can customize the color value of each echo intensity range by clicking on the color box so that users can distinguish different intensity echoes.

If the user is not satisfied with the current color, click on the default to restore to the default multi-color mode.

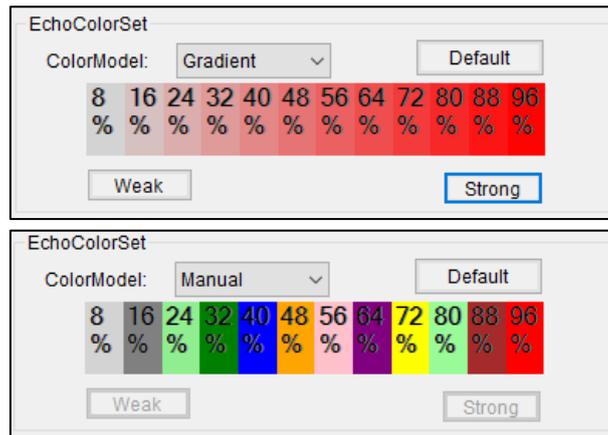


Figure 10-7-4 Display effect

10.7.3 Sound Velocity

There are two kinds of sound speed settings:

Manual calculation of sound speed: Input temperature, salinity, and other parameters, to calculate sound speed.

Access Sound Velocimeter: Configure serial port parameters, adjust the sound speed instrument, and software can obtain real-time sound speed.

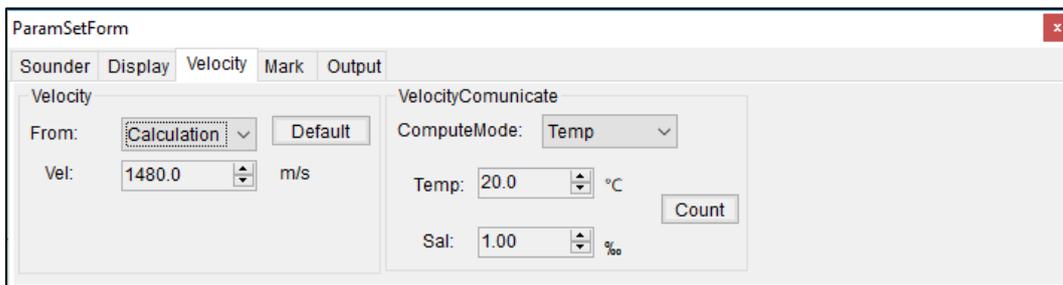


Figure 10-7-5 Velocity setting

10.7.4 Marking

The marking settings are shown in Figure 10-9-1, which is used to set whether the bathymetric page displays real-time marking lines, marking line information, and marking color settings. After setting up, the specific marking information will be displayed on the sounding page.

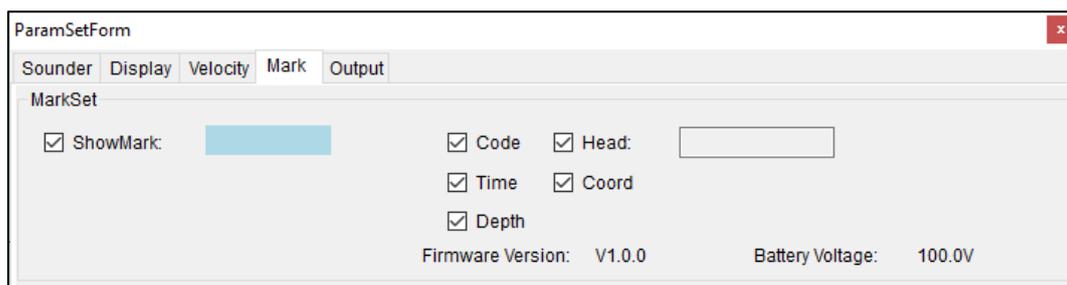


Figure 10-7-6 Marking setting

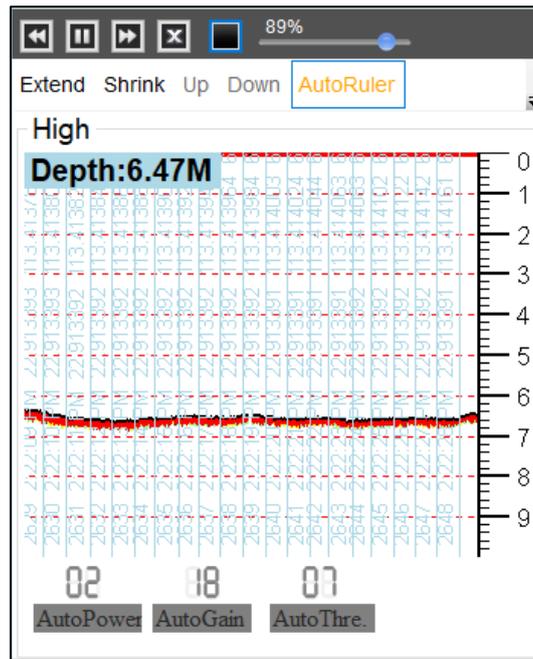


Figure 10-7-7 Marking display on sounding page

10.7.5 Output

This software supports two-way communication and can receive external marking commands. Support using a third-party software to collect and record data, and use this software to record echoes and mark information. This software provides water depth information and echoes information for third-party software, and third-party software provides marking information for this software. Users can set specific depth output formats according to their own needs.

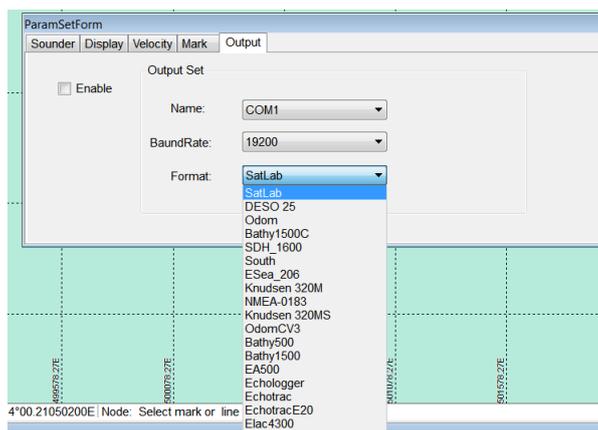


Figure 10-7-8 Set the output

We can set the output of SLHydro Sounder to the Hypack installed on your computer.

- (1) Connect Echosounder to the computer. Cable used: female to female serial cable (a cross-wire cable); serial port to USB cable.
- (2) Select the port, baud rate, select the Knudsen 320M format, and pick up the [Enable] function.

(2) Adding Knudsen 320M Serial equipment and GPS equipment in Hypack corresponding to water depth output format. (Use the virtual com)

(3) Hypack begins recording and marking

(4) Sounding software can start recording.

Specific marking and echo information can be viewed through playback or depth sampling modules.

10.8 Common Problems and Solutions

(1) Make sure the date/time is correct

When starting the measurement, pay attention to whether the date/time in the status information is correct. If the date/time is incorrect, please check whether the serial port has normal GPZDA information output and whether the output frequency is not less than 1Hz. If the date is incorrect, data collection cannot be carried out normally.

(2) Ensure that the GPS output frequency is not less than 1Hz

During measurement, it is necessary to ensure that the output frequency of GPS information is not less than 1Hz. If the output frequency of GPS information (such as GPZDA, GPGGA, and other information) is less than 1Hz, to ensure the accuracy of interpolation points, the software will default that this information is invalid. For example, when using the V90 Plus receiver, set the output frequency to 0.5Hz (output once in 2S). When recording data, the software will send out "no effective water depth data received!" Warning for.

(3) Heading problem: whether to output heading information

When the heading of the hull is found to be incorrect during measurement, please check whether the heading information output of the external sensor is normal. If the heading information is not obtained through the external sensor, the software calculates the heading according to the front and rear points of the positioning information, but at this time, make sure that the external sensor does not input the heading information. (For example, when GPS is not required to output the heading information, turn off the GPHDT information statement of GPS).

(4) Observe the recording conditions

For the solution state, the recording condition in the parameter set should be consistent with the actual measurement state. If the recording condition is fixed solution, it can be recorded normally only when the fixed solution is received; If differential decomposition is selected in the recording conditions, the actual state is differential decomposition and fixed solution, which can be recorded normally; If the single-point solution is selected in the recording conditions, the actual state is the single-point solution, differential solution and fixed solution, which can be recorded normally.

(5) GPGSA information is required for PDOP output

If the position dilution of precision (PDOP) is displayed incorrectly, check whether the GPS receiver has a GPGSA statement output. If not, set it to output the statement.

Chapter 11

Data Sampling

This chapter contains:

- Introduction to Basic Functions
- Bathymetric Data Correction
- Bathymetric Data Sampling

First, let's discuss why we do the sampling?

On the main page, click [Sampling] to enter the water depth sampling page. Just like the pic shows, the original false water depth point can be corrected, and sample some specified feature points.



Figure 11-0-1 Marking display on sounding page

- Marking line: Mark the point as marking points, each marking line has its number.
- Original water depth line: The original high-frequency depth points will be a reference for correcting the false data. Different solution states with different colors.
- Correcting water depth line: According to the original water depth line, the data line can be corrected manually or automatically. Non-fixed solution data points will be represented by solid circles with different colors, and the fixed solution is a hollow circle. Click on a solid circle or a hollow circle can find its position in the base map.
- Sampling line: Mark the water depth points as the sampling point.
- Range line: Guideline of sounding depth which helps sounding check.

11.1 Basic Functions

- Enlarge/reduce the water depth range

Click the [Zoom In] button  to expand the range of the displayed range, and click the [Zoom Out] button  to reduce the displayed range.

- Graphic movement

Click the [Up] button  or press the keyboard "Up", the current graph (including water depth line, edited water depth line, etc.) will move up, click the [Down] button  or press the keyboard "Down", the "Left" and "Right" arrow keys on the keyboard can move the current graph to the left or right.

- Increase/reduce the displayed interval

Click the [Span+] button  to increase the interval between the water depth points in the horizontal display. Click the [Span-] button  to reduce the interval.

The water depth interval reflects the density of water depth points, reduced interval can help to overall view the water depth variation, and increased interval can help to correct water depth.

- Show/hide the range line

Click the [Scope] button  and the button will turn red , which means the range line is displayed. Click the button [again] and the button will return to white, which means the range line is hidden. The orange line is the auxiliary line of the water depth gauge. The user can know the approximate depth range corresponding to the current water depth point according to the range line.

