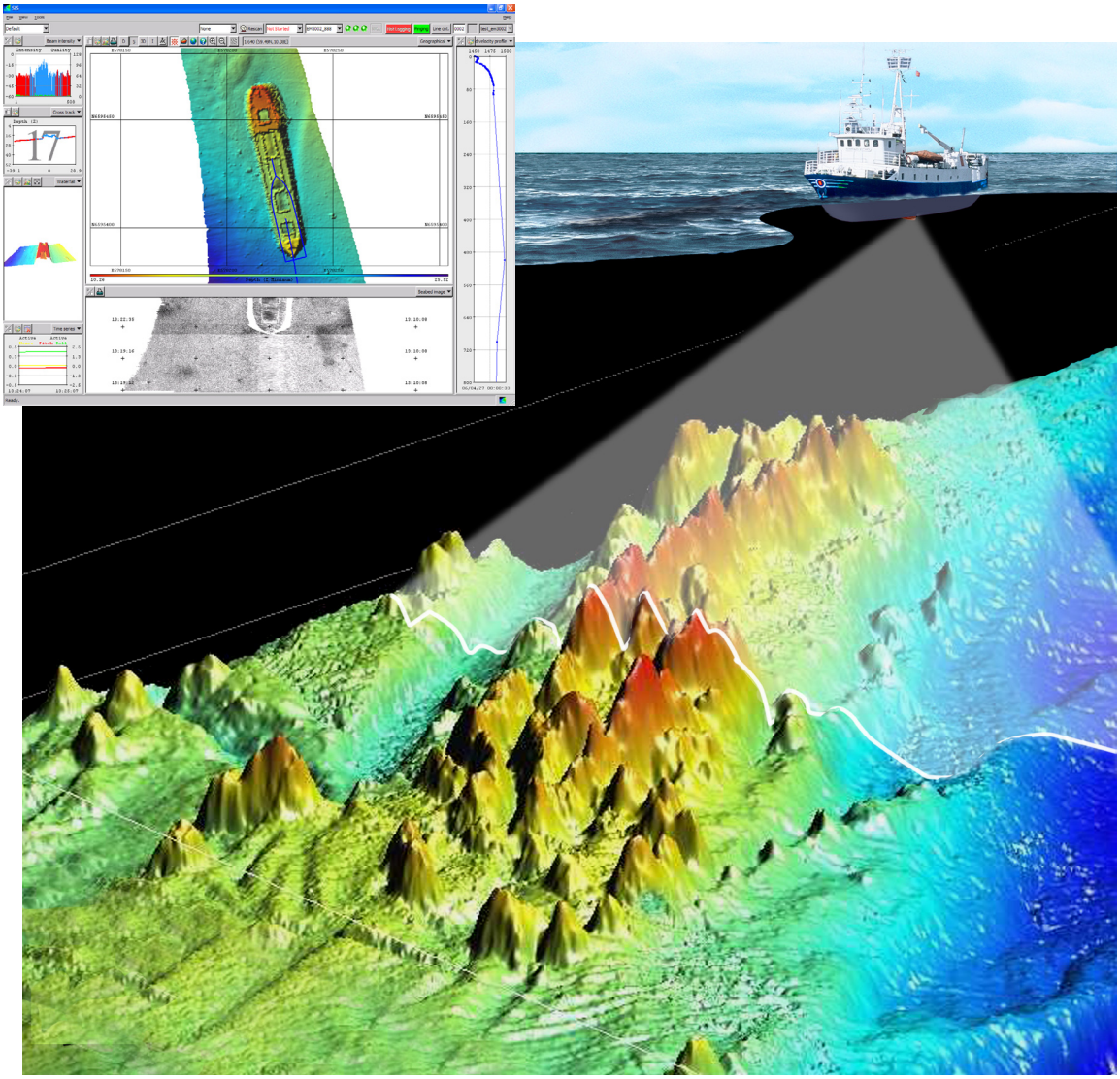
Operator Manual

KONGSBERG

SIS

Seafloor Information System



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Release 4.0

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Document history

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Rev. F	April 2007	Operator Manual for SIS version 3.4
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Rev. L	October 2013	Operator Manual for SIS version 4.0.

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.
Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

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Table of contents

About this manual

This is the Operator manual for the Seafloor Information System (SIS).

The purpose of this manual

The purpose of this operator manual is to describe the structure and functionality of SIS, as well as describing the procedures required to operate the system in a safe and efficient manner. The operator manual in an excerpt of the SIS Reference manual. The system parameter options and technical references are not described in the operator manual. Please refer to the SIS Reference Manual for full documentation of SIS and parameters for your specific system.

Contents

- *SIS system description* on page 9 – gives a brief and general description of SIS and it's use
- *Graphical user interface* on page 19 – description of the SIS user interface
- *Windows and views* on page 49 – presents all available SIS frames and their purposes
- *The menu system* on page 92 – presents the SIS menu
- *Operational procedures* on page 96 – contains procedures for a number of common SIS operations

Software version

This manual complies to SIS software version 4.0.

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References

Refer to the following manuals for additional information about SIS. These manuals are available through **SISHelp**. Press the Windows **Start** button, select **All Programs→SIS→SISHelp** to access relevant SIS documents. The documents are also enclosed on your SIS installation DVD.

The documents provided are (document numbers in brackets):

- SIS Operator manual [164709] – this manual
- EM Series datagram formats [160692]
- Software installation procedure [164891]
- SIS software release note [164890]

Support

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SIS system description

Topics

Basic description

Seafloor Information System (SIS) is a real time software designed to be the user interface and real time data processing system for hydrographic instruments produced by Kongsberg Maritime AS. Today the echo sounders EM 3002, EM 3001, EM 3000, EM 2040, EM 2040C, EM 2000, EM 1002, EM 710, EM 302, EM 300, EM 122, EM 121A, EM 120, ME70/BO, EA 400 and EA 600 are supported. SIS is included on all deliveries of multibeam echo sounders from Kongsberg Maritime. The main task for SIS is to be an intuitive and user friendly interface for the surveyor, providing the functionality needed for running a survey efficiently.

SIS operates under the Windows operating system, and is compatible with the HWS (Hydrographic Work Station) operator PC hardware. Up to four screens can be used on one HWS, and SIS can also show geographical displays on several remote PCs in the network.

The Kongsberg Maritime echo sounders are complete systems. All necessary sensor interfaces, data displays for quality control and sensor calibration, seabed visualization, and data logging are standard parts of the systems, as is integrated seabed acoustical imaging capability (sidescan).

SIS system information

Operating systems supported:

- Windows XP™
- Windows 7™

Hardware supported:

- HWS
- 1 or 2 displays, optional 4 displays if a second video card is installed

Licence control:

- By dongle connected to USB port

Options/versions:

- Basic version – Instrument control
- Multibeam echo sounder support
- Real time data cleaning
- Water column imaging
- SIS Objects

C-Map installation notes

- C-Map is NOT automatically installed.
- To install C-Map, launch **InstallCMAP** from the Windows **Start** button, then select **→Programs→SIS→InstallCMAP** and follow the instructions.
- All menu items and the option to load C-Map charts in the Geographical display is enabled only when C-Map is installed and the file `enableCMAP.bat` in the SIS/bin folder has been run.

SIS licences

The SIS software is subject to license control. Licensing of SIS is controlled by a HASP dongle. This dongle is programmed according to what SIS version has been purchased.

The control part of SIS is unlicensed. This version gives access to the following applications:

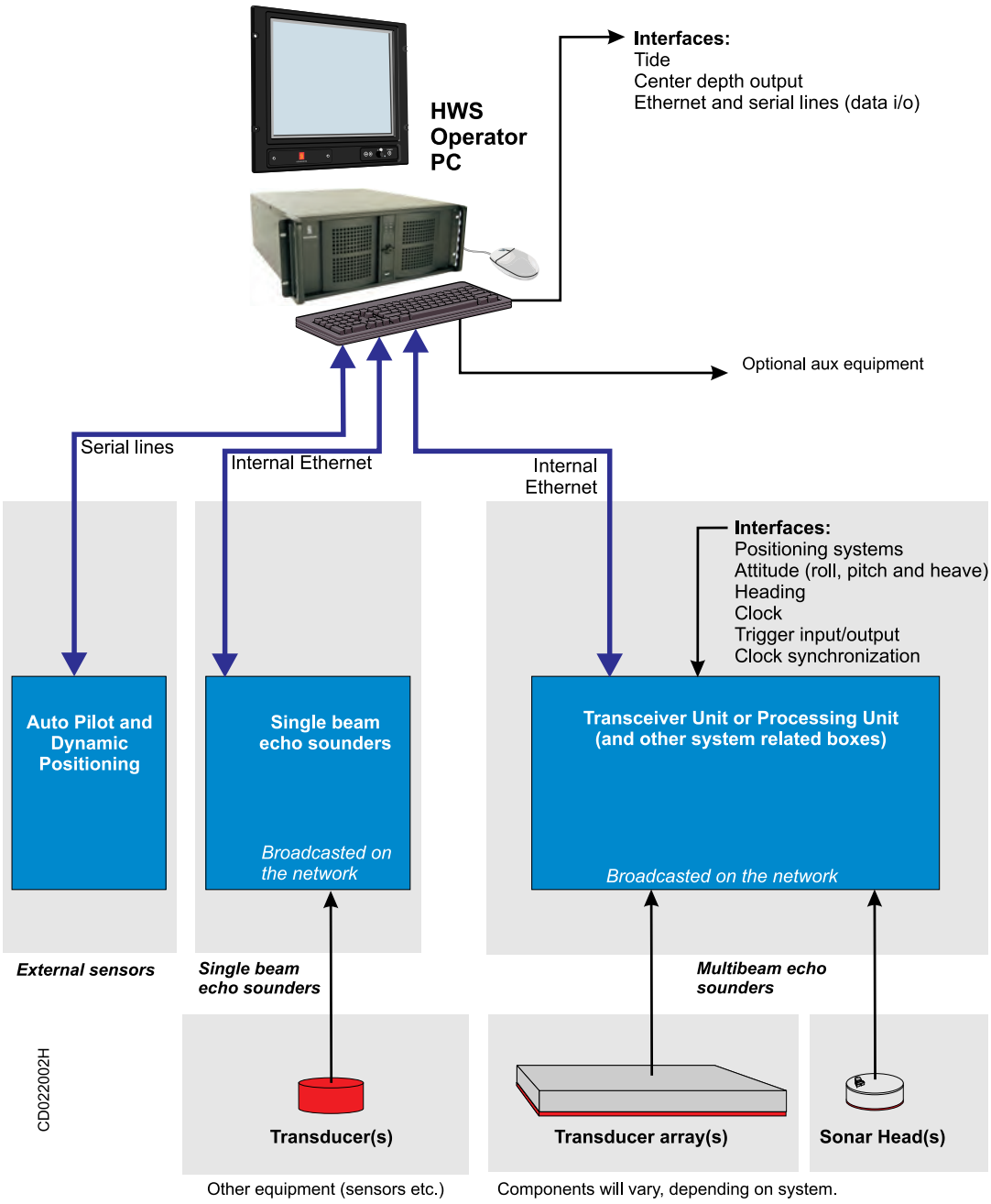
- Installation and runtime parameters
- Start/stop logging
- Survey administration
- New survey
- Messages, Beam intensity, Cross track, Time series, Seabed image, Numerical display and Water column windows

An unlicensed version of SIS will also work as an interface to third party software.

System drawing

The figure below shows the principle drawing of the hardware setup with the SIS software package, integrated with single beam or multibeam echo sounder systems.

Figure 1 Principle drawing, hardware setup with SIS



SIS system overview

The main task of SIS is to be a logical and user friendly interface for the surveyor, providing required functionality for running a survey efficiently.

Advanced features of SIS are:

- Control of several instruments simultaneously, both single- and multibeam echo sounders
- Screen layout with up to seven simultaneous display windows defined by the user
- Real time data cleaning of bathymetric data
- Enhanced functions for visual and automated data quality control
- Graphical displays for sound speed at sonar head and sound speed profile
- Built in health tests of the multibeam echo sounder and continuous monitoring the quality of input data. Error situations are logged, and user notifications are given advising what action to take.
- High resolution seabed image mosaic can be viewed in the Geographical view
- Unique features for plotting of scaled maps in size up to A0
- Imaging of acoustic reflectors in the water column (fish, biomass, etc.)
- Real time computation of the mean sea level using a geoid model
- Real time compensation for tide
- Fully operational when echo sounder is mounted on ROV/AUV
- Post processing of GNSS raw position data using Precise Point Positioning

Basic version – Instrument control

With the basic/instrument control version of SIS you can select which instrument to operate, turn it on/off, store data on/off, change setup and operating parameters and export data. There are graphical windows for quality checking of sensor input and the data produced. Sound speed at sonar head and sound speed profile input are interfaced and handled correctly in real time.

Multibeam echo sounders have built-in tests which can be activated to verify that the hardware is working correctly. In addition SIS constantly monitors input data to ensure the data quality. Error situations are logged and user notifications are given with advice of what action the operator should take.

Multibeam echo sounder support

Licensed multibeam support gives access to:

- More QA views for the multibeam data
- System calibration
- Visualisation of high resolution seabed backscatter data
- Visualisation of seabed imagery date in the Geographical view
- Plotting of survey results with full plotter resolution
- Support for remote Helmsman Display, connected via Ethernet

Geographical window

The Geographical window can display a terrain model in 2D and 3D mode. In 2D mode background maps can be displayed (DXF, C-MAP, KSGPL ascii files, GeoTIFF are supported), planned survey lines, a user defined vessel symbol, raw (limited) soundings and gridded (unlimited) terrain model. In 3D mode the seafloor surface can be viewed from different angles and in different resolutions, the light source can be shifted, and the surface can be rotated around all axis to obtain the best view.

The Geographical window can be zoomed and panned, and it can be set to follow the ship's position automatically.

Grid model from previous surveys can be imported and used as background information or used for comparison purposes.

A planning module makes it possible to define and edit planned lines, make parallel lines, define survey regions, etc. Plans can be imported and exported between systems.

Singlebeam echo sounder support

EA singlebeam echo sounders, from version 2.4.0.0 and onwards, have the ability to be used in a SIS compatible mode of operation. This will enable the EA echo sounder to be integrated in the SIS topside environment for control, display and data logging purposes.

From the SIS point of view an EA in SIS operational mode will behave as a traditional EM echo sounder except for some operational restrictions and a different data logging format.

An EA in SIS operational mode will broadcast it's presence on the network using port 1999. When detected by SIS it will be named EA600 and it can be started by SIS in the same manner as used for the EM range of echo sounders.

Only a small number of the different SIS information display frames will be active for the EA echo sounder. Most noteworthy, no installation and runtime parameter settings are currently available for this echo sounder. The numerical display will have a restricted function mainly showing position information, speed and depth. The major display for the EA operation in SIS will be the Geographical view frame. It is used to present the depth information in gridded format based on the logged data. The ship's position will be shown as a cross, as no heading is currently available in the EA position datagram.

The pinging and logging operation is controlled by the standard SIS buttons used for this purpose. The data being sent from the EA echo sounder, and logged by SIS, is processed data (i.e. not raw data).

Real time data cleaning

SIS includes highly efficient algorithms for automatic flagging of soundings which should be eliminated from the survey. The soundings are not removed, simply flagged as invalid so it is always possible to reverse the decision easily. For the majority of user needs, this processing will be satisfactory so that further processing is made either not necessary or at least substantially reduced.

The terrain model is generated in real time from input of all soundings available in one area, not just the current soundings, but all previous soundings in that area. The processing algorithm automatically chooses the best cell size, and then defines a curved surface through the majority of the soundings in that cell. This adaptive approach makes the processing very robust and "clouds" of invalid soundings (like schools of fish) can be flagged invalid automatically.

The gridding algorithm updates a multi-resolution display grid which makes it possible to select a grid with the best fit resolution to the selected map scale. Large areas can then be displayed with low resolution, but still important details can be shown. SIS can quickly zoom to smaller areas and display the terrain in full detail, even down to every single depth point.

Water column imaging

Some multibeam echo sounders, depending on model and purchased options, have built-in support for imaging of acoustic reflectors also in the water column. Such reflectors are for example fish or other biomass, but can also be submerged buoys or moorings.

Seabed image

SIS provides three views of seabed image data from multibeam echo sounders. In the first view, the user is presented with a classical time/across window where all seabed image is displayed along a time-axis. Second, in the Geographical window the user can see a low resolution seabed image mosaic by simply displaying reflectivity per display cell. Third, in Geographical window the user can call for a high resolution seabed image mosaic image to be displayed on top of the terrain. The resolution is typically 9 to 25 times higher than the maximum resolution of the bathymetric data.

GPS RTK and tide input

SIS provides users of GPS RTK systems to use geoid models in real time. The distance from the vertical reference to the seafloor, the distance from the geoid to the seafloor, and the distance from the ellipsoid to the seafloor are all calculated in real time. This eliminates heave and tide effects in the data in real time. Tide input can also be used in real time, either predicted tide from ascii files, or tide input from serial lines or network interfaces.

ROV operations

ROV operations are also supported in SIS. The depth of the ROV can be given to the echosounder in real time, and SIS will create a terrain model from the data collected by the ROV. Displays like Crosstrack and Waterfall are also useful when running an ROV survey.

SIS Objects

An addition to SIS makes it possible to add markers during survey. The user can define a set of lines, points, images and text to be displayed, and then the user can add such objects during survey. Such markers can be bouys, wreaks, shoals, coastlines, dryfall, etc. These objects can be exported to xml-files, and they can be read and displayed as background information later.

Precise Point Positioning in SIS

SIS integrates logging of raw GNSS observations from the Seapath 300 system. This data can be post-processed by applying more precise GNSS clock and orbit information to give very precise positions, typically in the sub-decimetre range, without use of GPS reference signals. This utilizes the TerraPOS software (by TerraTec) to compute the high accuracy position data. The process is highly automated in SIS and easy to use.

SIS operational principles

Note

The SIS software is used by single beam or multibeam echo sounders. When you run a survey, you can log data from more than one system at a time. This implies that not all information herein will be relevant for all systems. This is further explained in the following.

SIS is operated in *Online* or *Offline* mode.

- The *Online* mode is used during the survey. The application is used to control the (multibeam) echo sounder, to store the data, and to present various views of the data for quality assurance.
- The *Offline* mode is used after the survey has been completed, and the data is stored on disk. The application is used to view the results of the survey.

The standard SIS application will generate full documentation of the survey results, and provide output for survey statistics, contour charts, illuminated plots etc. For some purposes this may be sufficient, but normally additional SIS post-processing packages available are used for data cleaning, image processing and final chart production.

Parameter settings

There are a number of parameters that must be set. These are:

- Installation parameters for setting up e.g. communication, information related to the physical installation of the sensors and calibration results
- Survey parameters for setting e.g. projection, background data and administration of the survey data

Some parameters need starting values depending on type of operation and water depth.

You may start SIS by loading a predefined set of parameters, stored in a database, and then modify some of the individual parameters observing the effect on the displayed data. The modified parameters, including all the remaining parameters, can then be stored as a user specified set-up.

All parameters, as well as all the survey information, are stored in a database. The raw data is stored to disk.

You may wish to optimize system performance by adjusting parameters in the system. When the results are as desired, the current parameters set may be stored in the database for later retrieval.

Survey handling

Every echo sounder logs data to a survey. If no survey is defined, data will be logged to a predefined “fallback” survey.

Note

We strongly advise you to define your own default surveys. *A default survey contains information about where to store the raw and processed data on the disks, what projection to use, coastlines to display etc.*

When you create a new survey, you can use a default survey as a template for the new survey. This may save a lot of parameter definitions, and make life a lot easier for the surveyor.

More information

- *Operational procedures* on page 96

SIS as a controller

This manual also describes the use of SIS as an interface between Kongsberg Maritime’s multibeam echo sounders and third party data acquisition software packages. The two third party software packages that has been tested and verified by Kongsberg are at this moment HYPACK ® and QINSy ®. When SIS is working as a controller, the full SIS functionality is not needed.

An unlicensed version of SIS will work as a controller. The purpose of this is as follows:

- Provide installation parameters needed by the Processing Unit in real time
- Provide runtime parameters (ping rate, coverage etc.)
- Operation and activation of the echo sounder
- Export of echo sounder datagrams to the third party software package
- Data logging in Kongsberg format

The data logging mentioned above is only provided for testing and debug in case of equipment problems.

In the case of using SIS as a controller all installation settings have to be set correctly inside the controller. In addition, position, heading and attitude must be interfaced to the processing unit.

When SIS operates as a controller, the following will not be a part of the controller and have to be handled by the third party software:

- Installation parameters to calculate the correct depths (not needed by the sounder in real-time)
- Calibration
- Quality control of the data
- Data logging for daily operation
- Data cleaning and post-processing
- Creation of digital terrain models (DTM), charts, printouts etc.

The installation values needed in the controller will only be the one needed by the echo sounder itself to export quality data to third party software. Example: If the echo sounder is roll stabilized, it needs roll data, correct installation angles for motion sensor and sonar head.

HYPACK®

The Hypack software package will treat the echo sounder as a separate sensor and provide the drivers for interfacing. The motion data needed for correction of the echo sounder data is read from the network (provided by the sounder) together with the range data. The position is interfaced and logged by Hypack in a standard way (read from serial line).

Note

The motion data provided by the echo sounder is moved from it's initial position to the location of the echo sounder. This is done inside the echo sounder Processing Unit.

QINSy ®

Qinsy read the echo sounder range datagrams from the network and all other sensors are interfaced by Qinsy directly. In other words, position and attitude data is interfaced to a serial line directly on the Qinsy PC. To provide correct timing of depths and attitude data the Qinsy PC and the Processing Unit need to be synchronized. This is done by connecting a 1PPS cable from the position system to the echo sounder Processing Unit as well as to the Qinsy PC itself. In addition ZDA clock datagrams has to be provided to the two units. If the echo sounder is roll stabilized then roll data has to be sent to the Processing Unit.

Note

For detailed information on the setup of software from Hypack or Qinsy, refer to the manufacturer's documentation.

Note

Data logged in the Kongsberg format has been time tagged in the Processing Unit of the echo sounder. This means that the time tagging is accurate and reliable. If other logging systems are used, the time tagging of the data is the responsibility of that logging software if they bypass these files.

Graphical user interface

This section contains description of the graphical user interfaces and the parameters related to setting up the appearance of SIS.

Topics

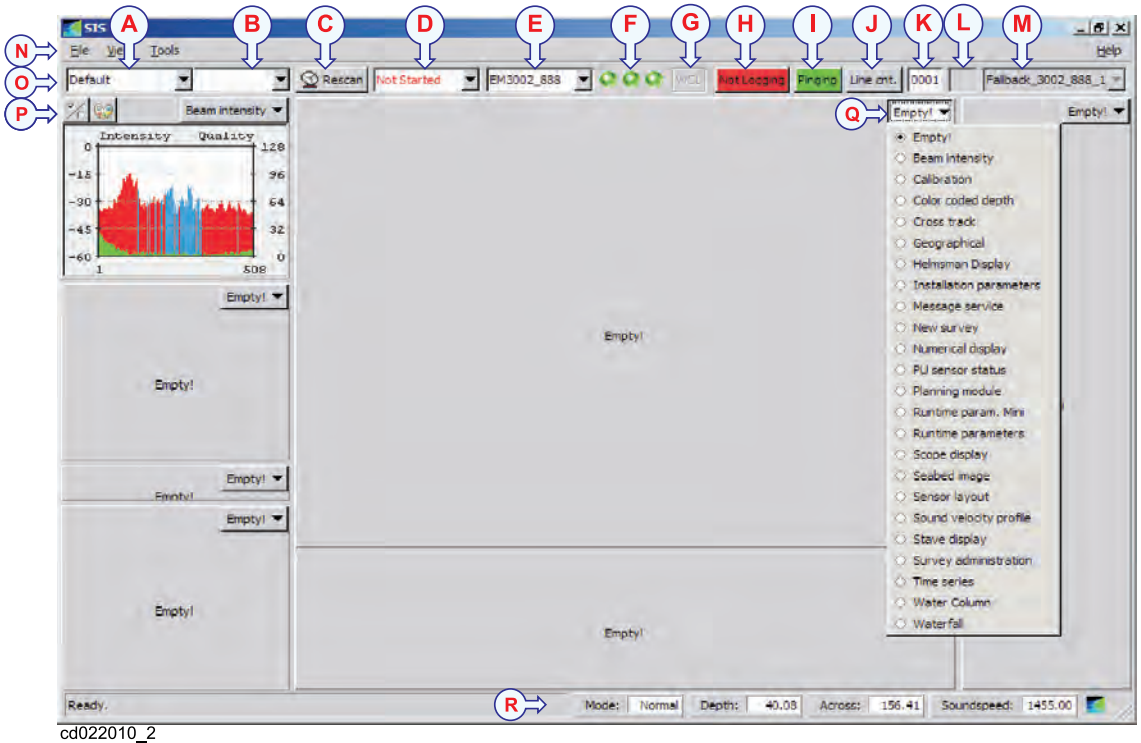
The application window

All interactions with SIS take place via a windows based interface on the Operator Station.

When you launch SIS, the application window opens containing several frames that can be set up. Available options will depend on what instrument you are using.

The SIS application window appears below. A description of its parts follows.

Figure 2 The SIS application window



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Description of the SIS application window

A Frame settings

B Active grid

C Rescan button

D Sonar systems detected, but not started.

E Current sonar system

F Status lamps for current sonar system

G Water Column Logging (WCL) status button

H Raw data logging status

I Pinging status

J Line counter

K Line number

L Time to line shift

M Current survey name

N Main menu

O Main toolbar

P Frame toolbar

Q Available frames

R Status bar

SIS defines a screen layout with up to seven simultaneous display windows (or frames). The boundaries between the frames can be shifted so that the frame sizes are adjusted to the user needs, but the system will make sure that no display frame is ever hidden behind another one. The information contents of each display frame can be changed according to the needs.

SIS has many windows, but there are always seven frames. You can choose from a list of windows for each frame, and you can save and read your own set up.

The frames are designed so that they will never overlap. This makes it impossible to hide one window behind another. You can change the size of the frames by moving the slide-bars. The four frames on the left are separated by three slide-bars which can be moved up and down, and the two frames in the middle are also separated with a slide-bar. There is also a slide-bar to the left of the four frames, and there is a slide-bar at the frame to the right.

The menu bar at the top contains common actions such as save/read settings, exit etc.

The next menu bar contains basic controls for all echo sounders. There are drop-down lists for surveys and survey settings, and for detected echo sounders and the echo sounder currently being operated. There are also control buttons to rescan for echo sounders, start/stop logging or pinging and line counting. Status lamps indicates hardware status for multibeam echo sounders.

In addition to the seven frames in the SIS main layout, up to five additional SIS frame can be opened in separate “tear-off” windows. See *Tear-off windows* on page 33 for details

SIS frames

The various windows available in SIS are:

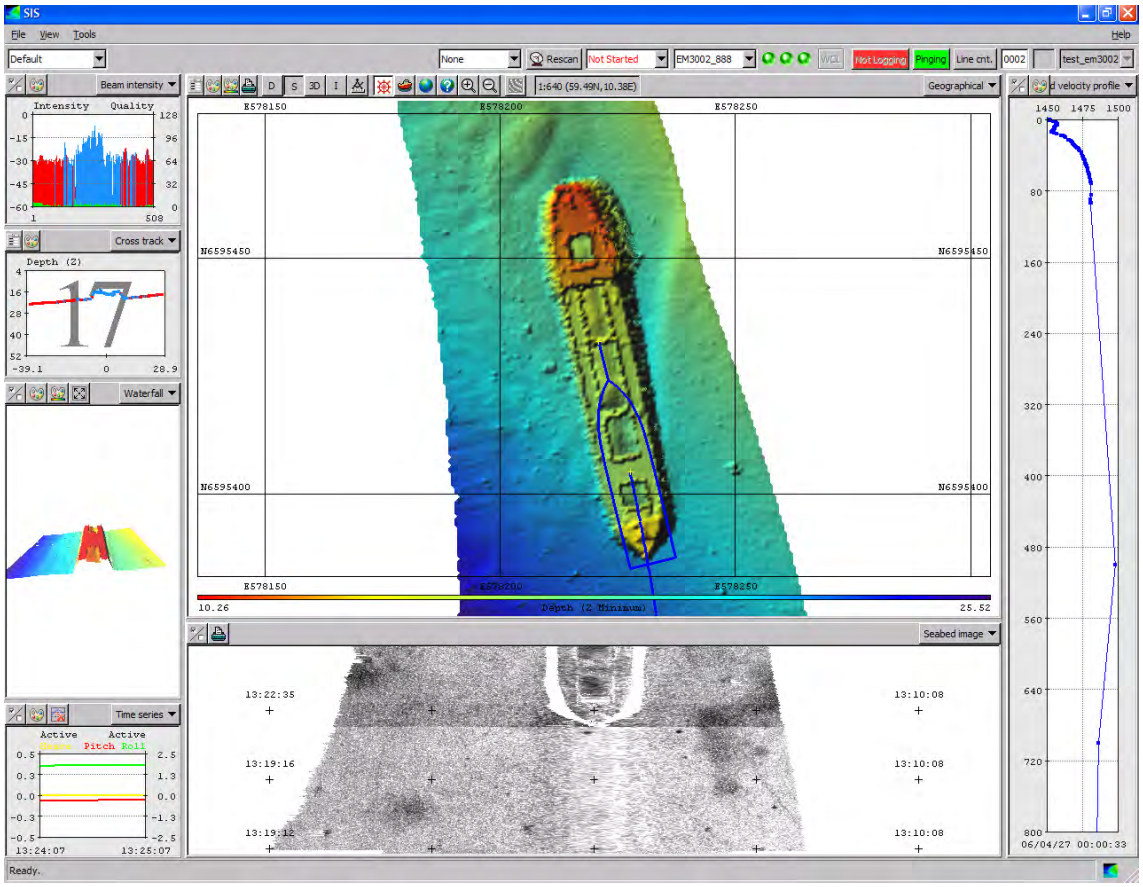
- Beam intensity
- Calibration
- Colour coded depth
- Cross track
- Geographical
- Helmsman Display
- Installation parameters
- Message service
- New survey
- Numerical display
- Planning module
- PU sensor status
- Runtime parameters
- Runtime Parameters Mini

- Scope display
- Seabed image
- Sensor Layout
- Sound velocity profile
- Stave display
- Survey administration
- Time series
- Waterfall
- Water column
- Empty frame

Each frame is briefly explained in the following. For detailed description of each of the available frames, please see

- *Windows and views* on page 49

Figure 3 Example of SIS frame setup



Geographical

The **Geographical** window is used to display all geographical data such as:

- DXF files

- Terrain models generated form ASCII xyz files
- Terrain models from surveys
- Geographical net (geographic and projection net)
- Other kinds of background data from ASCII-files
- Depth difference in each grid cell
- Number of points inside each grid cell
- Display of seabed imagery data generated by the GridEngine
- C-MAP background maps

It is possible to display several terrain models at the same time, both the terrain model that is being generated by the current survey and terrain models generated from previous surveys. If the data is in ASCII xyz-files, a terrain model can be generated and displayed as background data.

The **Geographical** window uses OpenGL for smooth rendering. This means that all views are 3D enabled and can be rotated in any direction.

SIS uses projection coordinates to display the data. The projection is set from the **New survey** or **Survey administration** frames. You can define your own projection or choose from a wide range of predefined projections. A 7-parameter datum transformation is also available.

The **Geographical** window can display a lot of different information. You can select from a long list of features what to display.

Note that the terrain model can be display with various depth values:

- Z – the distance from the surface to the seafloor
- Zt – tide corrected depth using a tide file
- Zv – tide corrected depth based on GPS observations and a geoid model
- Zg – the distance from the sea floor to the geoid
- Zr – the distance from the sea floor to the ellipsoid

For each grid cell you can choose if you want to see the minimum, median or maximum depth.

Note

SIS calculates the median depth, not the mean depth for each cell. The mean depth is an artificial depth which has not been observed, whilst the median is a real, quality controlled observed depth.

Beam intensity

The **Beam intensity** window shows the signal strength for each beam. Blue means amplitude detection and red is phase detection. Green indicates the quality for each measurement.

Cross track

The **Cross track** window shows the depth from each beam. The x-axis can either be meters or beams. Blue is amplitude detection and red is phase detection.

Seabed image

The **Seabed image** window logs seabed image data. The resolution in across direction depends upon the size of the window, the width of the swath and the resolution of the sonar. In the across direction a grid will be created to give the highest possible resolution in the window, and then each and every ping is stacked on top of each other.

Numerical display

The **Numerical display** window shows a list of current value of 36 different parameters. The parameters to show can be selected from a comprehensive list of available parameters.

Some of the parameters will give indication if the value exceed given limits by changing the background to yellow (warning) or red (error). This makes it possible to easily discover if there is a problem with some parts of the equipment. All exceptions are logged by **Message service**.

Message service

All messages from SIS are stored in the SIS database, SISDB. You can open the **Message service** window to see all messages that have been generated, and when they arrived. It is possible to mask certain types of messages and write these to a file. You can also choose a time frame to display the messages from.

Helmsman Display

The **Helmsman Display** window is usually used together with the **Planning module**.

When you have selected a planned line for surveying, the Helmsman Display window will show guidance information to the helmsman, such as position, depth, speed, course, cross track distance from planned line (XTE), etc.

There is also a history of XTE and a graphic presentation of the XTE and you can choose which of these parameters to display.

Colour coded depth

The **Colour coded depth** window shows the depth from each beam. The y-axis is always time and the x-axis is always beam number.

New survey

In the **New survey** window parameters defining a new surveys are created, including survey name, projection, background data, storage location, etc.

Survey administration

In the **Survey administration** window you can define survey parameters, such as projection, background data to display and where to store the survey data on disk. Normally, the default set-up can be used.

Planning module

The Geographical window can be set in Planning mode. From the **Planning module** survey lines can be created, survey areas can be defined and filled with parallel lines etc. You can save the planned lines to a planned job, and read a planned job from disk.

Time series

The **Time series** window is used to display different kinds of time series. Normally heave, roll and pitch from the active sensor is displayed. The following can also be displayed:

- Depths and backscatter from four beams selected by the user
- Depth below the water surface for the most vertical beam
- Depth and backscatter of the centre beam
- Single beam and multibeam depths for comparison
- Height
- Heave, roll and pitch from active and/or inactive motion sensor

Waterfall

The **Waterfall** window is fully implemented with 3D capabilities. You can zoom, pan and rotate freely in 3D, and the z-axis can be exaggerated to see small objects better.

Water column

The **Water column** window shows a graphical representation of the beam formed data for the entire water column for each beam. This window is only available for echo sounders with water column capabilities.

Sound velocity profile

SIS uses the depths generated in the Processing Unit. This means that the depths have already been corrected for sound speed profile. The current sound speed profile used by the Processing Unit is shown in the **Sound velocity profile** window.

Scope display

The **Scope display** window can be used to investigate the receiver echo data. It is mainly used for test purposes. The data is not logged. This window is available for multibeam echo sounders.

Stave display

The **Stave display** window shows a graphical representation of the signal level of all of the receiver elements (i.e. staves). This can be helpful for debug and for performance checks (display of interference signals, air bubbles, saturation, etc.) The data is not logged. This window is available for multibeam echo sounders with stave display capabilities.

Installation parameters

The **Installation parameters** window is used to set fixed installation parameters, including communication parameters to external sensors, installation offset angles and locations, calibration results, etc. These parameters are normally set only once. The parameters can not be modified during operation.

Built In Self Tests (BIST) are run from here.

Runtime parameters

In addition you may set the parameters employed by the Real Time Data Cleaning module.

Calibration

In the **Calibration** window you will be presented to a cross-section of the data from the selected survey lines. The Geographical window must be set in calibration mode (C), the survey lines to use (at least two) for the calibration must be selected and a corridor along or across these survey lines must be defined. Then the pitch, roll, heading and time offsets can be altered to visually see the impact on the data in the defined corridor.

When new offsets are obtained these must be entered into the installation parameters.

PU sensor status

Note

*The **PU – Processing Unit** may be a separate hardware unit or an integrated part of the **TRU – Transceiver Unit** cabinet, depending on echo sounder system.*

For SIS it makes no difference whether the communication is with a PU or a PU inside a TRU. The term PU is used in this manual.

The **PU sensor status** window shows how the PU's input sensors are set up. If any signal is missing, this is indicated by changed colour.

Runtime parameters Mini

The **Runtime parameters Mini** window is a subset of the Runtime parameters menu with the most commonly altered parameters in a small window.

Sensor layout

The **Sensor layout** window, display all defined sensors position in a 3D display. This window will give you an indication if the installation parameters are entered incorrectly.

Related topics

- *Tear-off windows* on page 33
- *Windows and views* on page 49

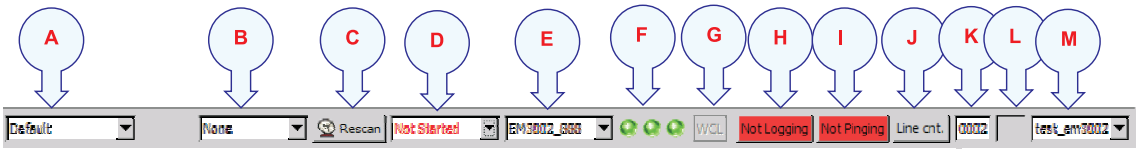
Toolbars

SIS has two types of toolbars. The **Main toolbar** is common for all frames. Each frame also has its own individual toolbar.

Main toolbar

The **Main toolbar** is located just below the **Main menu**. It contains several buttons and combo boxes.

Figure 4 Main toolbar



(cd22021)

A **Settings:** You can select different display settings from this combo box. Choose between standard settings or create your own by selecting **Save Settings As...** in the **File** menu.

B **Active survey:** Select the active survey. All surveys are listed, both the surveys you log on and the ones imported. You can only calibrate the active survey.

C **Rescan:** Press the **Rescan** button, and the program will scan for available echo sounders on the network. If for some reason contact with the echo sounder is lost, it is not necessary to shut down and restart SIS.

D **Echo sounders - not started:** This combo box displays all the echo sounders SIS has detected on the network at start-up time or when doing a rescan. All multibeam echo sounders announce themselves on the network when they are active, and SIS will detect them automatically. Select the echo sounder you want to start from this list.

E **Current echo sounder:** This combo box displays which echo sounder is currently being operated. You must choose one at the time when setting the installation and runtime parameters for the echo sounder. Select the echo sounder you want to change parameters for from this list.

F **Status lamps:** These lamps are for multibeam echo sounders only and applies to current echo sounder.

- **Lamp 1:** PU/TRU status (Processing Unit/Transceiver Unit)
- **Lamp 2:** BSP status (Beamforming and Signal Processing)
- **Lamp 3:** SH status (Sonar Head)

While logging, the lamps will be continuously updated.