- Show/Hide Echo

Click the [ShowWave] button , and the button will turn red , which means displaying echo waves. Click the button [again], the button will return to white, which means the echo waves are hidden.



Notice: When the water depth data record is in the external mark mode, there is no information displayed in the sampling window after the line is opened. Only when the user clicks the ShowWave button, the recorded marking information will be displayed along with the echo information.

- Control the translation of the image

Pressing the keyboard "Up, Down, Left, and Right" to move the image, the maximum depth range can reach 1000 meters.

- Base map settings

You can locate a specific point in the base map window by clicking on the solid circle or the hollow circle of the edit line. If you want to modify the survey line or base map of the base map window, you can set it by Display Paras and Line Manage in the ParasForm tab at the top right of the page.

- Start echo adaptation

Right click the blank area of echo, and check "Start adaptive". Scroll the pulley or drag the progress bar, and the echo adaptive range changes.

- Line retrieval

The retrieval time can be entered to retrieve the selected line containing the specific time point.

11.2 Bathymetric Data Correction

During surveying, due to the external interruption, some water depth may be false depth. Therefore, these wrong water depth points needed to be corrected when sampling.

Generally, check whether there is a sudden change on the water depth curve; If it exists, correct it according to the depth changing trend around that point.

Two sounding correction methods: manual correction and automatic filter correction.

11.2.1 Manual correction

Click the [EditHigh] button , and the color will turn to red  which means the data is editable. Drag to correct the depth. Click [EditHigh] again to exit.

If the survey line is double-frequency data, the default is editing high-frequency data. Clicking the [EditLow] button  can edit low-frequency data which is the same as the operation mentioned above.

11.2.2 Automatic Filter Correction

Set filter mode and filter parameters, and click [Process] to perform automatic filter correction.

The water depth line after automatic filter correction can also be manually edited.

11.3 Bathymetric Data Sampling

Since the raw data recorded is more than needed, it is necessary to do the sampling for the original data. Generally, first doing water depth correction, then doing sampling for the corrected depth value.

Including automatically sampling and manually sampling.

11.3.1 Automatically Sampling

Set the sampling mode and sampling interval, and then click the [Sampling] button.

-Sampling by distance: Take a sample point at a certain distance. For example, a 5m interval means every 5m takes a sampling point.

- **Sampling by time:** a water depth point is sampled every certain sampling interval.

- **Taking and marking points:** in the marine survey, marking instructions will be sent to the depth sounder for marking according to the time interval or distance interval. The measurement points collected during marking are marking points. If taking and marking points are selected, only the marked water depth points will be sampled.

- **The shallowest point in the equal interval:** the shallowest point in the area is sampled every certain sampling interval. For example, the sampling interval of 5 meters means that one shallowest point is sampled every 5 meters.

- **The deepest point in the equal interval:** the deepest point in the area is sampled every certain sampling interval. For example, the sampling interval of 5 meters means that one deepest point is sampled every 5 meters.

11.3.2 Manually Sampling

When the terrain is changing dramatically, need more sampling points reflect the sounding variation.

Click [*Sampling*] and the button turns red , data becomes editable, click the [*depth point*] and it will be marked with a sample line. If you want to cancel a sampling point, click it and the sampling line will disappear. Click [*Sampling*] once more to exit and the button will return to white.



Notice: The results of automatic sampling will cover manual sampling. Consequently, it is suggested to take automatic sampling before manual one.

11.3.3 Save the sampling data

The sampling lines will be highlighted in the list. Click [*Save*] to save current sampling data and the current survey lines will be marked as sampled.

11.3.4 Intelligent Processing

Click the [*Intelligent*] button  to enter the parameter processing page and set the intelligent processing parameter information.

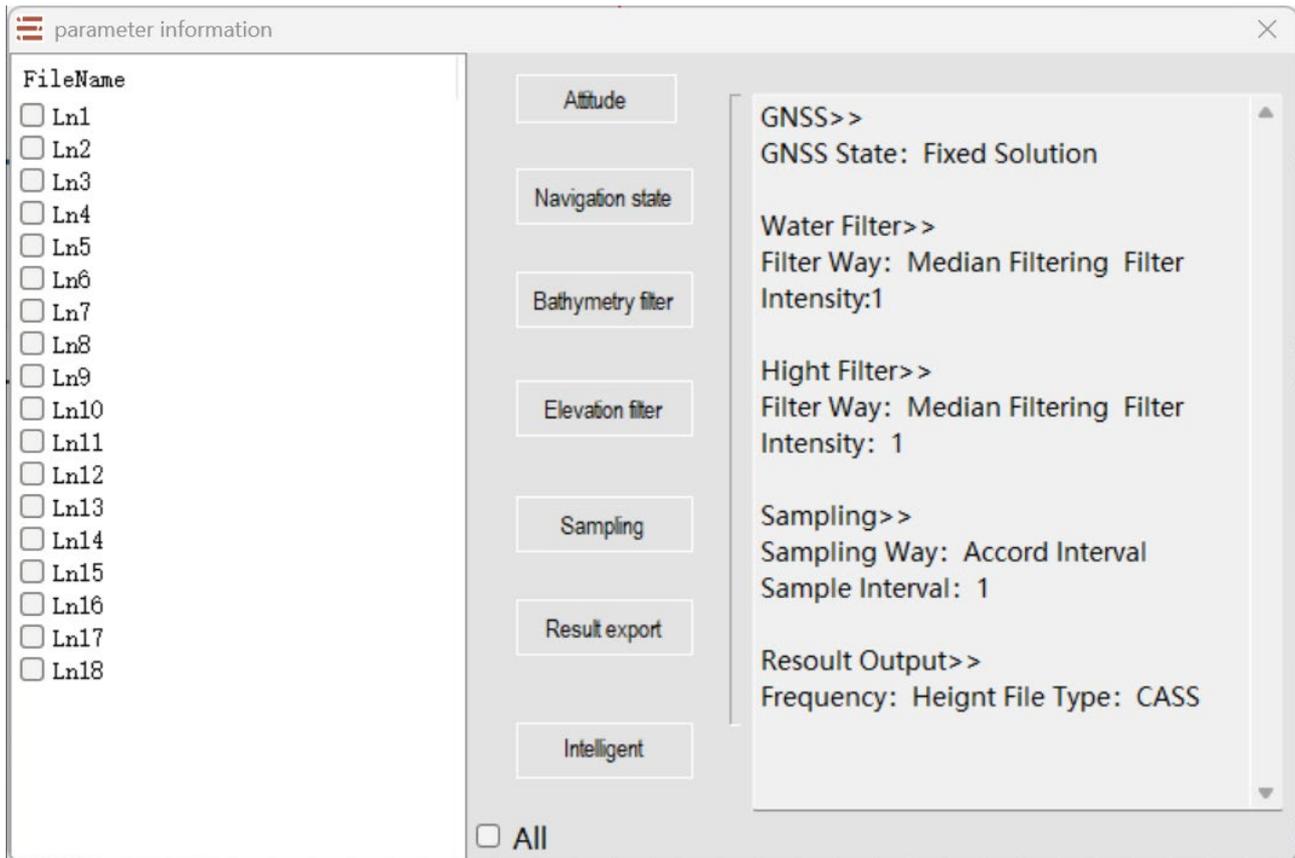


Figure 11-3-1

Click the **[Navigation State]** button to set the positioning mode; click the **[Bathymetry filter]** and **[Elevation filter]** buttons to set the filtering mode and filtering intensity of the bathymetry and elevation filters, respectively; click the **[Sampling]** button to select the sampling mode; click the **[Results Export]** button to select the high and low frequencies, output format and path.

After the above settings are completed, you can click the **[Intelligent]** button, and the data will be automatically processed and exported according to the above steps.

11.3.5 PDF Output



Click the [PDF] button to export the echogram, and set the export path.

Chapter 12

Data Correction

This chapter contains:

- Transformation Parameters Correct

- Delay Correct

- Draft Correct

- Sound Velocity Correct

- PPK Correct

- CheckPointing Correct

Some errors in data can be corrected in post-processing. Click the [Correct] to enter the correction page, here to correct the coordinate transformation, delay, level height, draft, and velocity.

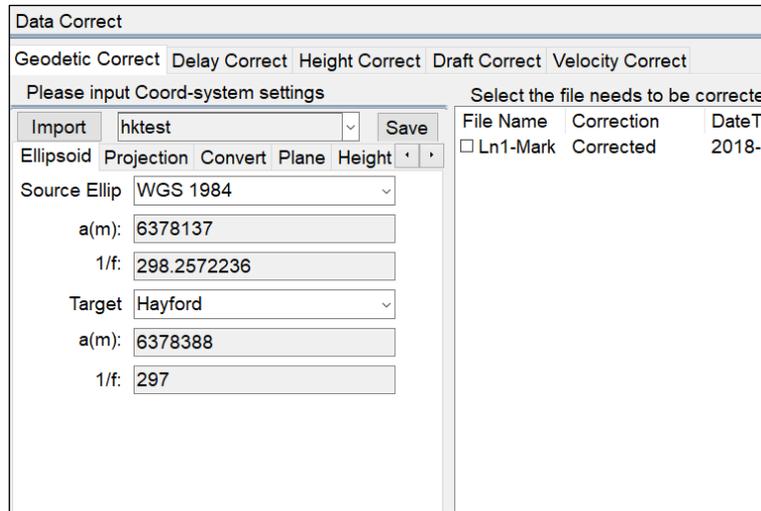


Figure 12-0-1 Data Correction Page

- **Geodetic Correct:** This function can help to correct the mistake on geodetic parameters before starting a project.
- **Delay Correct:** Corrects errors caused by GPS positioning data and water depth data matching delays.
- **Draft Correct:** Correct the impact of draft changes due to the fast ship speed
- **Velocity Correct:** Correct errors caused by the difference in sound speed at different depths.

12.1 Geodetic Correct

Select the line file that needs to be corrected in the file list, and click the [Correct] button to correct the data.

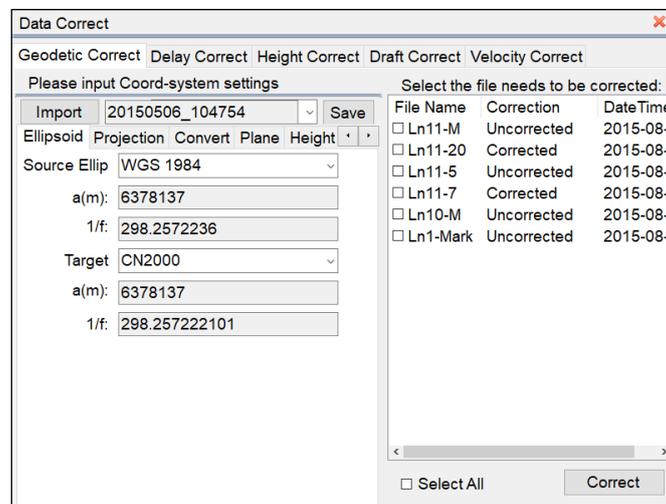


Figure 12-1-1 Geodetic Correct

12.2 Delay Correct

The Delay Correct is a correction for the GPS solution and data transmission delay.

The time delay value of a sounding system is always the same (if sensors of the echo sounder system are unchanged), but the different sounding system has different time delay values.

12.2.1 Delay Correct

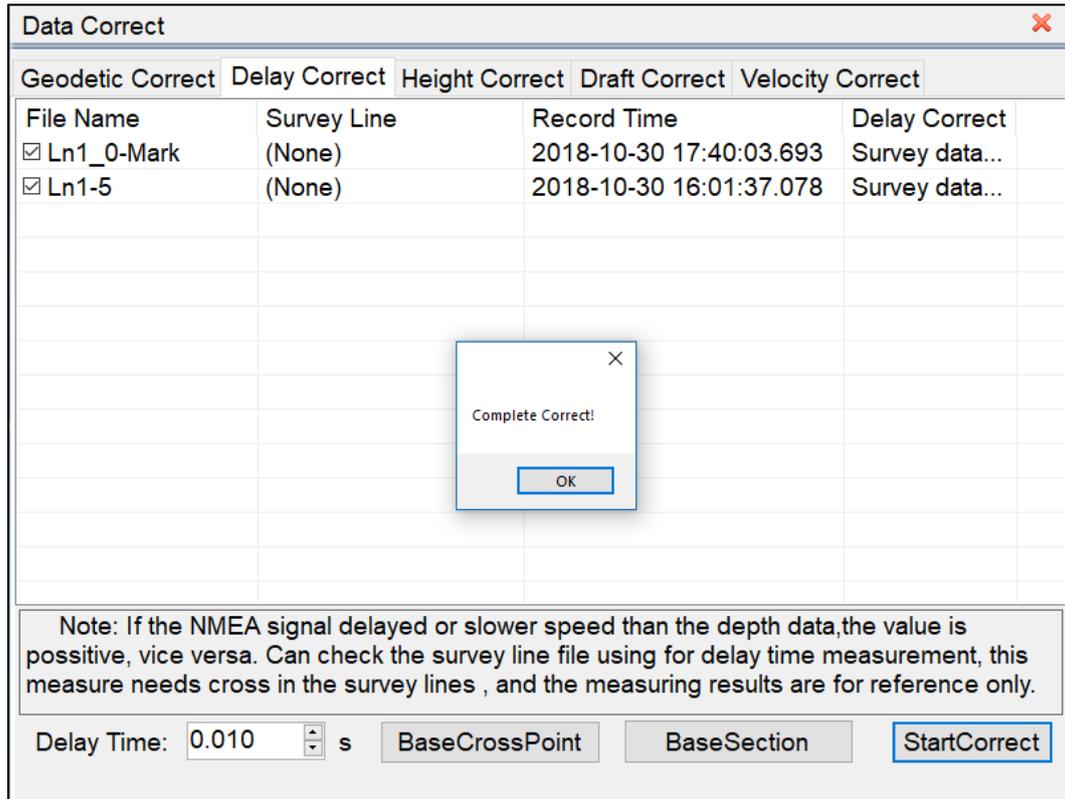


Figure 12-2-1 Delay correction page

Input the known Delay Time value or calculate the delay time by *[BaseCrossPoint]* and *[BaseSection]*. Check the sampling file and select the corresponding line name. Click *[StartCorrect]* to correct the file.

- If the time delay value is known, enter it directly.
- If the time delay is unknown, users must calculate the time delay of this sounding system before or after construction.

12.2.2 Calculate Time Delay

BaseCrossPoint

Requirement: There should be 2 intersecting round trip lines, and the number of intersections is no less than 3.

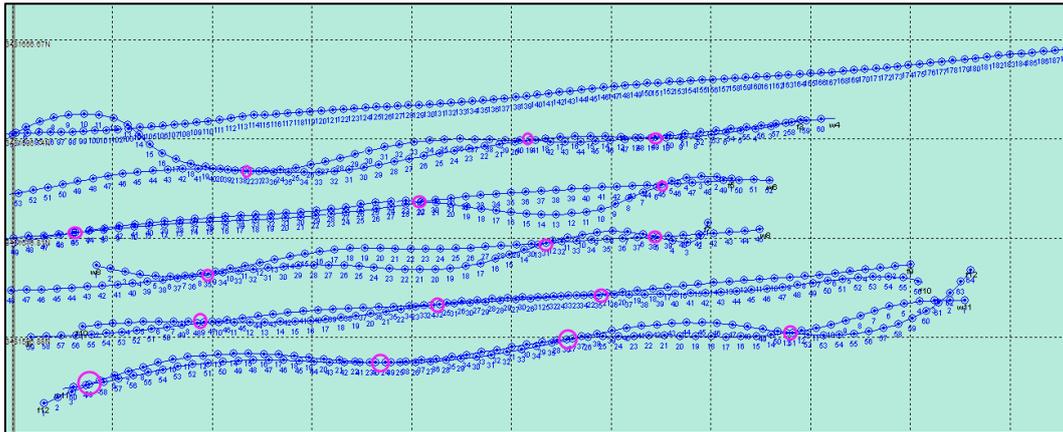


Figure 12-2-2 Sketch map of cross point

BaseSection

Requirement: The horizontal position of the two round trip lines should be as close as possible.

A horizontal gap between the roundtrip routes is no more than 2m apart will be suitable for calculation by the section method. Therefore, most of the selected round-trip lines should have a horizontal gap of no more than 2m apart.

There must be at least one feature segment in a pair of round-trip lines, and the feature segment requires that the horizontal position of the round-trip line should be no more than 0.5 m apart. The feature segment can be a cross point and a nearby segment, or a segment with a distance of no more than 0.5 m.

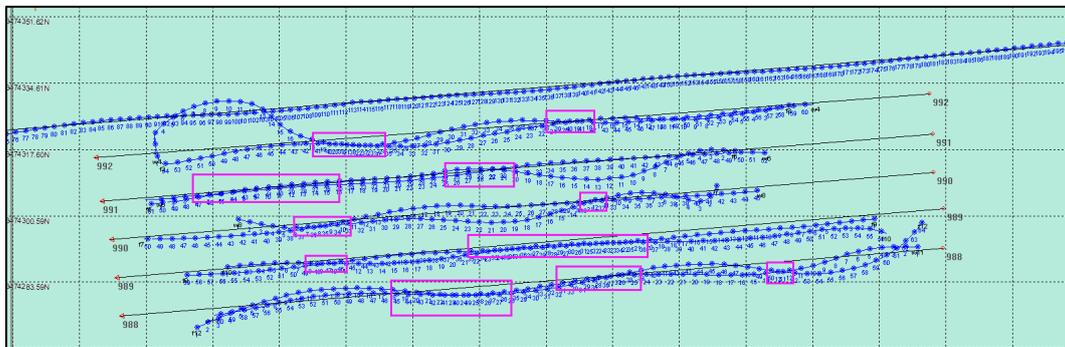


Figure 12-2-3 Sketch map of a feature segment

12.3 Draft Correct

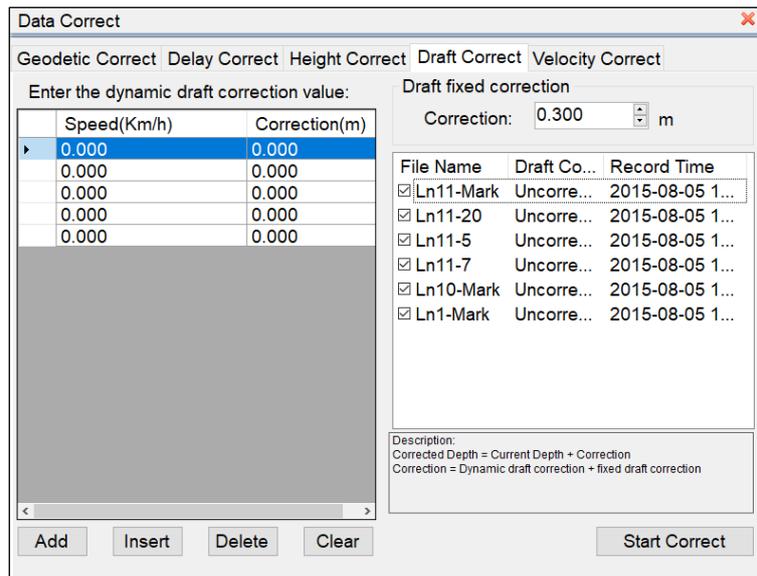


Figure 12-3-1 Draft Correction

- (1) Set the correction value, click **[Add]** to add a row of data, and input the speed and the corresponding correction value;
- (2) If choose the Draft fixed correction method, you can enter the value to correct the draft.
- (3) Check the file and click **[Start]** Correct to correct the file.

12.4 Velocity Correct

There are two ways to correct the sound velocity: Depth + Correction Value, Depth + Velocity

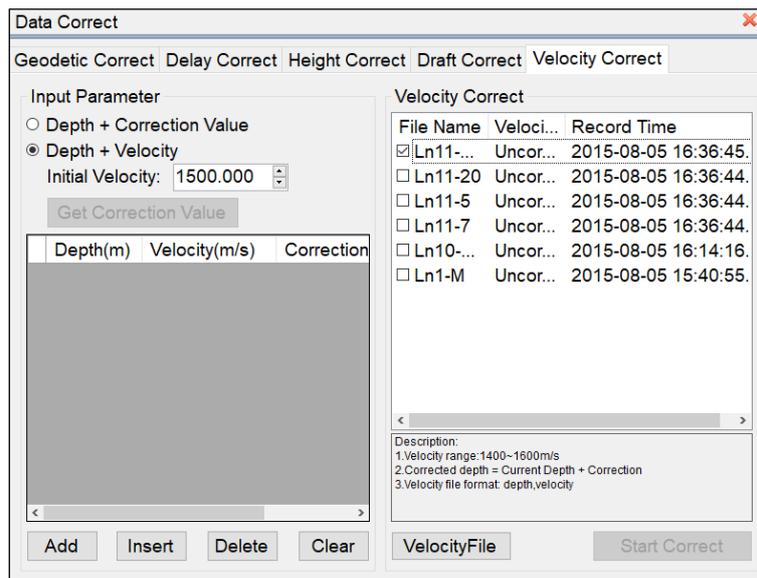


Figure 12-4-1 Velocity Correct

Depth + Correction Value

Use a comparison plate or other methods to measure the depth value in different water depths, and then contrast with the results from the echo sounder, and calculate the correction value in different depths.