Green	Orange	Red	Grey
OK	Warning	Error	Connected hardware is not in use

Tip

The 8 last echo sounder originated warning/error messages are displayed as tool tip when cursor is hovering above the PU, BSP and SH status buttons. The list is only displayed when they indicate warning or error conditions in the echo sounder (yellow and red lamps respectively). The messages are numbered with the newest on top.

G **WCL:** The **WCL** button is used for controlling the water column logging as well as showing the current water column log status.

By pressing the **WCL** button the water column logging operation is enabled or disabled. Water column logging is enabled when the button is in the down position. The actual water column logging is controlled by the standard **Logging** button. The **WCL** button turns green when the logging is active and red when logging is enabled, but suspended (i.e. off).

The **WCL** button is always displayed, but is only active for echo sounders with water column capabilities.

H **Pinging:** Press this button to start and stop pinging. Start pinging to activate the echo sounder (i.e. sending sound into the water). The colour of the button is green while pinging and red when pinging is off.

The text in the button reflects the current status.

I **Logging:** Press this button to start and stop logging. Start logging to write data to disk. The colour of the button is green while logging and red when logging is off.

The text in the button reflects the current status.

Note

If pinging is Off when logging is turned On, pinging will automatically be turned On. If logging is On and pinging is turned Off logging will automatically be turned Off.

J The **Line cnt** button is used to create a new line without stopping the logging and then starting it again. The line count is incremented by one when button is pressed.

K **Line counter:** The text field displays the line count for the currently selected echo sounder. The line count is cyclic between 1 and 9999. It is possible to enter a line number manually.

If logging is *Off* the line count is for the next line started. If logging is *On* the count is for the current line.

L **Remaining time:** This field shows the remaining time to log in the current line, i.e. the time before a new line is started. The time unit is in minutes. (When 1 minute is displayed this indicates less than 1 minute logging remaining.)

M **Current survey:** This combo box displays the current survey name. You can select all surveys for the current echo sounder from this combo box. When selecting another survey, SIS will change to that survey and start logging to that survey when this is enabled.

This combo box is disabled when SIS is logging.

Related topics

- *Frame toolbars* on page 29
- *Echo sounder – Not started list* on page 29
- *Current echo sounder* on page 30
- *Line counter toolbar set* on page 31

Frame toolbars

All frames have their own toolbar. On these toolbars there can be several buttons or just the Frames button. The most frequent buttons are:

A **Show/hide:** Press this button to open the **Show/hide** dialogue box.

B **Annotation colours:** Press this button to open the **Annotation colours** dialogue box.

C **Dynamic colours:** Press this button to open the **Dynamic colours** dialogue box. The dialogue box will only be launched if at least one or more surveys are loaded.

D **Frame selection button:** Press this button to select the content you want in that specific window frame.

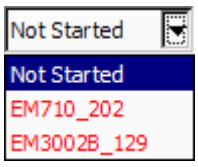
Figure 5 Example of a frame toolbar

The most common buttons are described in *Common display buttons* on page 42.

Special buttons for each frame are described in *Windows and views* on page 49

Echo sounder – Not started list

The **Not started** list will be displayed in a combo box found in the main toolbar.



The list contains all non-started echo sounders detected by SIS on the network. The list is linked to the autostart mechanism.

The combo box will only be displayed in two cases:

1 When echo sounders are detected by the system for the first time.

2 When the detected echo sounders differs from the set of echo sounders started in the previous SIS session. That is, if echo sounders have been added or removed from the network, and the autostart mechanism therefore is not activated.

In any other circumstance the autostart mechanism will start the echo sounders automatically and the combo box will be empty and not visible.

Note

*The Autostart of the echo sounder can be disabled/enabled under **Display** found by selecting **Tools→Custom...→Set parameters**.*

When you select an echo sounder from the list, you start the echo sounder and it will disappear from the list.

If automatic self test at startup is selected the **BIST** page will be displayed in a tear off window and the **Run all BISTs** sequence will be automatically started. This sequence can be cancelled at any stage by pressing the **Quit** button in the pop-up window that is displayed. When cancelling, the current test must run to completion before the sequence halts.

Note

If for any reason an echo sounder fails during start (BIST, Built-In Self Test, 99 failure) the echo sounder will remain in the list and the combo box will still be visible. The reason for this is to allow you to correct the problem and try a rescan.

If the licensing allows for only one started echo sounder, the combo box will be removed as soon as the start has been performed with a positive result.

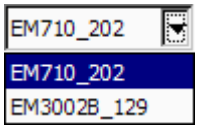
If the licensing allows for several started echo sounders, the combo box will be removed only when the list is empty, i.e. when all echo sounders has been started.

Related operational procedures

- *How to start pinging* on page 144
- *How to start the echo sounder* on page 139

Current echo sounder

Current echo sounder gives you a list of the all echo sounders and other instruments that are connected to the SIS software. Only the current echo sounder is visible in the text field. Press the arrow to see the entire list or click in the text field.



Select an echo sounder from the list. This echo sounder is now available for configuration. Each echo sounder is identified by name and serial number and all displayed frames will be updated to show the information from this unit, if applicable. Only one echo sounder can be selected as current at any given instance, i.e. you can configure only one echo sounder at a time and you can see data (for example beam intensity, cross track, numerical data, etc.) only from this current unit.

Related operational procedures

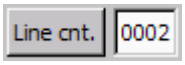
- *How to start pinging* on page 144

- *How to start the echo sounder* on page 139
- *How to interface a singlebeam echo sounder in SIS* on page 141
- *How to start and stop logging – Alternative 1* on page 154
- *How to start and stop logging – Alternative 2* on page 154
- *How to save data* on page 154

If you want to add instruments without a PU (Processing Unit/Rack) to the list, use the **External sensors** and **Instrument combinations** found on the **Tools** menu.

If you want to remove instruments without a PU (Processing Unit/Rack) from the list, use the **Remove instruments** found on the **Tools** menu.

Line counter toolbar set



The **Line counter** button and **Line counter** text field are found in the toolbar.

The Line counter text field displays the line number for the currently selected echo sounder. The count is cyclic between 1 and 9999.

When the **Line counter** is pressed, the line count is incremented by one for all active, logging echo sounders and not only for current echo sounder.

Note

If current echo sounder is not logging, nothing happens when the line counter button is pressed.

The line count for an echo sounder can also be incremented by three other mechanisms in addition to using the line counter button:

1 The line count is incremented each time logging stops showing the next line to be logged. Only the count for the handled (current) echo sounder is affected.

2 To avoid very large log files (.all-files) the counter for all active echo sounders are incremented automatically every 30 minutes. This can be configured from the Main menu; **Tools→Custom...→Set parameters**. This, however, only happens when the counter has not been incremented by other means within the last 30 minutes, i.e. by pressing the line counter button or by stopping and starting logging.

3 The line counter may be manually edited, when not logging. The edited value is for the next logged line.

Note

If several echo sounders are used and the line count initially is the same for all, it's important to notice that the counts may deviate after a while. This is due to the above described behaviour.

Related operational procedures

- *How to start the echo sounder* on page 139

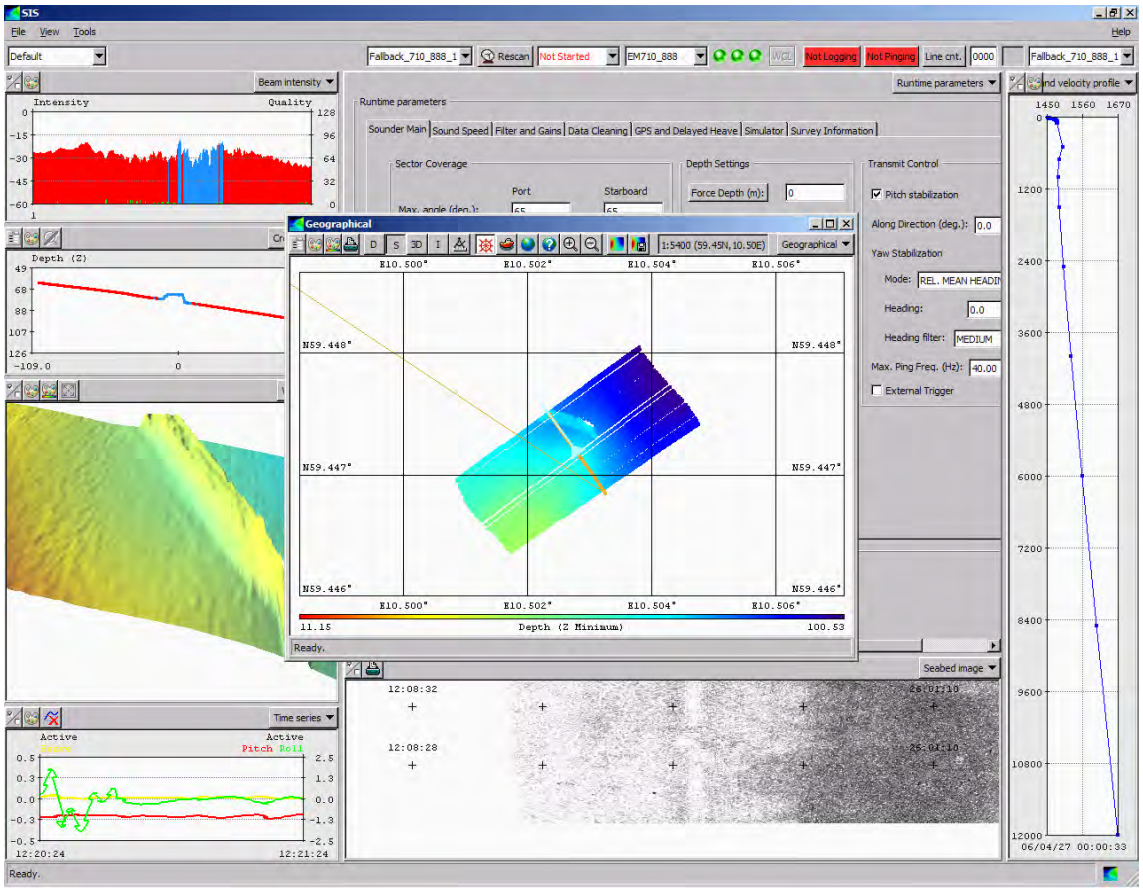
View menu

The **View** drop-down menu gives you the following choices:

Tear-off windows

Tear-off windows are accessed from the **View** menu.

It is possible to open any additional SIS frame in separate "tear-off" windows by selecting it from the **View→Tear Off** menu.



If the selected frame is already open in another window, the frame will be moved to the new tear-off window, and the other window will be emptied.

It is possible to have multiple tear-off windows open at the same time, a maximum of five tear-off windows are allowed. However, it is important to note that each open frame requires some processing power, so you may overload the system by opening too many windows at the same time. It is recommended to monitor the CPU load. If the CPU load remains near 100% for any length of time, you may have to close one or more of the tear-off windows. Frames with high CPU load include the Geographical, Water Column, Stave Display, Seabed Image and (to a lesser degree) the Waterfall frame.

Note

Parameters for size, location, and frame settings of the tear-off windows are not saved when settings are saved (File->Save Settings).

Screen capture of the tear-off windows are not stored by pressing Ctrl-S. Only the SIS mainframe is captured by Ctrl-S.

Icons

The **Icons** menu is accessed from the **View** drop-down menu.

Choose between:

- **Small Icons:** This will make all the frame toolbar buttons smaller
- **Large Icons:** This will make all the frame toolbar buttons larger

C-MAP detail level

Note

This menu option will only be available if C-MAP is installed.

The **C-MAP detail level** is accessed from the **View** menu.

To specify the detail level of the C-MAP background, choose between the following display levels with increasing levels of details:

- Basic
- Standard
- Full

Colour palette

The **Colour palette** is accessed from the **View** menu.

Depending on light conditions where the SIS display is located the colours of may be changed to best adapt to the conditions.

Choose between the following colour palettes:

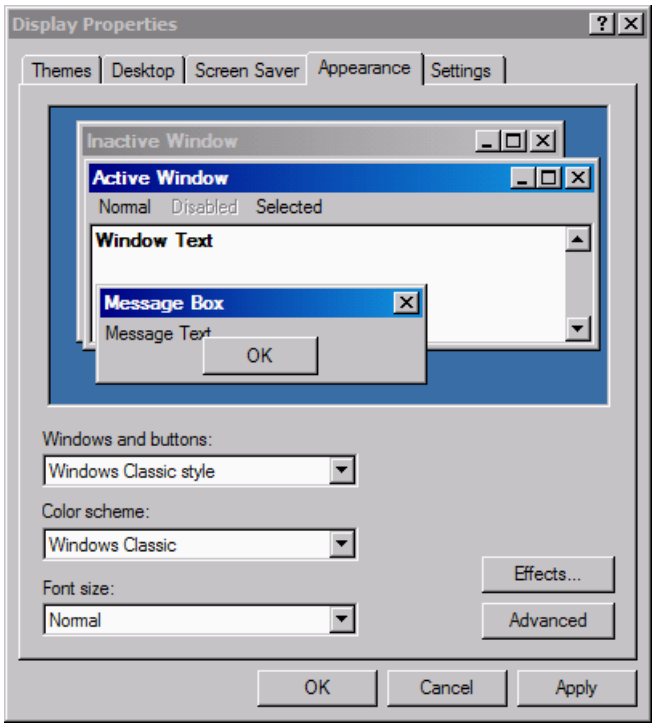
- **Day:** Bright day
- **Day Blackback:** Day with black background
- **Day Whiteback:** Day with white background
- **Dusk:** Dusk – less brightness to adapt to night vision
- **Night:** Night – lesser brightness to adapt to night vision

Windows PaletteController

Each of above palettes use a colour scheme of 64 colours with different RGB value for each palette. If used together with **PaletteController**, all Windows colours can be set as well.

PaletteController is an additional SIS program found in the installation's **bin** directory. **PaletteController** can be used to set the Windows colours globally on your computer according to the colour palettes defined by SIS.

For **PaletteController** to take effect you must ensure that the **Windows Display Properties→Appearance** is set to **Windows Classic style** for Windows XP and to **Windows Choice** for other Windows platforms.



Status bar

The **Status bar** is accessed from the **View** menu.

By selecting **Status bar** from the view menu you will be given the choice to display current value of four essential transducer parameters in a status bar at the bottom of the SIS display. By ticking the check box for each parameter, current parameter value will be continuously updated in the Status bar. Press the OK button to confirm the selection and leave the menu.

The following parameters can be displayed:

- **Mode:** current ping mode
- **Depth:** current depth
- **Across:** swath width in metres on the bottom
- **Soundspeed:** Sound speed at transducer depth
- **Last mess.:** The last message (error, warning or information message) generated by the system.

  Tip

  Hovering with the cursor above the **Last message** field will display the last 3 messages as a tool tip. The messages are numbered with the newest on top.

- **Beam sp.:** Beam spacing

Keyboard and mouse operations

In SIS there are different combinations of mouse and keyboard operations used to change the view or give quick access to selected functions. The combination of mouse and keyboard operation varies slightly depending on the frame you are working in. The keyboard and mouse operations for panning, rotating and zooming for each frame these functions applies to are presented in this section.

Topics

Rotate operations

To understand how to rotate the grid, it may be helpful to visualize a “virtual trackball” in the centre of the view. To rotate the grid, click and drag the mouse as if you were trying to rotate this “virtual trackball”. For example, if you click the mouse in the centre of the view (i.e. the centre of the virtual trackball) and drag straight up or down, the virtual trackball will rotate about it’s horizontal axis (i.e. the x-axis). This results in the grid rotating purely about the x-axis.

If you click the mouse in the centre of the view and drag straight to the left or right, the virtual trackball will rotate about it’s vertical axis (i.e. the y-axis). This results in the grid rotating purely about the y-axis.

If you click the mouse at the edge of the view, and then drag the mouse, the virtual trackball will rotate about an axis perpendicular to the plane of the view (i.e. the z-axis). This results in the grid rotating purely about the z-axis.

Keyboard and mouse in the Geographical view

Operation	Keyboard and mouse operation
Zoom to region	Left mouse button Press left mouse button, drag the mouse to a new area and release the mouse button.
Pan	Right mouse button Right click in the grid, hold down and move the view.
Zoom	Scroll the mouse wheel To zoom in or out on the geographical view, scroll the wheel forward to zoom in, or backward to zoom out.
Rotate	Shift key + Right mouse button To rotate the grid, hold down the Shift key, right click and drag the mouse.
Display high res. seabed image	Left mouse button + Shift key Mark the area to display as seabed image by using left mouse button to mark first corner, then press the Shift key, then drag the mouse to desired end corner. Release buttons.

Note

3D must be enabled to rotate the geographical grid.

Keyboard and mouse in the Planning module view

Use the Ctrl key and the mouse to carry out any editing or manipulation of planned lines.

Operation	Keyboard and mouse operation
Accept or Cancel	Ctrl + Right mouse button Use the Ctrl key while clicking the right mouse button to open the Confirm changes dialogue. Use left mouse button to accept or cancel as required.
Select a line or a polygon	Ctrl + Left mouse button Selecting a line or a polygon is carried out by holding the Ctrl key down while clicking on the object to be selected. Objects already selected will be deselected.
Deselecting multiple objects	Ctrl + Right mouse button Deselecting multiple objects can be carried out by holding the Ctrl key down while clicking on the right mouse button. This will open the Selected objects dialogue, where you can choose to deselect all selected lines, polygons or both.

Keyboard and mouse in the Sound velocity profile view

Operation	Keyboard and mouse operation
Zoom to a region	Left mouse button Press left mouse button, drag the mouse to a new area and release the mouse button. Press the Zoom Reset Button to return the display to the original state.
Zoom	Ctrl key + Scroll the mouse wheel To zoom in or out on the view, hold the ctrl key while scrolling the wheel forward to zoom in, or backward to zoom out. Press the Zoom Reset Button to return the display to the original state.
Pan	Alt key + Scroll the mouse wheel To pan up or down along the profile, hold the Alt key while scrolling the wheel forward to pan down, or backward to pan up. Note that you can only use the pan functionality if you have zoomed the view.

Keyboard and mouse in the Waterfall view

Operation	Keyboard and mouse operation
Pan	Right mouse button To pan the waterfall grid, right click in the grid, hold down and move the view.
Zoom	Scroll the mouse wheel To zoom in or out on the waterfall view, scroll the wheel forward to zoom in, or backward to zoom out.
Rotate	Shift key + Right mouse button To rotate the grid, hold down the Shift key, right click and drag the mouse.

Keyboard and mouse in the Sensor layout view

Operation	Keyboard and mouse operation
Pan	Right mouse button To pan the waterfall grid, right click in the grid, hold down and move the view.
Zoom	Scroll the mouse wheel To zoom in or out on the waterfall view, scroll the wheel forward to zoom in, or backward to zoom out.
Rotate	Shift key + Right mouse button To rotate the grid, hold down the Shift key, right click and drag the mouse.

Keyboard and mouse in the Water column view

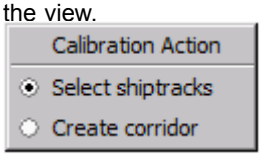
Operation	Keyboard and mouse operation
Force depth	Ctrl key + left mouse button Short-cut to force the bottom detection to selected depth.
Set scope beam number	Shift + left mouse button To view the beam pointed on by your mouse pointer in the scope display.
Rotate	Shift key + Right mouse button To rotate the grid, hold down the Shift key, right click and drag the mouse.

Note

*The **Force depth** and the **Scope beam** functions must have been enabled from the **Show/hide** menu of the **Water column** view before activation is possible.*

Keyboard and mouse in the Calibration view

In Calibration mode the Geographical window has the following additional keyboard and mouse functionality:

To	Operation
Select a line	Ctrl + Left mouse button To select a line, hold down the Ctrl key and left click on the line.
Open Calibration Action Quick Menu	Ctrl + Right mouse button To open the Calibration Action Quick Menu, hold down the Ctrl key, right click in the view. 
Select corridor	Ctrl + Left mouse button Set the end points of the corridor by holding the Ctrl key down while clicking left mouse button on each end point.

Hotkeys

The following functional hotkeys are defined in SIS

Key	Function
F2	Toggles logging on/off
F5	New line
F10	Toggle pinging on/off
F4	Toggle grid shading on/off

Key	Function
F8	Toggle depth under cursor on/off
Ctrl-S	Screendump of the application window saved as bmp file

You may redefine the hotkeys used for toggling logging and pinging on/off and for selecting new line. This is done from **Tools→Custom...→Set parameters→Logging**.

File storage locations used by SIS

During installation of SIS you will be prompted how to store your data. We strongly recommend using separate disk partitions for grid and raw data. The grid and raw data will be stored as follows:

- Raw data: **<disk 1>:\sisdata\raw**
- Grid data: **<disk 2>:\sisdata\grids**

The grid data disk will be used internally by SIS, and knowledge of the directory structure on this disk is not required.

The raw data disk contains raw data logged by SIS, i.e. the `*.all` files. The directory structure is by default **\sisdata\raw\<survey_name>**, and the filenames of the `*.all` files are defined during definition of your survey.

The raw data disk also contains the **\common** directory having a number of subfolders and use:

*Table 1 The **<disk 1>:\sisdata\common** subfolders and their contents and use*

Folder name	Contents/Use
3D_models	Default location for 3D models, i.e. AutoCAD (dwg), Inventor (iv) or VRML (wrl) files, to be imported into the geographical view.
ath	Default location for storing Applanix True Heave (ATH) raw data.
background	GeoTIFF files that are generated by pressing the **Save background data** button  are stored in this location.
backup_settings	Every time the **OK** button in the **Installation parameters** frame is pressed a backup file containing current PU parameters is generated. The backup file can be imported using **File→Import PU parameters**. The file name convention is `Backup_<echo_sounder_name>_<serial_number>_<YearMonthDay>_<HourMinuteSecond>`, e.g. `Backup_All_888_20100428_123035.txt`.
bist	Built-In Self Test results are saved to this location if the **Save** button on the **BIST** page is pressed.
compass_dev	This is the default location of any compass deviation files that you may want to use. Compass deviation files applies only if you are using SIS without any EM input, and are using a compass as your heading sensor. The compass deviation file is selected from the **External sensor** page.
Events	Location of events that are logged using the Global Event Marker.

*Table 1 The **<disk 1>:\sisdata\common** subfolders and their contents and use (cont'd.)*

Folder name	Contents/Use
javad	Default location for storing Javad or Trimble GPS raw data.
KSGPL	Default location for storing *.ksgpl files to loaded as background to the geographical view.
maintenance	Default storage location used by SIS Data Logger
message\auto	The **Message service** automatically logs all system generated information, warnings and error messages and stores the files in this location.
planning	This is were the **Planning** module of SIS by defaults stores its files. The file location may be altered by the user using standard Windows **Save as** functionality.
printer_files	Default location for storage of the post script printer files that can be made from the Geographical view by pressing the **Printer** button.
projections	Default location for projection files to be imported into SIS
pu_param	Default location for storage of PU parameter files used by **File→Import PU parameters** and **File→Export PU parameters**.
screendumps	When pressing **Ctrl-S** a screen shot will be created and saved as a `.bmp` file in this location.
srh	Default location for storing Seapath Real Heave (SRH) raw data.
svp_abscoeff	This is where the default absorption coefficient files that SIS uses are located. When you want to load or save an absorption coefficient file from the **Runtime parameters** frame this is the default location for opening or saving the file.
svp_logger	Default location to log raw SVP data to be used in the SVP Logger utility program.
sys_settings	Contains the factory setting PU parameter files for all echo sounder system
terratec	Default location for storing RTCM raw data.
user_settings	Default location for storing the SIS display settings.

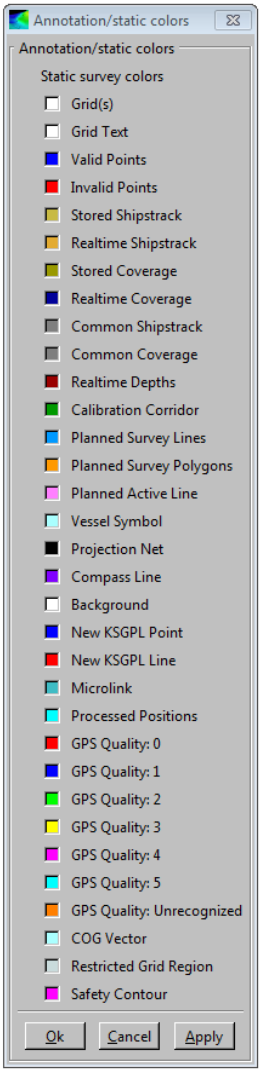
Common display buttons

Each SIS frame holds a toolbar with command buttons for parameter and display settings applicable to that frame.

The display buttons holds the same functionality independent of what frame it applies to. The common display buttons are described in this section.

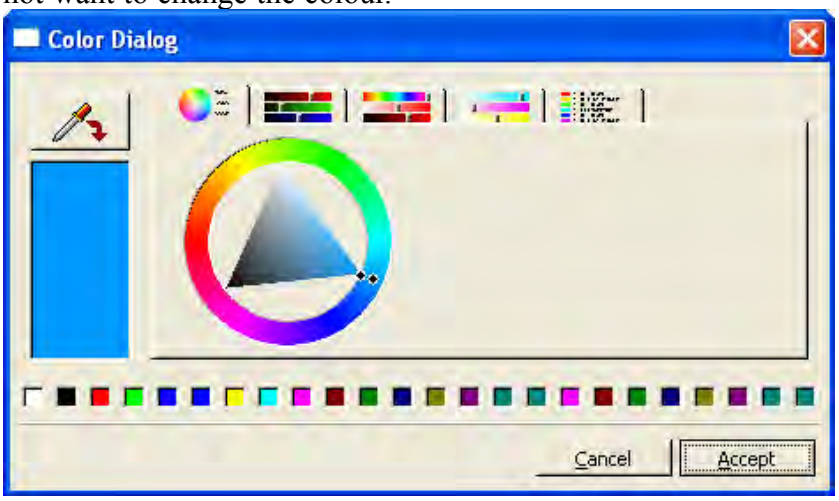
Common display buttons

Annotation colours button

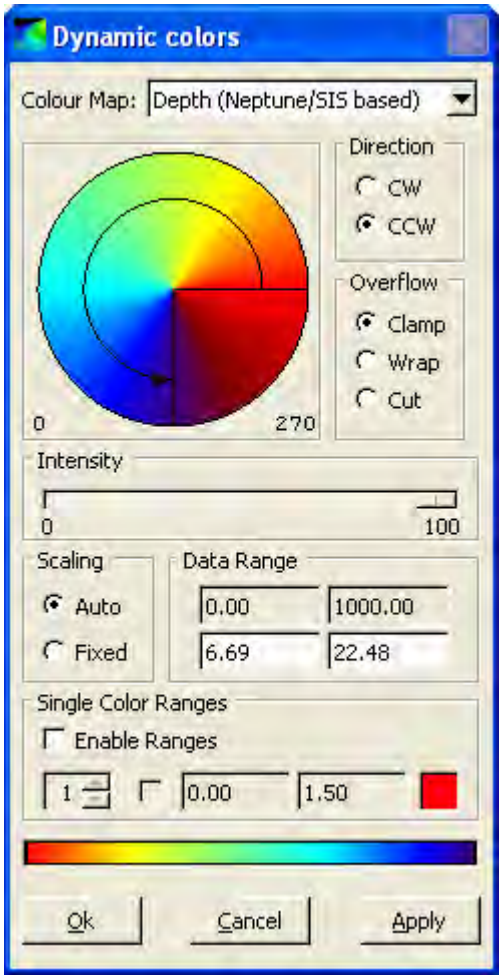


Display Colours: You can change the colours of the various elements displayed by double-clicking in the check box(es). The **Colour Dialog** window will appear. New colours can be selected in a number of different ways (using the eye dropper tool, entering the RGB colour code, using predefined colours etc.).

Select the new colour and click **Accept** to apply. **Cancel** if you do not want to change the colour.



Dynamic colours button



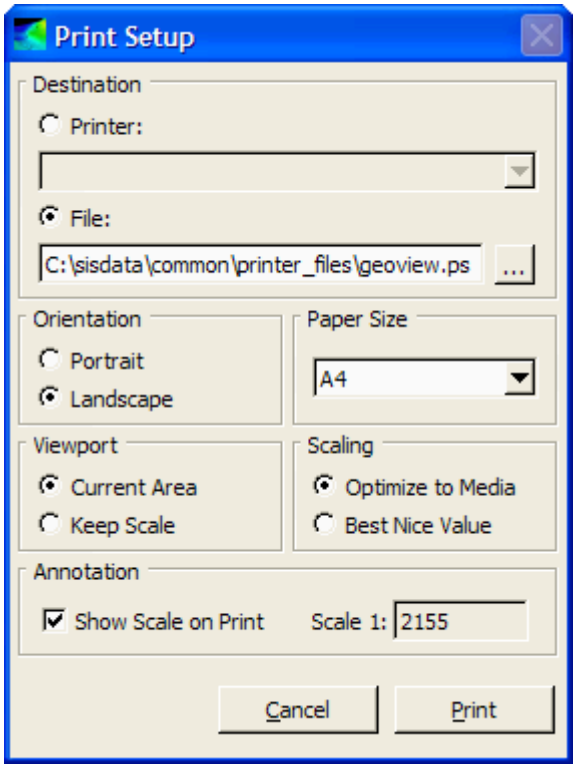
- **Colour map:** Select which objects to set the dynamic colours to.
- **Colour wheel:** Set the colour representation of the dynamic colours. Drag the arrow to set the start and stop limits.
- **Direction:** Set the direction of the arrow (CW or CCW).
- **Overflow:** Choose an overflow strategy for the colours – only valid when fixed scaling is selected.
  - Clamp - lock to the limits
  - Wrap - restart when reaching a limit
  - Cut - do not show data outside the limits
- **Intensity:** Set the intensity of the colours in the colour map. This can be used to dim the colour map for low light conditions.
- **Scaling:** Select automatic or fixed scaling.
- **Data Range:** Manually set the range (max/min) for the selected objects. The total range is automatically found from the data.
- **Single Colour Ranges:** Click in the **Enable** check box to set a range of data values to a single colour. For each set of depth ranges a different colour can be chosen. Double-click in the right check box to open the **Colour Dialog** window.

Note

*The available settings varies slightly depending on what SIS frame the **Dynamic colour** button applies to.*

Print button

Press the **Print** button to print the view. The **Print Setup** dialog will open.



The following options are available:

- **Destination:** Select if you want to send the print to a postscript printer or to a file. Files are saved in postscript format (*.ps).
- **Orientation:** Select page orientation.
- **Paper Size:** Select paper size.
- **Viewport:** Select **Current Area** to print current view.

  Select **Keep Scale** to send a larger area to the printer set by the **Zoom to region** dialogue. When selecting **Keep Scale** the centre of the view will correspond to the centre of the printout.
- **Scaling:** Select **Optimize to Media** to print view with it's actual scale.

  Select **Best Nice Value** to print the view with rounded scale values.
- **Annotation:** Show the scale on the printout or not.

Note

Only postscript printers or plotters can be used.

Zoom and view buttons

Zoom functionality

- in
- out
- to given region
- by mouse
- to ship
- to world
- to active survey
- reset zoom
- reset view

- pause

Zoom in

When you press the **Zoom in** button, the magnification of the view will increase.

Zoom out

When you press the **Zoom out** button, the magnification of the view will decrease.

Zoom to given region

Any user-defined region can be zoomed up to fill the display view. To define the region, perform the following:

1 Press the **Zoom to given region** button.

A **Zoom to region** dialogue box will appear.

2 Fill in the desired scale and the centre coordinates.

Zoom to active survey

When you press the **Zoom to active survey** button, the **Geographical window** will zoom out to an area covering survey data for the active survey.

Zoom to world

When you press the **Zoom to world** button, the **Geographical window** will zoom out to an area covering all loaded survey data. Note that if the data areas are small and widely spread out the data may become invisible.

Zoom to ship

When you press the **Zoom to ship** button, the **Geographical window** will zoom to wherever the ship is located in the world. This button will be disabled if no vessel is present.

Zooming using the mouse

In addition to using the zoom buttons above you can also:

- Zoom in or out on the data by using the mouse wheel
- Zoom in on a specific region by pressing the left mouse button, drag the mouse to a new location and then release the mouse button

Zoom Reset button

Reset the display after a zoom operation. This button is only active if the display has been zoomed. Clicking on this button will reset the start and stop ranges and the start and stop range modes.

Reset View Button

Reset pan, zoom and rotation to default values.

Pause button

Pause or continue the display of data. While paused, the display is visible, but not updated.

Scale buttons

Scale functionality

- auto scale
- auto scale once
- fixed scale

Auto Scale button

Set the **Start Range Mode** and the **Stop Range Mode** of both the depth and across axes to Auto.

When the **Start Range** is set to **Auto**, the start range of each axis is automatically set to the minimum value in the data set each time data is received. When the **Stop Range** is set to **Auto**, the stop range of each axis is automatically set to the maximum value in the data set each time data is received.

This button provides a quick and convenient way to set both the start and stop ranges to Auto.

Pressing this button is equivalent to opening the **Show/Hide** dialogue and selecting **Start Range→→Auto** and **Stop Range→→Auto** for both the depth and across axes.

Auto Scale Once button

Set the **Start Range Mode** and the **Stop Range Mode** (of both the depth and across axes) based on the values of the current data set, then lock to this range setting for the remaining of the data.

The fixed start and stop range values in the **Show/Hide** dialogue will be updated with the new values. This is a quick and convenient way to change to Fixed range mode and simultaneously update the fixed start and stop ranges with values appropriate for the current water column data.

Note

Pressing this button will update the Fixed start range value and the Fixed stop range value in the Show/Hide dialogue.

Fixed Scale button

Set the **Start Range Mode** and the **Stop Range Mode** of both the depth and across axes to Fixed. The start and stop ranges will be set to the values that were last entered in the respective **Start/Stop Range** text boxes in the **Show/Hide** dialogue.

This button provides a quick and convenient way to set the start and stop ranges of both axes to **Fixed**.

Pressing this button is equivalent to opening the **Show/Hide** dialogue and selecting **Start Range→→Fixed** and **Stop Range→→Fixed**.

Note that this is not equivalent to clicking on the Auto Scale Once button because the Fixed Start/Stop Range values in the Show/Hide dialogue are not updated in this case.

Windows and views

This chapter describes the various **frames** in SIS.

Seven frames can be displayed at the same time. The content of each and every frame is defined by using the **Frame selection** button.

When the wanted frame configuration has been set up you may save the frame configuration for later retrieval. The frame configuration is saved from the main menu, **File→Save settings**.

Monitoring Windows

Survey administration windows

Parameter setup windows

Calibration window

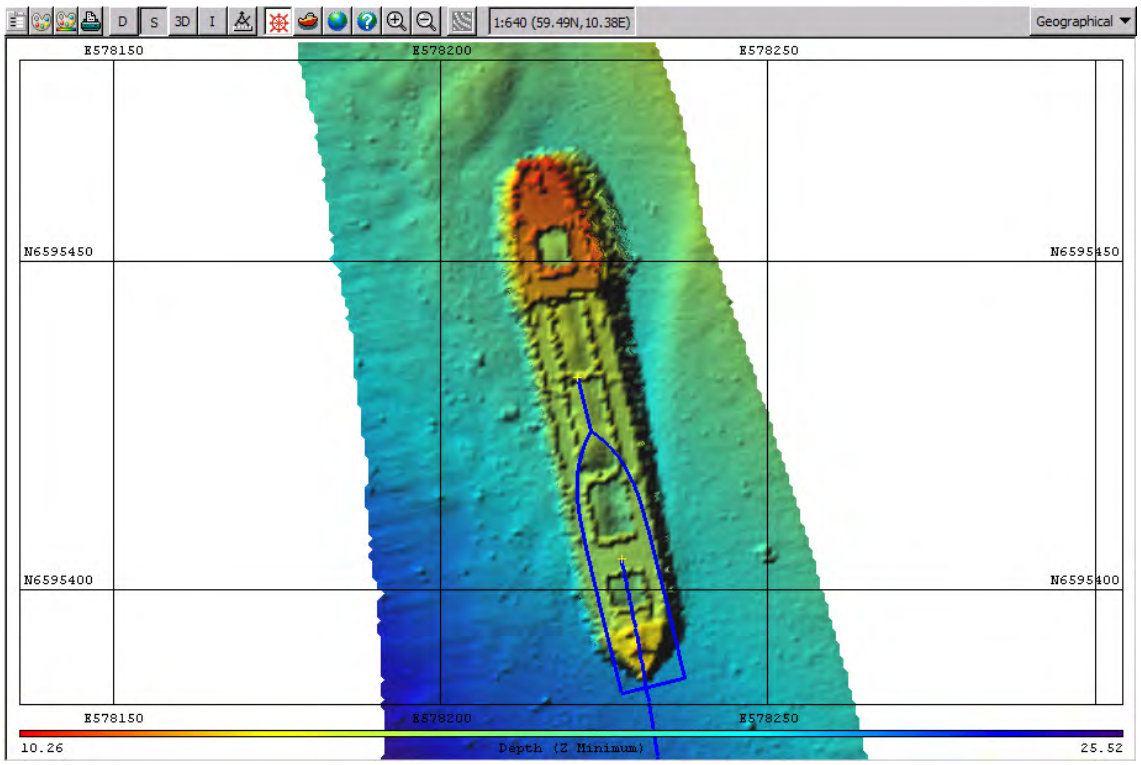
Geographical view

The **Geographical** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The main purpose of the **Geographical** window is to show geographical data like surveys, shipstracks, coverage, planned lines and so on. The window consists of a geographical region with a toolbar on top. It can also be referred to as main window.

This window is valid for all instruments.



Toolbar buttons

Figure 6 Toolbar example

The toolbar of the Geographical window holds the following buttons (from left to right):

Click this button	To
	Enter the geographical display options
	Set annotation colours
	Set dynamic colours

Click this button	To
	Print the view
	Show depth under cursor
	Toggle grid shading on/off
	Toggle between 2D or 3D
	Enter inspection mode
	Use the position and distance measure. Show position under cursor.
	Enter KSGPL edit mode (when selected)
	Enter planning edit mode (when selected)
	Enter calibration edit mode (when selected)
	Follow ship
	Zoom to ship
	Zoom to world
	Zoom to active survey
	Zoom to given region
	Zoom in
	Zoom out
	Load background data in .bgksgpl format
	Save background image in GeoTIFF format
	Enter C-Map manipulation mode (only available when C-Map is installed)

Note

There can only be one edit button activated at a time.

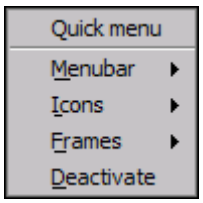
Modeless operation

- To open the **Options** menu as a modal dialogue, left click the **Option** button.
- To open the **Options** menu as a modeless dialogue, hold down the CTRL key and left click the **Option** button. In this mode, you can continue to use the SIS user interface while the dialogue is open.
- To open the **Options** menu as a modeless dialogue that always remains on top of other windows, hold down the CTRL+SHIFT keys and left click the **Option** button. In this mode, you can continue to use the SIS user interface while the dialogue is open and the dialogue will always remain on top of the SIS user interface.

Note

The "modeless" operation of the Options menu is not fully implemented. If a parameter is changed via the SIS user interface while the dialog is open, the dialog will not be updated to reflect the change. For example, if you use the 'S' toolbar button toggle grid shading while the dialog is open, the grid shading setting of the Options dialog will retain its current setting. The next time you apply settings from the dialog the grid shading will be toggled back to its original setting. Although the modeless operation is not fully implemented, it has been included in this release because it is still a useful feature, because most of the actions you can perform via the SIS user interface do not affect the dialogue settings.

Quick menu



The **Geographical window** have a quick menu accessed by clicking on the right mouse button inside the view. The following features can be accessed from this menu:

- **Menubar**
  - Annotation colours
  - Dynamic colours
  - Options
  - Print
- **Icons**
  - Small icons
  - Large icons
- **Frames**
  - Empty
  - All available display frames
- **Activate/Deactivate** - toggle between Activate/Deactivate depending on the current mode of the **Geographical window**

Related operational procedures

- *How to display realtime depths* on page 146
- *How to display a smooth surface* on page 149

- *How to look for artifacts* on page 150
- *How to display seabed imagery data in the Geographical view* on page 147
- *How to create and use a GeoTIFF background image in the Geographical view* on page 150
- *How to display sound velocity at transducer depth in the Geographical view* on page 148

Related topics

- *Keyboard and mouse in the Geographical view* on page 38

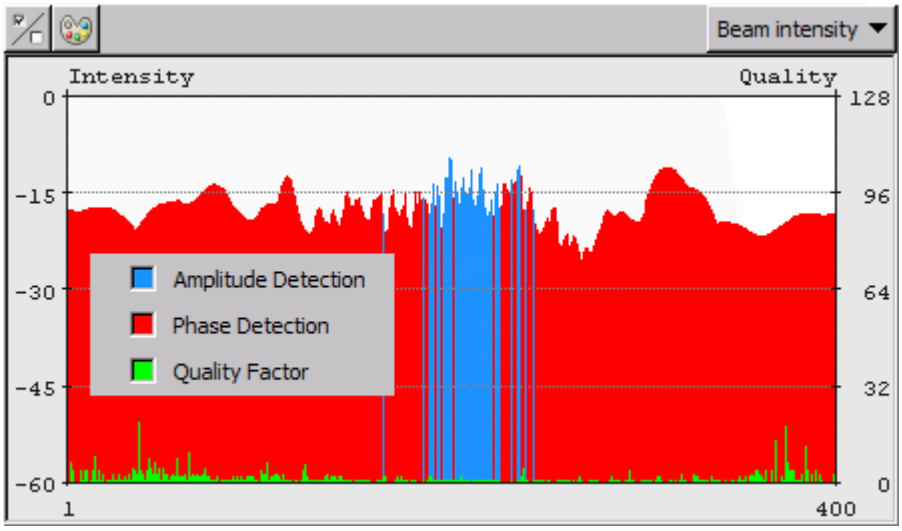
Beam intensity view

The **Beam intensity** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Beam intensity** view gives a graphical presentation of the beam intensity and signal quality factors.

This window applies to multibeam echo sounders.



The window contains scales along the left and right vertical axes, giving the signal strength in dB values on left side and the quality measure for the data on right side. The beam numbers are shown along the horizontal axis. This number depends on the echo sounder model.

The window presents two types of bars, either red or blue, for each individual beam. The bar colour shows what type of bottom detection used for each beam; blue for amplitude detection and red for phase detection.

The value of each bar is the backscatter signal strength of the bottom presented in dB. The values are corrected for system parameters, but not for any dependence upon angle of incidence.

Normally the backscatter signal strength will be highest straight down, typically -15 dB, and lowest in the outer beams, typically -35 dB. The signal strength depends on bottom material type and roughness (±15 dB or more).

The green bar shows a data quality measure for each beam. Small values (on a scale from 0 to 64 or 128) convey good data quality.

Toolbar buttons

The toolbar of the **Beam intensity** window holds the following buttons (from left to right):

Click this button	To
	Enter the beam intensity view's show/hide options
	Set annotation colours

Related operational procedures

- *How to verify echo sounder main functions* on page 146

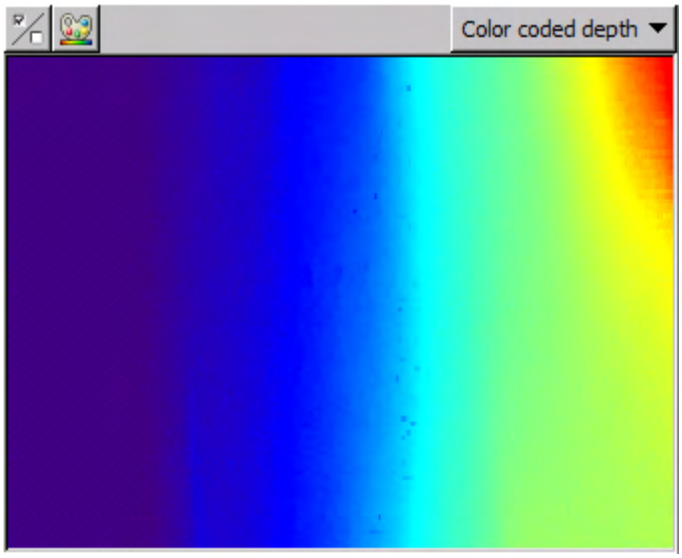
Colour coded depth view

The **Colour coded depth** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Colour coded depth** window shows the depth per beam shown by colour codes. A history buffer of varying size is used. The size of the history buffer depends on the size of the display. One vertical screen unit (pixel) is used per ping. Increasing the vertical size of the display area increases the number of vertical screen units, thus increasing the history buffer size.

The **Colour coded depth** window applies to multibeam echo sounders.



Toolbar button

The toolbar of the **Colour coded depth** window holds the following buttons (from left to right):

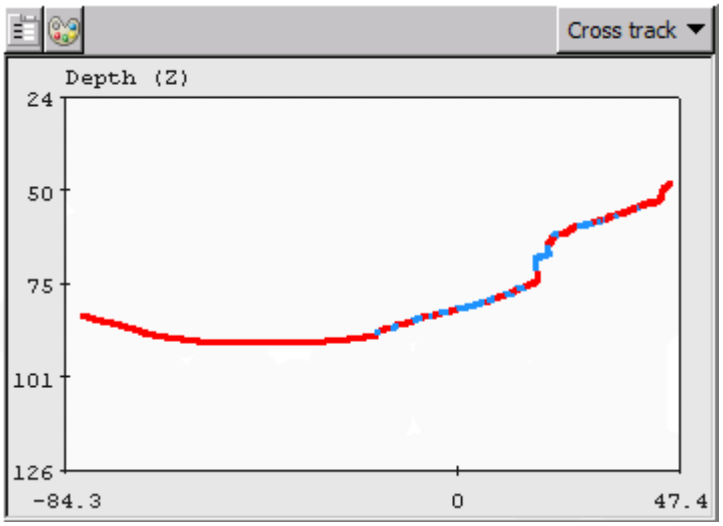
Click this button	To
	Enter the colour coded depth show/hide options
	Set dynamic colours

Cross track view

The **Colour coded depth** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **cross track** window shows the measured depths in all beams from the last ping. This window applies to the multibeam echo sounders.



The display contains a depth scale along the left-hand (vertical) axis and beam numbers or metres along the horizontal axis.

Different colours are used to show if a beam has a valid bottom detection, and if so what type of detection has been used. Red is used to show beams with phase detection, blue is used to show beams with amplitude detection. Beams without any detection are not shown.

Toolbar buttons

The toolbar of the **Cross track** window holds the following buttons (from left to right):

Click this button	To
	Enter the cross track display options
	Set annotation colours

Modeless operation

- To open the **Options** menu as a modal dialogue, left click the **Option** button.
- To open the **Options** menu as a modeless dialogue, hold down the CTRL key and left click the **Option** button. In this mode, you can continue to use the SIS user interface while the dialogue is open.
- To open the **Options** menu as a modeless dialogue that always remains on top of other windows, hold down the CTRL+SHIFT keys and left click the **Option** button. In this mode, you can continue to use the SIS user interface while the dialogue is open and the dialogue will always remain on top of the SIS user interface.

Note

The "modeless" operation of the Options menu is not fully implemented. If a parameter is changed via the SIS user interface while the dialog is open, the dialog will not be updated to reflect the change. For example, if you use the 'S' toolbar button toggle grid shading while the dialog is open, the grid shading setting of the Options dialog will retain its current setting. The next time you apply settings from the dialog the grid shading will be toggled back to its original setting. Although the modeless operation is not fully implemented, it has been included in this release because it is still a useful feature, because most of the actions you can perform via the SIS user interface do not affect the dialogue settings.

Related operational procedures

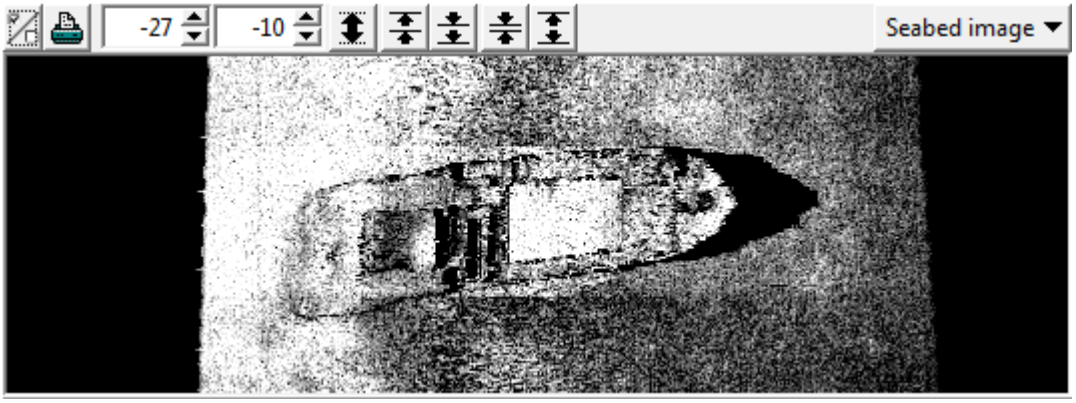
- *How to verify echo sounder main functions* on page 146

Seabed image view

The **Seabed image** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Seabed image** displays the seabed backscatter data. For each ping a straight line is plotted, this covers the swath width. The darkness of the display at any point represents the reflectivity of the bottom.

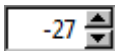
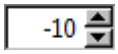


The horizontal distance between the outermost crosses in the view is set by the swath width across parameters max and min. If these are set to be ±50 m, the total distance is 100 m. This can be used to make rough dimension estimates of artefacts on the seabed.

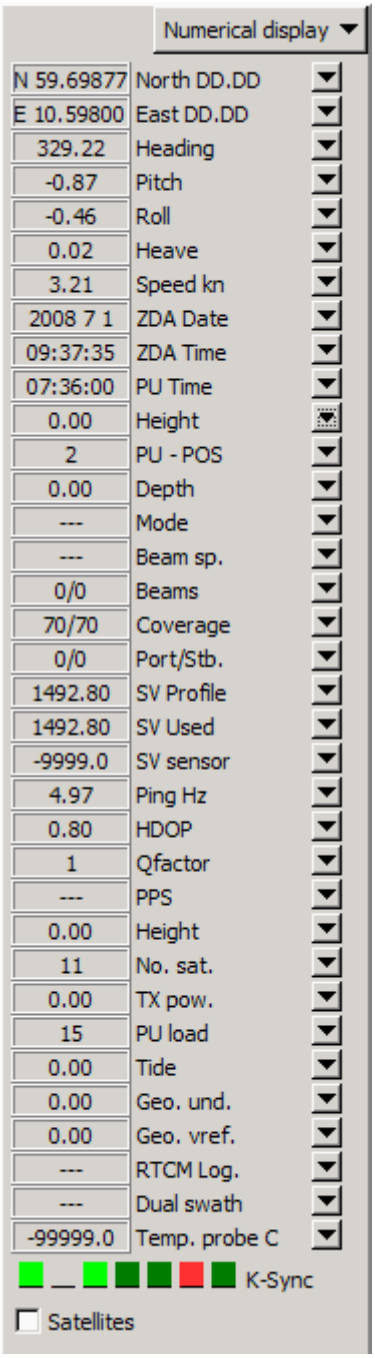
This window applies to the multibeam echo sounders.

Toolbar button

The toolbar of the **Seabed image** window holds the following buttons (from left to right):

Click this button	To
	Enter the seabed image show/hide options
	Print the view
	Range Minimum: Minimum value of dynamic range used for computing colour map for display. Use the arrows to increade/decrease or enter the value.
	Range Maximum: Maximum value of dynamic range used for computing colour map for display. Use the arrows to increade/decrease or enter the value. The maximum value will not exceed 0 dB.
	Automatically set the range minimum and maximum values. The current maximum and minimum values of beam intensity from the most recent depth datagram are used (these values are shown in the beam intensity display). However, the minimum range window size (for range auto) is limited to 20 dB, so the maximum and/or minimum values may be adjusted if necessary to satisfy this criteria.
	Move the range up (in dB) by increasing both the range minimum value and range maximum value by 1 dB. The maximum value will not exceed 0 dB, so the range will not be moved up past this point.
	Move the range down (in dB) by decreasing both the range minimum value and range maximum value by 1 dB.
	Narrow the range by decreasing the range maximum by 1 dB and increasing the range minimum by 1 dB.
	Widen the range by increasing the range maximum by 1 dB and decreasing the range minimum by 1 dB. The maximum value will not be increased past 0 dB.

Numerical display



The **Numerical display** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

The **Numerical display** window allows you to monitor various SIS parameters. The parameters cannot be changed here. Exceeded limits are shown by red.

If you press the button next to the text, an alphabetically ordered list with selectable parameters will appear. Choose the parameter you want to monitor.

This window applies to all instruments.

Some parameters applies to specific instruments only.

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145
- *How to monitor the survey progress* on page 186
- *How to verify echo sounder main functions* on page 146

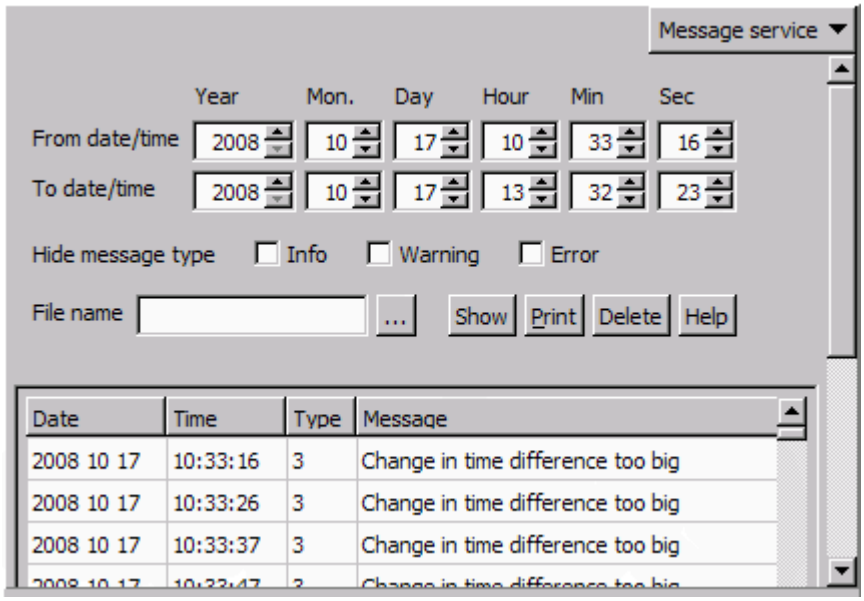
Message service view

The **Message service** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Message service** instantaneously displays and logs all system generated information, warnings and error messages. The automatic generated log files are store in `..sisdata/common/message/auto`.

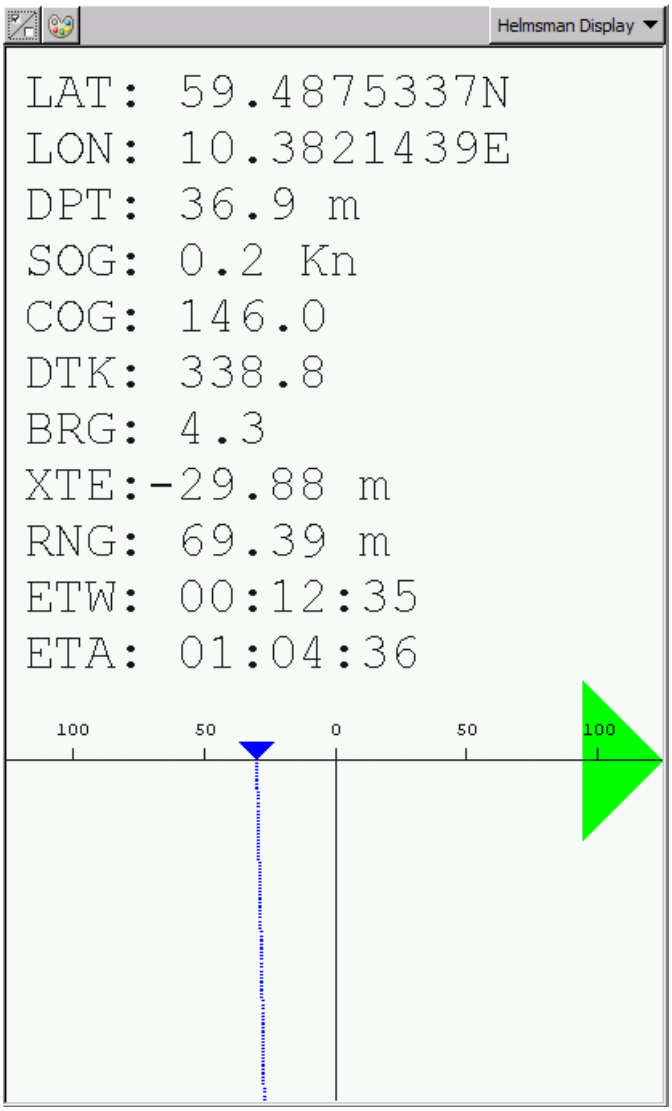
This window applies to all instruments.



Related operational procedures

- *How to monitor the external sensors in SIS* on page 145
- *How to monitor the survey progress* on page 186

Helmsman display view



The **Helmsman Display** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Helmsman Display** provides steering guidance of the ship relative to planned survey lines.

This window applies to all instruments.

A line may have several waypoints, and the DTK, XTE, CMG and DST deviation indicators all show their values to the next waypoint or to the current line segment. The scale changes automatically. Red and green arrows indicate that the helmsman have to steer port or starboard to relocate. Before the ship reaches the start of the line, the indicator will form an arrow pointing downwards.

When reaching the end of the line (or before entering the line) the Helmsman Display will continue to display the ship's position relative to the continuation of the last line segment of the planned line.

Note

*The **Helmsman display** must be active when SIS is controlling the Autopilot.*

Toolbar buttons

The toolbar of the **Helmsman display** window holds the following buttons (from left to right):

Click this button	To
	Enter the helmsman display show/hide options
	Set annotation colours

Related operational procedures

- *How to start the Remote Helmsman Display* on page 189
- *How to plan a new job in SIS* on page 185
- *How to retrieve a planned job* on page 185
- *How to display planned lines on the Remote Helmsman Display* on page 190

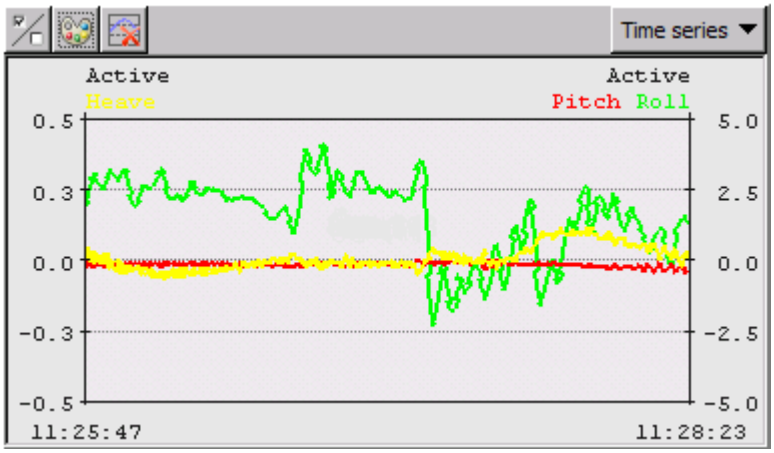
Time series view

The **Time series** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Time Series** window is used for presenting external interfaces or depth information as time series. Information from one or more sensors or beams can be selected.

Time series may be useful for detection of incorrect performance of the sensors or of incorrect depth determination.



Toolbar buttons

The toolbar of the **Time series** window holds the following buttons (from left to right):

Click this button	To
	Enter the time series show/hide options
	Set annotation colours
	Clear plot

Related operational procedures

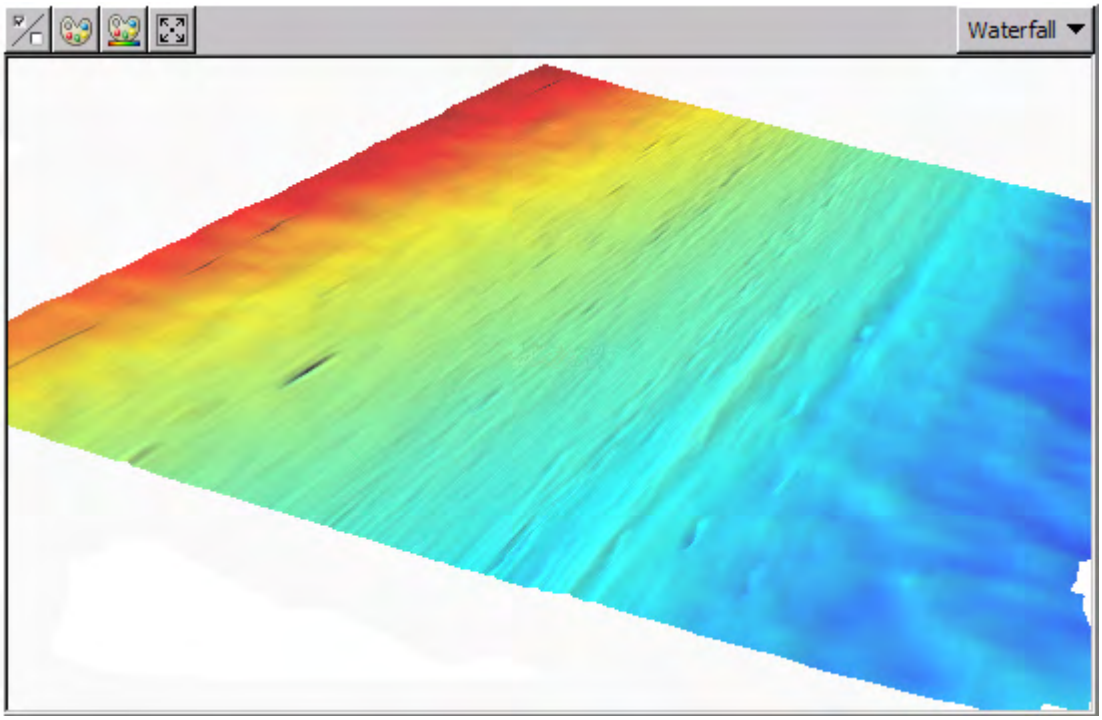
- *How to monitor the external sensors in SIS* on page 145

Waterfall view

The **Waterfall** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

In the **Waterfall** window the depth profiles from a number of pings are displayed as a function of acrosstrack horizontal distance with a small vertical offset between each profile. This gives a crude 3D representation of the most recently measured bottom area.



Note that the colour coding applied to the profiles shows depth levels, not bottom detection.

Toolbar buttons

The toolbar of the **Waterfall** window holds the following buttons (from left to right):

Click this button	To
	Enter the Waterfall show/hide options
	Set annotation colours
	Set dynamic colours
	Reset the view

Related operational procedures

- *How to verify echo sounder main functions* on page 146

Related topics

- *Keyboard and mouse in the Waterfall view* on page 39

Water column view

The **Water column** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The Water column display shows a graphical image of biomass and other acoustic reflectors that might be present in the water column. The received amplitude of the reflected signal through the entire water column for each beam is presented. The vertical scale on the left of the display shows the depth in metres. The horizontal scale along the bottom of the display shows the across track distance in metres. The seafloor is shown as a yellow or red band in the data view.

The display may be found useful for debugging and for habitat monitoring.

A TVG fiunction (x log) is applied to the data.

The **water column** window applies to multibeam echo sounders with water column capabilities.

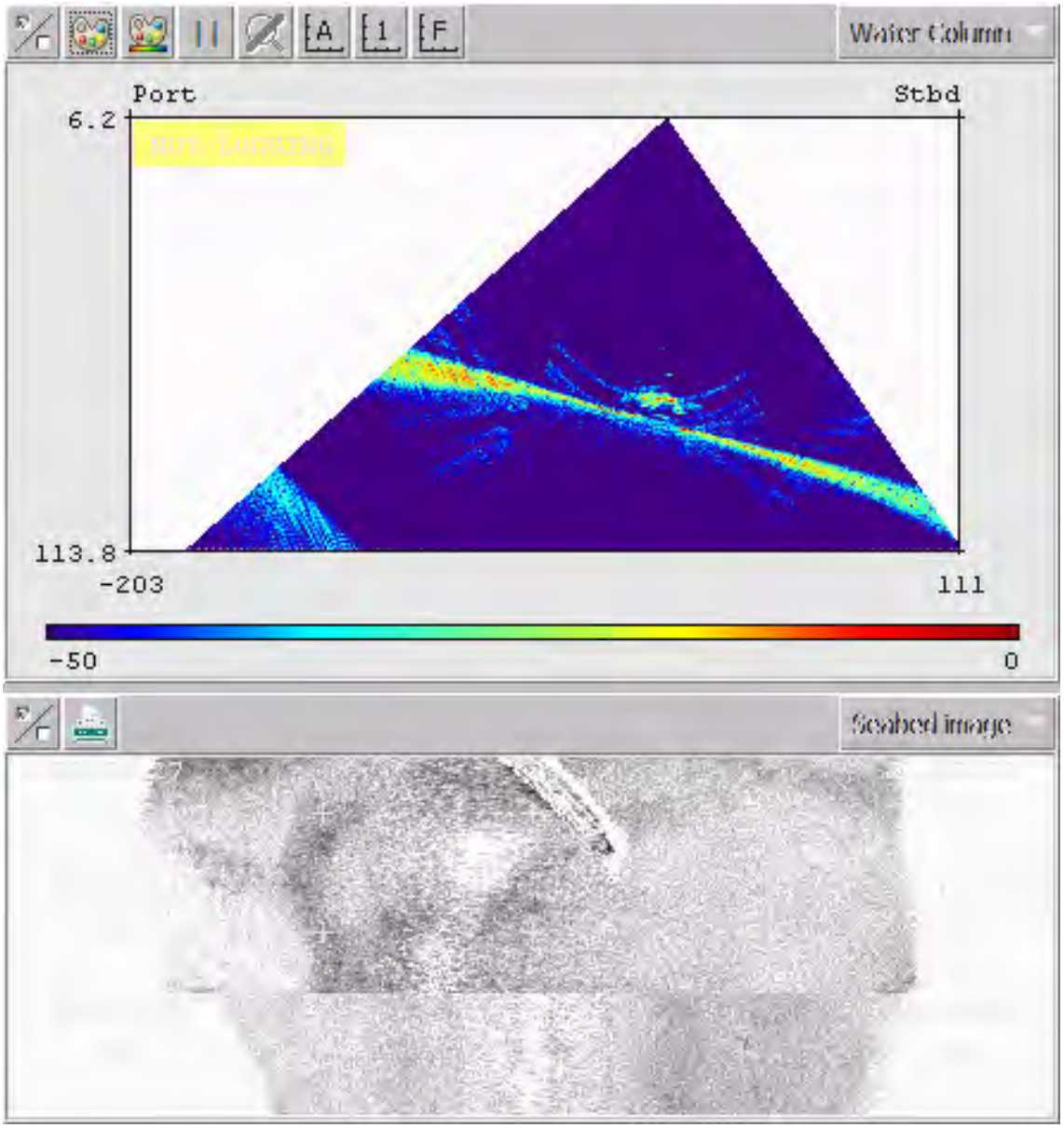
There is a short-cut to forcing the bottom detection around the depth selected by the mouse.

There is also a short cut to select scope display beam number.

Related topics

- *Keyboard and mouse in the Water column view* on page 40

Figure 7 Water column data with associated seabed image – passing a wreck



Note

Sound velocity corrections and ray bending corrections are not applied.

Water column logging

Water column data can selectively be logged to either the standard log file (.all) or to a separate water column file (.wcd). Water column datagrams can not be logged to both files simultaneously.

Water column logging to separate file must be enabled in the **Output setup** tab under **Installation parameters**.

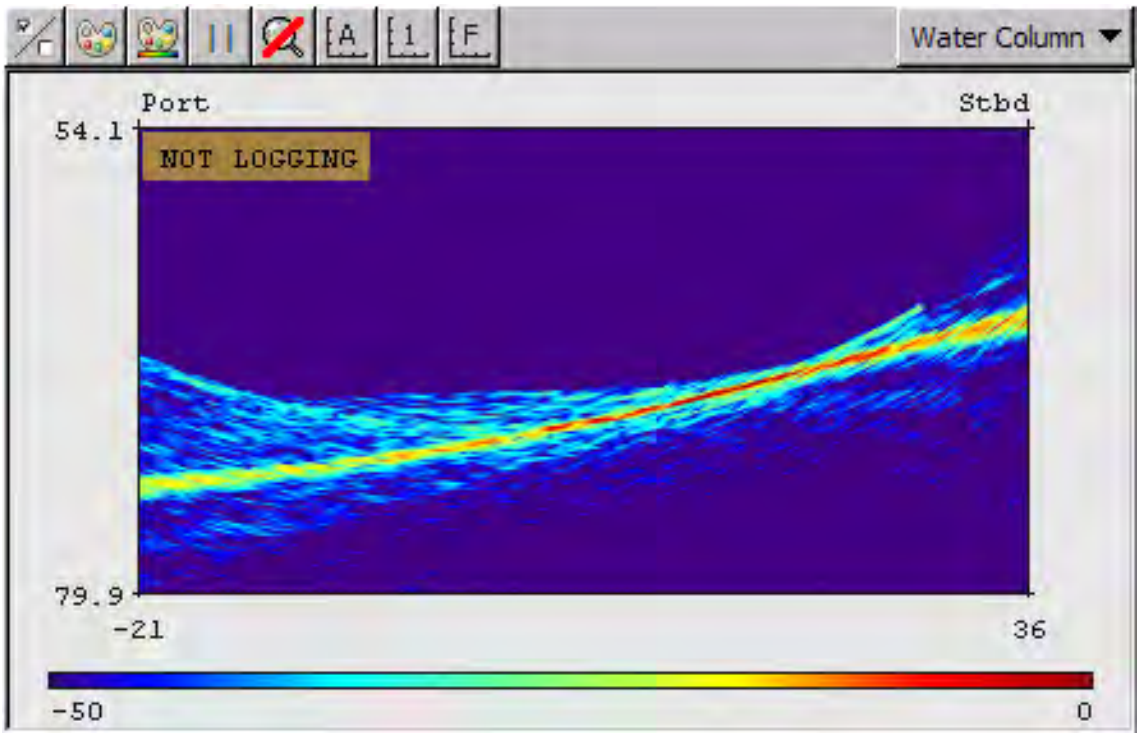
Logging is toggled on/off from the **Main toolbar**.

Please note that the logged data amount is very large, that is, typically 1 to 2 Gigabytes per hour.

Separate water column data (.wcd) files may optionally be logged to a disk different from the one used for the raw data (.all) files. Water column data file locations are set from the **Logging** option accessed from **Tools→Custom→Set Parameters** for details.

Zooming

It is possible to zoom in to a region of the grid by clicking the left mouse button and dragging a rectangle around a region of the grid. When the left mouse button is released, the region of the grid to which you have zoomed will be displayed.



Note that the **Zoom Reset** button now will be enabled, i.e. not longer dimmed. It is possible to zoom in even further, by clicking and dragging a rectangle inside the zoomed region.

To reset the zoom, click the **Zoom Reset** button. This will return the display to original scale. You can also reset the zoom by selecting one of the auto range options from the **Show/Hide** dialogue.

Toolbar buttons

The toolbar of the **Water column** window holds the following buttons (from left to right):

Click this button	To
	Enter the Water Column show/hide options
	Set annotation colours
	Set dynamic colours
	Pause the water column display
	Reset zoom
	Scale the axes automatically
	Scale the axes to currently received data
	Scale the axes to fixed values

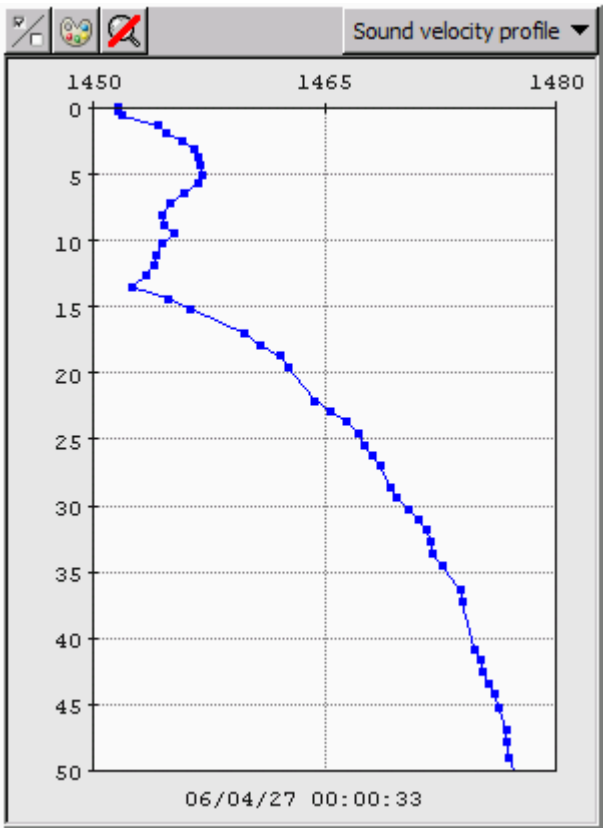
Related operational procedures

- *How to verify echo sounder main functions* on page 146
- *How to log water column data* on page 155

Related topics

- *Keyboard and mouse in the Water column view* on page 40

Sound velocity profile view



The **Sound velocity profile** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Sound velocity profile** window is used for displaying the sound velocity profile being used by the multibeam echo sounder. It is not an editor.

The profile is a sequence of points. These have coordinates with increasing depth values.

Toolbar buttons

The toolbar of the **Sound velocity profile** window holds the following buttons (from left to right):

Click this button	To
	Enter the Sound Velocity Profile show/hide options
	Set annotation colours
	Reset zoom

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145
- *How to collect the sound velocity profile* on page 127
- *How to convert your sound velocity profile to SIS format* on page 128
- *How to modify and load a sound speed profile into SIS* on page 136
- *How to display sound velocity at transducer depth in the Geographical view* on page 148

Related topics

- *Keyboard and mouse in the Sound velocity profile view* on page 39

Scope display

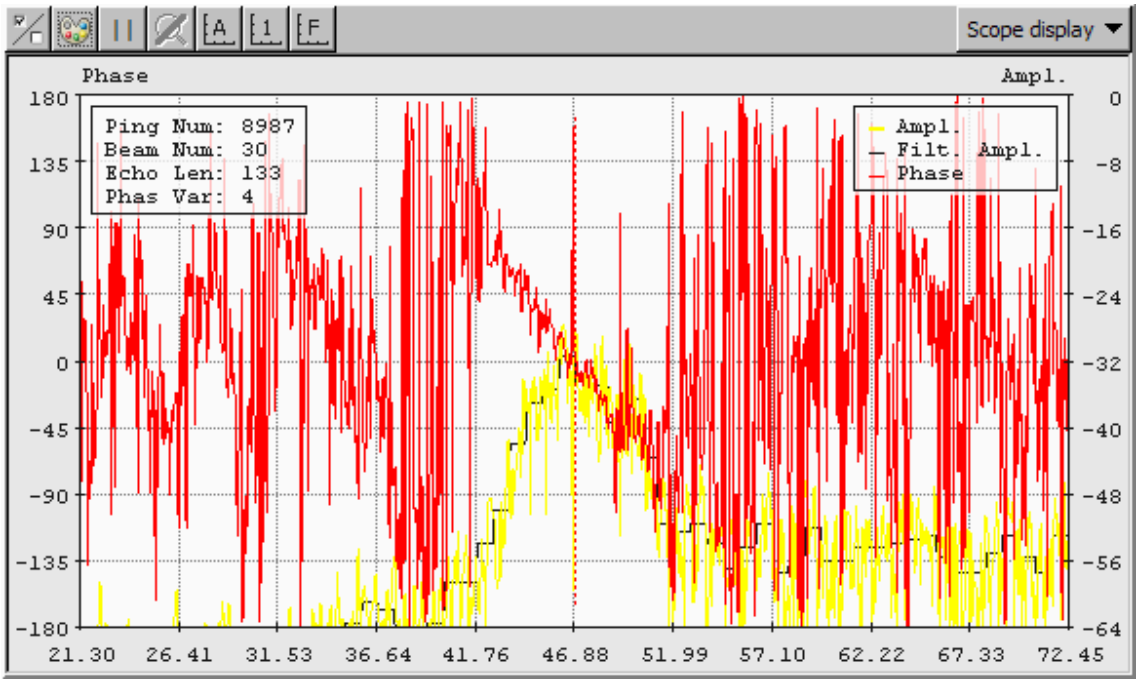
The **Scope display** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Scope display** is used for investigating the receiver echo data. It is mainly used for test purposes. The data is not logged.

The Scope display window applies to all multibeam echo sounders.

The data is presented as an xy series, having time on the horizontal x-axis and receiver echo level on the vertical y-axis. Beams close to normal incidence will have short echo and a noisy split beam phase signal. The outer beams will normally have a long echo and a well-defined phase curve. The range for the bottom detection is indicated by a vertical dotted line. Amplitude detection, filtered amplitude detection and phase detection are plotted.



Beam number to investigate is selected from **Runtime parameters→Simulator**. For system with dual swath capability the Swath number for the Scope Display is also selected from here.

The example above shows a phase detection for beam number 30.