Click the [Add] button to create the corresponding record and select the multiple files to be corrected in the list bar on the right, and then click the [Start] Correct button.

Depth + Velocity

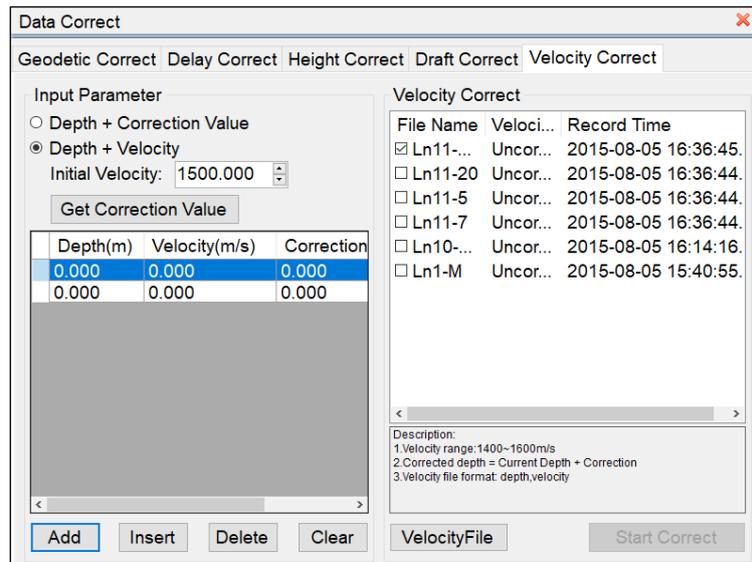


Figure 12-4-2 Depth + Velocity correction

The steps are as follows:

Step 1

Import the velocity file, the file format is as follows:

The first column is depth, and the second column represents the sound velocity.

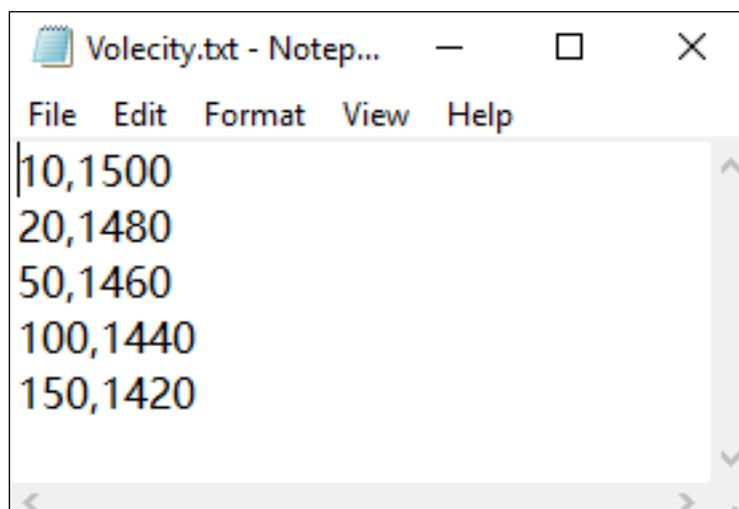


Figure 12-4-3 Sound velocity file

Step 2

The imported file will appear in the list:

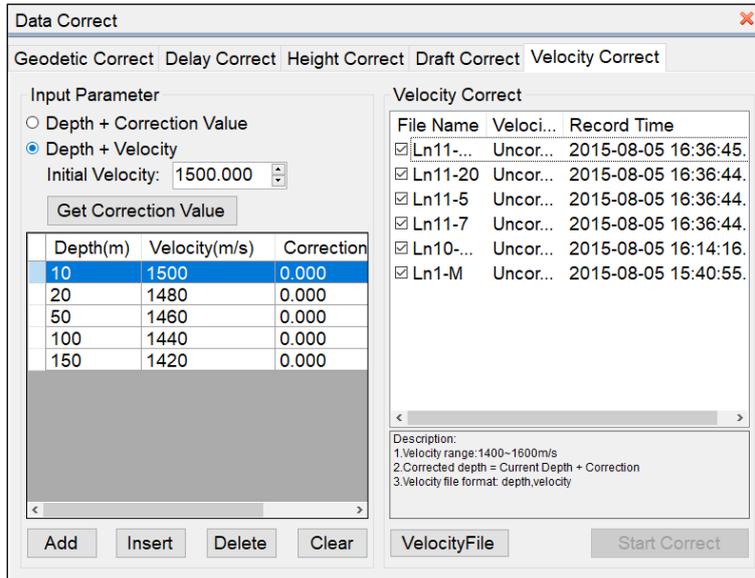


Figure 12-4-4 Import sound velocity file

Step 3

Input the [Initial Velocity] during measurement, and click [Get Correction Value] to calculate the correction value of different sections according to the velocity of different depths:

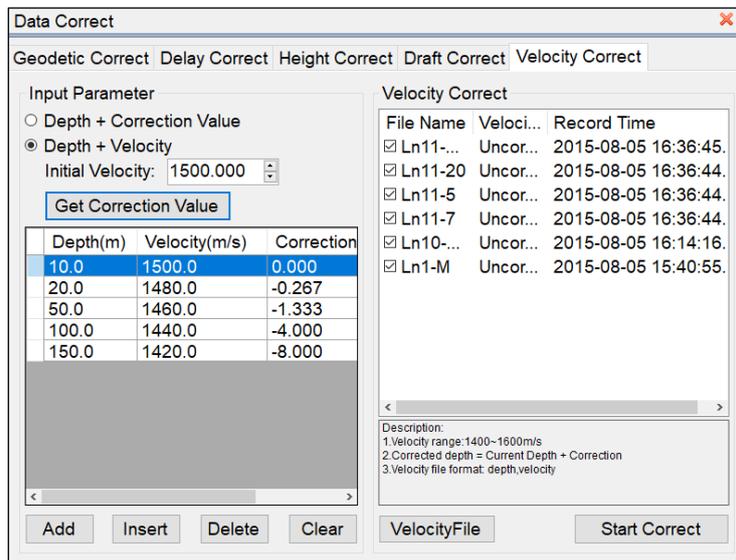


Figure 12-4-5 Calculate sound velocity value

Step 4

Check the files to be corrected, and click [Start Correct].

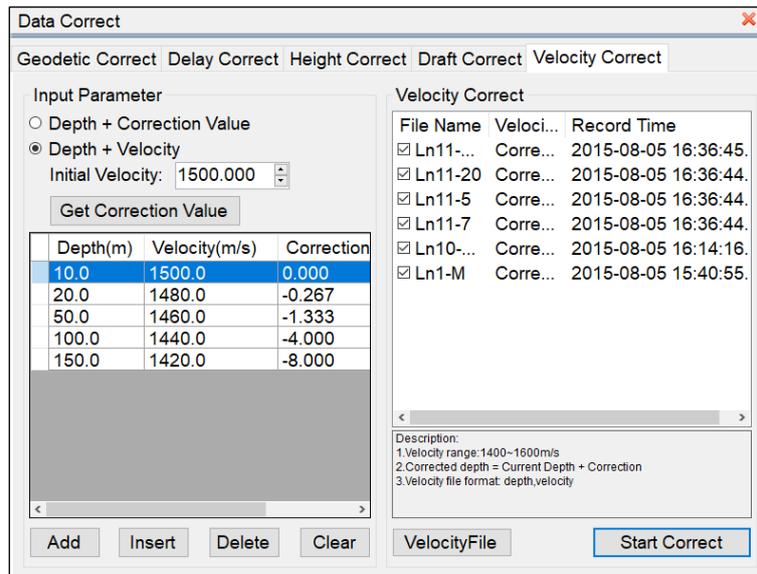


Figure 12-4-6 Calculate sound velocity value

The sound velocity change is determined by the input depth and the correction value.

For example:

Input depth and correction value (10, 0.135), (20, 0.000), (50, -0.676).

- The depth is less than 10 meters and the correction is 0.135 meters;
- The depth is between [10,20] meters, the correction value is 0.000 meters;
- The depth is between [20,50] meters, the correction value is -0.676 meters.

If using the Depth +Velocity mode, the software will calculate the correction value under the different depths through the depth and correction value in the velocity file, and then correct it according to the above method.

12.5 PPK Correct

(1) Click on the left side of the **[Import]** button, from the file manager to select the csv format file for the corresponding form production.

(2) Check the file, click **[Start Correction]**, you can correct the file.

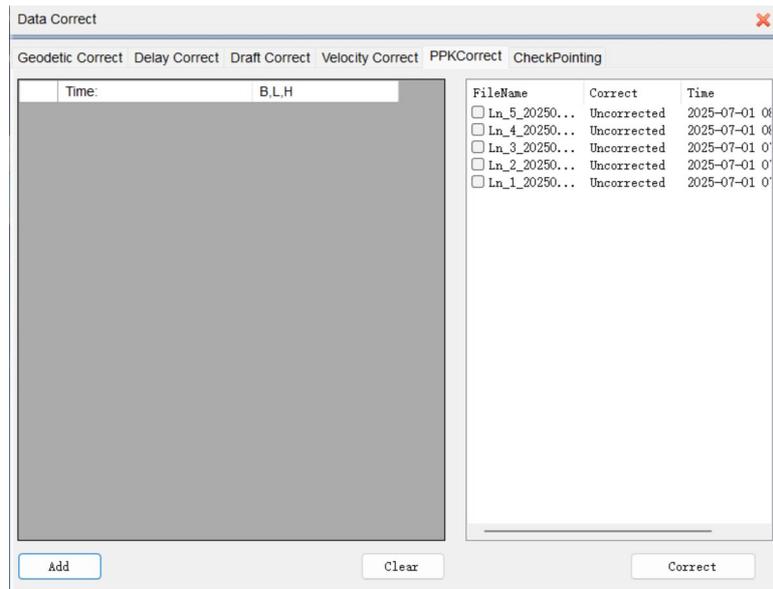


Figure 12-5-1 PPK Correct

12.6 CheckPointing Correct

- (1) Click on the left side of the [Import] button, from the file manager to select the txt format file for the corresponding table production.
- (2) Check the file, click [Apply], you can correct the file.