Toolbar buttons

The toolbar of the **Scope display** window holds the following buttons (from left to right):

Click this button	To
	Enter the Scope display show/hide options
	Set annotation colours
	Pause the scope display
	Reset zoom
	Scale the axes automatically
	Scale the axes to currently received data
	Reset zoom

Stave display

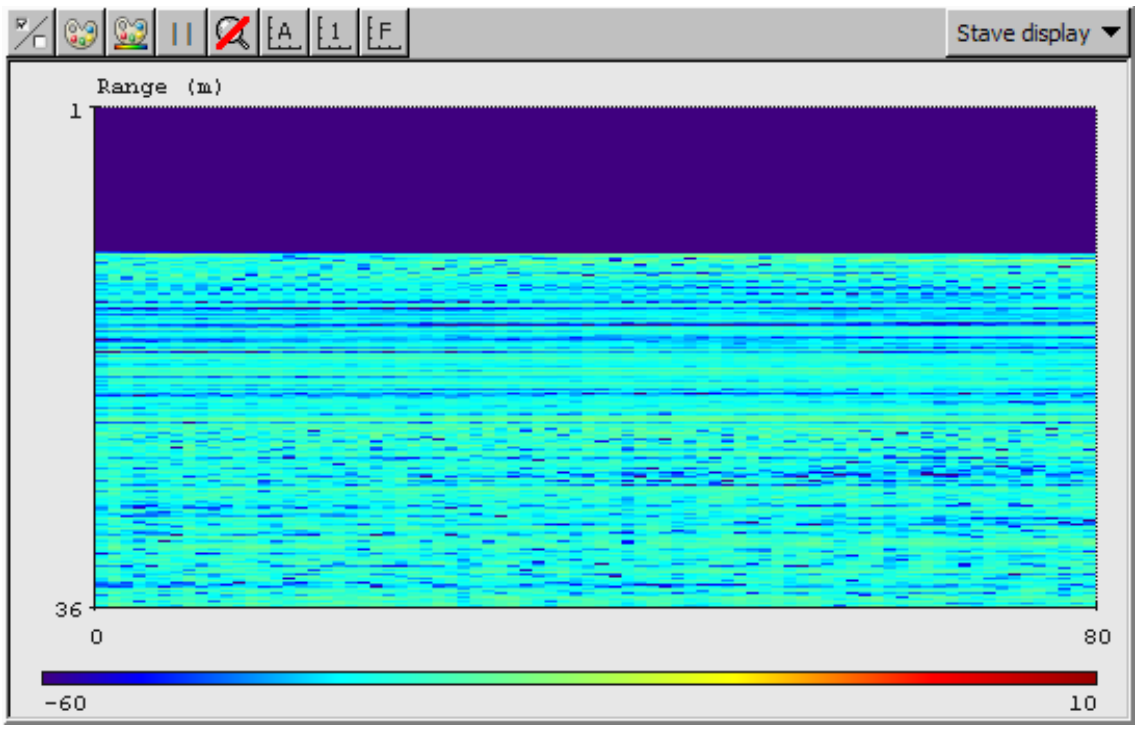
The **Stave display** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Stave display** window shows a graphical presentation of the status of all the receiver elements or staves in the multibeam. The number of staves varies from multibeam to multibeam.

The Stave display can be helpful for debugging and verifying the performance of a system, establishing if there is interference from other systems, if there are air bubbles etc. The data is not logged.

This window applies to multibeam echo sounders with stave display capabilities.



The Stave display presents a grid in which each row of the grid corresponds to one data sample, and each column in the grid corresponds to one receive stave. Each grid cell shows the received signal level for the corresponding sample and stave.

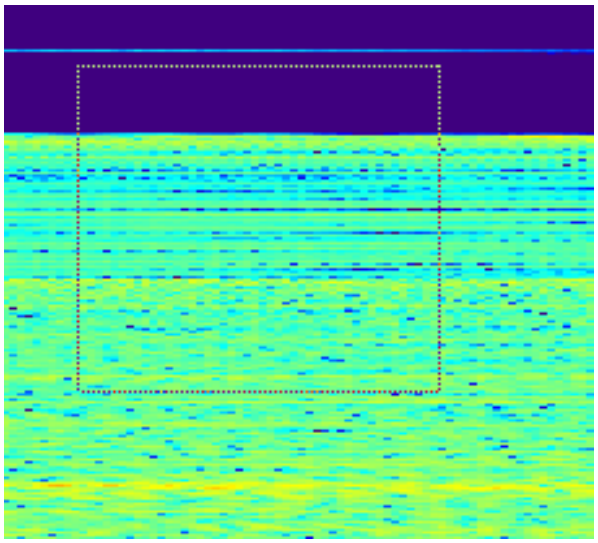
The scale along the left vertical axis shows the sample number, the scale along the right vertical axis shows the range in meters, and the scale along the horizontal axis at the bottom shows the stave number.

Toolbar buttons

The toolbar of the **Stave display** window holds the following buttons (from left to right):

Click this button	To
	Enter the Scope display show/hide options
	Set annotation colours
	Set dynamic colours
	Pause the scope display
	Reset zoom
	Scale the axes automatically
	Scale the axes to currently received data
	Reset zoom

Zooming

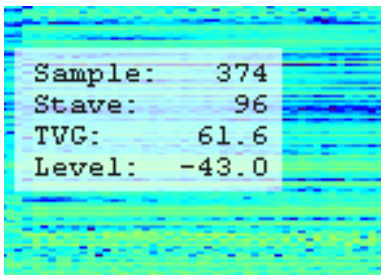


You may zoom in to region of the grid by clicking the **left mouse** button and dragging a rectangle around a region of the grid.

When the left mouse button is released, the region of the grid to which you have zoomed will be displayed. Note also that the **Zoom Reset** button will now be enabled (i.e. it is no longer dimmed). It is possible to zoom in even further by clicking and dragging a rectangle inside the zoomed region.

To reset the zoom, click the **Zoom Reset** button. This will return the display to the scaling mode that existed prior to the original zoom operation. You can also reset the zoom by selecting one of the auto range options from the **Show/Hide** dialogue.

Displaying cell information

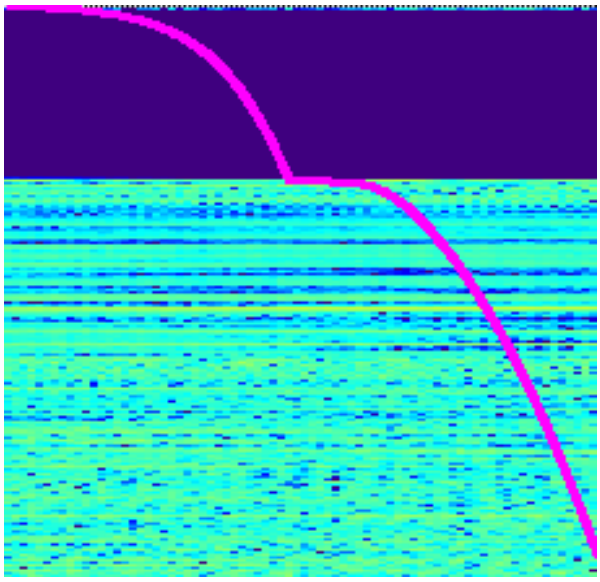


It is possible to display the sample number, stave number, TVG and level for any grid cell. To display the cell information, hold down the **Ctrl** key and click **left mouse** button on the desired grid cell. Because the size of the grid cells sometimes is very small (down to several cells per screen pixel), it may be necessary to first zoom into a region of the grid before clicking on a cell.

The cell information will remain on the screen and will be updated in real time as stave data is received until the user left clicks somewhere inside the grid.

The user can repeatedly display cell information for several cells by holding down the **Ctrl** key and repeatedly clicking **left mouse** button on different grid cells. In this case, it may be helpful to pause the display first (otherwise the data will continue to be updated in real time).

TVG curve



It is possible to display the TVG (Time Varying Gain) curve on top of the stave data. The TVG curve can be shown or hidden from the **Show/Hide** dialogue. The TVG curve scale is not shown, however it is possible to determine the TVG value at any location on the curve by pressing the **Ctrl** key and **left mouse** button on that location on the curve.

PU sensor status view

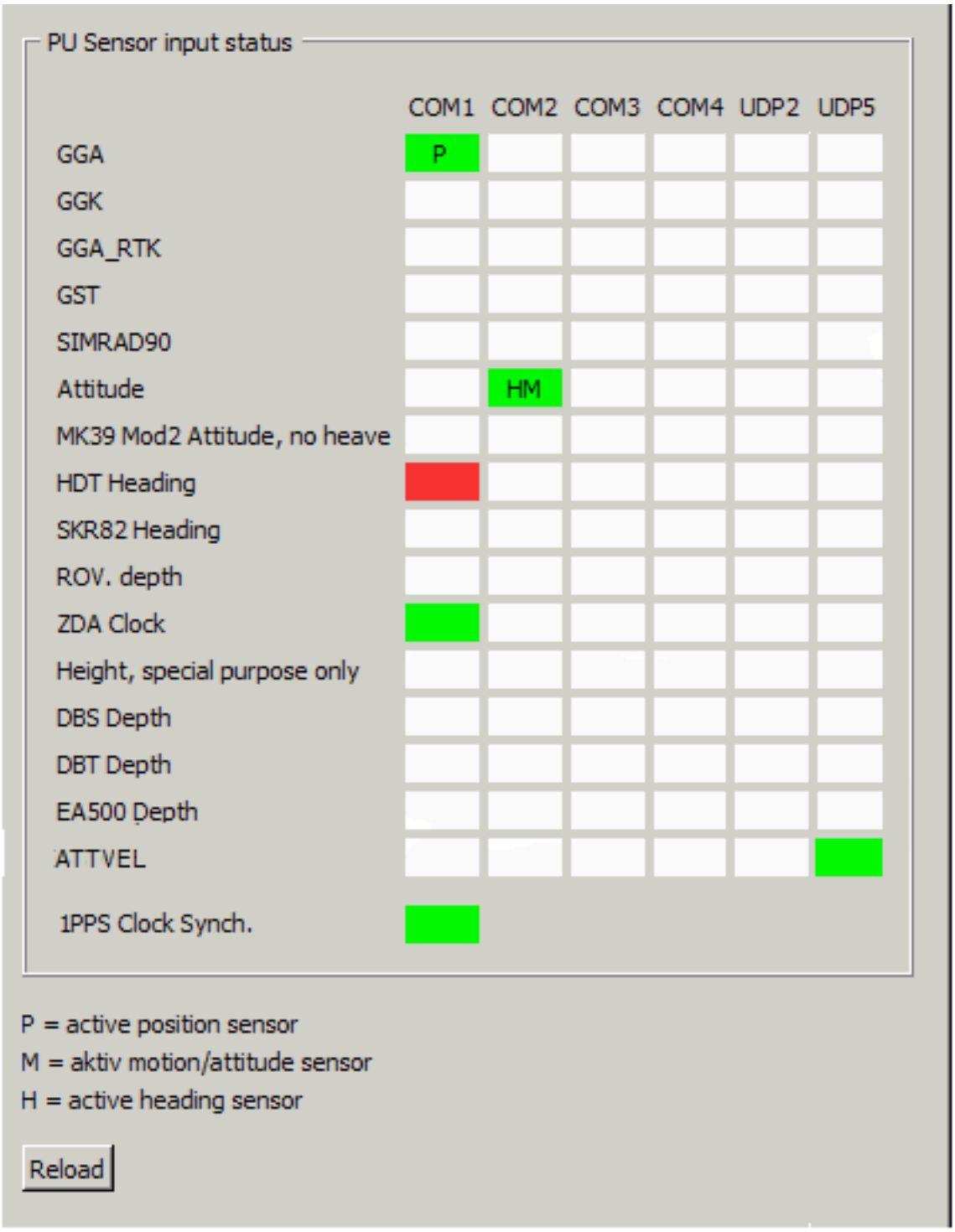
The **PU sensor status** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Note

*The **PU – Processing Unit** may be a separate hardware unit or an integrated part of the **TRU – Transceiver Unit** cabinet, depending on echo sounder system.*

For SIS it makes no difference whether the communication is with a PU or a PU inside a TRU. The term PU is used in this manual.

The window is intended for giving an overview of the current reception status of all selected sensor inputs on a PU. It shows which sensors are selected as active sensors. The information refers to the PU (Processing Unit) of the echo sounder selected as **Current echo sounder** combo box in the **Main** toolbar.



The status information is presented as a matrix with columns with the PU input ports and a row for each of the available sensor types. The settings in this matrix reflects the settings in the Installation parameters frame (i.e. **Installation parameters→PU Communication Setup→Input Setup**). Colours are used to represent the status as follows:

White: Combination not selected.

Green: Input from sensor selected and received

Red: Input from sensor selected, but not received.

Yellow: Input from sensor selected and received but having poor quality.

Any letters in the marked combinations are used to indicate which combination is set as the active sensor. Different letters are used in the different supported languages. The English equivalents are:

P: The marked combination is set as active position sensor.

M: The marked combination is set as active motion attitude sensor.

H: The marked combination is set as active heading sensor.

The display is updated with a frequency of 1 Hz and any changes done in the **Installation parameters** frame will be reflected.

Errors (red indications) and poor quality (yellow indications) will be reported to the error message system and may be viewed in the **Message Service** frame. The problem will also be indicated by setting the appropriate colour (red or yellow) in the PU status lamp in the **Main toolbar** in SIS. Errors will have priority over bad quality in the lamp setting.

Note

Poor quality will only be reported for sensors selected as active.

PU sensor input status frame will only contain information for a PU if the PU has been started (i.e. selected in the "Not Started" combo box in the "Main toolbar").

PU Sensor logging

Logging of the received sensor data from a selected port can be started by pressing `Shift+Ctrl+Alt+RightMouseButton`.

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145

Related topics

- *Main toolbar* on page 27
- *Current echo sounder* on page 30
- *Message service view* on page 63

New survey window

The **New survey** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **New survey** setup guides you through the configuration of all essential survey parameters. These include projection data, background maps, storage location and data gridding parameters. These are parameters that are vital for the data acquisition, and incorrect settings may not be possible to correct for in post processing.

Note

*To avoid having to set all the survey parameters every time a new survey is created, we advise you to define your own Survey template from the **Survey administration** window, and select this template as basis for your new survey.*

The **New survey** parameters can be saved to current or all survey templates, and it is thereby not required to set the survey parameters more than once for a survey.

The **New survey** window contains the following tab-menus:

- **Basic parameters** – used to create and identify the new survey. The GridEngine Parameters are used to set the cell size when using the **GridEngine** gridding method
- **Storage options** – used to specify parameters for SIS raw data logging
- **Advanced options** – contains the following sub-tabs:
  - Background data – used to specify background data such as projection, background map, tide and geoid data
  - Projections – used to specify what datum and projection to use for the survey

The parameters defined under **New survey** may also be accessed from the **Survey administration** window, the difference being that the **New survey** parameters applies to that survey definition only, whereas the **Survey administration** parameters applies to templates.

Related operational procedures

- *How to configure your survey* on page 101
- *How to enter parameters for a new survey* on page 105
- *How to enter survey parameters* on page 101
- *How to define a new projection and datum transformation* on page 109

Related topics

- *Survey administration window* on page 83

Survey administration window

The **Survey administration** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Survey administration** setup allows you configuration of all essential survey parameters. These include projection data, background maps, storage location and data gridding parameters. These are parameters that are vital for the data acquisition, and incorrect settings may not be possible to correct for in post processing.

In addition, the **Survey administration** is an administrative tool for handling several survey templates.

The **Survey administration** window contains the following tab-menus:

- **User handling** – used to identify the SIS user of the survey
- **Background data** – used to specify background data such as projection, background map, tide and geoid data
- **Survey template handling** – contains the same sub-tabs as found in the **New survey** window:
  - Basic parameters – administrative data for the available survey templates
  - Storage options – used to specify parameters for SIS raw data logging
  - Advanced options – contains the following sub-tabs:
    * Background data – used to specify background data such as projection, background map, tide and geoid data
    * Projections – used to specify what datum and projection to use for the survey
    * GridEngine Parameters – used to set the cell size when using the **GridEngine** gridding method
    * CUBE parameters – used to set the grid specifications when CUBE is being used

Related operational procedures

- *How to configure your survey* on page 101
- *How to enter parameters for a new survey* on page 105
- *How to enter survey parameters* on page 101
- *How to define a new projection and datum transformation* on page 109

Related topics

- *New survey window* on page 82

Planning module window

The **Planning module** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Planning module** in SIS is a tool that can be used to create and display survey lines. These can be parallel lines, lines within a polygon or turns. The lines can be edited, changed direction of, extended or cut. Guidance information relative to the active survey line can be sent to the Helmsman display.

Note

All planning buttons are disabled until this the Planning module is activated by:

1. *Select **Planning** from the Show/Hide option of the Geographical window*
2. *Press the **Planning** button **P***

Planning features

The Planning module has three elements:

- Jobs – used to create and save a new job, or to reactivate an existing job
- Remote – used to transfer data to a remote Helmsman Display
- Objects – used to create and manipulate lines and polygons within an existing job

Related operational procedures

- *How to plan a new job in SIS* on page 185
- *How to retrieve a planned job* on page 185
- *How to display planned lines on the Remote Helmsman Display* on page 190

Related topics

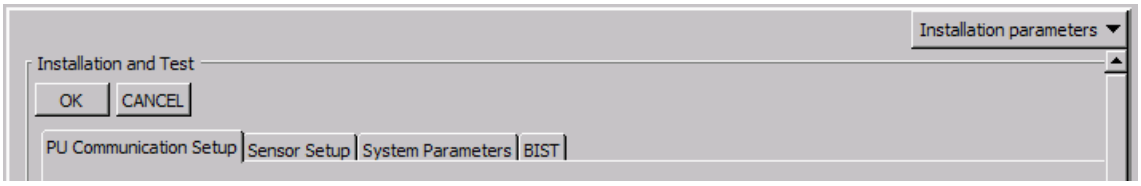
- *Keyboard and mouse in the Planning module view* on page 38

Installation parameters window

The **Installation parameters** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Note

Pinging must be Off to configure the Installation Parameters



Purpose

The **Installation parameters** window is used to set parameters for all navigation systems, motion sensors and sonar heads or transducers connected to the hydrographic system. These parameters include:

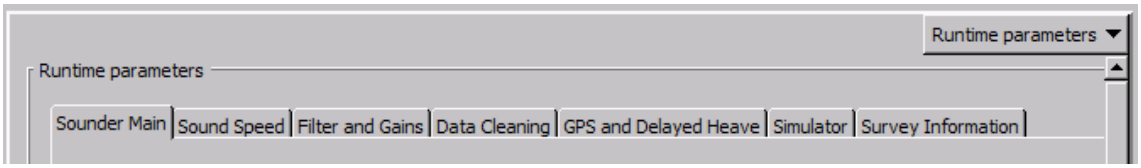
- **Sensor locations (x, y, z)**: Used to input the relative locations of the sensors
- **Angular offsets**: Input of installation angles of the sensors
- **Waterline reference**: Definition of the ship's draft relative to the sensors
- **Position input system**: Setup of position input
- **Clock reference**: Definition of clock source
- **System parameters**: Used for setting up Tx and Rx opening angles and backscatter parameters
- **PU input/output datagrams**: Definition and setup of input and output datagrams
- **BIST**: Used for doing the Built-In Self Tests

Related operational procedures

- *How to open the installation parameter interface* on page 113
- *How to modify the installation parameters* on page 113

Runtime parameters window

The **Runtime parameters** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.



The contents of the window will differ, depending on the echo sounder system.

Equipment with a Processing Unit (i.e. all multibeam echo sounders) contains parameter setting pages for the following features:

- **Sounder main**: Used to set ping mode, swath coverage, beam spacing, depth and stabilization
- **Filter and gains**: Used to set what filter method and absorption coefficient to apply
- **Data cleaning**: Configuration of what rules to apply for data cleaning, ping processing, grid processing and for seabed image processing
- **GPS and delayed heave**: Used for configuration of logging files related to positioning and attitude data that optionally can be used in post processing.
- **Simulator**: Parameters for simulator mode.
- **Survey information**: Displays survey parameters for current survey.

In addition to the full Runtime parameters window described in this section a scaled down window with only a subset of essential parameters are also available. This reduced runtime parameters window will occupy very little space, still allowing you easy access to basic runtime settings:

- See *Runtime parameters mini view* on page 87

Related operational procedures

- *How to open the runtime parameter interface* on page 120
- *How to modify the runtime parameters* on page 120

Runtime parameters mini view

The **Runtime param. Mini** frame is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

The **Runtime Parameters Mini** frame provides easy access to most commonly used parameters of the Runtime Parameters.

The parameters available in the **Runtime Parameters Mini** frame is a selection from the **Sounder Main** tab in the full **Runtime parameters** window.

When the parameters are changed, the background is marked using yellow colour. Press enter on the keyboard, or make a selection in a combo box, to confirm and send the parameters to the echo sounder (PU).

Note

When using the buttons in continuous mode no range checking will be made on the changed parameter values. The parameters can therefore be set outside valid bounds. However, when the button is released and you press enter to confirm, a single press on the same button or editing of another parameter will cause an error message to appear if the parameter is set outside valid boundaries.

Mini and full Runtime parameters frame synchronization

The Mini window can be displayed together with the full Runtime parameters window. If a change is made and confirmed in one of the two windows the other window will be updated automatically, keeping the windows synchronised.

Related operational procedures

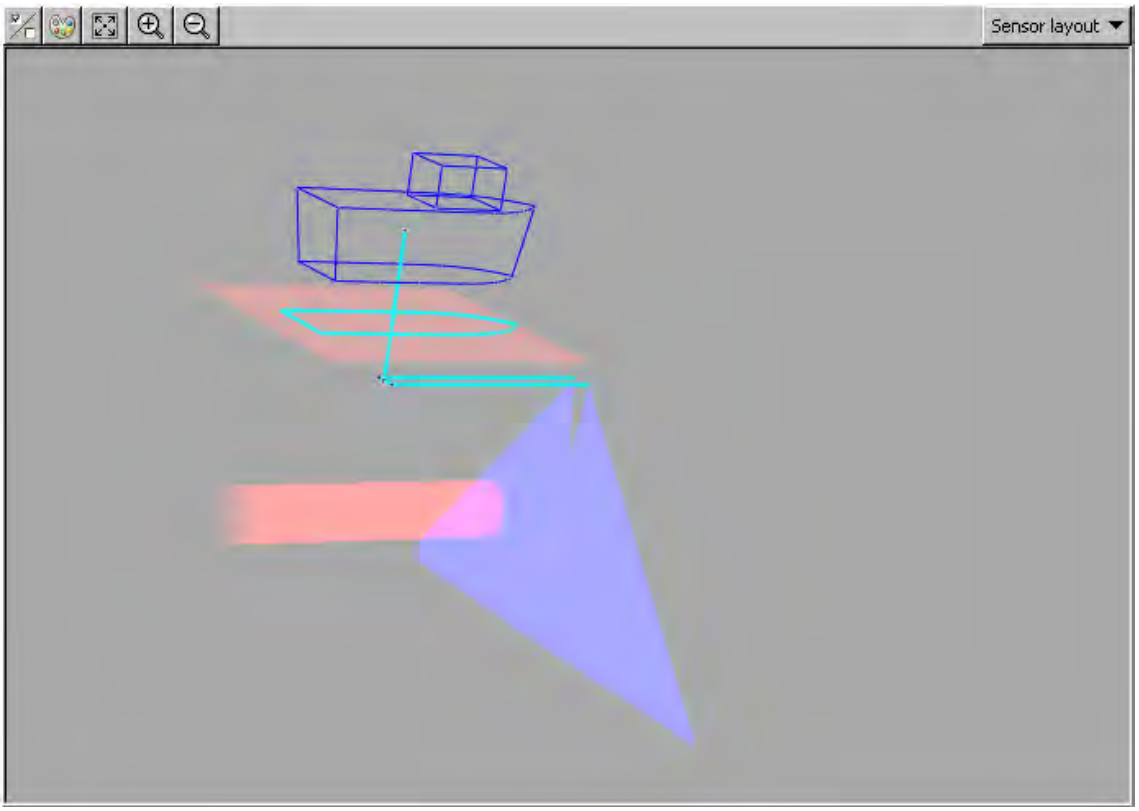
- *How to open the runtime parameter interface* on page 120
- *How to modify the runtime parameters* on page 120

Sensor layout view

The **Sensor layout** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Sensor layout** gives a graphical presentation of the sensor locations on the ship which may be useful to verify installation parameters.



Toolbar buttons

The toolbar of the **Sensor layout** window holds the following buttons (from left to right):

Click this button	To
	Enter the Sensor Layout show/hide options
	Set annotation colours
	Reset the view
	Zoom in
	Zoom out

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145

Related topics

- *Keyboard and mouse in the Sensor layout view* on page 39

Calibration view

Note

The SIS calibration frame is designed for determination of sensor angular offsets. It is NOT intended for determining the angular orientation of the system transducers. These must be determined through measurements as described in the installation manual. The reason for this is that it is not possible to do a linear addition of sensor offsets and transducer orientation angles.

The only exception to this is if the transducers are oriented such that they have zero heading and pitch installation angles, i.e. that they lie horizontal when the pitch is zero and are mounted parallel to the keel, in which case receive transducer roll installation angle and sensor roll offset act as a linear sum. This may be exploited in temporary installations where it may be very difficult to measure roll installation angles with sufficient accuracy.

The calibration is neither intended for finding remaining errors in XYZ locations of the sensors. Accurate locations of the sensors must be determined using land survey methods as described in the systems installation manual.

The **Calibration** window is accessed by selecting it from the **Frame selection** button or by opening it as a separate window from the **View→Tear Off** menu.

Purpose

The **Calibration** window is intended for analysis of data from a calibration survey, i.e. a survey to determine remaining biases in the depth observations. Depths from two different survey lines is compared in order to visualise the effect of the correction. Please refer to related operational procedures for description of the principles of a calibration survey.

The **Calibration** features of SIS can be run both during online and offline operations.

Note

*No correction values will be applied until these are entered in the **Installation Parameters** frame*

The **Calibration** frame applies to multibeam echo sounders only.

Toolbar buttons

The toolbar of the **Calibration** frame holds the following buttons (from left to right):

Click this button	To
	Enter the Calibration show/hide options
	Reset zoom

Buttons

- **Set:** Apply changes to the corridor width.

  To change the corridor width, enter a new value and press **Set**. If you select a new corridor, the previously used offsets will be applied and corrected data will be displayed in the diagram.
- **Apply:** Calculate and display the data points after setting new offsets.
- **Store:** Save the new offsets in the database.
- **Auto Calib:** If licensed this button brings up the dialogue to enter parameters to be used by **SeaCal**.

Quick menu

The Calibration window have a quick menu accessed by clicking on the right mouse button inside the view.

- Select shiptracks - First select two lines using Ctrl + Left mouse button.
- Create corridor - Then create a corridor using Ctrl + Left mouse button.

The system will now calculate and display the two lines from raw data. For a dual system one head at a time must be calibrated.

Seacal auto calibration

If licensed the **AutoCalib** button brings up the dialogue to enter parameters to be used by **SeaCal**.

AutoCalib may be used as an alternative to the visual determination of correction values as offered by the **Calibration** frame. It is also a useful tool for verifying the correction values found by the visual method.

Related operational procedures

- *Roll offset in the acrosstrack direction* on page 157
- *Pitch offset and time delay* on page 158
- *Heading offset – Alternative 1* on page 160
- *Heading offset – Alternative 2* on page 161
- *Sound speed quality inspection* on page 162
- *Sound speed control* on page 163
- *Verification* on page 164
- *How to determine calibration values using SIS Calibration frame* on page 165
- *How to determine calibration values using SeaCal automatic calibration* on page 168
- *How to collect the sound velocity profile* on page 127
- *How to convert your sound velocity profile to SIS format* on page 128
- *How to modify and load a sound speed profile into SIS* on page 136

Related topics

- *Keyboard and mouse in the Calibration view* on page 40

The menu system

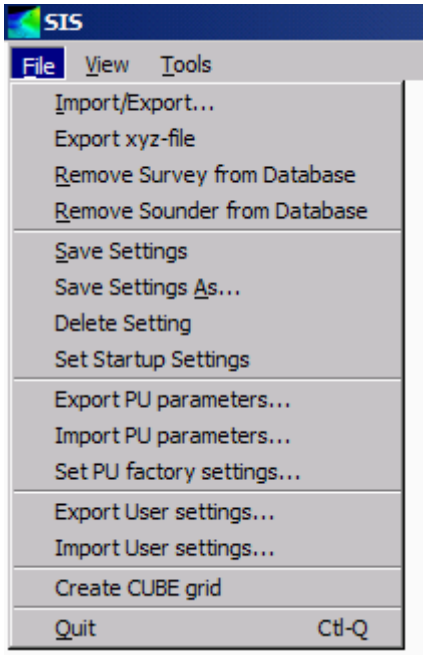
This chapter provides a brief description of the menu system provided by SIS. The menu options are not explained in detail, but references are provided for the detailed dialog box and functional description.

Main menu

The main menu is located on the top of the application window. It provides the following choices:

- *File menu* on page 93
- *View menu* on page 93
- *Tools menu* on page 94
- *Help menu* on page 95

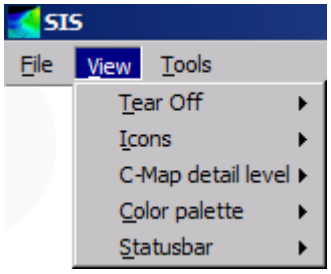
File menu



The **File** menu gives you the following choices:

- **Import/Export:** Dialog for import and export of raw data and gridded survey data
- **Export xyz file:** Export of survey data to xyz ascii file
- **Remove survey from Database:** Used to delete surveys from the database
- **Remove sounder from Database:** Used to delete obsolete or unwanted echo sounders from the database.
- **Save settings:** Used to save current frame settings
- **Save settings as...:** Save current frame settings with a new filename
- **Delete settings:** Used to delete selected frame setting file
- **Set startup settings:** Used to select how you want the SIS frames to appear at start up
- **Export PU parameters:** Used to save the Installation and Runtime parameters for current echo sounder to file in an ascii readable format
- **Import PU parameters:** Used to import previously saved parameters for a given echo sounder
- **Set PU factory settings:** Used to restore the echo sounder's (PU's) original factory settings.
- **Export user settings:** Used to save current database settings for later retrieval
- **Import user settings:** Import previously exported database settings
- **Create CUBE grid:** Used to create a CUBE grid after completion of data logging
- **Quit:** Exit SIS

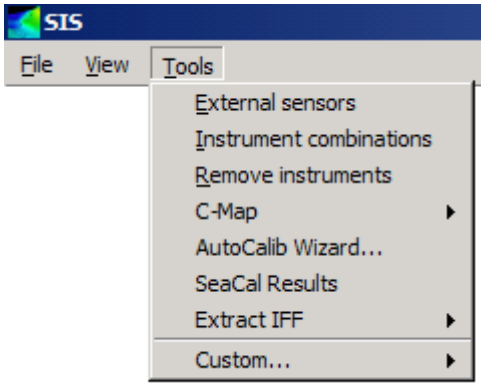
View menu



The **View** drop-down menu gives you the following choices:

- *Tear-off windows* on page 33
- *Icons* on page 34
- *C-MAP detail level* on page 35
- *Colour palette* on page 35
- *Status bar* on page 36

Tools menu

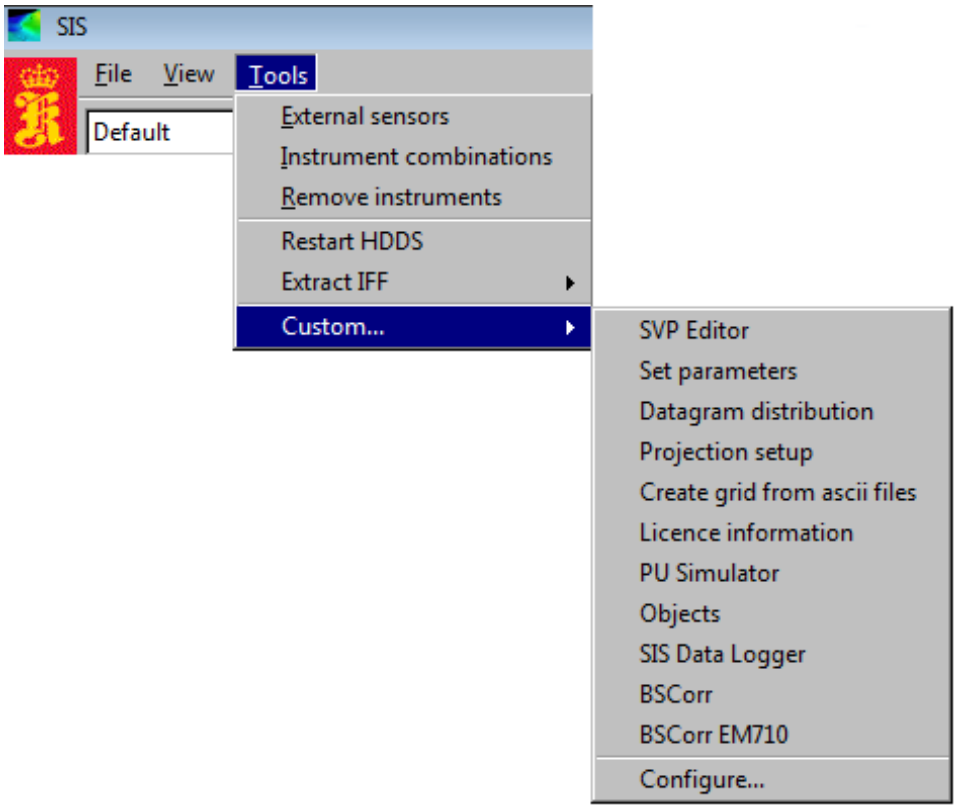


The **Tools** drop-down menu gives you the following choices:

- **External sensors:** This is where you define the interfaces to your external sensors that are attached directly to the Hydrographic Work Station (HWS)
- **Instrument combination:** This is a dialog for creating combined interfaces from external sensors that can be started as any system sent from the PU
- **Remove instruments:** Used to remove selected instrument combinations.
- **C-MAP:** Dialog for administrative for C-MAP – only available if C-MAP is installed
- **AutoCalib Wizard:** Wizard that will guide you through a SeaCal calibration
- **SeaCal results:** Direct access to location where your Seacal result files are stored
- **Extract IFF:** Used to extract position datagrams
- **Custom...:** A new level of menu selections.

See *Custom menu* on page 94

Custom menu

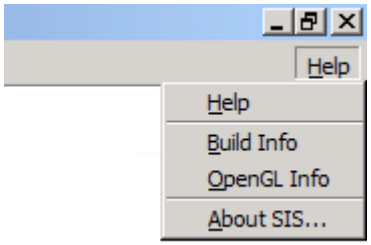


The **Custom...** sub-menu is accessed from the **Tools** menu. This menu is used to access various Custom applications. It is also possible to manage or add applications to this menu.

Choose between the following options:

- **SVP editor:** Used to load and edit sound speed profiles logged in .asvp or .actd format.
- **Set parameters:** Parameter settings that are used to control the behaviour of SIS.
- **Datagram distribution:** Used to route selected datagrams to given IP addresses on the network.
- **Projection setup:** Used to define the projections and datum transformation that you later can apply.
- **Create grid from ASCII files:** Dialog for creating terrain model from a Neptune ASCII file.
- **Licence information:** Opens the log file to the license server, containing your SIS license information.
- **PU Simulator:** Used for simulation and playback of previously logged raw data.
- **Objects:** Opens a utility for adding points, lines, images, text, polygons, video and html into the SIS map.
- **SIS data logger:** Opens a utility for logging data received on either the PU or the SIS computer.
- **BSCorr:** Opens a utility program for editing the backscatter calibration. When completed the backscatter calibration file is returned to the PU for use. Applicable for EM 122 and EM 302.
- **BSCorr EM710:** Opens a utility program for editing the backscatter calibration for EM 710. When completed the backscatter calibration file is returned to the PU for use. Applicable for EM 710.
- **Configure...:** Used to manage existing applications in the **Custom** sub-menu.

Help menu



The **Help** drop-down menu gives you the following choices:

- **Help:** Opens online help
- **Build info:** Contains information about your SIS software build.
- **OpenGL settings:** Contains information related to SIS software drivers.
- **About SIS:** General SIS software information.

Operational procedures

This chapter presents the most important operational procedures required to operate the SIS software.

You will find descriptions and main operational procedures on how to start and exit SIS, plan and run a survey, set installation and runtime parameters etc. in this chapter.

Note

This chapter applies to all the Kongsberg Maritime multibeam echo sounders. You may therefore find that some procedures and parameter settings do not apply to your All system.

For parameter description specific to your system we refer you to the SIS Reference Manual for your system.

The following operational procedures are described in this section:

Start, stop and operational procedures

Configuration procedures

Quality control procedures

Calibration procedures

- *Outer beam angle offset calibration* on page 164
- *Verification* on page 164
- *How to determine calibration values using SIS Calibration frame* on page 165
- *How to determine calibration values using SeaCal automatic calibration* on page 168
- *How to calibrate a dual head system* on page 172

Planning procedures

- *How to plan a new job in SIS* on page 185
- *How to retrieve a planned job* on page 185
- *How to display planned lines on the Remote Helmsman Display* on page 190

SIS utilities

Operational procedures describing various functionality of the SIS utilities are found in the Reference Manual. The following operational procedures are described:

- *How to use SmartTalk* on page 127
- *How to use csv2asvp* on page 128
- *How to use SVP Logger* on page 129
- *How to use SVP Manager* on page 130
- *How to use SVP Editor to convert an SVP file to .asvp format* on page 133
- *How to use macros in the SVP Editor to convert an SVP file to .asvp format* on page 135
- *How to run the PU simulator* on page 187
- *How to change the language of SIS* on page 100

Normal operational sequence

Note

*To ensure correct setup and operation of SIS the **Survey Template Handling** is essential. When all parameters are set up and stored in the template, all future surveys that are set to using this template will be defined by these parameters.*

Note

If SIS has been left inactive for some time, the operating system may have swapped the complete SIS process to disk. The operating system must then read SIS into the RAM again. This may take a few seconds. Datagrams including installation and runtime parameters must not be sent to the Processing Unit during this process.

Normal operational sequence

The normal sequence of operations required for running surveys using SIS are as follows:

1 Start SIS

See *Start SIS* on page 100

2 Enter survey and operator parameters, background data and set projection

See *Enter survey and operator parameters, set projection* on page 101

3 Check installation and runtime parameters

See *Check installation and runtime parameters* on page 111

4 Start the echo sounder

See *Start the echo sounder* on page 139

5 Run the Built-In Self Tests (recommended)

See *BIST* on page 118

6 Import a Neptune grid (optional)

See *Import a Neptune grid to SIS* on page 144

7 Start pinging

See *Start pinging* on page 144

8 Check sensor input

See *Check sensor input* on page 145

9 Check echo sounder main functions

See *Check echo sounder main functions* on page 146

10 Start and stop logging

See *Start and stop logging* on page 153

11 Perform a system calibration (optional)

See *Perform a system calibration* on page 155

12 Plan a survey (optional)

See *Plan a survey* on page 183

13 Run the survey

See *Run the survey* on page 185

14 Export data

See *Export data* on page 189

15 Operate Helmsman Display (optional)

See *Remote Helmsman Display* on page 189

16 Exit SIS

See *Exit SIS* on page 191

Start SIS

How to start SIS

Note

The SIS license dongle must be connected to an USB port on the HWS. The license dongle is required to run the advanced options of SIS.