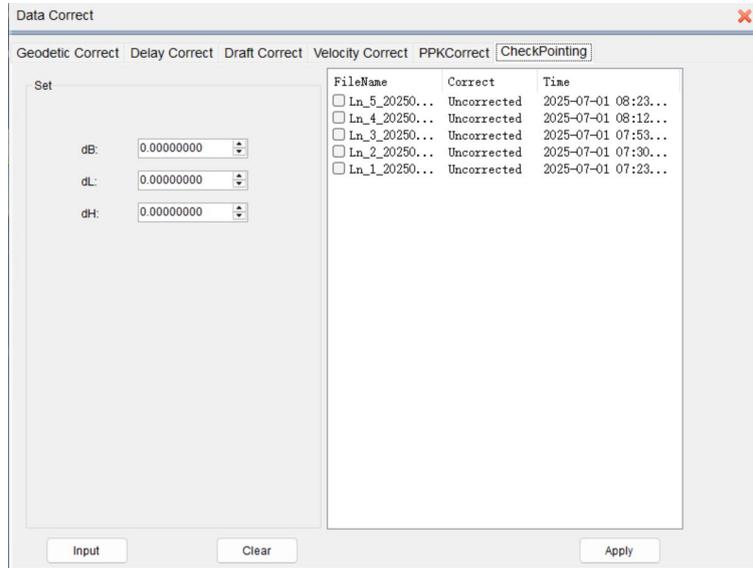


Figure 12-6-1 PPK Correct

Chapter 13

Tide Correct

This chapter contains:

Fixed Correct

Single Correct

Area Correct

Data Correct

Since the height accuracy of the beacon or SBAS is not much good enough, we should use tide correction to obtain the underwater height. On the main page of the software, click **[Tide]** to enter the tide correction page.

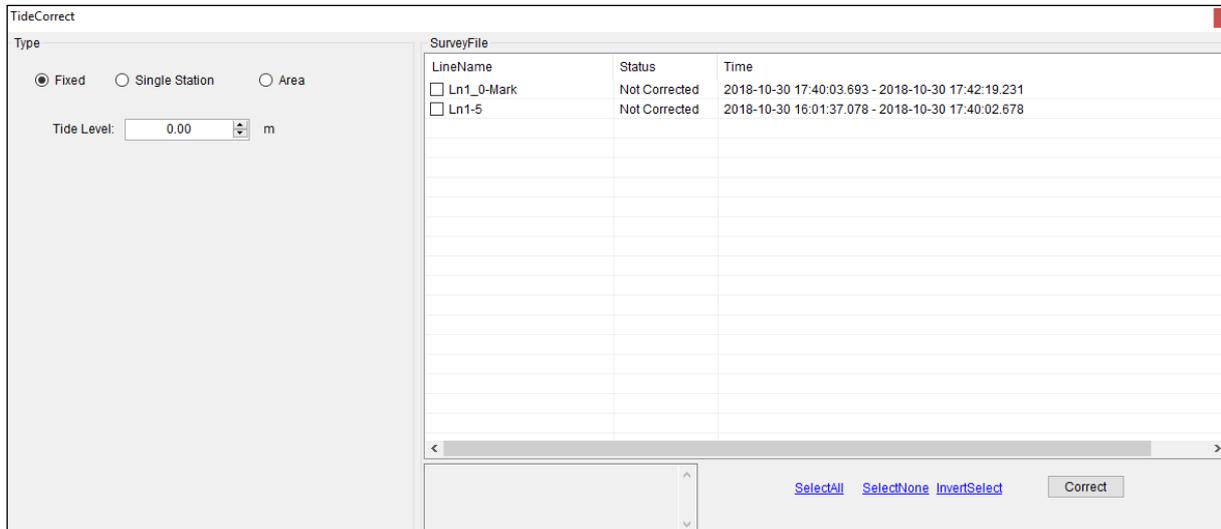


Figure 13-5-1 Tide correction page

Generally, 3 ways to correct the tide:

- (1) **Fixed:** Set a fixed water level value, and then select the line file to be corrected for correction. This method corrects all areas of the selected line.
- (2) **Single Station:** First enter the geographic coordinates and water level information of the tide station then elect the line data to be corrected for correction. Only one tidal station can be selected at one time, and all areas of the line will be corrected.
- (3) **Area:** First enter the geographic coordinates and water level information of the tide station. Then create an adjustment area and set the tide station in this area. Finally, choose survey lines to correct. This method can be customized like 2-station correction, 3-station, multi-station correction, and so on. Users can also customize the correction area. Different correction areas can be corrected by different tide stations.

13.1 Fixed Correct

Select one of them, the default method is Fixed. Just enter the water level, check the file, and click **[Correct]**.

13.2 Single Station Correct

(1) Enter the tide station data

Step 1

Create a new tide station. Click **[Single Station]**, select one row, double click on the cell and enter the station name and coordinates, then press the enter key.

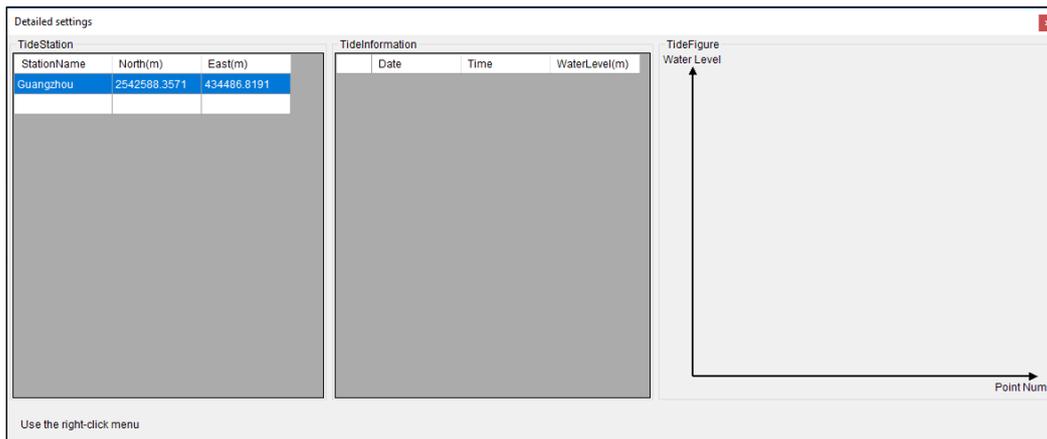


Figure 13-5-2 Create a New Station

Step 2

Input the water level information. After the Tide Station Settings is completed, select a tide station, then in the Tide Information box, right-click the mouse to pop up the insert window, select the multi-insert option and enter the Begin Time, End Time, and Interval, click **[OK]** and it will add multiple lines water level record. The next step is entering the water level information each time respectively. The entered information will be saved automatically.

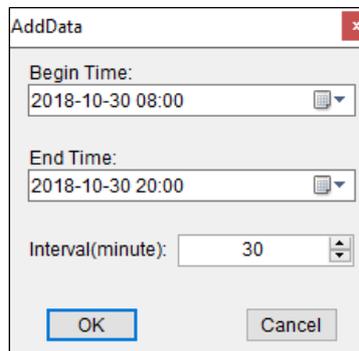


Figure 13-5-3 Add Data

(2) Edit the existing tide station

Step 1

Edit the tide station information. In the list of tide stations, select a row, then double-click the corresponding tide station cell, set the new coordinates of the tide station, and click the corresponding name to complete the coordinates edit.

Step 2

Edit the water level data of the tide station. In the water level information list, you can modify the date, time, and water level. If you need to insert a line, click the line number to select the line, then right-click and click Insert, and enter the date, time, and water level.

(3) Delete the tide station

In the tide station list, select the line you want to delete, then right-click and click *[Delete]*.



Notice: The time of the water level information of the tide station should completely cover the period of the water depth measurement, so guarantee that each surveying point has the water level information.

13.3 Area Correct

Area correction is precisely correcting for one or more specific areas. Single station correction and fixed error correction do not require setting area correction parameters. Click the *[Area option]* and enter the Detailed Settings page, you can further set the tide station information for the corresponding area and then click *[Next]* to set area correction.

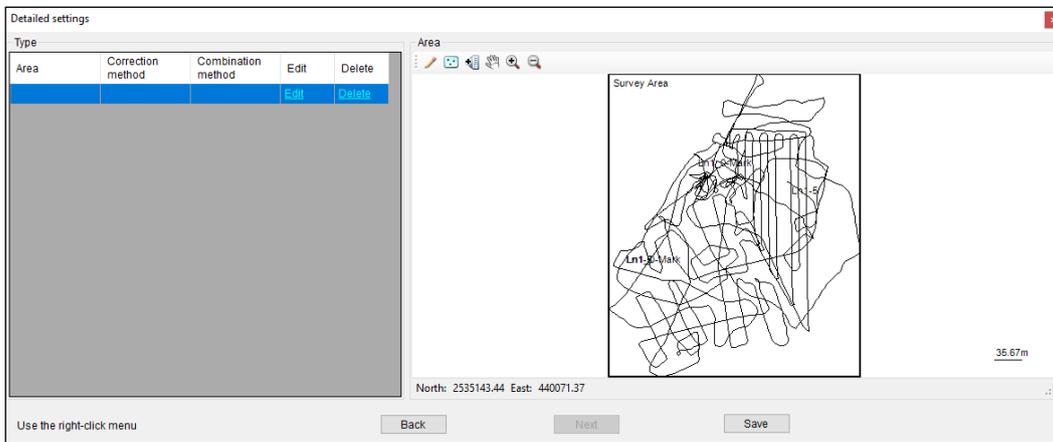


Figure 13-5-4 Area Correction

(1) Create a correction area

Step 1

Click *[Edit]* and select the correction method, and find the desired combination mode in the mode list, click *[OK]* to complete.