1 Power up the echo sounder units.

2 Power up the external sensors.

Note

Your system may include a number of peripheral devices. Consult the applicable manufacturer's documentation for correct operation of these.

3 Configure the single beam echo sounder(s) - if applicable.

4 Power up the SIS HWS – Hydrographic Work Station.

The operating system on the SIS HWS loads automatically. When the boot process is finished, you can open the SIS program.

5 Click on the SIS icon on the desktop or select SIS from the Windows start menu.

6 Verify that the SIS application window opens as described in *The application window* on page 19.

How to change the language of SIS

Normally, you will set your language of SIS during software installation. It is also possible to change the language. This is done from a command window outside SIS.

Note

The translations from English may be incomplete.

1 Open a console window, e.g. as follows

- **a** Press the Windows **Start** button
- **b** Select **Run...** in the right side of the Start menu
- **c** Type **cmd** in the text field that appears
- **d** Press **OK**

2 Go to the directory where the **SIS\SQL** directory.

To change drive and directory in a console window:

- **a** Type the drive letter, e.g. **C:**, and press Enter to change the drive
- **b** Type **`cd\`** to change directory to the root directory
- **c** Type **`cd <sub-folder> \<next sub-folder>`** to change the directory to an existing directory below, e.g. **`cd program files\Kongsberg Maritime\SIS\sql`** to change to the SIS\SQL directory

3 Type **setParameter SIMRAD_LANG 1 <number>**, where **<number>** is.

1 = Norwegian
2 = English
3 = Spanish

4 Press the **Enter** button on the keyboard.

Enter survey and operator parameters, set projection

We recommend that you define one or several survey templates for the survey area before you start the survey.

How to configure your survey

1 Choose the frame **Survey Administration** and set the parameters for your survey type. These settings can be stored as a survey template available for easy set up of new surveys.

2 Select the frame **New survey** and select applicable survey template from here

3 Define the **survey name**

4 Check and verify reasonable **grid cell size**

The parameters can be saved to current or all survey templates, and it is thereby not required to set these parameters more than once for a survey. This method will save you a lot of work, and ensure correct survey parameter setup throughout the survey.

This section explains how to create and modify survey templates.

Operational procedures

- *How to enter survey parameters* on page 101
- *How to enter parameters for a new survey* on page 105
- *How to define a new projection and datum transformation* on page 109

Related topics

- *New survey window* on page 82
- *Survey administration window* on page 83

Set survey parameters

How to enter survey parameters

Open the **Survey administration** frame, select the different tabs in turn and enter parameters as described in the following.

User handling

This is where you add new users of SIS.

1 Enter identification a the new user

2 Press **Update** to apply

Background data

Background data in SIS are any projection file, KSGPL contour files, files containing predicted tide or geoid data files that you want to apply.

If you have background data, you can enable (or disable) the files for your survey or survey template by selecting the path to where the files are stored.

1 Select the path to the background data.

2 Press the **Add** button to add that file location to the list of background data

and/or

3 Select the background data path to be remove

4 Press **Delete** to remove the files from SIS.

The files are not deleted from the disk.

Survey template handling

The **Survey template handling** tab is used for creating survey templates or modifying existing survey templates.

The survey templates are useful for easy and correct setup of the survey parameters of SIS. Once a setup for a survey is done the complete setup can be stored in a template and used for next survey at the same place, for next survey with similar setup or just as a template for correct setup of a new template.

1 Select the **Basic parameters** tab.

   a Enter a new name in the **New survey template** text field if you want to create a new template,

   or

   select the template you want to modify from the **New survey template** drop down list.

   b Select the **Survey template** you want your new template to be based upon from the drop down list.

   You can select any of previously stored templates, previous used template or default template.

   c Select name of user.

   If you want a new user to be defined go to the **User handling** tab.

   d It may be useful to add your own comments **Comment** to the generated template.

   e Press **Update** to save the new template or the modifications you have done to an existing template.

   Note

   *If you do any further changes to the survey template you have defined, you must remember to press the **Update** button again to save your changes.*

2 Select the **Storage options** tab.

Observe the default storage location of raw data and gridded (survey) data. We recommend that you stick to the default storage structure unless you have specific requirements. Sub-directories will be added according to your selections of naming convention as described in point 4 below.

a Select where you want gridded data to be stored.

b Select where you want your raw data to be stored.

c Select the naming convention of your raw data by selecting appropriate tick boxes.

For each tick box you enable a new sub-directory for storage of **raw** data is added.

d Enter name of the ship, and tick off for **Use as postfix in filename** if you want the ship's name as the last part of the file names.

e Click **Apply to all survey templates** if you want your settings to apply to all loaded templates.

Survey template handling – Advanced options

This tab is found both under the **Survey administration** frame and in the **New survey** frame. Modifications that you do from the **Survey administration** frame applies to the template you are working on, whilst if you do modifications from the **New survey** frame they will only apply to current survey.

Note

*Independent of where you are accessing these pages from, you will find **Apply** buttons that are short-cuts to applying your changes to either **all survey templates** or to the **default survey template**.*

The **Advanced options** tab contains four new tabs. The configuration of all are described in the following procedure.

1 Select the **Background data** tab.

This is where you select the file location of background data that you want to use for the survey template you currently are setting up. You can choose between paths that were enabled in the **Background data** tab at the top level of the **Survey administration** window.

The background data may be a projection file, a KSGPL contour file, a file containing predicted tide or a geoid data file.

Click **Apply this path to the Default survey** only if you want your selection of background data to apply to the **Default** template.

2 Select the **Projections** tab.

Select your projection from the drop-down list.

If your datum and projection is not in the list a new datum and projection can be defined from **Tools→Custom→Projection setup**.

Click **Apply this projection to the survey template** only if you want your changed projection to be the default projection in the **Default** template.

3 Select the **GridEngine parameters** tab.

a If you are applying real time data cleaning, select what depth to use in the processing.

The real time data cleaning module will use the given depth plane to identify outliers in the data and remove them.

Note

We recommend that you set the real time data processing depth to either tide corrected depth, Z_t, or to geoid and RTK corrected depth, Z_v, in order to avoid unwanted depth rejections caused by natural variations such as the tide.

b Select resolution of your grid, i.e. number of cells and cell size, suitable for your depth and expected coverage.

Note

The grid resolution applies to displayed data only, the raw data is not affected.

The grid resolution can not be changed during the survey, and should therefore be carefully set to apply to the whole survey area.

If the cell size is set too large the resolution in your geographical view will be poorer than necessary. If you set the cell size too small you may experience that there are not sufficient data points in the cells to compute a valid depth value, and no depth value is displayed. Too small cell size may also overload the computer and give you delays in the real time display.

The following factors have influence on the selection of the cell number and cell size:

- Depth
- Achieved swath width (shown in numerical display)
- Survey speed
- Coverage area per beam (footprint)

The following rule of thumb have proven to be reasonable:

Normal resolution

- Cell size = average swath width/100
- Number of cells in processing grids: 64x64

High resolution

- Cell size = average swath width/200
- Number of cells in processing grids: 128x128

Example: If depth is 100 meters and sector coverage is set to ±70°, the swath width is 550 meters. Cell size computed from above rule of thumb for may then be set to 5.5 meters for normal resolution and 2.8 meters for high resolution.

Note

The cell size settings applies to highest possible display resolution, i.e. LOD0.

c If you want to do real time data cleaning, you may access the real time processing parameters by pressing the **Processing...** button.

You will be directed to the **Real time data cleaning** page normally accessed from the **Runtime parameters** frame. The real time data cleaning uses rules, i.e. a set of parameters that controls the algorithms used in the real time processing of echo sounder data.

By default, the real time data cleaning is set off.

d Click **Apply to all survey templates** if you want your GridEngine settings to apply to all loaded templates.

Cube parameters

This procedures applies only if you want to use the CUBE data cleaning method instead of the default GridEngine.

CUBE is enabled from **Tools→Custom→Set parameters→Logging**.

1 Select the depth reference you want to use

2 Enter the geographical coordinates of the centre of your survey area.

3 Enter the width and height of your survey area.

4 Enter your required grid cell size.

The smaller grid cell size the better resolution. However, too small grid cells will not be accepted by the CUBE algorithms. You may have to enter a larger grid cell size.

Note

*Remember to press the **Update** button from the **Basic parameters** tab to save your changes.*

Related operational procedures

- *How to enter parameters for a new survey* on page 105
- *How to define a new projection and datum transformation* on page 109

Start a new survey

How to enter parameters for a new survey

We assume at this stage that you have created a survey template that defines your survey parameters. The **New survey** frame is then used to define current survey, based upon parameters given by the survey template.

Open the **New survey** frame, select the different tabs in turn and enter parameters as suggested in the following.

Basic parameters

1 Select the **Basic parameters** tab.

2 Enter a unique survey name descriptive to your survey in the **New Survey name** text field.

3 Select the survey template you have defined for your survey in the **Select survey-template** drop down list.

The setup for previous survey was automatically saved as a template named **Previous**. If the conditions for your new survey are the same as for the previous one, select the **previous** to easily select correct survey parameters.

4 Select a predefined **User**.

If your user name is not defined you may add a user from the **User handling** tab in the **Survey administration** frame.

5 Select an existing survey if you want to continue data logging to an existing survey.

Press **Continue on existing survey** to confirm.

6 Add any comments that may give relevant information about the survey. The comment will be logged in the header of each raw data file.

7 After you have set ALL parameters, including the storage options and advanced options, press **Save new survey** to save and apply your settings.

Storage option

This tab is found both under the **Survey administration** frame and in the **New survey** frame. Modifications that you do from the **Survey administration** frame applies to the template you are working on, whilst if you do modifications from the **New survey** frame they will only apply to current survey.

Observe the default storage location of raw data and gridded (survey) data. We recommend that you stick to the default storage structure unless you have specific requirements. Sub-directories will be added according to your selections of naming convention as described in point 4 below.

If required,

a Select where you want gridded data to be stored.

b Select where you want your raw data to be stored.

c Select the naming convention of your raw data by selecting appropriate tick boxes.

For each tick box you enable a new sub-directory for storage of **raw** data is added.

d Enter name of the ship, and tick off for **Use as postfix in filename** if you want the ship's name as the last part of the file names.

e Click **Apply to all survey templates** if you want your settings to apply to all loaded templates.

Survey template handling – Advanced options

This tab is found both under the **Survey administration** frame and in the **New survey** frame. Modifications that you do from the **Survey administration** frame applies to the template you are working on, whilst if you do modifications from the **New survey** frame they will only apply to current survey.

Note

*Independent of where you are accessing these pages from, you will find **Apply** buttons that are short-cuts to applying your changes to either **all survey templates** or to the **default survey template**.*

The **Advanced options** tab contains four new tabs. The configuration of all are described in the following procedure.

1 Select the **Background data** tab.

This is where you select the file location of background data that you want to use for the survey you currently are setting up. You can choose between paths that were enabled in the **Background data** tab at the top level of the **Survey administration** window.

The background data may be a projection file, a KSGPL contour file, a file containing predicted tide or a geoid data file.

Click **Apply this path to the Default survey** only if you want your selection of background data to apply to the **Default** template.

2 Select the **Projections** tab.

Select your projection from the drop-down list.

If your datum and projection is not in the list a new datum and projection can be defined from **Tools→Custom→Projection setup**.

Click **Apply this projection to the survey template** only if you want your changed projection to be the default projection in the **Default** template.

3 Select the **GridEngine parameters** tab.

a If you are applying real time data cleaning, select what depth to use in the processing.

The real time data cleaning module will use the given depth plane to identify outliers in the data and remove them.

Note

We recommend that you set the real time data processing depth to either tide corrected depth, Z_t, or to geoid and RTK corrected depth, Z_v, in order to avoid unwanted depth rejections caused by natural variations such as the tide.

b Select resolution of your grid, i.e. number of cells and cell size, suitable for your depth and expected coverage.

Note

The grid resolution applies to displayed data only, the raw data is not affected.

The grid resolution can not be changed during the survey, and should therefore be carefully set to apply to the whole survey area.

If the cell size is set too large the resolution in your geographical view will be poorer than necessary. If you set the cell size too small you may experience

that there are not sufficient data points in the cells to compute a valid depth value, and no depth value is displayed. Too small cell size may also overload the computer and give you delays in the real time display.

The following factors have influence on the selection of the cell number and cell size:

- Depth
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The following rule of thumb have proven to be reasonable:

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High resolution

- Cell size = average swath width/200
- Number of cells in processing grids: 128x128

Example: If depth is 100 meters and sector coverage is set to ±70°, the swath width is 550 meters. Cell size computed from above rule of thumb for may then be set to 5.5 meters for normal resolution and 2.8 meters for high resolution.

Note

The cell size settings applies to highest possible display resolution, i.e. LOD0.

c If you want to do real time data cleaning, you may access the real time processing parameters by pressing the **Processing...** button.

You will be directed to the **Real time data cleaning** page normally accessed from the **Runtime parameters** frame. The real time data cleaning uses rules, i.e. a set of parameters that controls the algorithms used in the real time processing of echo sounder data.

By default, the real time data cleaning is set off.

d Click **Apply to all survey templates** if you want your GridEngine settings to apply to all loaded templates.

Note

*Remember to press the **Save new survey** button from the **Basic parameters** tab to save your changes.*

Related operational procedures

- *How to define a new projection and datum transformation* on page 109
- *How to enter survey parameters* on page 101

Define a projection and datum transformation

How to define a new projection and datum transformation

1 Select **Tools→Custom→Projection setup** from the main menu.

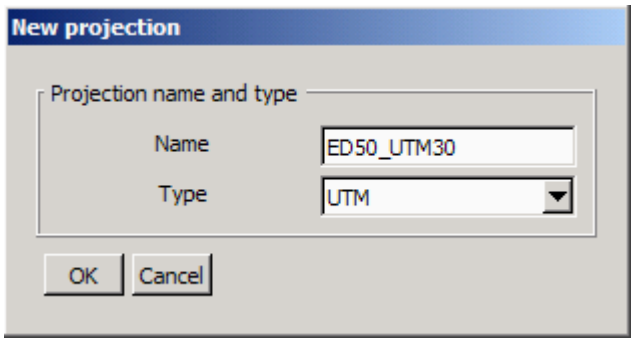
2 Select the **Define projections** tab.

3 Locate the **Projection definition** section.

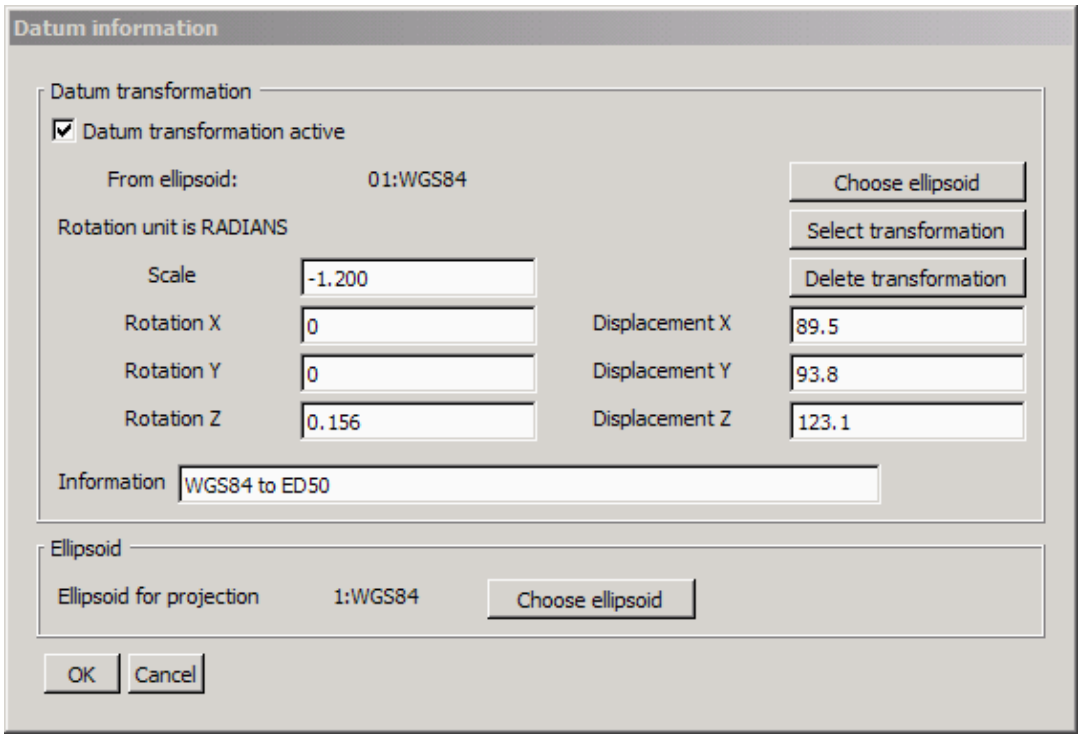
4 Press the **New** button.

5 Enter a name to identify the selected datum and projection, e.g. ED50_UTM30

6 Enter the type of projection for mapping the ellipsoidal coordinates onto the map plane



Press **OK** to continue



7 Tick off for **Datum transformation active** if you want the entered datum transformation to be carried out to your input positions.

Datum transformation is by default turned off.

8 Press **Choose ellipsoid** to select the ellipsoid of the input position.

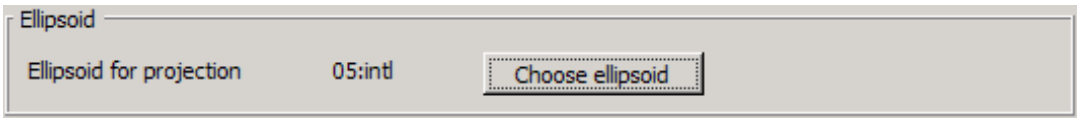
For GPS position input this will normally be the WGS84 ellipsoid.

9 Press **Select transformation** to use predefined datum transformation parameters

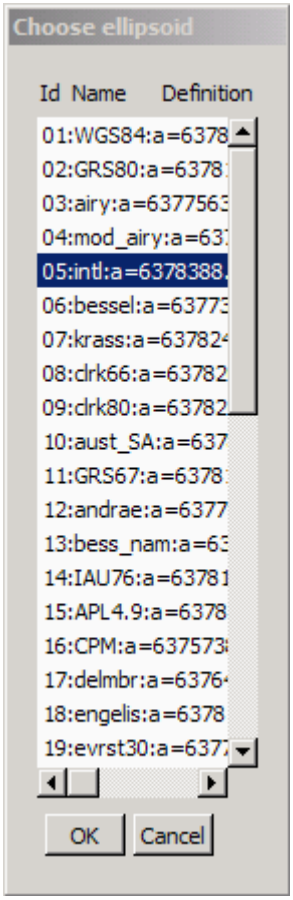
or

10 Enter the 7-parameter datum transformation parameters in the applicable parameter fields

11 Press **Choose Ellipsoid** in the **Ellipsoid** field to enter the ellipsoid for the output position.



12



Select the ellipsoid and press **OK** to apply.

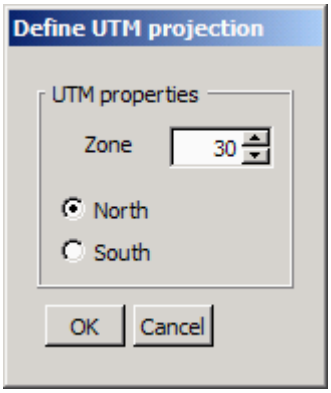
The available ellipsoids in SIS are identified by (scroll the side bar to view the parameters):

- id
- short name
- major axis (a)
- reverse flattening (rf)
- full ellipsoid name

e.g. for ED50, the International 1909 ellipsoid applies having the following parameters:

- id = 05
- short name = intl
- a = 6378388.0 m
- rf = 297.0

13



Press **OK** to apply the datum transformation selected.

When UTM projection type has been selected the **Define UTM projection** dialog will appear

14 Select **UTM zone** and whether you are on northern or southern hemisphere.

15 Press **OK** to apply.

16 Press **Edit...** to change the datum transformation or projection parameters selected

17 Press **Delete...** if you want to delete the settings you have chosen

Check installation and runtime parameters

Installation and runtime parameters are associated with the echo sounder and not with the survey. This means that the installation and runtime parameters are set up separately for each individual echo sounder. These parameter settings will remain the same for that echo sounder, independent of the survey run.

The parameter settings for each echo sounder will be stored in a database. When an echo sounder is detected for the first time, all parameters will be set to a default value, determined by the type of echo sounder. It is important that the installation and runtime parameters are checked and updated if necessary.

Note

We recommend that you keep a record of the parameters and settings used in a safe and accessible place.

External sensors: For interfaces to external sensors that are attached directly to the Hydrographic Work Station (HWS) the interface parameters must be defined in the External sensors dialog.

Note

The Installation parameter window can be displayed at any time, but parameters can only be modified when pinging and logging is deactivated.

The Runtime parameter window can be modified at any time, independent of pinging and logging status.

Operational procedures

- *How to open the installation parameter interface* on page 113
- *How to modify the installation parameters* on page 113
- *How to open the runtime parameter interface* on page 120

- *How to modify the runtime parameters* on page 120
- *How to setup the input from external sensors* on page 122
- *How to setup the output to external sensors* on page 124
- *How to enter the waterline for a single beam system* on page 125

Related topics

- *Installation parameters window* on page 85
- *Runtime parameters window* on page 86

Installation parameters

The installation parameters are divided into three main groups described in the following:

- Communication setup parameters
- Sensor setup parameters
- BIST – self test

Note

*The **PU – Processing Unit** may be a separate hardware unit or an integrated part of the **TRU – Transceiver Unit** cabinet, depending on echo sounder system.*

For SIS it makes no difference whether the communication is with a PU or a PU inside a TRU. The term PU is used in this manual.

Communication setup parameters

The communication setup parameters define the input and output settings for the serial - and network (Ethernet) ports on the echo sounder Processing Unit. In addition, this parameter group defines the type of information (datagrams) that is received and/or sent on the individual ports. To be able to set these parameters correctly it is necessary to know the type of equipment connected to each individual PU port. Depending on the port type, the connections are either direct using a serial link, or remote via the system network. The equipment type and which port the different equipment types may be connected to, is defined by a set of rules/restrictions. These rules are defined in the **PU communication→Input setup** tab located in the **Installation parameter** frame.

Note

If the communication setup is not correct this may result in loss or corrupted functionality - in worst case an inoperable system.

Sensor setup parameters

In order to determine correct depth values the system must know the physical positions, tilt, biases and delays for all transducers and sensors. This information belongs in the second main group of installation parameters - sensor setup parameters. Also, based on the set of equipment that is connected to the echo sounder PU (Processing Unit), it may

be necessary to select what equipment to use as active units when several alternatives are available. If no selection is made, the system will automatically use the sensor connected to the lowest numbered port when two or more alternatives are available.

BIST - self tests

The options available allow you to test individual functions and hardware items.

How to open the installation parameter interface

The installation parameters for the different echo sounders are located in the **Installation parameter** window. All external sensors connected to the Hydrographic Work Station (HWS) are located in the **External sensors** dialogue box found on the **Tools** drop-down menu.

In order to open the installation parameter interface perform the following actions:

1 If you have more than one echo sounder connected, select the echo sounder you want to change parameters for in the **Current echo sounder** combo box.

2 Select the Installation parameters by either:

- Use the **Frame selection** button to select Installation parameters in the desired frame.

or

- Select **Installation parameters** from the **View→Tear Off** menu.

How to modify the installation parameters

Open the **Installation parameters** frame, select the different tabs in turn and enter parameters according to the recommendations below.

PU communication setup

This is where you define input to and output from the Processing Unit (PU).

Note

*The **PU – Processing Unit** may be a separate hardware unit or an integrated part of the **TRU – Transceiver Unit** cabinet, depending on echo sounder system.*

For SIS it makes no difference whether the communication is with a PU or a PU inside a TRU. The term PU is used in this manual.

1 Select the **Input Setup** tab.

a Set the communication settings for each of the ports you are using for input to the PU.

Select the port you want to modify first. Then baud rate, data bits, stop bits and parity must be set equal to the settings in the external sensor the port is connected to.

Note

- *COM1 – position input*
- *COM2 – motion sensor input*
- *COM3 – position input*
- *COM4 – position input*
- *UDP2 – position and depth input*
- *UDP5 – attitude velocity input*

b Select the **Input format** of the data you want to read on the selected port, i.e. select the format your external device is set up to output.

c Select Port **UDP5** if you want to enable input of attitude velocity.

d Select if you want to use the secondary network for the attitude velocity data.

e Select what attitude sensor to read velocity data from.

You have to configure the PU's secondary network card. Find the net mask and a vacant IP address in the network you are connecting to. Enter your selected IP address and correct net mask. Set the port number to which the attitude system is transmitting to. Refer to the attitude system user's documentation if necessary.

2 Select the **Output Setup** tab to define the datagrams to be output from the Processing Unit (PU)

a Set the UDP Host port to either **SIS Logging** or **User defined** depending on what type of data you want to configure your output for.

- **SIS Logging** is used by the system to define what SIS raw data to log. The settings for this link should normally not be changed. Mandatory datagrams are disabled from deselecting
- **User defined** can be used when you need to define your own selection of datagrams. By using the given port address these datagrams can be picked up by any third party systems with access to the same network.
- **PU Logging** applies to systems where internal logging to PU disk is possible, e.g. when the PU is installed in an AUV.

  Must be enabled by ticking off the **Enable PU logging to disk** check box below.
- **Watercolumn** can be selected if you want to log **Watercolumn** data to a separate file.

  Must be enabled by ticking off the **Log watercolumn to separate file** check box below.

Port addresses is given by SIS and can not be changed.

b Select the datagram subscriptions for each output

We recommend:

- **SIS Logging**: Use the default setup.
- **User defined**: Subscribe to datagrams required by the receiving system.
- **PU Logging**: Use the default setup.

- **Watercolumn**: Subscribe to at least the Installation and Position datagrams.

c Select if you want the PU to broadcast it's existence on the network on given port.

3 Select the **Clock Setup** tab

a Select the time reference to synchronize the PU clock to.

The PU clock can be synchronized to either of the following time references:

- **External ZDA Clock**: An NMEA time datagram available from many GPS receivers. Outputs current UTC time which the PU clock will be set to.

  Note

  External ZDA can only be selected if ZDA input is selected.

  *When **External ZDA clock** is selected both the PU Communication Setup and the Clock Setup tabulators are changed to red to indicate that you need to check current clock setup.*

  The red tabulator setting is turned off when the OK or the CANCEL button is pressed

  In the case that the ZDA Clock input is turned off and the clock source setting is External ZDA Clock the (fall back) clock source is automatically set to Active pos. system.

- **Active pos. system**: The PU clock will be set to the time contained in the position datagram, normally the NMEA GGA datagram. For modern GPS system the time of **Active pos. system** is equal to current UTC time, i.e. negligible processing delay.

  Note

  The GGA datagram contains no date entry.

- **Operator station**: Sets the PU clock to the internal clock of the SIS Operator Station (HWS)

b **Offset (sec)** is used if you want to refer to a different time zone than your time reference. This may be useful e.g. if you have tide data referred to Local time, whereas you are synchronizing to UTC time.

c Select whether a 1PPS signal from a GPS receiver shall be used to synchronize the PU for clock drift.

If a 1PPS signal is available, it is highly recommended that you utilize it.

If possible, we recommend using **External ZDA Clock** and **1PPS** synchronization.

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145
- *How to modify the runtime parameters* on page 120
- *How to log water column data* on page 155

Sensor setup

This is were you configure the input position and attitude sensors.

1 Select the **Settings** tab

a Select what positioning system to modify by selecting its input port.

Only ports enabled for position input by the PU communication setup tab can be selected.

b Select **Time to use**, i.e. what time tag to use for the position.

This can be

- **System** time, defined by the time tag given by the PU when the datagram arrives on the port

  or

- **Datagram** time, i.e. the time of the observation read from the position datagram

There are various scenarios:

- If the PU is synchronized to **External ZDA clock** and a **1PPS** signal is used, the position and depth will refer to the exact same time reference (UTC time). The PU software will know the exact time difference between the depth and the position observation, and correct for this.

  Time to use is to be set to **Datagram** in this case. **Position delay** will not apply, and should be set to 0.

  Note

  Datagram *is to be selected ONLY if the PU clock (Clock Setup tab) is set to* ***External ZDA clock*** *and 1PPS is connected and used.*

  This method is the recommended method for best possible time synchronization.

- If the PU is synchronized to **Active pos. system**, **Time to use** should be set to **System** and **Position delay** set to the processing time of your positioning system.

  Note

  For modern positioning system the position delay is normally negligible, but if the processing delay is significant you should consider choosing a different source for synchronization of the PU.

- If the PU is synchronized to the **Operator station**, **Time to use** should be set to **System**, and **Position delay** according to the processing time of your positioning system.

Note

*Independent of what method you use, you must monitor the PU time versus either the position time (PU-POS) or the ZDA (PU-ZDA) time in the **Numerical display**. Any large figures indicates synchronization errors, and should be corrected for.*

*Also note that the **Time to use** and **Position delay** settings can be changed during post processing.*

c Tick off for **motion correction** of your position input for.

d Enter a **position delay**.

You must refer to the position system's documentation to find the delay.

Delay will only apply if **Time to use** is set to **System**.

e Select name of the datum you are using.

Note

*This is only text information to the logged files. Actual datum is given by your position input. If required, datum transformation may be enabled from the **Tools→Custom→Projection setup** menu.*

f Select **Log all heights** if you want to enable height datagrams from the GGA and GGK position input with height input having a quality factor as specified.

g Enter the quality indicator numbers (comma separated) that you want to accepted as your height observations.

The quality indicators are given by the NMEA GGA and GGK specifications.

h Select the **roll reference plane** according to your motion sensor.

i Enter the motion sensor delay according to motion sensor documentation

j Select your active sensors by selecting the port to which the relevant sensor is connected

2 Select the **Location** tab

Enter the location offsets relative to the vessel reference point for the different sensors and transducers.

Caution

The positioning system may have internal offset parameters set. Make sure that the antenna offsets are not applied both in the positioning system and in SIS.

Note

If the vessel's deplacement or trim changes during a survey, the waterline value must be updated accordingly.

3 Select the **Angular Offset** tab

Enter the angular offsets for the different sensors and transducers.

Caution

The attitude sensor may have internal offset parameters set. Make sure that the angular offsets are not applied both in the attitude sensor and in SIS.

4 Select the **ROV specific** tab if your system is mounted on an ROV/AUV.

Note

*ROV depth found in the **PU communication setup→Input setup** tab must have been selected to enable the ROV specific options.*

Verify that the depth and pressure settings are set according to your conditions.

Related operational procedures

- *How to monitor the external sensors in SIS* on page 145
- *How to define a new projection and datum transformation* on page 109
- *How to determine calibration values using SIS Calibration frame* on page 165
- *How to determine calibration values using SeaCal automatic calibration* on page 168

System parameters

1 Select the **System Parameters** tab

2 Verify that the backscatter offset parameters and the Tx and Rx opening angles are set as intended.

Note

The reference point of the array remains unchanged when the opening angle is changed. This means that you do not have to change the TX/RX location offsets after modification to the TX/RX opening angle.

Note

If the specified angles are set larger than the angles given by the physical array size, the system will run with degraded performance.

Example: If RX and TX opening angles are both set to 2 degrees for a 1 x 1 degree system, the system will run as a 2 x 2 degrees system, utilizing only parts of the transducer arrays.

BIST

The **BIST** page gives you access to run the different Built-In Self Tests that you can perform to check the operation of the echo sounder system.

1 Press the **Run all BISTs** button

or

Press each BIST test button one by one

2 Verify that all BIST test buttons turns green when test i performed.

If any of the tests fails the specific test button will turn red or yellow, and a description of the test result will be displayed in the **PU BIST result** field.

Please refer to the echo sounder's maintenance manual for corrective actions.

Runtime parameters

Runtime parameters are divided into the following main groups:

- Sounder Main parameters
- Sound Speed
- Filter and Gains
- Data Cleaning
- GPS and delayed heave
- Simulator
- Survey information

The content of these groups will vary depending on echo sounder type.

Sounder main

The sounder main settings concern the operational parameters for the echo sounder including coverage, depth and swath control.

Sound speed

Sound speed settings concerns selection and use of sound speed profiles and sound speed at transducer settings.

Filter and gains

Filter and gains settings concern filtering to avoid erroneous measurements, e.g. false bottom detection. It also includes settings for the bottom backscatter measurement and seabed imaging.

Data Cleaning and Seabed Image Processing

Data Cleaning defines rule sets for how the to carry out the gridding. There are two parameter groups: Ping processing rules and Grid processing rules. It also includes settings for the seabed imaging for the Geographical view.

GPS and delayed heave

The GPS and Delayed Heave tab contains options for logging of data files related to position and attitude data that optionally can be used in post processing to improve the final seabed data.

Simulator

The Simulator tab contains parameters for enabling simulation of echo sounder data.

Survey information

The Survey Information tab contains summarized information about current survey.

Advanced parameters

This menu is intended for Kongsberg Maritime internal use only. Pulse length and bandwidth can be changed from here.

How to open the runtime parameter interface

To open the runtime parameter interface the following actions must be carried out:

1 Select the echo sounder you want to change parameters for in the **Current echo sounder** combo box.

2 Select the Runtime parameters by either:

- Use the **Frame** button to select Runtime parameters in the desired frame.

or

- Select **Runtime parameters** from the **View→Tear Off** menu.

How to modify the runtime parameters

Open the **Runtime parameters** frame, select the different tabs in turn and enter parameters according to the recommendations below.

Sounder main

1 Set the sector coverage parameters according to your conditions and requirements

2 Set the depth parameters according to your expected survey depth

Note

*The Min and Max depth settings are used to guide the echo sounder in tracking the bottom. Incorrect settings may result in a failure to detect the bottom and thus a disabled system. If the echo sounder has problems detecting the bottom within the min-max range use the **Force Depth** button with a measured depth or a depth from a chart.*

3 Set the swath control parameters

4 Set Pitch and Yaw stabilization parameters

5 Select whether the echo sounder will receive trigger signals from an external device (e.g. K-Sync)

Sound speed

In order to ensure accurate depth determination, you must know the sound speed profile in the survey area. The profile may change with both time and position in the survey area. It may therefore be necessary to determine the profile several times during a survey. The profile is stored as a file.

1 Collect a sound speed profile from surface to bottom and save the profile to file.

2 Select the **Sound Speed** tab

This tab contains Sound Speed Profile and Sound speed at transducer depth.

3 Find and select the correct **Sound Speed Profile** file by using the **Browse** button.

The text field will turn yellow.

4 Activate the profile by pressing the button marked **Use Sound Speed Profile**.

The text field will return to original colour when loaded.

5 Select the **Sound speed at transducer** source as one of the following:

1 Manual – Sound speed value must be entered.

2 Profile – A value from the sound speed profile is used (existing value or interpolated).

3 Probe – If you have a sound velocity probe attached at transducer depth the values from the probe is used. The offset value must then be specified.

Related operational procedures

- *How to collect the sound velocity profile* on page 127
- *How to convert your sound velocity profile to SIS format* on page 128
- *How to modify and load a sound speed profile into SIS* on page 136
- *How to display sound velocity at transducer depth in the Geographical view* on page 148

Filter and gains

1 Set the **Filtering parameters**.

We recommended to only change the filtering parameters from default settings if false bottom detections is very likely.

2 Set the **Absorption Coefficient** parameters.

A correct value for the absorption coefficient is important with respect to the validity of the bottom backscatter measurements.

On broadband sonar systems, like the EM 710, absorption coefficient matrixes are automatically calculated by SIS from sound speed profiles and salinity and CTD profiles.

Default salinity is 35 ppt. Correct the value if necessary.

3 Set the **Normal Incident Sector**.

Degrees from nadir defines the angle at which the bottom backscatter can be assumed to be independent of the strong increase at normal incidence. The value is dependent on bottom type.

4 Set **Mammal protection** for system where this is implemented.

Reduced TX power level can be set, as well as a delay period in which the output power level gradually will be increase from zero up to set maximum level.

Data cleaning

This is where criteria for real time data cleaning are defined.

Caution

Please familiarize yourself with the SIS data cleaning functionality before making any changes to it's parameters.

The SIS Data cleaning is described in the SIS reference manual and in the SIS online help.

Note

Real time data cleaning does not delete any data, invalid data is simply flagged.

External sensors

The **External sensors** page is accessed from the **Tools** menu, and are used to define interfaces to external sensors that are attached directly to the Hydrographic Work Station (HWS).

Note

*Interfaces to external sensors that are attached to the Processing Unit (PU) are defined in the **Installation parameters**.*

The External sensors dialog contain setup information for the following sensors:

Input

- Sound velocity probe
- Real time tide
- SVP logger
- Barometer
- Geodimeter
- Heading
- Position

Output

- Auto pilot
- Dynamic positioning
- Depth below keel

How to setup the input from external sensors

1 Enter the sound velocity probe parameters

Sound velocity probe

To prepare and use an external sound velocity sensor the following steps must be followed:

a Make sure that the external sensor is powered up and connected to a HWS input port (i.e. COM port).

Alternatively, in the case where SIS is receiving external sound velocity datagrams via UDP the datagrams must be available on the network.

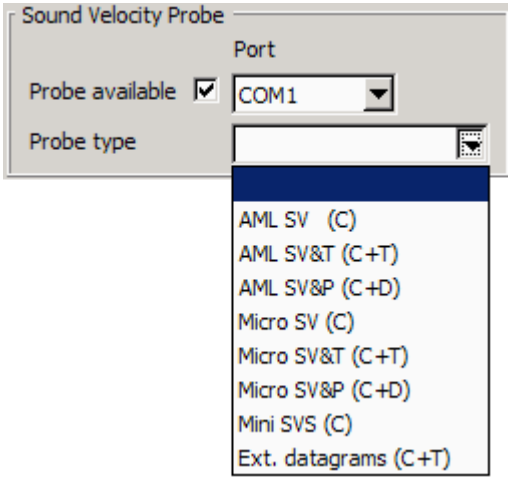
b Select the type of sensor or input to use as source for the sound velocity samples:

a Tick the **Probe available** box to signify that a sound velocity sensor or external sound velocity datagrams is to be used.

The **Probe type** combo box is now enabled

b Select the specific type of sound velocity probe to be used.

A number of choices are available:



c If a sensors is selected, set the port to where it is connected.

Note

There is no need to set communication settings for the selected input COM ports. (Auto detect or fixed 9600 baud is assumed).

If 'Ext. datagrams' is selected the port combo box is disabled as UDP is used.

c Configure the **Sound speed** parameters in the **Runtime parameters**.

2 Tick off if you have input from either of the following sensors

- Realtime tide
- SVP Logger
- Barometer
- Geodimeter

3 Set the port number, baud rate, data bits, stop bits and parity for each input enabled.

4 Enter the **Heading and position parameters**

This setting applies only if you are using SIS without any EM input, that is, if your position and heading are input directly to the SIS HWS, and not to the PU. This may be the case if you have single beam echo sounder input via NMEA datagrams and

no multibeam echo sounder, or if you want to use SIS without any echo sounder input at all.

a Write a name in the **Sensor name** combo box.

The name given here will be the one that is displayed in the installation parameters for GPS and single beam echo sounders.

b Choose either **serial line** or **ethernet** connection. Press **Add** for each sensor.

- If you choose a serial port, mark the check box under **Serial** and select the port you want to use for heading and/or position by selecting it from the combo boxes under **Port**. The communication parameter is set with the respectively combo box.
- If you want to use an Ethernet connection, mark the check box under **Ethernet**. The IP address and the port, where the data is to be send, is displayed in the text field to the right.
- If serial line communication is chosen a small program starts automatically when the equipment is started. This program receives data on RS-232 and forwards the data on UDP. The program will close down automatically.

c **Compass deviation file:** Use the browse button (three dots) to find the desired file.

d **Position delay (sec):** Enter any known position delay.

The accuracy of the position sensor is vital for the data accuracy, and it is therefore important that the relative timing of vessel position data and system depth data is correct. To define the duration of life of the positioning system input data, you can enter a position delay.

A position delay is required if the position that is output on the port applies to an observation that was done a significant number of seconds ago. The position delay may be significant for systems where the internal computation and processing of the position takes time.

e **Location offset (m):** Use the text fields to enter the location of the GPS antenna relative to the vessel's reference point.

Caution

The positioning system may have internal offset parameters set. Make sure that the antenna offsets are not applied both in the position system and in SIS.

How to setup the output to external sensors

1 Tick off if you want to output to either of the following systems

- Auto pilot
- Dynamic positioning
- Depth below keel

2 Set the port number, baud rate, data bits, stop bits and parity for each output enabled.

How to enter the waterline for a single beam system

This procedure only applies to single beam echo sounder interfaced to the SIS HWS using NMEA datagrams. The waterline offset is used to compensate for the depth difference between the vessel reference plane and the EA transducer depth.

Note

*Waterline for the multibeam echo sounders are input through the **Installation parameters**.*

1 Locate the **Waterline (m) Downward (Z)** entry in lower left corner of the **External sensor** dialog box

2 Enter the vessel's waterline vertical location (in normal trim) in the vessel's reference coordinate system.

Related operational procedures

- *How to modify the runtime parameters* on page 120

Enter a sound velocity profile

A sound speed profile must always be taken within the survey area and loaded in **.asvp** or **.actd** format into SIS before the survey is started.

We recommend that you collect at least two profiles at each location. If the two profiles deviates significantly, you should carry out further attempts until you are confident that you have a representative sound velocity profile.

The method used for collecting a sound velocity profile depends on the type of sound velocity probe you are using. You must refer to your sound velocity probe's user documentation for instructions on how to collect the sound velocity data.

There are three stages in the process of entering a sound velocity profile into SIS:

1 Collecting the sound velocity profile data

See *How to collect the sound velocity profile* on page 127

2 Converting the sound velocity profile data to the SIS .asvp format

See *How to convert your sound velocity profile to SIS format* on page 128

3 Checking and preparing the sound velocity profile for SIS

See *How to modify and load a sound speed profile into SIS* on page 136

There is an automated method in SIS for collecting and applying a sound speed profile. This method requires input of sound velocity profiles in one of the SSP format types.

See *How to automatically collect and apply a sound velocity profile in SIS* on page 138.

SIS reads the sound velocity profile in the **.asvp** and **.actd** formats only. The **.asvp** format is an ascii format consisting of a header row and data rows for each depth and sound speed as shown in the following example:

```
( SoundVelocity 1.00 12 200605290813 22.3452678
 66.4483298 4500 200605290813 200605301210 SVP-16 PE 8 )
0.1 1483.6
5.0 1484.2
7.0 1485.3
12.0 1488.1
20.0 1485.7
25.0 1484.0
40.0 1483.8
12000.0 1509.6
```

The **.actd** format is a special format containing water density in addition to the sound speed. It is used in ROV operations where the scaling factor is automatically calculated. The **.actd** format is not described further in this section.

The SIS software package offers a number of utility programs that may assist you in collecting, converting, checking and loading your sound velocity profile.

Program	Description
SmartTalk	Logging sound velocity profile data from an AML sound velocity probe. Logged data in .csv format. Available on the SIS installation DVD
csv2asvp	Converts the .csv file collected using SmartTalk into .asvp format. Available using the SVP Editor utility in SIS
SVPLogger	Logs sound velocity data from an AML or Morse sound velocity probe. Converts the data into the .asvp format. Available using the SVP Editor utility in SIS
SVP Manager	Reads any column based sound velocity file and will when configured convert the file to an .asvp file. Available on the SIS installation DVD
SVP Editor	Reads the .asvp file, displays the profile and holds a number of functions for editing and preparing the profile for use in SIS. A SIS utility program.
SVP Editor	Also reads any column based sound velocity file and converts it to the .asvp format.

Operational procedures

- *How to collect the sound velocity profile* on page 127
- *How to use SmartTalk* on page 127
- *How to use csv2asvp* on page 128
- *How to use SVP Logger* on page 129
- *How to use SVP Manager* on page 130
- *How to use SVP Editor to convert an SVP file to .asvp format* on page 133
- *How to use macros in the SVP Editor to convert an SVP file to .asvp format* on page 135
- *How to modify and load a sound speed profile into SIS* on page 136
- *How to automatically collect and apply a sound velocity profile in SIS* on page 138

Related operational procedures

- *How to modify the runtime parameters* on page 120
- *How to display sound velocity at transducer depth in the Geographical view* on page 148

How to collect the sound velocity profile

The method used for collecting a sound velocity profile depends on the type of sound velocity probe you are using. You must refer to your sound velocity probe's user documentation for instructions on how to collect the sound velocity data.

In general the method is as follows:

1 Prepare the probe for data logging.

There are two methods. Either to collect data through a data cable between the probe and the PC while the probe is lowered, or to collect the data within the probe and download the data to your computer when the probe is recovered.

2 Lower the probe slowly from the surface to the bottom, or to a required depth.

3 If you are logging data directly to the computer, ensure that data is being recorded.

4 Recover the probe slowly.

5 Save your profile in the SIS computer.

Note

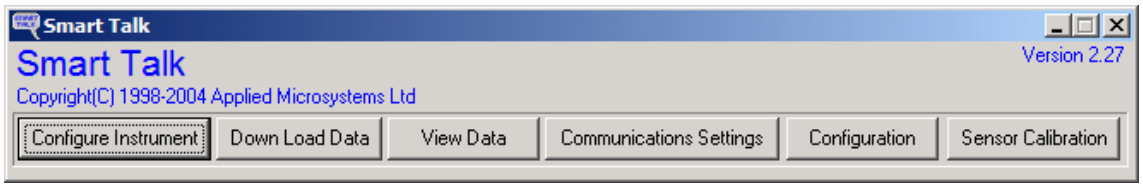
*If you are using an AML sound velocity probe you may use the **SmartTalk** utility program included on the SIS installation DVD to log the sound velocity profile in a comma separated (.csv) format. The .csv format must then be converted to .asvp format.*

***SmartTalk** is not a Kongsberg Maritime software.*

*Alternatively, for the AML and Morse SVP probes the SIS utility **SVPLogger** can be used to log and directly convert the sound velocity data to .asvp format.*

How to use SmartTalk

The AML sound velocity probe collects data internally during the sound velocity dip. The logging must be configured before the you lower the probe, and the data is downloaded to your computer after recovery of the unit.



1 Connect the probe to the serial port on your SIS computer.

2 Press **Configure Instrument** to set up the communication and data logging

3 Select your instrument

4 Press **Configure**

5 Enter a log file name and set the logging parameters according to your requirements

6 Press **Program Instrument** to load the settings into the probe

7 Disconnect the probe and collect the sound velocity data

8 Reconnect when the probe is recovered

9 Select **Down Load Data** from the main dialog

10 Select your instrument

11 Select the correct file and the destination path

12 Press **Transfer file(s)** to start downloading

13 Select **View Data** from the main dialog

14 Select **Load File**

15 Evaluate the data briefly

16 Press **Export**

17 Select **Formatted Comma Separated Values**

18 Enter a **Destination file name** with extension **.csv**

19 Press **Export File**

20 Use the SIS utility **csv2asvp** to convert the file into **.asvp** format.

See *How to use csv2asvp* on page 128

How to convert your sound velocity profile to SIS format

SIS reads the sound velocity format in the standard .asvp (Ascii Sound Velocity Profile) format. Your sound velocity data must be converted to the SIS .asvp format before they can be applied.

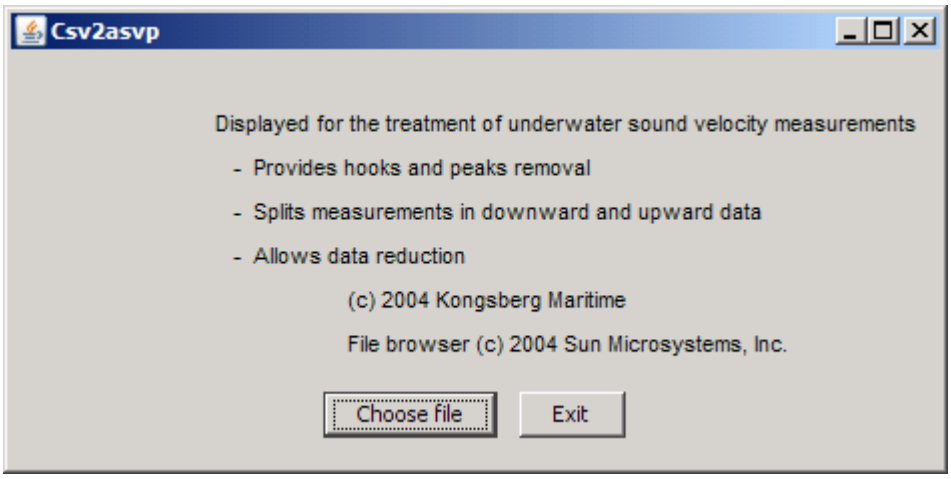
Depending on what type of probe you have SIS offers various utility programs to convert probe data into .asvp format.

How to use csv2asvp

csv2asvp converts observation files from an AML SVP sensors in **.csv** format to **.asvp** format

1 Open the **SVP Editor** from the SIS menu **Tools→Custom...→SVP Editor**.

2 Select **Tools→csv2asvp**



3 Press **Choose file**.

A standard Windows file open dialog appears.

4 Browse for the **.csv** file you want to convert.

A message dialog appears telling you what file you have selected to convert.

5 Click the **OK** button.

A message dialog appears telling you the converting process is done.

6 Click **OK**.

7 Click **Exit** to leave **csv2asvp**

8 Verify that the file is converted.

The new file will have the same name as the original .csv file, but now with the extension .asvp.

9 Modify and load the sound velocity profile into SIS.

See *How to modify and load a sound speed profile into SIS* on page 136

How to use SVP Logger

SVP Logger logs raw data from **Morse** and **AML** SVP sensors and converts the data to .asvp format

SVP Logger assumes that a **Morse** or **AML** SVP probe is interfaced to the SIS HWS (Hydrographic Work Station) using the **External Sensor Input setup**.

For details, see

- *How to setup the input from external sensors* on page 122

1 Select **Tools→External sensors**

2 Locate the **SVP Logger** field

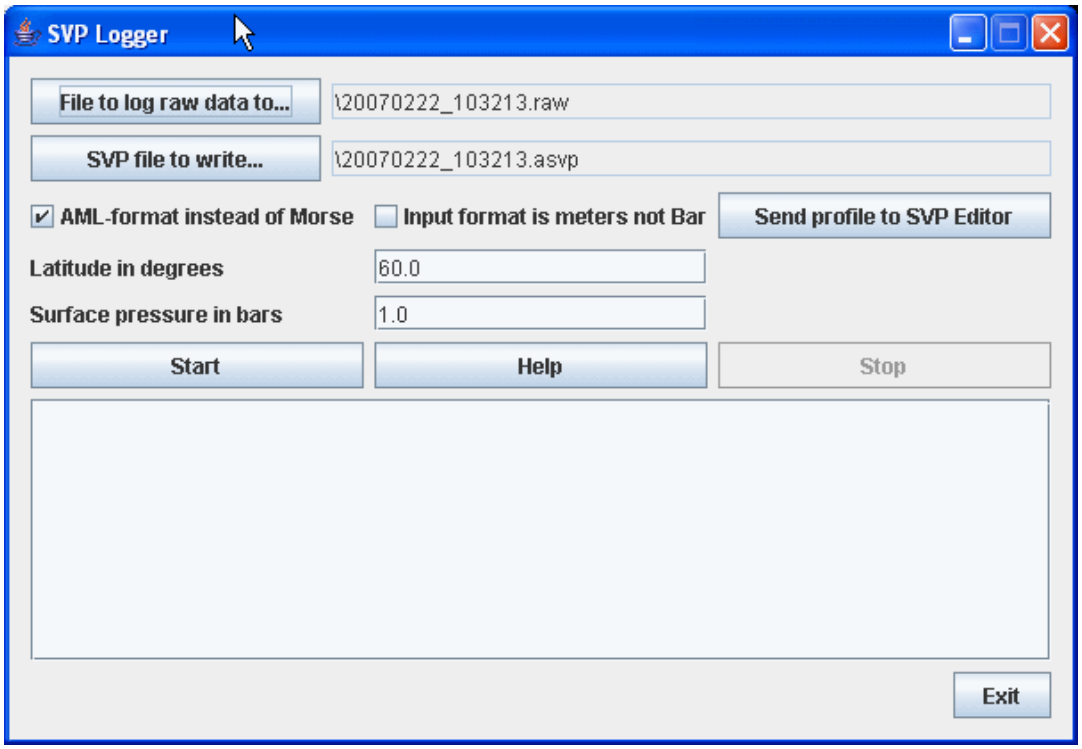
3 Check the **SVP Logger avail** checkbox

4 Select input port in the **Port** drop down list

5 Press **OK** to exit **External sensors**

6 Open the **SVP Editor** from the SIS menu **Tools→Custom...→SVP Editor**.

7 In the SVP Editor, select **Tools→SVPLogger**



8 Select the path of your SVP data by pressing **File to log raw data to...**

9 Select the path where you want the converted files to be saved to by pressing **SVP file to write...**

10 Select whether your SVP format is AML or Morse by checking/unchecking **AML-format instead of Morse**

11 Select whether your observations are in Bars or Meters by checking/unchecking **Input format is meters not Bar**

12 Enter your approximate latitude

13 Enter the surface pressure in bars

14 Press **Start** to start logging

15 Press **Stop** to stop logging.

Observe that the content of the .asvp file is displayed.

16 Press **Send profile to SVP Editor** to enable modifications to the data.

17 Modify and load the sound velocity profile into SIS.

See *How to modify and load a sound speed profile into SIS* on page 136

How to use SVP Manager

When configured **SVP Manager** will convert any column based ascii SVP file to the **.asvp** format

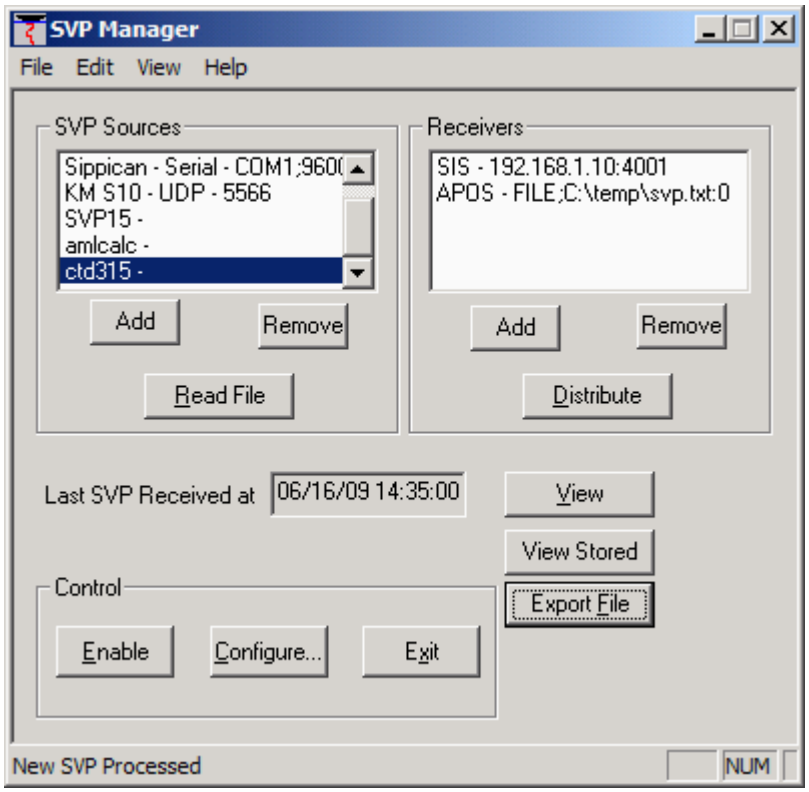
SVP Manager is a utility program that is included on your SIS installation DVD. You can use SVP Manager to define a standard conversion from your input SVP format to the .asvp format.

1 Locate **SVPMan** on your SIS installation DVD.

2 Run the installation file called **SVP Manager.msi**.

3 Copy the **SVP Manager** program file to the desktop for accessibility

4 Start **SVP Manager**.



Define the SVP format

First time you are using SVP Manager to convert your SVP data you need to define your format. Some known formats are predefined.

a Locate the **SVP Sources** area

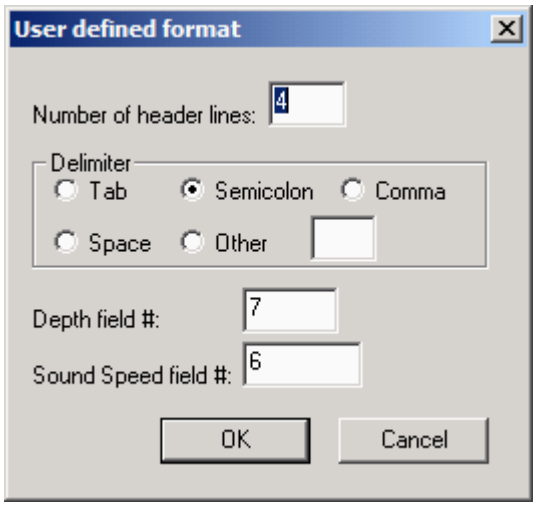
b Press **Add**

c Give a descriptive **Name**

d Set **Source** to be a **File**

e Set **Data Type** to **User defined**

f Press the **Cfg** button to configure the input



g Enter **Number of header lines** in your input file

h Select the **Delimiter** used in your input file.

Note

Tab and space may appear identical in a text file viewer.

i Select the column number in your input file where the **Depth** data is located

Note

Depth and pressure data can both be selected for this field.

j Select the column number in your input file where the **Sound velocity** is located

k Press **OK** to save the configuration

l Press **OK** to save your user defined SVP source

For each file you want to convert:

5 Highlight the SVP source you have created a converting routine for.

6 Select **Read file**.

A standard Windows File dialog opens.

7 Select the file you want to convert

8 Enter an approximate location for the sound velocity profile in the **Enter position** dialog that appears.

9 Press **OK**

10 Observe that the sound velocity profile is shown in the **SVP Edit** windows that appears.

11 Verify that the file has been correctly converted.

12 Press **OK**

13 Select **Export file** from the SVP Manager main dialog.

A standard Windows Save as dialog opens.

14 Save the file the .asvp file to the SIS directory **../common/svp_abscoeff**

15 Press **Exit** when you want to leave SVP Manager

16 Modify and load the sound velocity profile into SIS.

See *How to modify and load a sound speed profile into SIS* on page 136

How to use SVP Editor to convert an SVP file to .asvp format

This procedure describes how to convert a SVP file from any column based ascii format to the .asvp format read by SIS.

Note

If your original file format requires a lot of operations to convert to the .asvp format, you may define a macro that runs all operations in one automated process. In that way you only have to define the operations once. See How to use macros in the SVP Editor to convert an SVP file to .asvp format on page 135.

1 Open the **SVP Editor** from the SIS menu **Tools→Custom...→SVP Editor**.

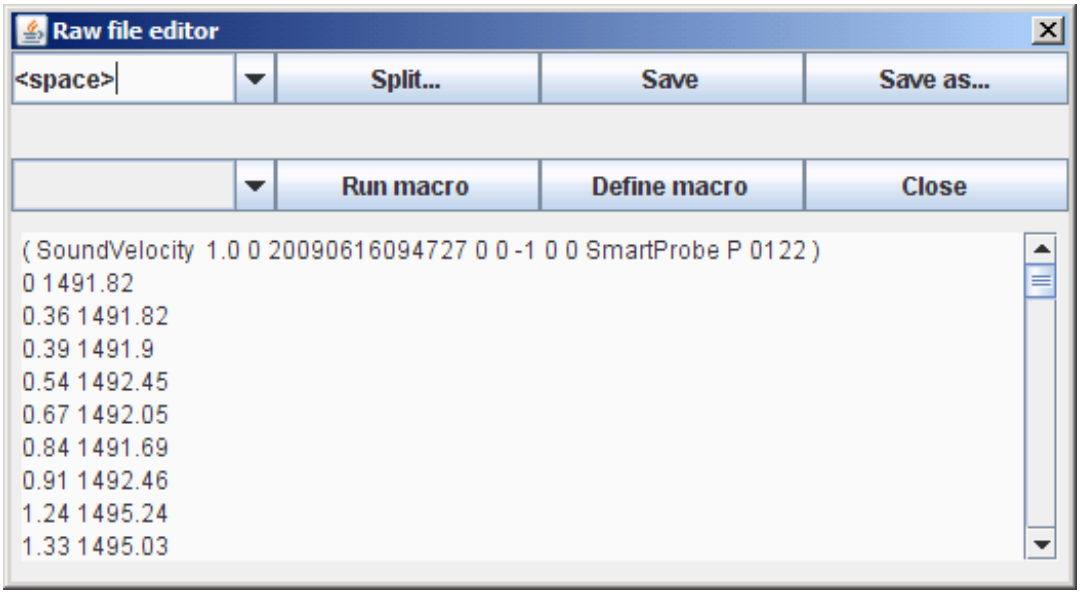
2 Expand the view by dragging the boundaries of the window.

3 Open the SVP file from the **File→Open in editor...** menu

4 Change the **Files of Type:** drop down selection to **All files**

5 Browse for your SVP input file and press the **Open** button

The **Raw file editor** opens.

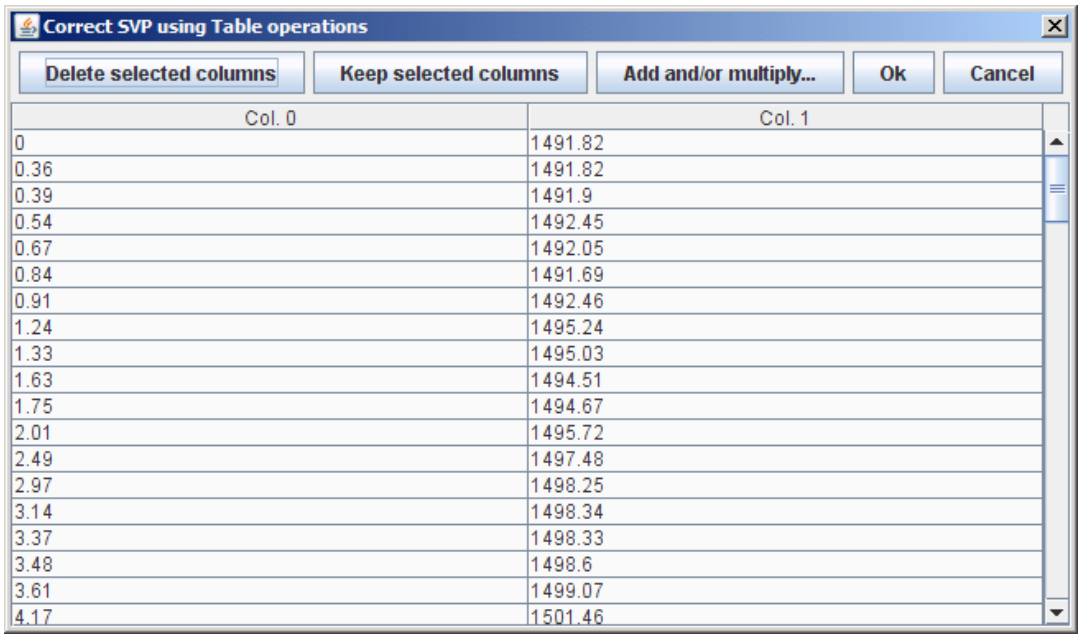


6 Remove all header rows by marking them and press the Delete key on your keyboard.

7 Select the delimiter from the drop down list.

8 Press **Split** to apply the delimiter.

A new window will appear.



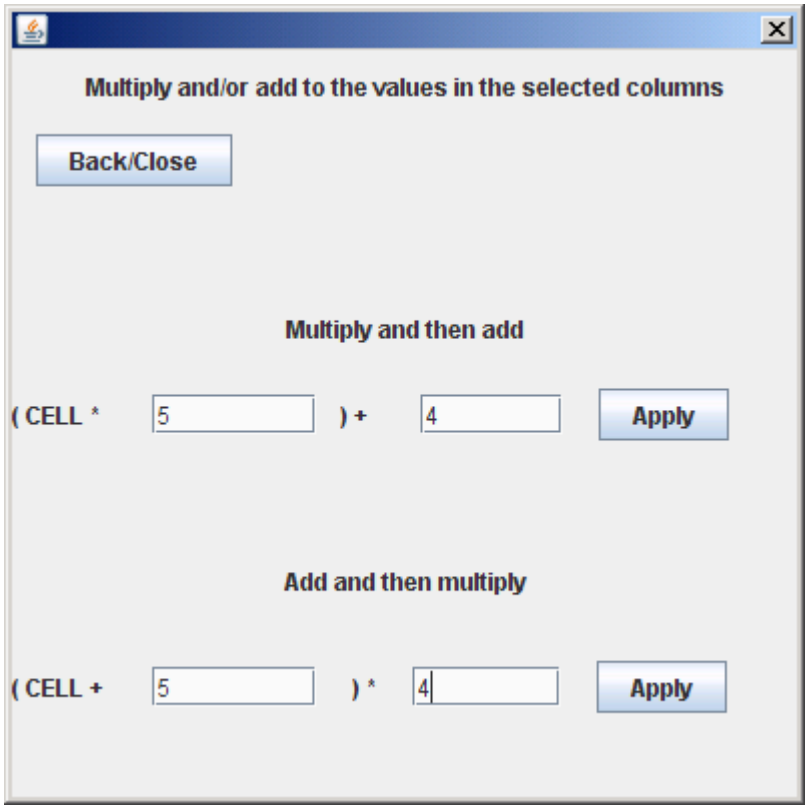
Col. 0	Col. 1
0	1491.82
0.36	1491.82
0.39	1491.9
0.54	1492.45
0.67	1492.05
0.84	1491.69
0.91	1492.46
1.24	1495.24
1.33	1495.03
1.63	1494.51
1.75	1494.67
2.01	1495.72
2.49	1497.48
2.97	1498.25
3.14	1498.34
3.37	1498.33
3.48	1498.6
3.61	1499.07
4.17	1501.46

9 Mark the columns you do not need.

Position the mouse in the first data row to mark that column.

10 Press **Delete selected columns** to remove the columns you have marked

11 Press **Add and/or multiply...** to perform offset and scale operations to a column



You can perform multiply-add/scale-offset operations in two ways:

- Multiply (scale), then add (offset) (ab+c)
- Add (offset), then multiply (scale) (a+b)c

Press **Back/Close** when finished. The figures in the selected column will be updated.

12 Move the columns by position the mouse pointer on the column header row and drag the column to right position.

13 Press **OK** when selected columns are in right place.

You will now return to the **Raw file editor**

14 Select **Save as...**

15 Save the new file in the SIS directory **../common/svp_abscoeff**

The file extension is automatically set to **.asvp**

16 Modify and load the sound velocity profile into SIS.

See *How to modify and load a sound speed profile into SIS* on page 136

How to use macros in the SVP Editor to convert an SVP file to .asvp format

This procedure describes how to define and use a macro to convert a SVP file from any column based ascii format to the .asvp format read by SIS.

If your original file format requires a lot of operations to convert to the .asvp format, you may define a macro that runs all operations in one automated process. In this way you only have to define the operations once.

1 Open the **SVP Editor** from the SIS menu **Tools→Custom...→SVP Editor**.

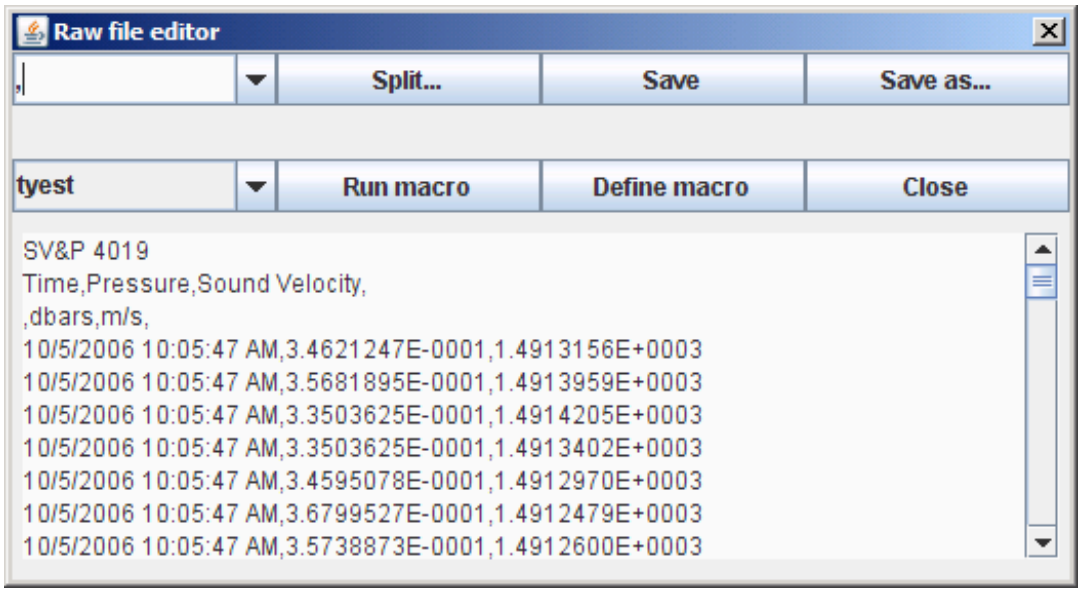
2 Expand the view by dragging the boundaries of the window.

3 Open the SVP file from the **File→Open in editor...** menu

4 Change the **Files of Type:** drop down selection to **All files**

5 Browse for your SVP input file and press the **Open** button

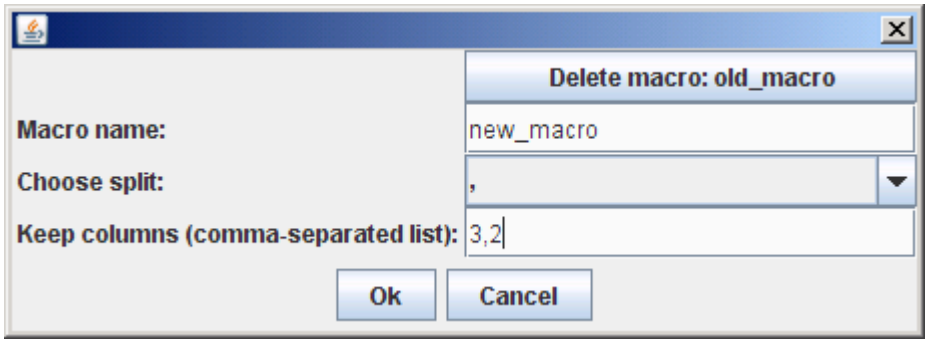
The **Raw file editor** opens.



6 Remove all header rows by marking them and press the Delete key on your keyboard.

7 Press **Define macro** to define a new macro.

A new window will appear.



8 If required, use the **Delete macro:<macroname>** button to delete currently selected macro.

9 Enter a new, unique **Macro name**.

10 Select the column split that separates the columns of your format.

11 Enter the column numbers that you want to keep, i.e. the depth and the sound velocity readings

You may switch the order of the columns.

Note

Left column is Column 0

12 Press **OK** to save the macro.

You will return in the **Raw file editor** window.

13 Select the macro you want to run from the drop down box.

14 Press the **Run macro** button to execute the selected macro.

15 If required, use the **Add and/or multiply...** to perform multiply-add instructions to a column

16 Press **OK** when selected columns are in right place.

You will now return to the **Raw file editor**, and a new header has been added.

17 Select **Save as...**

18 Save the new file in the SIS directory **../common/svp_abscoeff**

The file extension is automatically set to **.asvp**

19 Modify and load the sound velocity profile into SIS.

See *How to modify and load a sound speed profile into SIS* on page 136

How to modify and load a sound speed profile into SIS

This procedure assumes that a sound velocity profile file is available in **.asvp** format.

1 Open the **SVP Editor** from the SIS menu **Tools→Custom...→SVP Editor**.

2 Expand the view by dragging the boundaries of the window.

3 Open the **.asvp** file from the **File→Open...** menu

4 Adjust the graphical view by

   1 Select **From depth** and **To depth** according to your depth range

   Use the scroll bar on the right to scroll through your data.

   2 Select **From speed** and **To speed** according to your recorded sound speed values

   or

   3 Enable **Automatic speed scale** to automatically adjust the scale to display all sound speed observations

5 Check the observations for double entries or upward depths by choosing **Tools→Check profile**

   Observations that are suggested removed are highlighted.

6 Press **Delete row** to delete highlighted entries.

7 Remove gross errors/spikes from the profile by selecting the point you want to remove

8 Press **Delete row** to delete highlighted point

9 Continue step 7 and 8 until the profile is acceptable

10 Extend the profile from the **Tools→Extend** menu.

   This will add sound velocity values from last observed depth down to 12000 meters depth.

11 Thin the profile from the **Tools→Thin Profile** menu.

   This will reduce number of observations to adopt to the PU's limitations for sound velocity observations

12 Save the file from the **File→Save as...** menu

   It is recommended to use a filename that identify date, time, place and that the file is thinned

13 Select **File→Send primary svp to echosounder** to send the profile selected as you primary profile to SIS.

14 Return to SIS.

15 Select **Sound speed** in the **Runtime parameters** frame

16 Use the browse button to open the correct **.asvp** file.

   Normally the file will have been selected via the **Send primary svp to echosounder** command from SVP Editor.

   When selected the file name will be shown in the text field next to **Use Sound Speed Profile**. The text field background colour will turn yellow, notifying that the input must be accepted to be applied.

17 Press **Use Sound Speed Profile** to apply the selected sound speed profile

How to automatically collect and apply a sound velocity profile in SIS

This procedure applies when you have a sound velocity input into SIS via the Ethernet. This applies e.g. to realtime collection of the sound velocity profile from moving profilers.

1. A profile is obtained with a data set in accordance with one of the SSP format types for immediate use, i.e S00, S01, S02, S03, S04, S05, S06 or the new S07.
2. The obtained profile must be extended and made error free.

   This step is vital for the process to carry on.
3. The extended and error free profile is sent to SIS via the Ethernet network using UDP and port 4001 on the SIS HWS.
4. The profile is received by SIS and checked for errors. If an error is detected at this stage the automatic process is stopped and you will be notified for manual intervention.
5. The error free profile is used to generate a standard depth/sound speed profile which is distributed to all started echo sounders (PUs). In addition, a number of absorption coefficient profiles are made, one for each major sounder frequency used. The echo sounders are updated with the new absorption coefficient values by SIS when appropriate. The absorption coefficient profiles are generated based on the CTD information in the received profile (i.e. S01, S02, S03, S04, S05, S06 or S07) or from the operator set salinity when no CTD information is available (i.e. S00).
6. The SIS operator display is updated with the new profile name (based on date and time from the received profile) in the **Runtime parameter** frame. The profile will also be displayed graphically in the **Sound velocity profile** frame if opened.

Start the echo sounder

The echo sounder is started by selecting the desired echo sounder from the **Echo sounder - not started** combo box. The **Logging**, **Pinging** and **Line counter** buttons will all be disabled until the echo sounder is ready. When the echo sounder is ready, you can start to ping.

How to start the echo sounder

Before you start pinging, the echo sounder must be turned on.

1 Press the **Rescan** button to scan for available echo sounders on the network.

2 Select your echo sounder from the **Echo sounder - not started** combo box.

Single beam echo sounders must be set up and started manually on its own Operator Station.

Autostart

If the echo sounder is powered before SIS is started, you may set the echo sounder to start automatically when it is detected by SIS on the network.

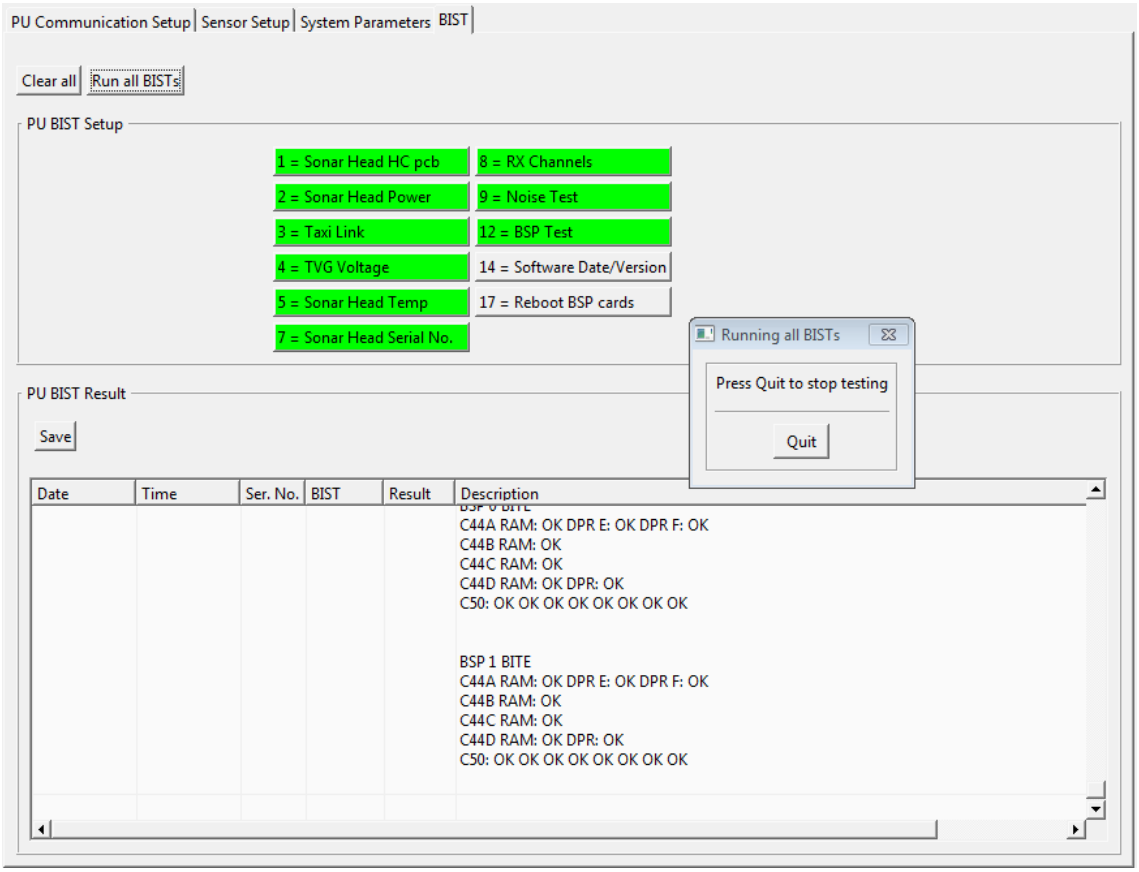
Autostart is enabled from **Tools→Custom...→Set parameters** under the **Startup options for the system** settings.