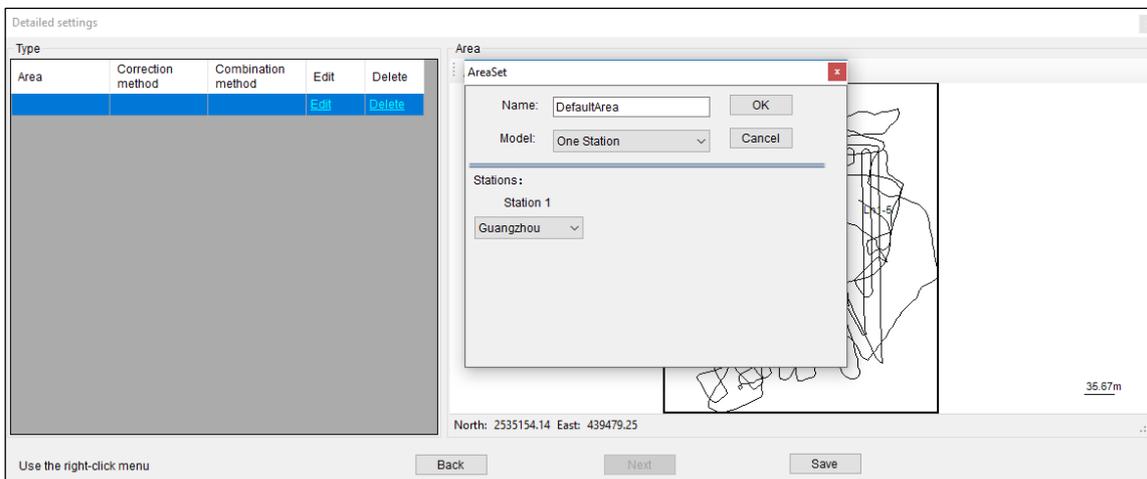


Figure 13-5-5 Regional Correction Settings

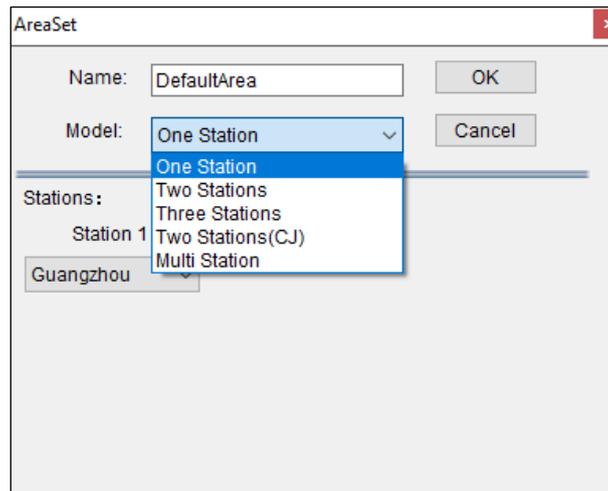


Figure 13-5-6 Area Type Setting

Step 2

Draw the boundary of the correction area. A boundary has two ways to create: Draw and Input.

- Draw Area button  to enter drawing mode. Draw the polygon boundary of the area in the measurement area by mouse clicks, and right-click to end the drawing.
- Input Area button  to enter the vertex coordinates of the area in the pop-up coordinate list. In the measurement area view, the polygons of the current area are displayed in red, and others are displayed in blue. The upper left corner of each polygon has an area number.

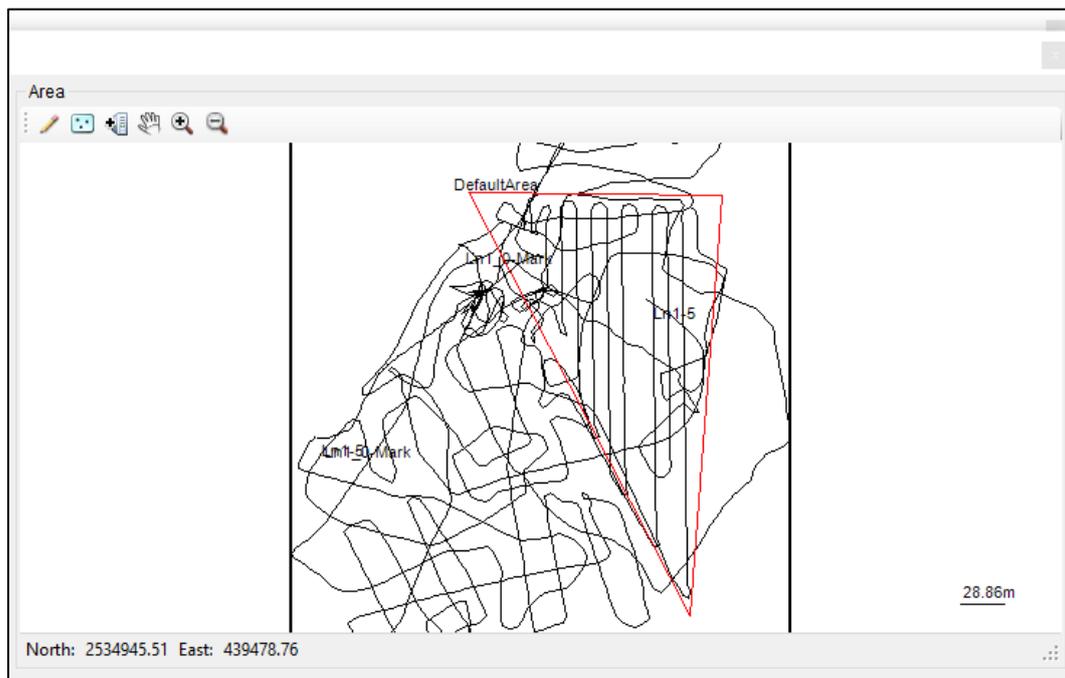


Figure 13-5-7 Area Boundary Polygon

(2) Edit the correction zone

Step 1

Edit tide station group in correction area.

In the area list, select the area to be edited, and then click [Edit] to re-select the correction method and the tide station. Click [OK] to complete the modification.

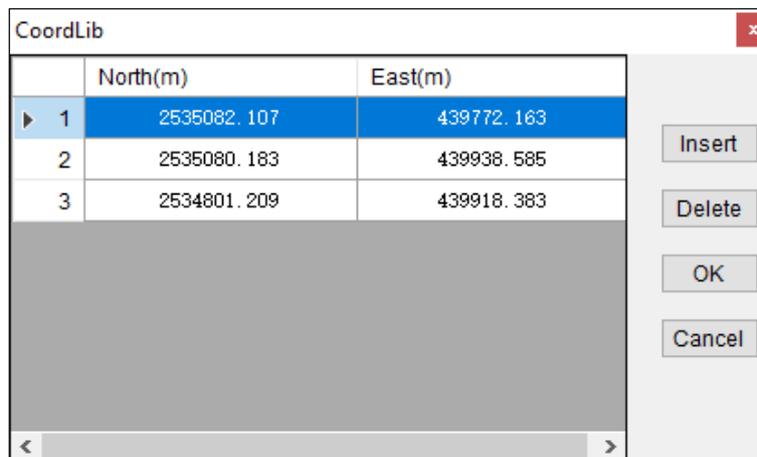
Step 2

Edit boundary of correction area.

Two ways to edit boundary: click by mouse and input coordinate:

- If you need to clear the boundary of the current area, click the [Draw Area] button, the boundary will be cleared, and then you can start drawing new area boundaries. After the drawing is complete, click the right mouse button to end the area drawing. If you need to move the vertex position of the area, click the [Edit Area] button , use the mouse to move the nodes, and right-click to exit.

- If you need to modify the coordinates of the current boundary, click the [Input Area] button  to edit the coordinates of the nodes. If you need to insert a record after a line, click the [line and Insert] button to enter the coordinates. If you need to delete a line, click the line number to select this line, click the [Delete] button, and click [OK] to complete the editing of the area boundary.



	North(m)	East(m)
▶ 1	2535082.107	439772.163
2	2535080.183	439938.585
3	2534801.209	439918.383

Buttons: Insert, Delete, OK, Cancel

Figure 13-5-8 Coordinate list of boundaries

(3) Delete the correction area

In the area list, select the area you want to delete and right-click, then click the [Delete] button.

(4) Drawing area view browsing

You can click the [Zoom In] button to zoom in according to the view center; click the [Zoom Out] button to zoom out according to the view center; click the [Move Full Map] button to

drag the view, right-click to exit. The coordinates of the mouse are shown on the view bottom.

If tide station information is incorrect or you need to add a new tide station, you can click [*Back*] to back to the tide station setting, and click [*Next*] to return to the area correction to correct the area setting.



Notice: Since the area correction will not be possible at the measurement point in the correction area, the area set by the multi-area correction preferably covers the measurement area completely, thereby ensuring that each measurement point can be corrected. If a measurement point is in multiple correction areas at the same time, the system will correct the area with the lowest number.

13.4 Data Correct

After setting Single Station Correction or Regional Correction, return to the tide level correction main page for data correction. Select the tidal station or correction area to be used, then select the line file to be corrected, click [*Start Correction*] to start the process and the status will be "Corrected".



Notice: If the line file is not sampled by water depth, it will not be displayed in the line file list. In the process of data correction, if there is a time when the measurement point is not in the water level information period of the tide station, or if the measurement point is not in the correction area, please check the water level information input and the area correction setting, and then correct it.

Chapter 14

Results Preview

This chapter contains:

Data preview

Picture Export

Results export

Generate Section

The Result Preview makes it easy to know the measurement result. After sampling and tide correction, it can show the contour line generated by the result data and the pseudo-color water depth map by the Result Preview function.

On the main page, click [*Result Preview*] to enter the results preview page.

Click [*Results Management*]  on toolbar to go Results Management window.

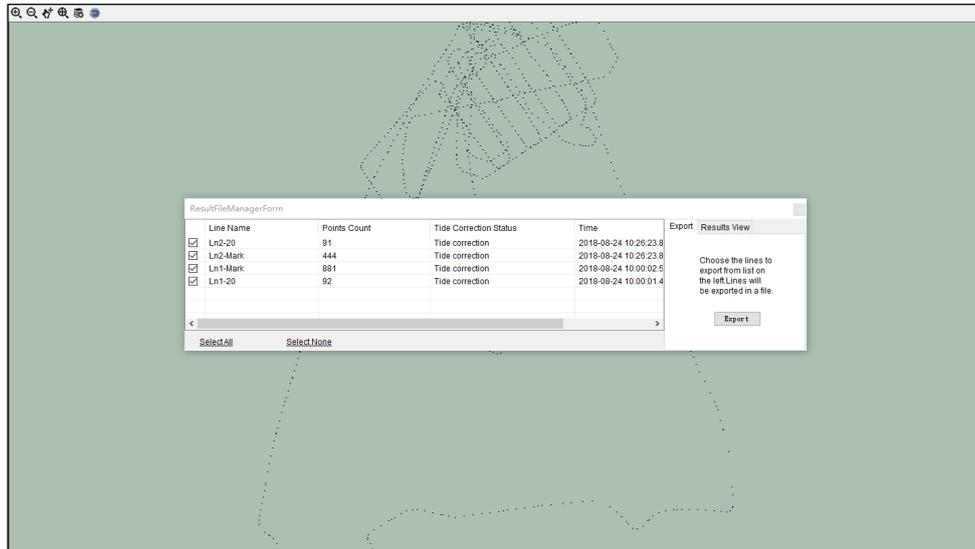


Figure 14-1 Main page of Preview

14.1 Data Preview

Step 1 Check the measurement file that needs to be previewed.