For those who have more than one echo sounder on the same network, echo sounders may start automatically when detected on the network, but only when the detected echo sounders are the same as last time SIS was started. This means that Autostart is not activated when new echo sounders are detected and/or previous used echo sounders are missing. The Autostart mechanism may be enabled/disabled by a setting in the SIS database. Default setting is disabled.

Automatic Built-In Self Test at echo sounder start-up

When an echo sounder is started it is an option to run all defined BISTs (Built In Self Test) for the echo sounder automatically. This option is controlled (*On-Off*) from the **Tools→Custom...→Set parameters** under the **Startup options for the system** settings. Default setting is *Off*, i.e. BISTs are not run automatically. When changed it is not necessary to restart SIS.

When this option is *On* and an echo sounder is started an **Installation and Test** tear off window will be displayed showing the BIST tabulator content. If an Installation and Test window is already opened this window will be used.



A **Run all BISTs** test sequence is then automatically started for each available echo sounder head. This sequence can be cancelled at any stage by pressing the **Quit** button in the pop-up window that is displayed. When cancelling, the current test must run to completion before the sequence halts.

The progress of the tests can be monitored by looking at the status colour in the test buttons or in the **PU BIST Result** area. The results of the completed tests can be read at any time during the test run.

When the test sequence has run to completion the test results may be saved by pressing the **Save** button.

Note

The full selection of BISTs for an echo sounder may contain some special items that should not be run during start-up. These include e.g. re-booting of BSP cards, upload of new head software etc. Such tests will not be run in this context.

Some tests may require a considerable time to complete. There is no countdown or any other indication of remaining time in the current implementation.

How to interface a singlebeam echo sounder in SIS

EA singlebeam echo sounders, from version 2.4.0.0 and onwards, have the ability to be used in a SIS compatible mode of operation. This will enable the EA echo sounder to be integrated in the SIS topside environment for control, display and data logging purposes.

From the SIS point of view an EA in SIS operational mode will behave as a traditional EM echo sounder except for some operational restrictions and a different data logging format.

An EA in SIS operational mode will broadcast it's presence on the network using port 1999. When detected by SIS it will be named EA600 and it can be started by SIS in the same manner as used for the EM range of echo sounders.

Only a small number of the different SIS information display frames will be active for the EA echo sounder. Most noteworthy, no installation and runtime parameter settings are currently available for this echo sounder. The numerical display will have a restricted function mainly showing position information, speed and depth. The major display for the EA operation in SIS will be the Geographical view frame. It is used to present the depth information in gridded format based on the logged data. The ship's position will be shown as a cross, as no heading is currently available in the EA position datagram.

The pinging and logging operation is controlled by the standard SIS buttons used for this purpose. The data being sent from the EA echo sounder, and logged by SIS, is processed data (i.e. not raw data). The following is a list of the different EA datagram types being logged:

- GL (Geographical Location)
- CS (Comment String)
- D1, D2, D3, D4 (Detected bottom depth)
- Q1, Q2, Q3 (Echogram – post processor)
- PR (Parameter request)
- PE (Parameter Enter)
- ST(Status Telegram)
- MS (Motion Sensor)
- SV (Sound Velocity)

The data is stored in files with a '`.dg`' extension. The file name format is the same as for standard SIS '`.all`' files. The '`.dg`' files will always contain a 'CS (Comment String) datagram as first entry. It contains the date information (which is not found elsewhere).

Raw data logging can be performed by the EA itself to a local hard disk in parallel with the logging operation in SIS. I.e. new EA raw data files are created in parallel with the lines logged in SIS. This feature is turned on by default, but may be turned off by selecting **Tools→Custom...→Set parameters→Logging** and setting **EA raw data logging (No=0, Yes=1)** to 0.

Note

EA is a single beam echo sounder normally only measuring the depth straight below the ship. This implies that SIS is logging relatively small amounts of data and if running a survey in straight lines the gridded result might be meagre. This is caused by the method used for gridding based on making triangular planes between three measured depths. A better gridding result will be obtained when the survey contains several lines, more or less in parallel and close.

Note

The EA data must contain navigation data to be read by SIS.

1 In the EA software:

- **a** Open the **Interfaces→Network Interface** dialog and locate the **Datagram output** field.
- **b** Check the **Navigation** check box to send navigation data to SIS.
- **c** Press **OK**.
- **d** Open the **Install→Navigation** dialog and locate the **Protocol** field.
- **e** Select the **NMEA** protocol.
- **f** Press **OK**.
- **g** Open the **File→Operation**g dialog box
- **h** Check **SIS** checkbox.
- **i** Press **OK.**

  The SIS display will apparently freeze.

2 Go to **SIS**

3 Press **Rescan** to scan for recognized systems on the network.

Note

Both EA 400 and EA 600 systems will be identified by SIS as EA 600.

4 Start the EA 600 system from the **Not started** drop-down menu of SIS.

Allow SIS to initialize the use of the EA system. SIS is ready for use when the **Logging** and **Pinging** buttons becomes selectable.

5 Select **Pinging** from SIS to start EA pinging.

or

6 Select **Logging** from SIS to start EA pinging and raw data logging.

The EA system will continue in normal operation.

Your vessel will be shown in the geographical display of SIS.

All EA parameter settings and the display of the Echograms will be shown in the EA software.

Detecting the echo sounder on the network

This procedure describes how to detect echo sounders on the network, and applies only to situations where you are using SIS with more than one echo sounder at the same time.

When the SIS program starts it will automatically scan the network for connected echo sounders. This will normally take approximately 10 seconds. The detected echo sounders will be compared with a list of echo sounders detected on the previous run of the program. If new echo sounders are detected they will automatically be configured in the SIS program according to a predefined setup for each echo sounder type. This will take approximately 5-10 seconds for each new echo sounder. All detected echo sounders will then be listed in the **Current echo sounder** combo box, available for selection of an echo sounder in further configuration.

In addition, the same echo sounders may be listed in the **Echo sounder - not started** combo box, depending on whether the autostart mechanism is triggered or not. The autostart mechanism will automatically start all detected echo sounders, provided they are exactly the same as on the previous run, that is, if no echo sounders are missing and no new echo sounders are added since the last run. Otherwise the echo sounder will appear in the **Echo sounder - not started** combo box and must be started manually.

Choose which system you want to change the parameters for, by selecting it from the **Current echo sounder** combo box.

Since several types of echo sounders, with different purpose and capabilities, are handled by the SIS software, the parameter settings for the different types will vary depending on system.

The multibeam echo sounders broadcasts their existence on the network. EA single beam echo sounders, from version 2.4.0.0 and onwards, will also be detected on the network by SIS. Earlier versions of single beam echo sounders and other sensors transmitting NMEA datagrams must be set up manually in SIS. Use the **Add instruments combinations** found in the **Tools** menu. When defined, these sensors will be handled the same way as echo sounders that broadcast their existence on the network.

The external sensors, connected directly to the HWS, such as a sound velocity probe, heading and position sensors are registered in the **External sensors** found in the **Tools** menu.

Note

It is important that the default parameter settings for each echo sounder is checked and/or modified according to the operational and physical conditions applicable for the current echo sounder.

Related topics

- *Main toolbar* on page 27
- *Echo sounder – Not started list* on page 29
- *Current echo sounder* on page 30

Import a Neptune grid to SIS

If you have a terrain model generated by the Neptune software and want to load this as your background grid in SIS you will need to add a definition of the projection to the Neptune file(s).

How to import a Neptune grid to SIS

1 Select **Tools→Custom...→Create grids from ascii files**

2 Select the **projection** of your current SIS survey, i.e. the projection you want the imported Neptune grid to appear in. The datum is given by the header of the Neptune file.

3 Set **Grid size in meters** and **Number of cells in processing grid** according to depth and coverage of your data.

4 Press **Select grid output directory...** to specify where to store the grid. Note that this directory must exist and be accessible for writing.

5 Type a descriptive **Grid name**.

6 **Select ascii input files** opens a file selection dialog where you can browse for the Neptune files to import.

7 Select **Remove files in list** if you want to remove a selected file from the list.

8 Press **OK** to start the process.

9 Select **File→Import/Export...** from the SIS main menu.

10 Press the **Import** button.

11 Browse for the directory where you selected to store the grid and select the directory having the grid name that you entered.

12 Press **OK** to return to the **Import/Export** dialog box.

13 Highlight the survey to import and press **OK**.

14 In the **Geographical** view, press **Zoom to world** to display the grid.

Note

The GridEngine must be running for this program to work.

Note

If the process causes GridEngine to stop you may have to kill the Import from the process manager and restart the GridEngine.

Start pinging

How to start pinging

Pinging must be started manually after the echo sounder is ready. When pinging is *On*, the **Waterfall**, **Cross track** and **Beam intensity** windows becomes active.

1 Select the echo sounder you want to ping with in the **Current echo sounder** combo box.

2 Press the **Pinging** button on the toolbar. The button is red when *Off* and green when *On*.

The selected echo sounder will now start transmitting.

Related topics

- *Main toolbar* on page 27
- *Current echo sounder* on page 30
- *Beam intensity view* on page 55
- *Cross track view* on page 58
- *Waterfall view* on page 67

Check sensor input

Proper operation of the external sensors are vital for the SIS operation. These are sensors connected to the PU (Processing Unit) and not directly to the HWS (Hydrographic Work Station).

Note

*The **PU – Processing Unit** may be a separate hardware unit or an integrated part of the **TRU – Transceiver Unit** cabinet, depending on echo sounder system.*

For SIS it makes no difference whether the communication is with a PU or a PU inside a TRU. The term PU is used in this manual.

External sensors are continuously monitored in SIS. The **Time series** window presents data from the motion sensor. Sensor data is also shown in the **Numerical display** window. Sensor errors are reported in the **Message service** window.

How to monitor the external sensors in SIS

1 Select the **Time series** frame.

2 Verify that roll, pitch and heave data is being received by SIS.

3 Verify that the roll, pitch and heave data appears according to expected values.

4 Select the **Numerical display** frame.

5 Verify that values read from all your external sensors, including roll, pitch, heave and sound velocity are close to what you expect.

6 Select the **Message service** frame.

7 Scroll through the logged messages and verify that there are no messages indicating problems reading the external sensors.

8 Select the **PU sensor status** frame.

9 Verify that your sensors are marked with green, meaning that sensor is selected as active and that data is being received.

10 Select the **Sensor layout** frame.

11 Verify that your sensors are located correctly

Related topics

- *Time series view* on page 66
- *Numerical display* on page 62
- *Message service view* on page 63
- *PU sensor status view* on page 79
- *Sensor layout view* on page 88

Check echo sounder main functions

Before you start logging, you are advised to make sure that the echo sounder system is locked on the bottom and that the swath coverage is as expected.

The **Geographical** window presents a real time view of the system(s) performance during online operation. The window shows the raw data from the system(s) after corrections have been applied for vessel attitude and sound speed.

Note

The following information applies to multibeam echo sounders only. Single beam echo sounders and GPS equipment do not have this option.

How to display realtime depths

While pinging or logging, realtime depths may be displayed in the **Geographical** window using the following setup:

1 Press the **Option** button in the **Geographical** frame's toolbar.

2 Expand **Survey** in the left pan of the Geographical Options menu.

3 Select the **Realtime Depth**.

4 Press **OK**

How to verify echo sounder main functions

Check the following windows:

1 Check the **Waterfall** window for a continuous bottom.

2 Check the **Cross track** window to see the depths for all the beams ping by ping.

3 Check the **Beam intensity** window for reasonable backscattering strengths for each individual beam.

4 Check the sensor status in the **Numerical display** window and in the **PU sensor** status.

5 Check the **Water Column** display if available.

Related topics

- *Geographical view* on page 51
- *Beam intensity view* on page 55
- *Cross track view* on page 58
- *Numerical display* on page 62
- *PU sensor status view* on page 79
- *Waterfall view* on page 67
- *Water column view* on page 69

Geographical frame settings

How to display seabed imagery data in the Geographical view

Note

The grid must be generated with the seabed image options enabled. The seabed image can be generated in real time or it can be generated during import of logged raw data.

1 Generate seabed image data in real time by

- **a** Select the **Survey administration** frame.
- **b** Open the **Survey template handling** tab.
- **c** Select the **Advanced** tab.
- **d** Select the **GridEngine parameters** tab.
- **e** Press the **Processing...** button.

or generate seabed image data from logged raw data by

- **a** Select **File→Import/Export...**
- **b** Select **Raw data files**
- **c** Enter Survey name, raw data path and other survey parameters as appropriate
- **d** Locate the **Grid Engine Parameters** field at the bottom of the dialog
- **e** Enter appropriate Number of cells and cell size.
- **f** Press the **Processing...** button.

2 Press the **Advanced...** button.

3 Tick off for **Seabed Image Processing in Grid Engine**.

4 Type a name for your new **Seabed Image Processing** rule the text field next to the **Save as** button.

5 Press **Save as**

6 Press **Apply** to make changes active.

7 Press **OK** and next **Accept** to return to the **Raw Data Files** dialog box.

8 If you are creating the grid through importing raw data, press **OK** now and await the import process to finish.

9 Select the **Geographical** frame.

10 Select the  **Options** button.

11 Select **Survey→SIS Based Surveys** in the left tree structure.

12 Locate the **show/hide** field to the right of the dialog.

13 Check the **Sonar Display Grid** option.

14 Press **OK**

15 Select the area in the geographical view that you want to display with high resolution seabed image by:

- **a** Click left mouse button in start point for the area.
- **b** Drag the mouse to the end point for the area.
- **c** Press the shift key.
- **d** Release the mouse button and the shift key.

16 Observe that selected area is shown with seabed image mosaic.

How to display sound velocity at transducer depth in the Geographical view

This functionality requires that your raw data (*.all files) contains data from a sound velocity probe that is connected at the same or close to the depth of your transducer.

1 Open a console window, e.g. as follows

- **a** Press the Windows **Start** button
- **b** Select **Run...** in the right side of the Start menu
- **c** Type **cmd** in the text field that appears
- **d** Press **OK**

2 Go to the directory where the SIS executable files are located, i.e. the **SIS\bin** directory.

To change drive and directory in a console window:

- **a** Type the drive letter, e.g. **C:**, and press Enter to change the drive
- **b** Type **`cd\`** to change directory to the root directory
- **c** Type **`cd <sub-folder> \<next sub-folder>`** to change the directory to an existing directory below, e.g. **`cd program files\Kongsberg Maritime\SIS\bin`** to change to the SIS\bin directory

3 Run **`makeSoundSpeedAtHeadFile.bat`** with the path to the raw data as argument.

E.g. if your raw data is stored at c:\sisdata\raw\testdata you must type the following in the command window:

```
makeSoundSpeedAtHeadFile.bat c:\sisdata\raw\testdata
```

4 Observe that the program is running by reading the raw data files you have specified.

When completed the following message will be displayed in the command window:

File soundspeed.txt can now be imported into SIS

The new file will be stored at the same location as you run **`makeSoundSpeedAtHeadFile`** from.

5 Return to SIS

6 Select **Tools→Custom...→Create grid from ascii files**

7 Select the **Project** that your data was logged in

8 Select a **grid size** and **number of cells in processing grid**.

Note

The grid cell size should be set a lot larger than you would for a standard survey.

9 Select the output directory and a name of your new gridded sound velocity data

10 Press **Select ascii input files...** and browse for the **soundspeed.txt** file

11 Enable the selection of the file by highlighting the file name in the **File** list

12 Press **OK** to start the importing.

A status window will be displayed as the data are converted into grid data

13 Select **File→Import/Export...**

14 Press the **Import** button to select a gridded data set

15 Browse for the folder named after the survey name set in the **Create grid from ascii files** process

16 Highlight the selected survey and press **OK** to import

17 Press the **Zoom to world** button in the Geographical display toolbar

18 Verify that the sound speed is displayed.

Note

SIS will interpret the sound velocity as a depth value, so the legend will display 'Depth' even though the values are the sound velocity.

Note

*The sound velocity data may be easier to read if you display the data as points, rather than filled polygons. Select the **Display option** button, then go to **Survey→Gridded data** and set **Drawstyle** to **Points**.*

How to display a smooth surface

To display a nice and smooth model of the seafloor, use the **Option** button and choose **Survey→SIS based survey→Depth operations: Min**. This will select the minimum value in each grid cell and create a surface from them. Noise will be hidden in this surface, but it will be the shallowest surface drawn very smooth.

1 Press the **Geographical option** button

2 Expand **Survey** in the left tree structure

3 Select **SIS based survey** in the tree structure

4 Locate **Depth operation** in the mid field on the right side of the window

5 Set **Depth operation** to **Minimum**

How to look for artifacts

Inspection mode is used to scan for objects on the seafloor and to filter out noise that may look like objects. The **I** button is used to toggle **inspection mode** on and off. When in inspection mode, the LOD is set to 0, depth operation is set to median depth and the depth scale factor is set to 2. Toggling the **I** button a second time will restore the previous settings.

Alternatively, you may manually set the inspection parameters as follows:

1 Press the **Geographical option** button

2 Expand **Survey** in the left tree structure

3 Select **SIS based survey** in the tree structure

4 Locate **Depth operation** in the mid field on the right side of the window

5 Set **Depth operation** to **Median**

6 Select **Gridded data** in the tree structure

7 Locate **Level of detail**

8 Choose a smaller **Level of detail (LOD)**

   You should not start using level of detail 0, as this may overload the system resources. Instead try to use an increasingly smaller level of detail until a good picture is found.

9 Select **General** in the tree structure

10 Locate **Light source**

11 Try to turn the **light source** on and off.

   When off, the light source will follow the mouse cursor and make it easier to see shadows from different angles.

12 Select **Survey** in the tree structure

13 Locate **Depth scale factor**

14 Try to change the **Depth scale factor** to see shadows even better.

How to create and use a GeoTIFF background image in the Geographical view

Note

GeoTIFF is a standard which allows georeference information to be embedded within a TIFF file.

You can create and display a GeoTIFF image from gridded survey data. You can also import a GeoTIFF file into SIS and display it as background in the Geographical display.

How to create a GeoTIFF background image from the Geographical view

A gridded survey must be loaded in the Geographical view in SIS.

1 Select the area you want to create a graphical GeoTIFF file from.

2 To create a picture with best possible resolution, select the **Geographical Options** button, locate the **Level of Detail** field, and select the Level Of Details (LOD) that gives the best presentation of your selected area.

3 Press the **Save background data** button  .

Three files are created in the background directory, i.e. `\sisdata\common\background`:

- `gvsor` – the GeoTIFF file
- `gvsor_tmp.tif` – a standard tiff file (not geo-referenced)
- `gvsor_tmp.tfw` – a tiff world file (geo-referencing information for the tiff file)

4 Rename and copy the created file if you want to keep it.

How to use the GeoTIFF file in the Geographical view

A GeoTIFF file can be give useful background data information for an area, e.g. data from an earlier survey in the area. To load a GeoTIFF file to be displayed as background data in SIS:

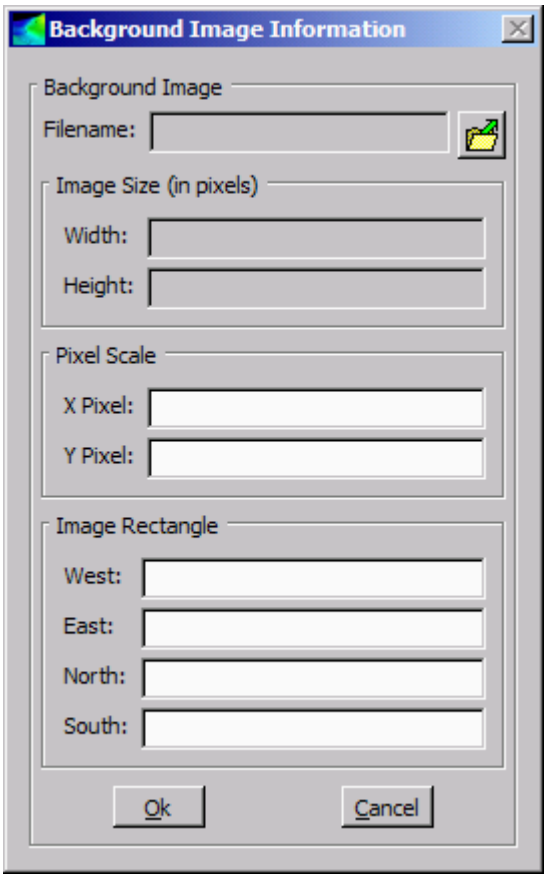
1 Select **File→Import/Export**

2 Locate the **Data Types** field

3 Select **Background Images**

4 Press the **Import** button

The **Background Image Information** window appears



5 Browse for the GeoTIFF file by pressing the browse button in the upper right corner.

When selected the image and georeference information fields in the **Background Image Information** window will be completed.

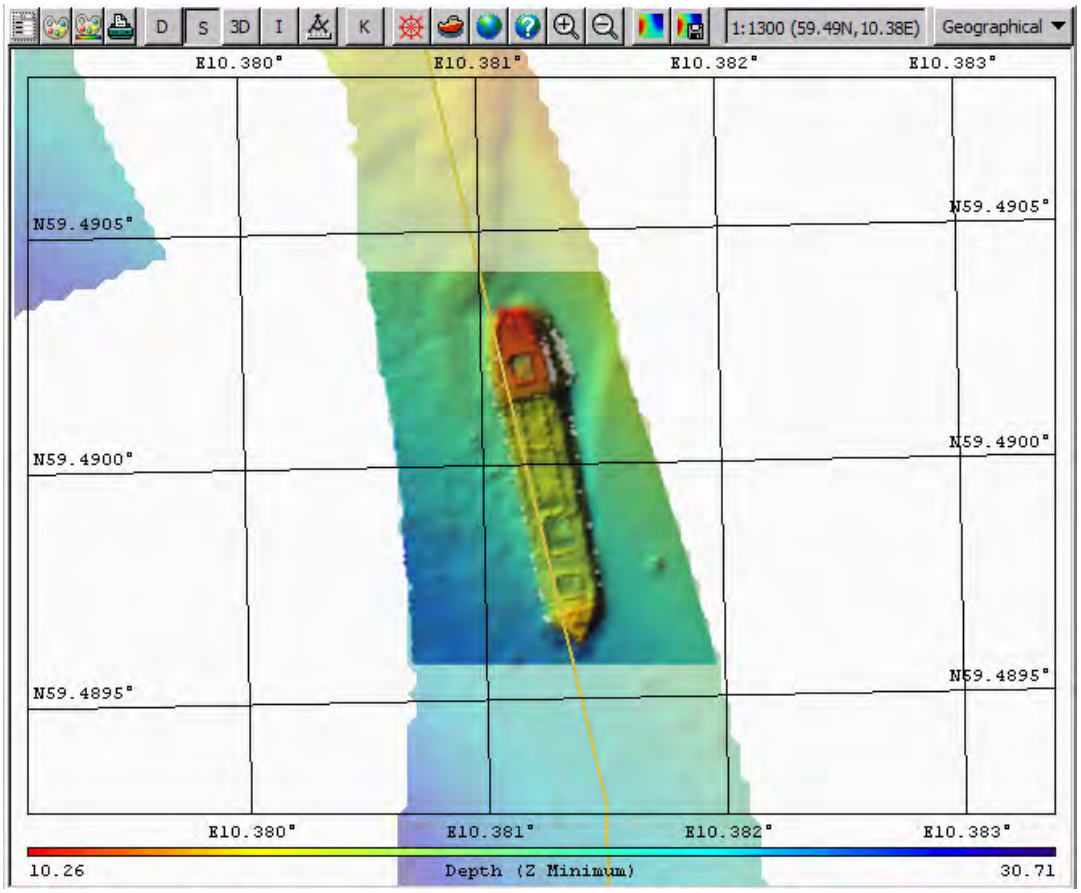
6 Press **OK** to leave the **Background Image Information** window

7 Press **OK** once more to leave the **Import/Export** window

You will now have a background image in the Geographical view. The GeoTIFF files will with it's georeferenced information be displayed in the correct projection and scale.

The following figure shows an example of the use of a GeoTIFF background image. A high resolution image of the survey is displayed on top of a loaded survey, which in this example is displayed 50% transparent.

Figure 8 Example of use of GeoTIFF background image



Related operational procedures

- *How to enter survey parameters* on page 101

Related topics

- *Geographical view* on page 51
- *Keyboard and mouse in the Geographical view* on page 38

Start and stop logging

Logging must be started manually after the echo sounder is ready. In the **Current echo sounder** combo box, select the echo sounder you want to start.

Note that if pinging is *Off* when logging is turned *On*, pinging will automatically be turned *On*. If logging is *On* and pinging is turned *Off*, logging will automatically be turned *Off*.

How to start and stop logging – Alternative 1

During the survey, the vessel navigates along the pre-planned survey lines. Logging must be started at the beginning of each line. Stop the logging at the end of each line and start it again at the beginning of the next.

At the start of every survey line:

1 Press the red **not logging** button on the toolbar.

2 Verify that logging starts by that the button turns green.

3 Press the green **logging** button when the vessel has reached the end of the line.

4 Transit to the next line.

5 Press the red **not logging** button when starting the next line.

6 Press the green **logging** button when the final survey line has been completed.

How to start and stop logging – Alternative 2

You can also start the logging at beginning of the first line and let it run continuously, changing line number only at start of each new survey line.

At the start of the first survey line:

1 Press the red **not logging** button on the toolbar.

2 Verify that logging starts and the button turns green.

3 Press **Line Cnt (xxxx)** at the beginning of each survey line.

4 Verify that a new line number has been assigned.

5 Press the green **logging** button when the final survey line has been completed.

Related topics

- *Current echo sounder* on page 30
- *Line counter toolbar set* on page 31

How to save data

When the echo sounder has started logging, data is automatically saved to disk.

The **Line counter** button on the toolbar shows the line count for the currently selected echo sounder.

To avoid very large log files the counter for all active echo sounders are incremented automatically every 30 minutes (this is configurable). This, however, only happens when the counter has not been incremented by other means within the last 30 minutes, i.e. by pressing the line counter button or by stopping and restarting logging. **Interval for line counter** is set from **Tools→Set parameters→Logging**.

A full disk warning will be given. When a full disk warning is received, you must copy the surveyed data to an external storage device and delete the data from the logging computer.

How to verify data logging

To verify that data is actually being logged, and that nothing has caused the logging process to stop or not to start at all, there are different methods:

1. Verify that logging is started without any error messages or pop-up messages appearing.
2. If you have not deliberately turned off the display of gridded data, the display of gridded data is an indicator of that data is being logged. It is the logged data that is the basis for the gridded data. The realtime tail or the realtime displays uses data directly from the echo sounder and are thus no indication as to whether data is being logged or no.

   Note that missing gridded data also may be caused by memory problems, and gives therefore no firm indication of that logging of raw data has stopped.
3. Open the Windows Explorer and locate the raw data directory. Verify that the raw data file, `.all` file with current time, is being updated.

How to log water column data

Water column data can be logged to either the standard log file (.all) or to a separate water column file (.wcd). Water column data can not be logged to both files simultaneously. Water column logging to separate file is enables as follows:

1. Open the **Installation parameters** frame.
2. Select the **Output setup** tab.
3. Enable **Log watercolumn to separate file**.
4. Open the **Water Column** frame.
5. Select the **Show/Hide** toolbar button
6. Toggle logging on/off by checking/unchecking the **Logging** option located as second option in the dialog.

How to log stave data

Stave data can be logged to the currently opened `.all` file.

1. Open the **Stave display** frame.
2. Select the **Show/Hide** toolbar button.
3. Enable **Logging**.

To enable this logging the following conditions must be fulfilled:

- The **Stave display** frame must be open and remain open.
- Standard logging must be started/active (i.e. the **Logging** button is the SIS main toolbar must be green).

Perform a system calibration

This section contains the following procedures:

Operational procedures

Note

This section applies to multibeam echo sounders only.

To ensure maximum reliability and accuracy of the depth determination, it is strongly recommended that the system and it's externally connected sensors are calibrated before the start of a new survey.

All sensors must be accurately surveyed with respect to the vessel's reference point and with respect to the vessel's reference plane during installation of the system. The attitude sensor will normally with intervals be calibrated while along a quay using land survey methods.

The intention of the SIS calibration is to find remaining biases in the installation angles and to find any time synchronization biases between the systems. The biases can origin from transducer alignment, from the alignment of the attitude sensor or be caused by time synchronization differences between the sensors.

The correct calibration of the vessel's attitude sensors as well as determining the time delay of the positioning system is vital to the quality of the depth data determined by the multibeam echo sounder.

The calibration should be performed in the following order and the values from each calibrations entered in the system before the next calibration:

- Rough roll calibration
- Pitch and time delay calibration
- Heading calibration
- Roll calibration

The calibrations should be repeated until the calibration results are within ±0.1 degree.

The built-in SIS calibration is used to process data from a calibration survey, usually consisting of one or more sets of overlapping lines as described below. It is recommended to use the SIS calibration, where depth data from two or more lines are compared. The

offset values are found either by visually determining the correction values that gives best fit between the two depth curves, alternatively by using the SeaCal automatic calibration feature if licensed.

Determining a suitable calibration area

Note

Sound speed and echo sounder errors are not considered in this discussion. Sound speed must be thoroughly determined for the calibration area.

On a flat area only a roll offset will cause significant depth errors. Thus, if the survey is to be run in a reasonably flat area, it may be sufficient to perform roll calibration only. However, a full calibration is normally required. The calibration must then be carried out to eliminate influence by other errors than the one you are calibrating for.

Note that the positioning accuracy is vital for good calibration results, except for the roll error calibration on a flat bottom.

The ideal calibration area is partly flat and partly a fairly steep slope with little change in depth acrosstrack, and with a distinct feature such as a peak or hollow in the flat area. If the heading and positioning errors are negligible, the flat area is not required if the slope has a reasonably constant depth acrosstrack. In order to resolve the pitch offset and time delay accurately, the slope should have an appreciable relative change in depth from top to bottom of approximately 30%. Note that the slope should not be too steep, say not more than 20°, otherwise the echo sounder may have problems in maintaining good data quality.

Calibration lines

To determine any local variations across the swath, we recommend that you run calibration survey lines that covers two times the swath width.

Related operational procedures

- *Run the survey* on page 185

Related topics

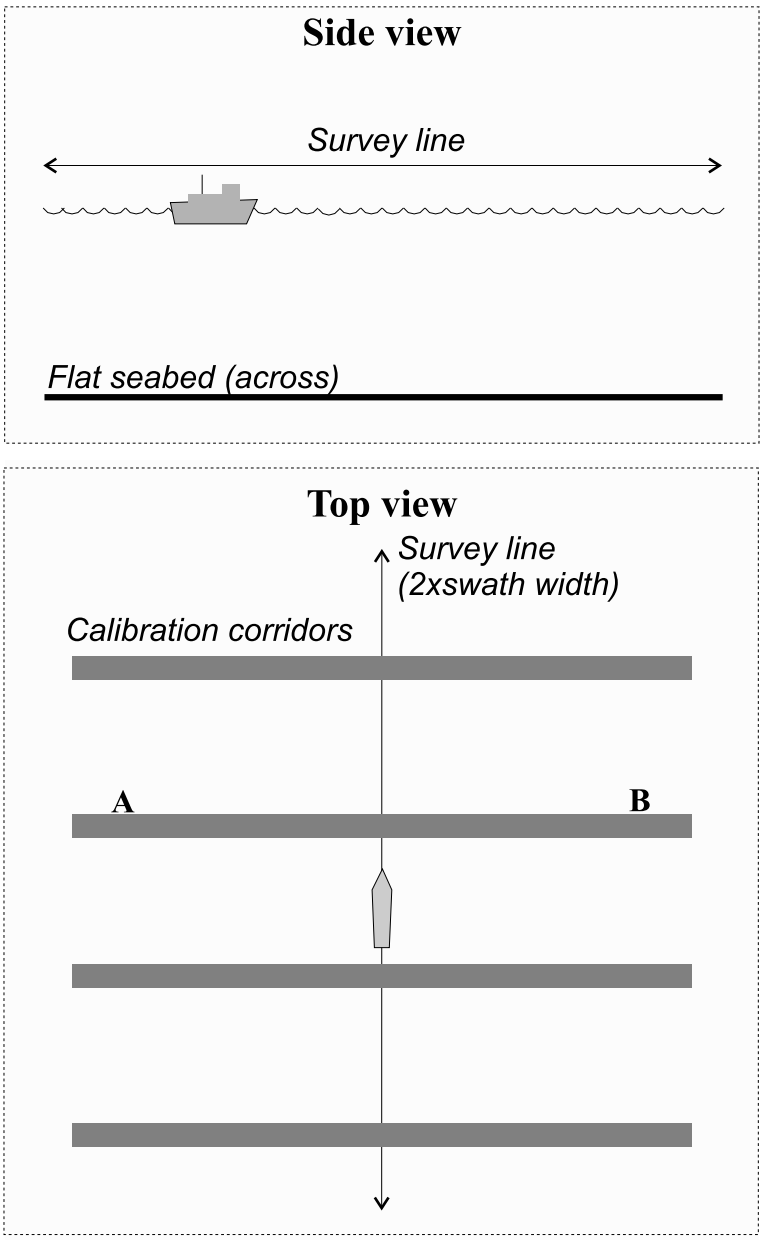
- *Calibration view* on page 90

Roll offset in the acrosstrack direction

1. Choose a horizontally flat area (at least acrosstrack)
2. Survey two lines in opposite directions.

   Ensure that sufficient lead-in time to the line is used allowing the roll sensor to stabilize.
3. Place a calibration corridor orthogonally to the survey lines.

Figure 9 Roll offset calibration procedure



4 Compare depth data from the two lines in the selected corridor.

If there is a roll offset, there will be a depth difference between the two data sets, increasing with acrosstrack distance from the centre where it is zero.

5 Repeat step 3 and 4, i.e. create several corridors along the calibration survey line to determine any variations over the area.

Pitch offset and time delay

1 Choose an area with a continuous but not too steep slope alongtrack

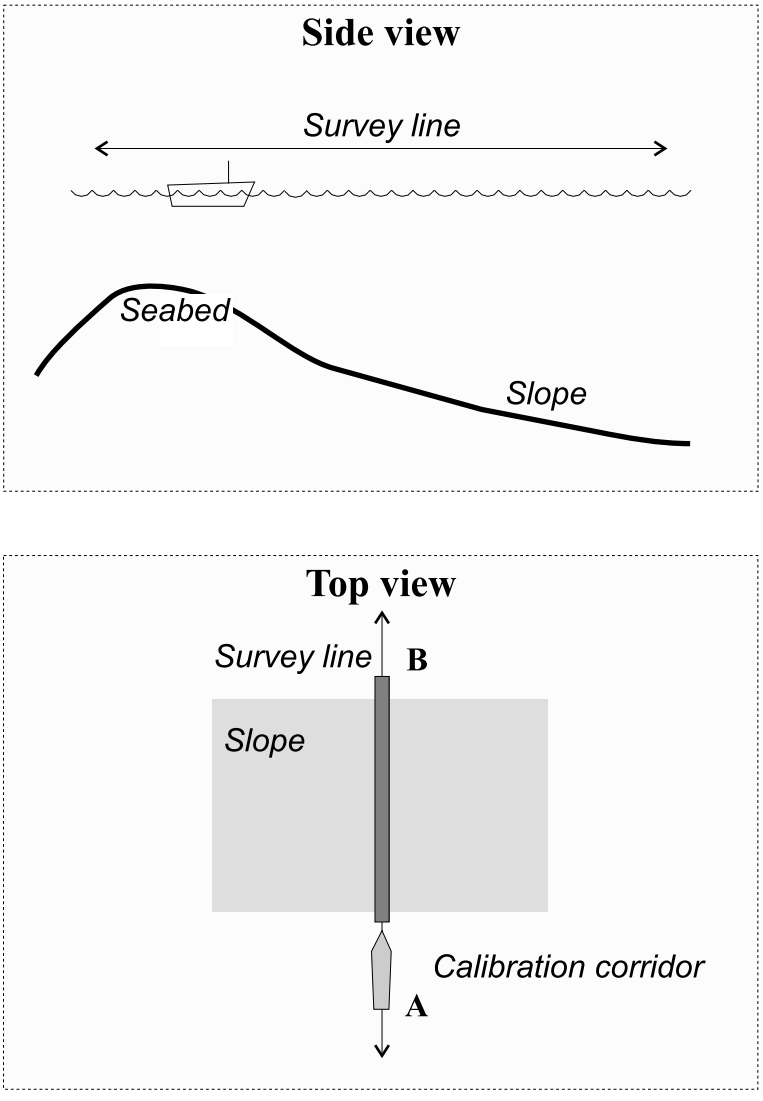
2 Survey two lines in opposite directions with constant vessel speed along each line

3 For time delay calibration, survey a third line on top of the two with constant, but significantly lower speed.

The direction of the last line is not essential. Ensure that sufficient lead-in time to the line is used for the pitch sensor to stabilize.

4 Place a calibration corridor parallel to the survey lines, on top of the vessel track

Figure 10 Pitch offset and time delay calibration procedure



5 Compare depth data from the two lines in the selected corridor.

Any alongtrack depth difference between the runs may be due to four different factors:

- Pitch offset

- Time delay between actual position and position when position datagram is supposed to be valid
- For multibeam echo sounders with transducers a position distance offset (either due to an error in the positioning system or an error in entered locations)
- Tide difference

6 Determine any time delay in the position system

Note that a depth error on a constant gradient slope, due to pitch offset, increases with increasing depths. Depth errors caused by position time delay increases with vessel speed, whilst errors due to distance offset is independent of depth and speed.

Comparing data from the two lines in the same direction, but with different vessel speed, will thus allow the time delay to be found.

7 Determine any pitch offset.

After the correction for time delay error has been applied to the data, the pitch offset can be determined from the two lines run in opposite directions.

Note

If PPS and time from datagram are used, there should be zero time delay.