Step 2 Set the contour interval and check the elements to be displayed, like contour line, pseudo-color water depth rendering, and water depth mark.

Step 3 Click [*Calculate*] to generate a preview graphic.

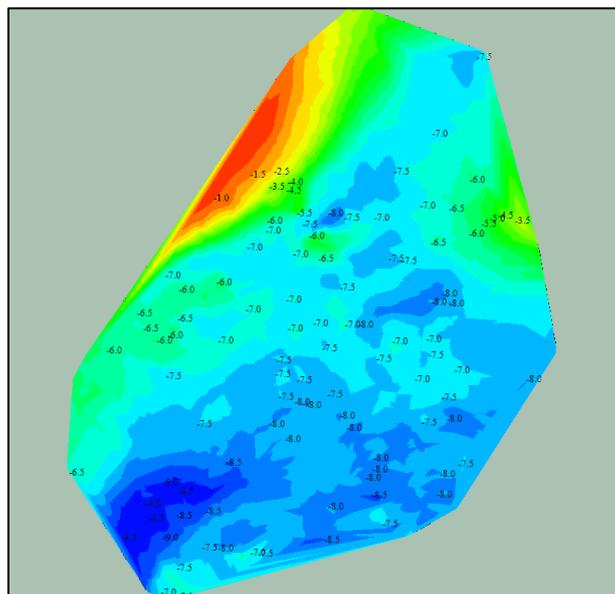


Figure 14-1-1 Preview Results

14.2 Picture Export

I: Global export, full-screen capture of the current interface .

II: Box Selection Export, users can select the preview image to export by themselves.

14.3 Data Export

Step 1

Check the measurement file that needs to be exported.

Step 2

Go Export tab and click [*Export*], select the format and enter a file name to save.



Notice: If the line file is not sampled by water depth, it will not be displayed in the line file list. If the line data is not corrected by the tide level and the result data is exported, the system calculates the bottom elevation of the measuring point according to the water surface elevation collected by the GPS. If the line data has been corrected by the tide level and the result data is exported, the system will use the water level correction value of the tide station to calculate the underwater elevation of the measurement point.

14.4 Generate Section

Click [*Section*]  in the toolbar to draw the cross section, and then click [*Section Settings*]  to set the spacing in the section, and then click [*Generate*] to complete the settings.

Click [*Edit Section*]  in the toolbar to export the selected section.

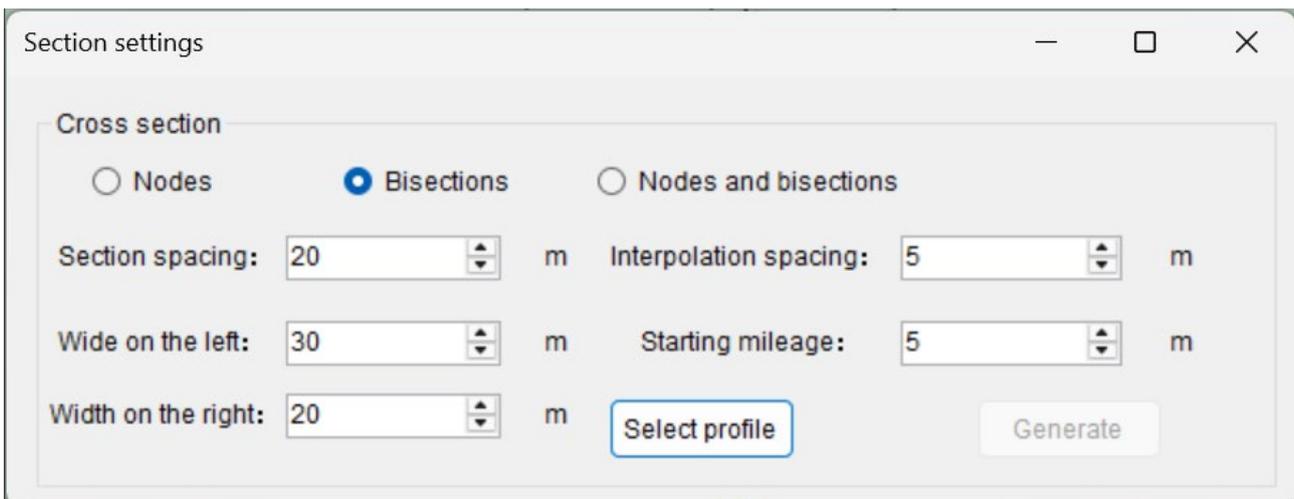


Figure 14-4-1 Generating Section Lines

Chapter 15

Utility Tools

This chapter contains:

- Calculation of Transformation Parameters

- Coordinate Transformation

- Calculation of distance and Azimuth

- Unit Calculation

- Coordinate Library

- Central Meridian

On the main page of the software, click [UtilityTools] to enter the page.

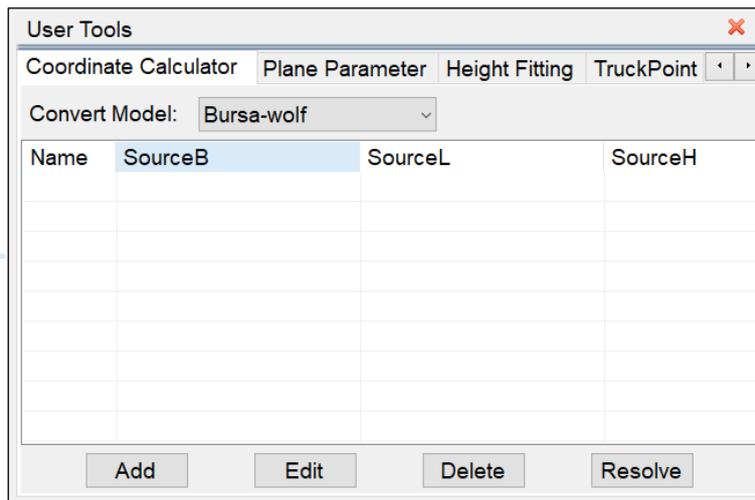


Figure 15-1 Utility Tools

15.1 Calculation of transformation parameters

15.1.1 Calculation of ellipsoid parameter

(1) Choose the calculation method

The calculation methods of ellipsoid parameters include Bursa-wolf, Modensky, OneTouch, and Plane+Height Fitting.

(2) Point pairs

- **Add point pairs:** Click the **[Add]** button to add the known source and target point coordinates, you can directly enter the coordinates or click the button  to measure points by the GPS receiver.
- **Edit point pairs:** Select a point pair to re-enter the coordinates, and click the **[Finish]** button.
- **Delete point pairs:** Select a point pair and click the **[Delete]** button.

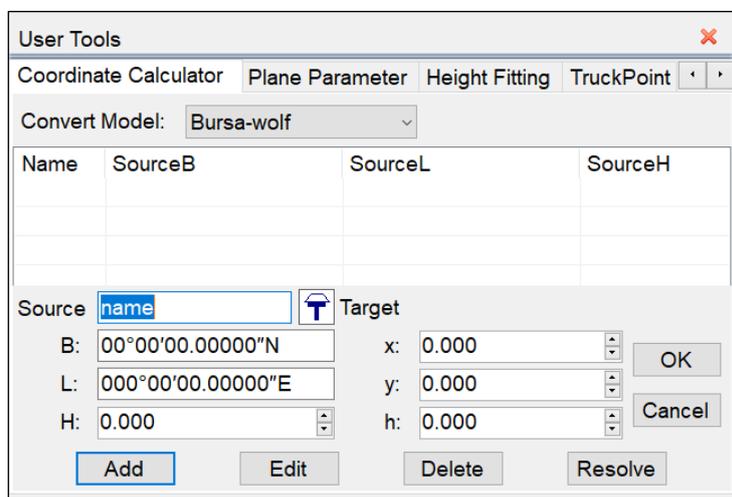


Figure 15-1-1 Add Coordinate

(3) Convert parameters

- 3-parameter calculation requires only a 1-point pair;
- 7-parameter calculation requires a minimum of 3-point pairs;
- OneTouch requires at least 3-point pairs;
- 4-parameter + height fitting requires at least 2-point pairs;
- Plane fitting requires at least 3-point pairs;
- Surface fitting requires at least 6-point pairs.

Check the point pairs and click the **[Resolve]** to start calculating the ellipsoid parameters, and click **[Apply]** to apply the calculated parameters to the current project.

Figure 15-1-2 7-Parameter Calculation

15.1.2 Calculation of plane parameter

The plane parameters calculation and height fitting parameters calculation need to be done separately when they are using different known points.

Similar operation as calculation of ellipsoid parameter, add point pairs to calculate and get parameters to apply.

Name	SourceX	SourceY	TargetX	TargetY	RMS

Figure 15-1-3 Plane Parameters

15.1.3 Calculation of height fitting

When using different known points, plane parameters calculation and height fitting parameters calculation need to be done separately.

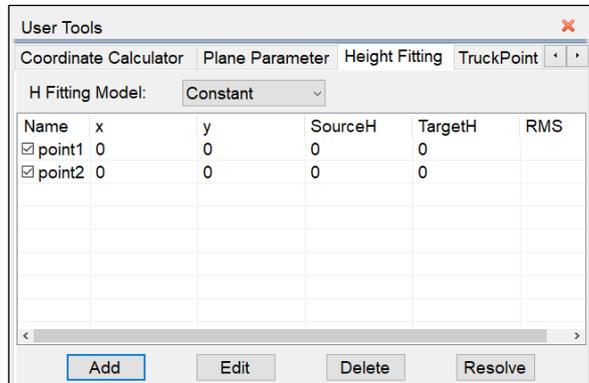


Figure 15-1-4 Height Fitting Parameters

(1) Select the height fitting model

The height fitting model includes Constant, Plane, and Curve.

(2) Add point pairs

Click **[Add]** to the source point elevation and the target point elevation.

(3) Resolve

- Constant method requires at least a 1-point pair;
- Plane method requires at least 3-point pairs;
- Curve method requires at least 6-point pairs.

Check the point pairs and click the **[Resolve]** to calculate the parameters.

Generally, the maximum residual value should be less than 3 cm, click **[Apply]** to apply parameters to the current project.

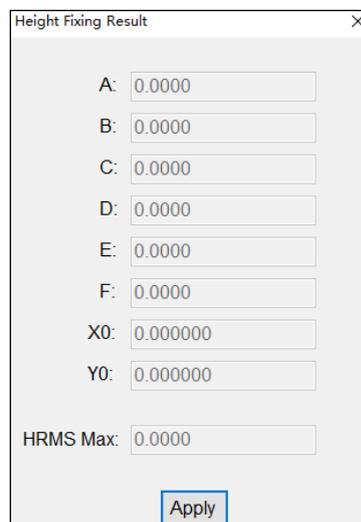


Figure 15-1-5

15.1.4 Truck Point

It's used to calculate the translation parameters of the plane and elevation between two coordinate systems and is mainly used for partial engineering measurements.

The plane coordinate system is converted into a local coordinate system by a known point.

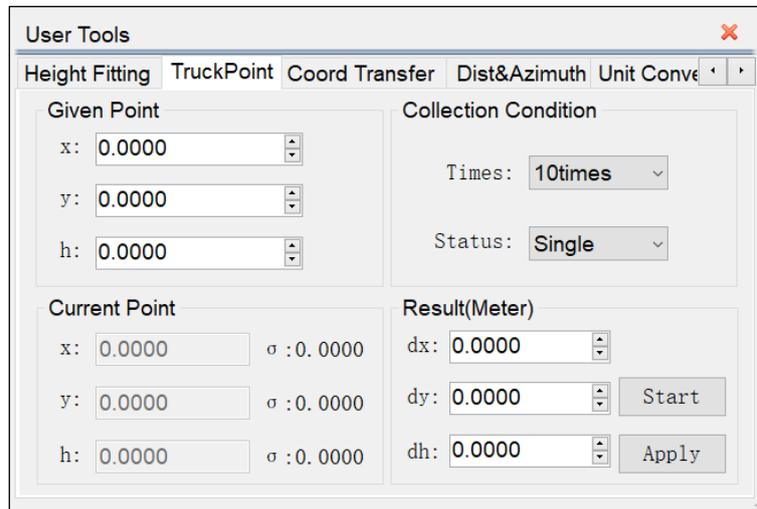


Figure 15-1-6

(1) Enter the coordinates of the known point

(2) Setting average collection requirement

- Times: Select average times, like "10 times", "50 times", "100 times", and "manual stop".
- Status: Requirement for GPS data, like "Single", "DGPS", and "Fixed".

(3) Calculate the translation parameter

Click **[Start]** to start collecting GPS measurement;

Click **[Stop]** to stop average collection.

Click **[Apply]** to apply the calculated result to the translation parameter of the current project.

15.2 Coordinate Transformation

Select the source coordinate type and the local coordinate type, and input the source coordinates or local coordinate value:

- (1) Click  to convert the source coordinates to local coordinates.
- (2) Click  to convert local coordinates to source coordinates.

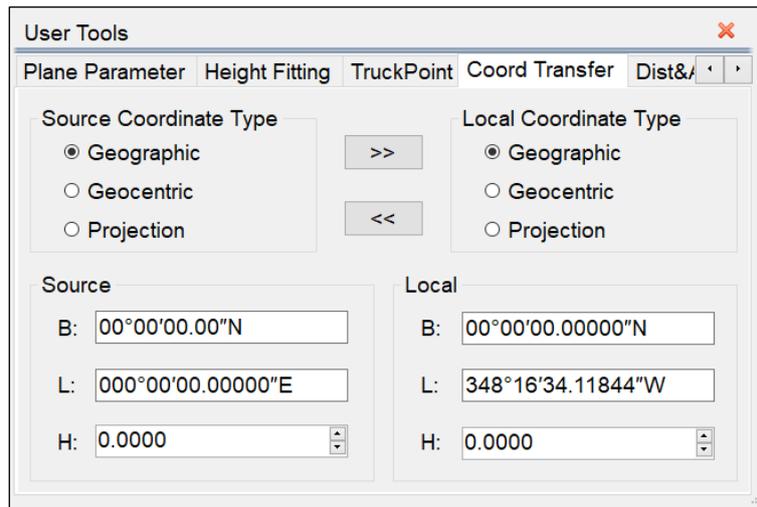


Figure 15-2-1 User tools

15.3 Calculation of Distance and Azimuth

The distance and azimuth between two points can be calculated, and the point coordinates can be estimated from the distance and the azimuth.

- (1) Click , the distance, and azimuth can be calculated from the current start to endpoints.
- (2) Click , the coordinates of the endpoint can be estimated from the current starting point to the distance azimuth value.

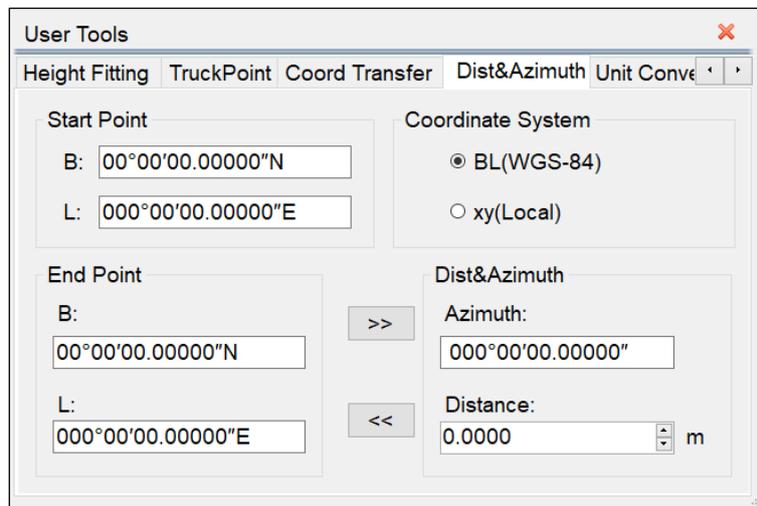


Figure 15-3-1 Distance and Azimuth Calculation

15.4 Unit Conversion

Select the unit type, then select the source unit and target unit, enter the value and click to calculate the target value.

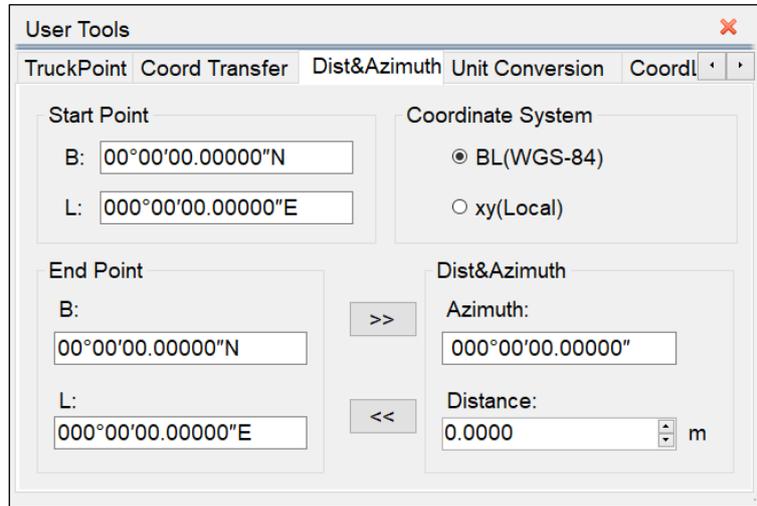


Figure 15-4-1 Distance and Azimuth Calculation

15.5 Coordinate Library

Edit the coordinate library file and edit it with the **[Add]**, **[Insert]**, **[Delete]**, and **[Edit]** buttons. You can also import or export CSV files or DXF files.

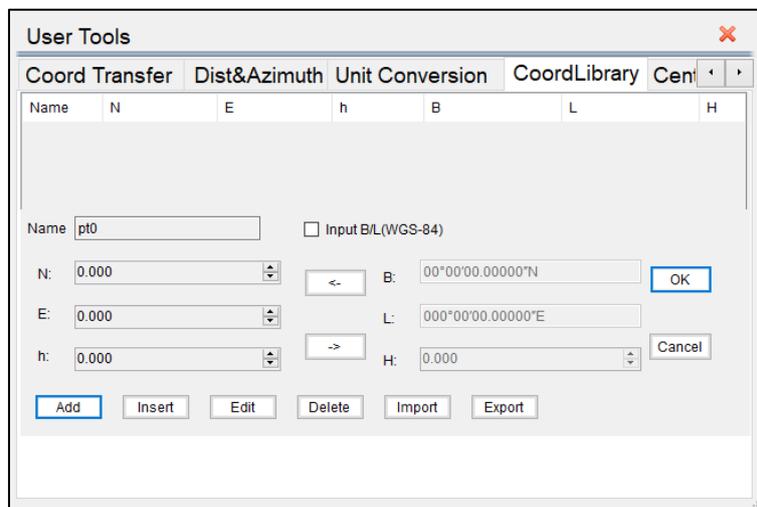


Figure 15-5-1 User Tools

15.6 Central Meridian

The software can help to calculate the central meridian according to the GPS receiver position, here are the steps:

(1) Select the first or second item in the **[Projection]** method according to the actual situation, and connect the GPS receiver.

- (2) Click the **[Measure]** button, then the location of the current GPS antenna will be displayed under the button.
- (3) Click the **[Calculate]** button on the right, and the calculated central meridian will appear above the button.
- (4) Finally, click **[Apply]** and it will be modified to the current coordinate library.

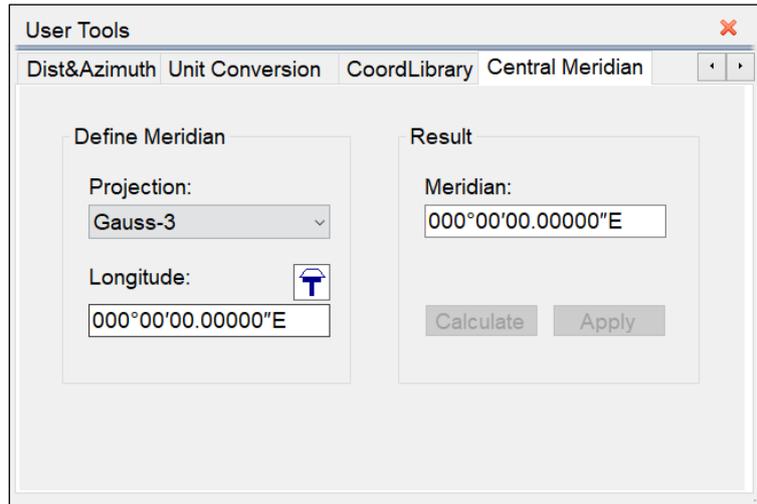


Figure 15-6-1 Central Meridian



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