Heading offset – Alternative 1

Note

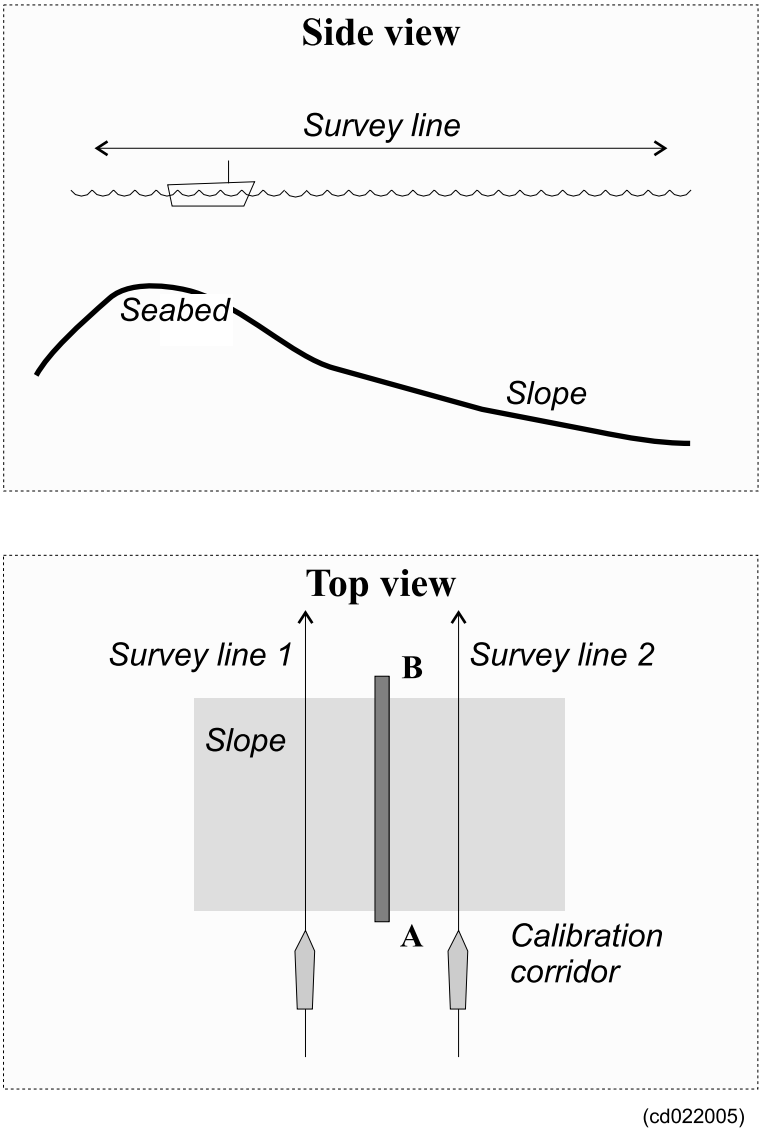
The best check of the gyro is done using land survey methods while in harbour.

1 Run two parallel lines up or down a slope in the same direction, separated, but with overlap in-between.

2 Select a calibration corridor.

The corridor used for comparison must be placed alongtrack in-between the lines.

Figure 11 Heading offset calibration procedure (alternative 1)



3 Compare depth data from the two lines in the selected corridor.

Any heading offset will give a depth difference between the two lines.

Heading offset – Alternative 2

1 Find an easy recognizable point or feature on the bottom such as a peak or a depression.

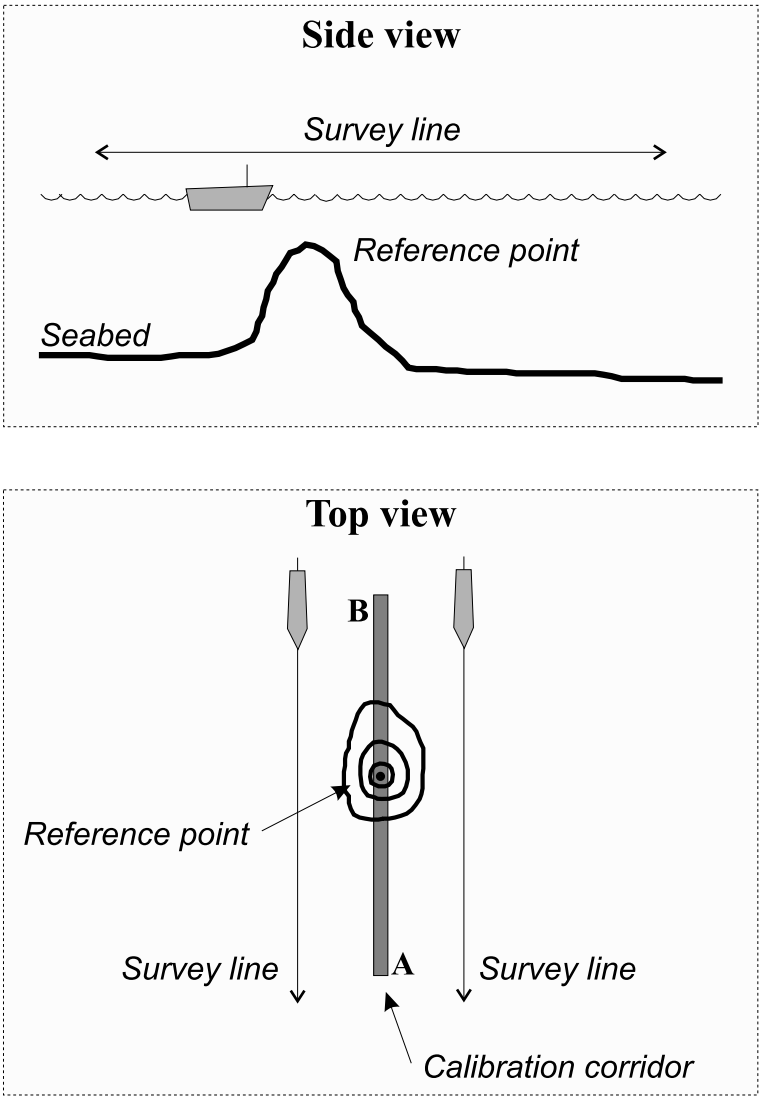
2 Run two survey lines at opposite sides of this feature so that the point will be in the outer part of the echo sounder swath.

Survey these two lines in same direction.

3 Select a calibration corridor

The corridor used to compare data from the two survey data sets must be placed so that it intersects the feature, and is parallel to the survey lines.

Figure 12 Heading offset calibration procedure (alternative 2)



4 Compare depth data from the two lines in the selected corridor.

If there is a heading offset, you will have a different location alongtrack in the two data sets

Note

Accurate positions and position time delays are required.

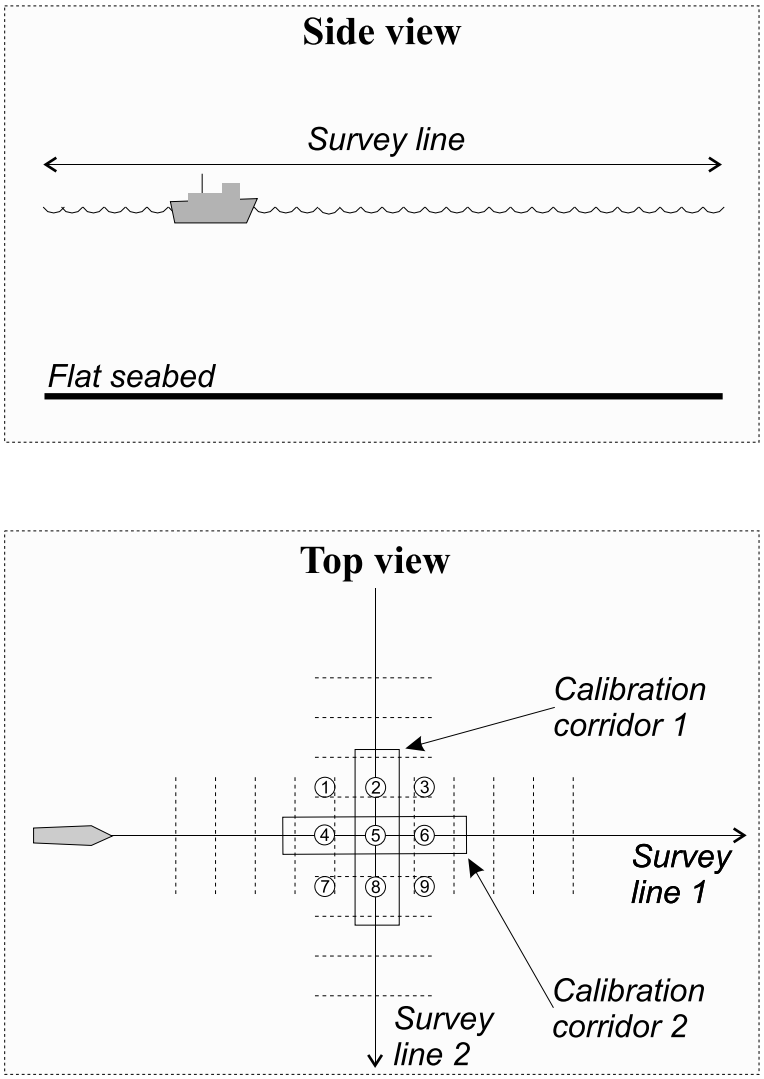
Sound speed quality inspection

1 Survey two lines or more, perpendicular to each other.

This means that the two lines in the pair cross each other on a flat area of the sea floor with a difference in the sailing direction of about 90 degrees.

2 Create calibration corridors in the crossover area

Figure 13 Outer beam angle calibration



3 Compare the depth in different points in the crossover region.

Depth differences along the two centre lines with respect to the outer edges of the swath from the other line (i.e. points 2, 4, 6, 8) will be due either to roll or sound speed errors. Note that the depth error due to sound speed has the same sign, while those due to roll changes sign across the centre line.

Sound speed control

The same procedure as used for the outer beam angle offset calibration may be used as a check for sound speed corrections. Provided that the roll offset and outer beam angle offsets are correct, any depth deviation between the two lines in the two calibration corridors are due to sound speed errors, either in the used profile, and/or in the sound speed at transducer depth.

Outer beam angle offset calibration

Please see *Outer beam angle calibration* on page 163 for a graphical description of the method.

Note

The outer bean angle offset calibration applies to EM 1002 only

Note

The outer beam angle offset is critically dependent upon correct roll calibration and correct sound speed calibration.

1. Run two perpendicular survey lines on a relatively flat bottom.

   The depth must be approximately 50 to 100 meters, and 150 degrees coverage must be used.
2. Set a calibration corridor along each of the lines in the crossover area.
3. Compare the depth in different points in the crossover region.

   Any angular error at the points 2, 4, 6 or 8 may be due to errors in:

   - Outer beam angle offset
   - Sound speed
   - Roll offset
4. Determine the roll offset

   If sound speed and roll offset are correct, determine angular errors by changing the roll offset angle to make the outer beam depths equal at 2, 4, 6 and 8, and take the average of these.

   If the outer beams are too shallow compared to the centre beams, the outer beam angle offset is positive, if they are too deep the outer beam angle offset is negative.
5. Add the outer beam angle offset to the outer beam angle offset already used in the installation menu.

Verification

Important

After the calibration values have been determined, we strongly advise you to repeat the procedure for verification. This is especially important if your calibration results is larger than the expected accuracy of the sensors.

Automatic calibration

SIS offers an automatic calibration using the **SeaCal** program. Calibration survey lines are as described in the procedures above. **SeaCal** will based on the selected lines compute the offset values for each parameter that gives best fit, i.e. smallest residual with highest possible reliability. **SeaCal** may be used as an alternative or as an addition to the visual method.

How to determine calibration values using SIS Calibration frame

Calibration will only work with two or more selected lines in a survey. The lines must have been surveyed according to recommended patterns. These patterns are:

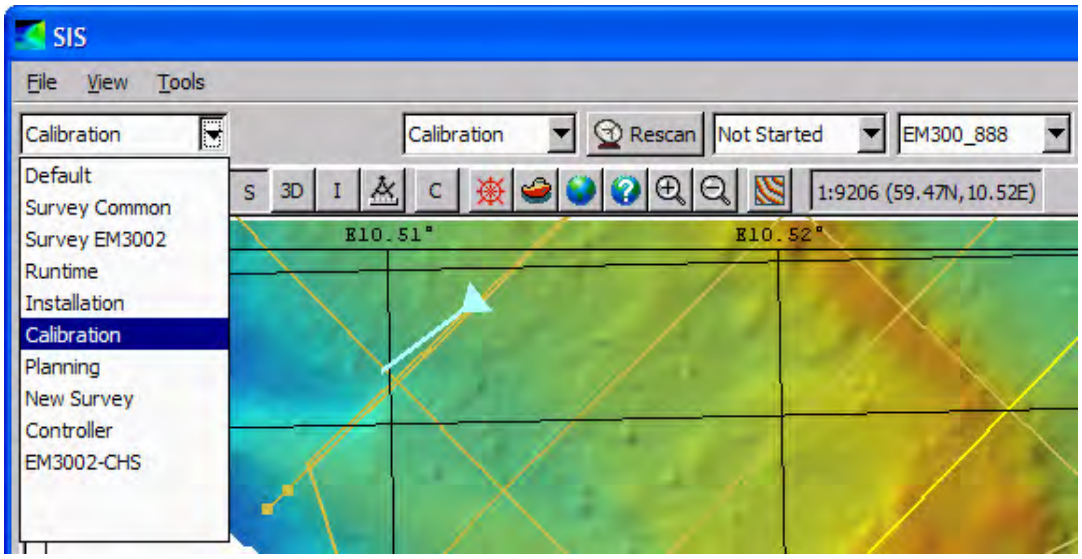
- Roll calibration: parallel lines over a flat area, in opposite direction and with overlap for the outer beams
- Pitch calibration: parallel lines over a slope, in opposite direction and with lines on top of each other
- Heading calibration: parallel lines over a slope or a seabed feature, same direction and with overlap for the outer beams
- Time: same as for pitch calibration, but with different constant vessel speed for the two lines

The data used in the calibration computations is the data found inside the geographical area currently displayed in the geographical view. You may select as many lines as you want before you make your corridor. If the geographical area is set too large, or too many lines are selected, the computation may become too resource demanding for the computer. The solution is to reduce the displayed area (zoom in), or deselect some lines.

Note

Stored Shipstracks *must be turned on from the* ***Geographical Options*** *menu.*

1 Select **Calibration** from the frame selection drop down list of the main toolbar to enable the calibration mode.



2 Press C from the Geographical view's toolbar to enable selection of lines and calibration corridor

3 Press the **Follow ship** button to stop the view from moving along with the ship

4 If more than one Survey is loaded, select from the **Survey List** box which survey to use.

5 Select the lines by holding down the **Ctrl** button and selecting the lines using **left mouse** button.

or

select the lines by name by clicking on the **Select Lines...** button at the bottom of the **Calibration** frame.

You can check that you have picked the correct line by looking at the file name of the selected line that appears in lower left corner of the SIS application window.

Note

You may need to zoom in to be able to separate and select the correct lines

6 Enable selection of a **calibration corridor** to show the depth data for by holding down the **Ctrl** button and click the **right mouse** button

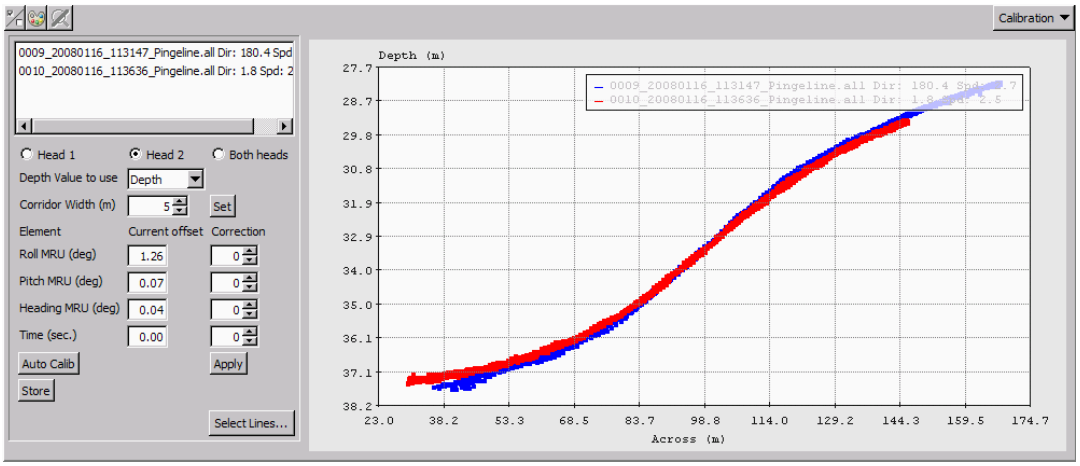
7 Select a corridor by holding down the **Ctrl** button and clicking using **left mouse** button at the two end points of the selected line

Data from two or more lines inside this corridor will be analysed.

- For roll calibration – select a corridor across the two survey lines
- For pitch calibration – select a corridor along the survey lines
- For heading calibration – select a corridor along the survey lines
- For timing calibration – select a corridor along the survey lines

When a corridor has been selected, the calibration module will read the raw depth and display them in a diagram.

8 Make sure the depth data for the selected survey lines along the selected corridor is displayed in the **Calibration** frame.



The system will use data within the corridor, which represents all points within a specified distance from a calibration line. The data will be displayed using a two-dimensional diagram with the horizontal axis representing the distance along the corridor, and depth along the vertical axis. Data from two different survey lines will be shown in the same diagram, each with its own colour.

In the Calibration window you can change the offset value of the sensor you are calibrating and immediately see its effect on the depths shown. The offset value giving the best fit between the curves is the result of the calibration.

Note

*The offsets applied in the selected files are shown as **Current Offset**. These are not necessarily the current ones in the Installation parameters. Take care to check that the lines used for calibration have been run with the same parameters as the current ones in the Installation parameters*

9 If you have dual head, select what head you want to calibrate.

10 Enter an estimated correction value for the sensor you are calibrating, i.e. either roll, pitch, heave or time

The values can be increase/decreased by using the spin buttons.

11 Press **Apply** to calculate and display the effect on the depth curves

12 Iterate through step 9 and step 10 until you find the value that gives best visual fit between the two depth curves

The offset value that gives the best fit between the depths on the two calibration lines is finally to be entered in the corresponding sensor field in the system's **Installation parameters**.

13 Repeat step 7 to step 12 placing the corridor at different places along the calibration lines.

14 Ensure that you have consistent calibration values along the line before you apply any calibration values to the installation parameters.

If there is significant inconsistency along the line you must evaluate what may be causing the inconsistency, and what you can do to correct for them. The reason for inconsistency may be:

- Variation in sound speed over the area.
- Unreliable position and motion observations
- Remaining errors in the installation angles

Note

The Seacal calibration as described in the following can be used to verify any suspected inconsistency along the calibration line. Seacal will automatically look for consistency along the whole calibration line, and label the results as unreliable if they are inconsistent.

15 Press **Store** to add the new values to the existing ones that are set from **Installation parameters→Sensor setup→Angular offset**

and/or

16 Open the **Installation parameters** frame and select **Sensor setup→Angular offset**.

17 Verify the newly stored values, or manually enter your new calibration figures.

Note

To verify that correct values have been automatically entered you must know the original figures, which not necessarily were zeros.

For single head systems the values are to be applied to the **Attitude** sensor in use.

For dual head systems you have to enter the values manually.

For dual head system we recommend that you apply the average value for head 1 and 2 on the attitude sensor, and the difference from the average on each of the sonar heads. I.e. if the results for head 1 and 2 are +0.3 and +0.5, respectively, we recommend that you apply +0.4 on the attitude sensor and -0.1 and +0.1 on sonar head 1 and 2.

18 Press **OK** to download the new values to the echo sounder.

19 Verify the calibration results by rerunning the calibration procedure step 1 to step 13.

If the calibration was successful, the new correction values will be close to zero.

Related topics

- *Calibration view* on page 90
- *Keyboard and mouse in the Calibration view* on page 40

How to determine calibration values using SeaCal automatic calibration

Automatic calibration requires two or more selected lines that have been surveyed according to patterns described earlier in this chapter. The lines may be the same as you have used for visual determination of calibration values as described in *How to determine calibration values using SIS Calibration frame* on page 165. If you already have selected your calibration lines you do not have to repeat it.

SeaCal will use all available data within what is currently displayed inside the geographical view. By panning and zooming you may select the optimal area for the calibration computations. If the geographical area is set too large, or too many lines are selected, the computation may become too resource demanding for the computer. The solution is to reduce the displayed area (zoom in), or deselect some lines.

1 Select the lines by holding down the **Ctrl** button and selecting the lines using **left mouse** button.

You can check that you have picked the correct line by looking at the file name of the selected line that appears in lower left corner of the SIS application window.

Note

You may need to zoom in to be able to separate and select the correct lines

2 Zoom back to a view showing the complete length of the lines.

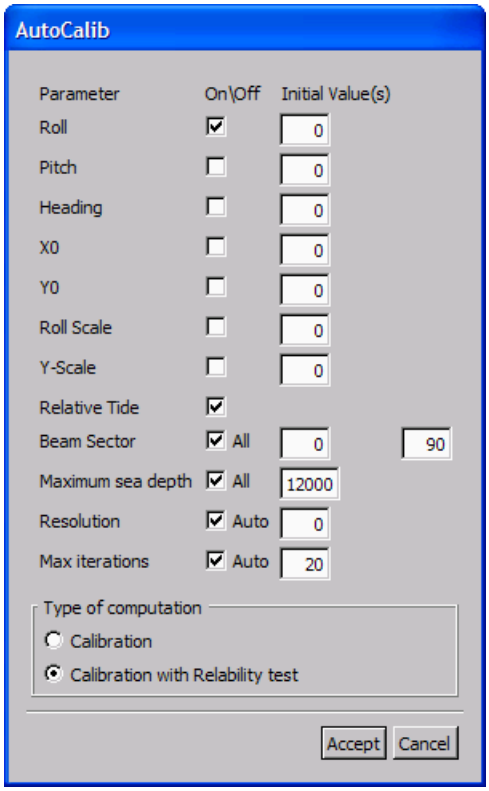
If not, only data from the view will be used in the computation.

3 Select what head you are calibrating.

Note

*If you have a dual head system you are allowed to calibrate both heads in one computation. Select **Both heads** to calibrate both heads.*

4 Press the **AutoCalib** button



5 Tick off for the element you are calibration, i.e. either roll, pitch or heading. Further, we recommended to tick off for the following options:

- Relative Tide: All
- Beam Sector: All
- Maximum sea depth: All
- Resolution: Auto
- Max iterations: Auto

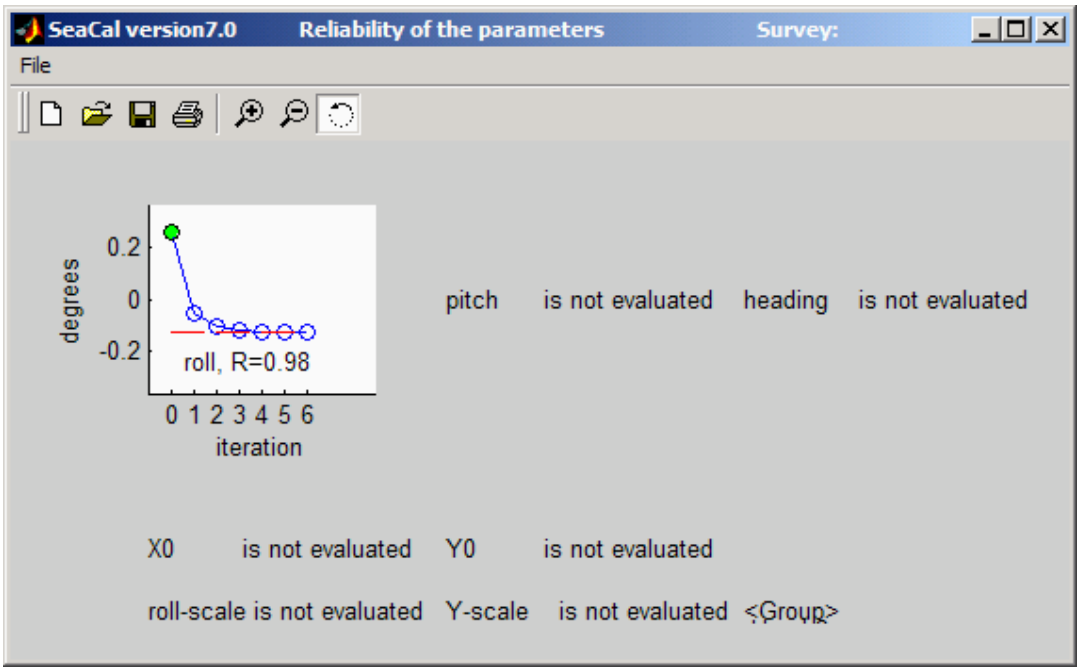
Leave the remaining parameters unchecked.

6 Set **Type of computation** to **Calibration with Reliability test**

7 Press **Accept** to start the computations

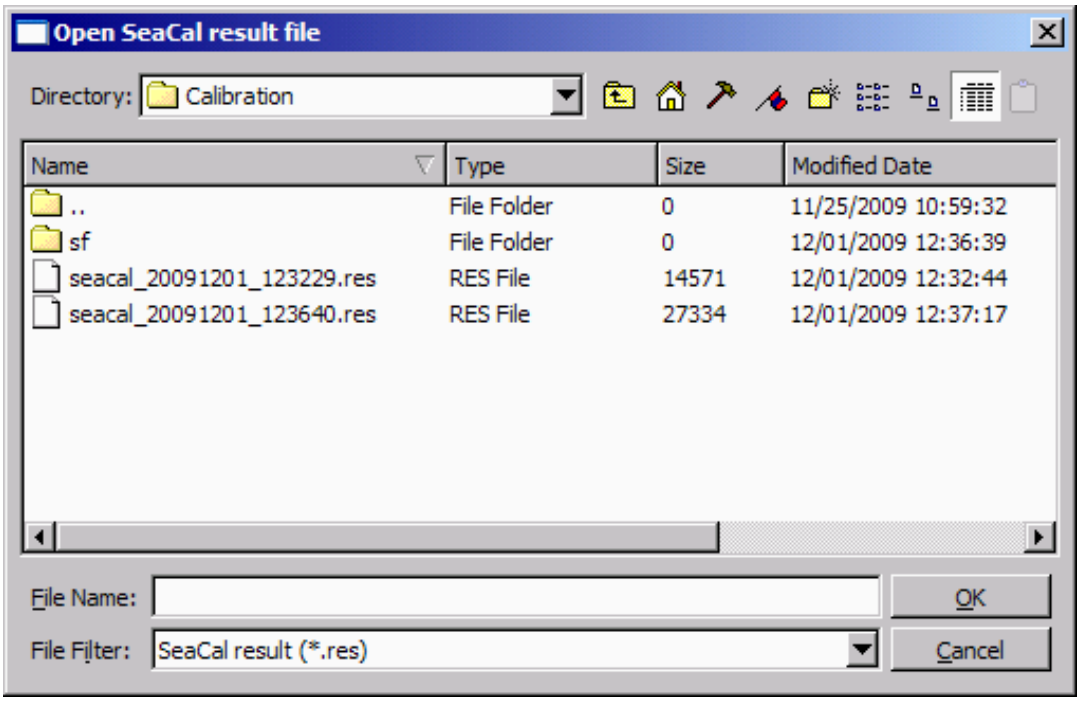
Depending on the data consistency there will be a number of iterations carried out. You may follow the iteration process in a command window appearing.

When completed windows showing the reliability of the computed values are shown for each head. The graph shows how well Seacal is able to compute the calibration value. The reliability indicator, R, should be as close to 1.0 as possible.



8 Close the reliability windows

The window **Open SeaCal result file** appears.



9 Open the *.res file. The filename of the result file has the format `Seacal_yyyymmdd_hhmmss.res`, where `yyyymmdd` is date of computation and `hhmmss` is local time of computation.

Note

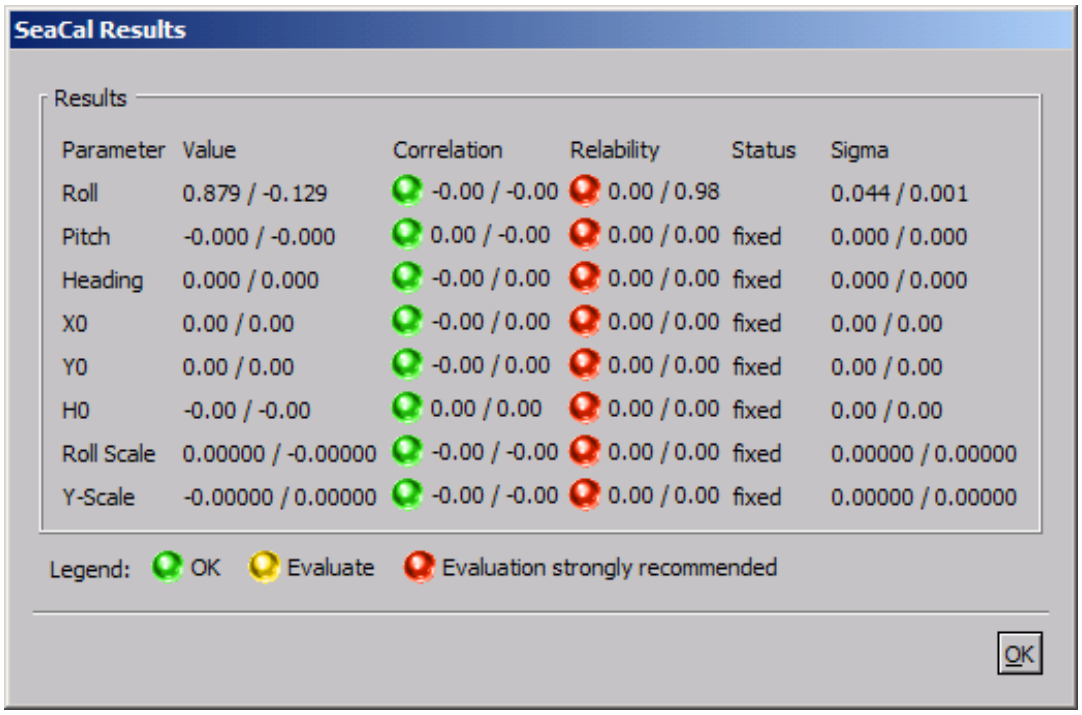
For dual head systems the result file will contain the results for both heads.

The **SeaCal Results** window will appear. In example below roll has been calibrated giving the following results:

- Roll calibration value = 0.879/-0.129, i.e. the correction value that may be applied to head 1 and head 2, respectively
- Correlation = 0.00

  The correlation coefficient gives information about how well the parameters can be separated. Values below 0.3 is labelled OK.
- Reliability = 0.00/0.98, i.e. close to 1, which is best achievable figure for reliability

The result values for roll are labelled with green label, which means results are consistent and considered to be reliable.



10 Press OK to finish.

Note

*No corrections are applied. Correction values must be entered into **Angular Offsets** set in the **Installation Parameters** frame*

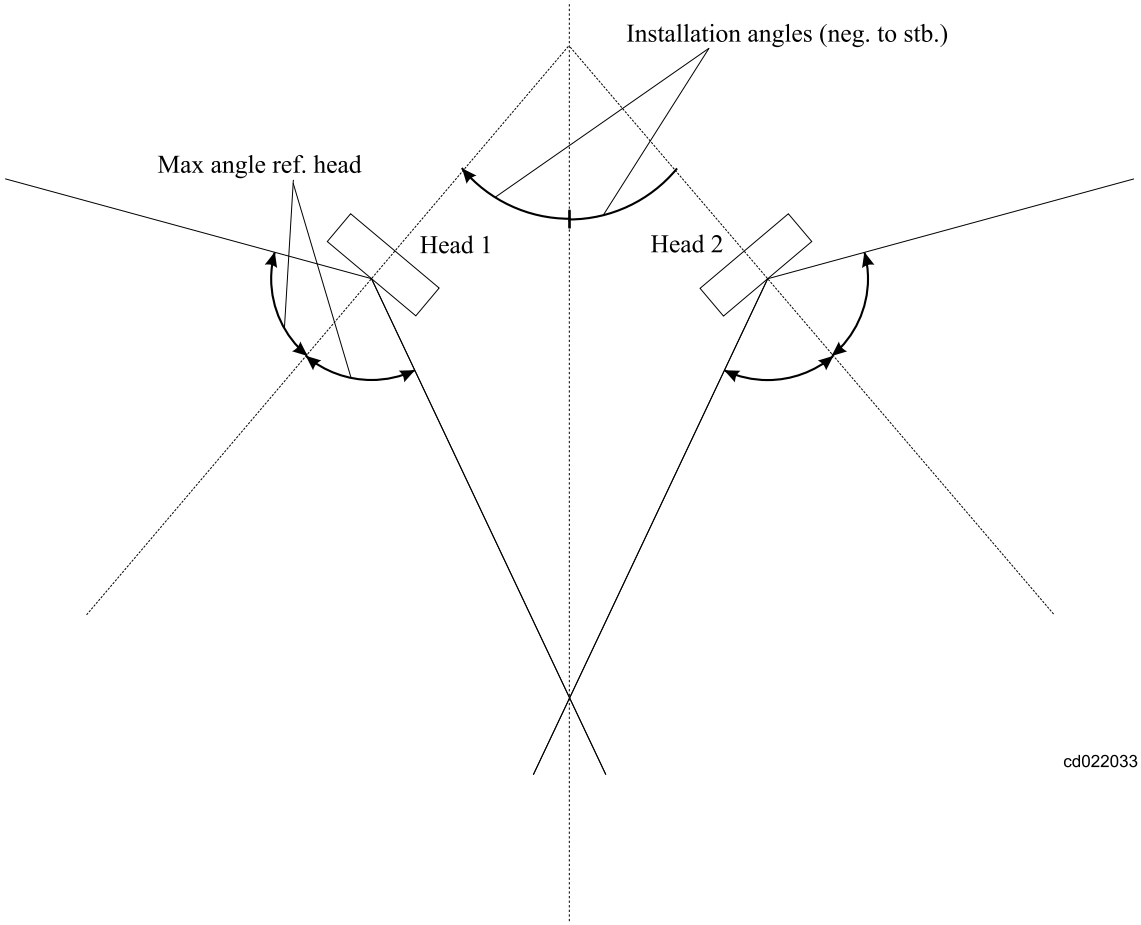
Note

*To review the SeaCal results, select **Tools→Seacal Results** from the SIS main menu*

Related operational procedures

- *How to determine calibration values using SIS Calibration frame* on page 165

How to calibrate a dual head system



If you have a multibeam echo sounder with two heads installed there are some additional concerns related to calibration you need to consider:

- You have to determine offset values separately for both heads
- The heads will normally be installed pointing sideways instead of down calling for a different calibration survey pattern

Note

A valid sound velocity profile must be used to obtain a correct result.

The calibration should be performed in the following order and the values from each calibrations entered in the system before the next calibration:

- Rough roll calibration
- Pitch and time delay calibration
- Heading calibration

- Roll calibration

The calibrations should be repeated until the calibration results are within ±0.1 degree.

Use the SIS Calibration frame and/or the Seacal automatic calibration to evaluate the data and determine the offset value. See

- *How to determine calibration values using SIS Calibration frame* on page 165
- *How to determine calibration values using SeaCal automatic calibration* on page 168

Roll offset calibration – dual head

1 Choose a horizontally flat area (at least acrosstrack)

2 Survey three lines in opposite directions and with distance between the lines to ensure full overlap for each head, i.e approximately half the swath width. Survey these lines at the same speed.

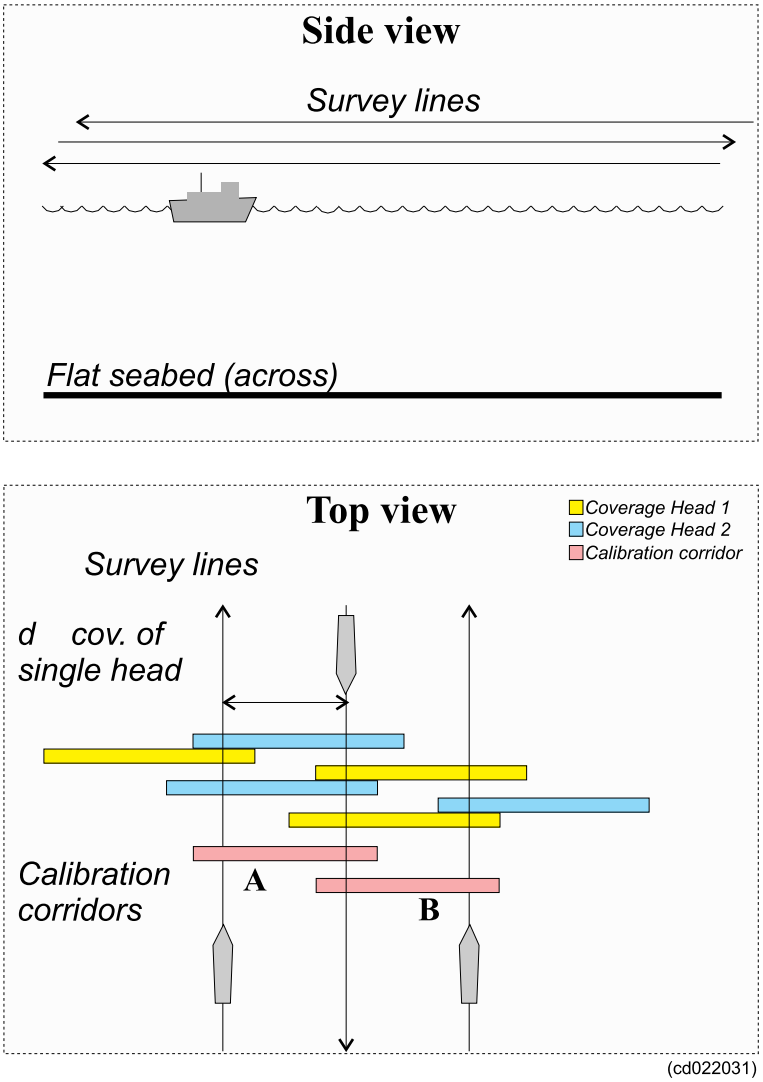
Ensure that sufficient lead-in time to the line is used allowing the roll sensor to stabilize.

3 Select two of the lines.

Select the lines that gives full overlap for one of the heads.

4 Place a calibration corridor (A) orthogonally to the survey lines.

Figure 14 Roll offset calibration procedure



5 Compare depth data from the two lines in the selected corridor.

If there is a roll offset, there will be a depth difference between the two data sets, increasing with acrosstrack distance from the centre where it is zero.

6 Select two of the lines that gives full overlap for the other head.

7 Place a calibration corridor (B) orthogonally to the survey lines.

8 Compare depth data from the two lines in the selected corridor.

If there is a roll offset, there will be a depth difference between the two data sets, increasing with acrosstrack distance from the centre where it is zero.

Pitch offset calibration – dual head – Alternative 1

Preparations: Reduce the opening angle to ±50 degrees on the outer sectors. Open the inner angle to ±20 degrees on the inner sectors.

1 Choose an area with a continuous, but not too steep, slope alongtrack.

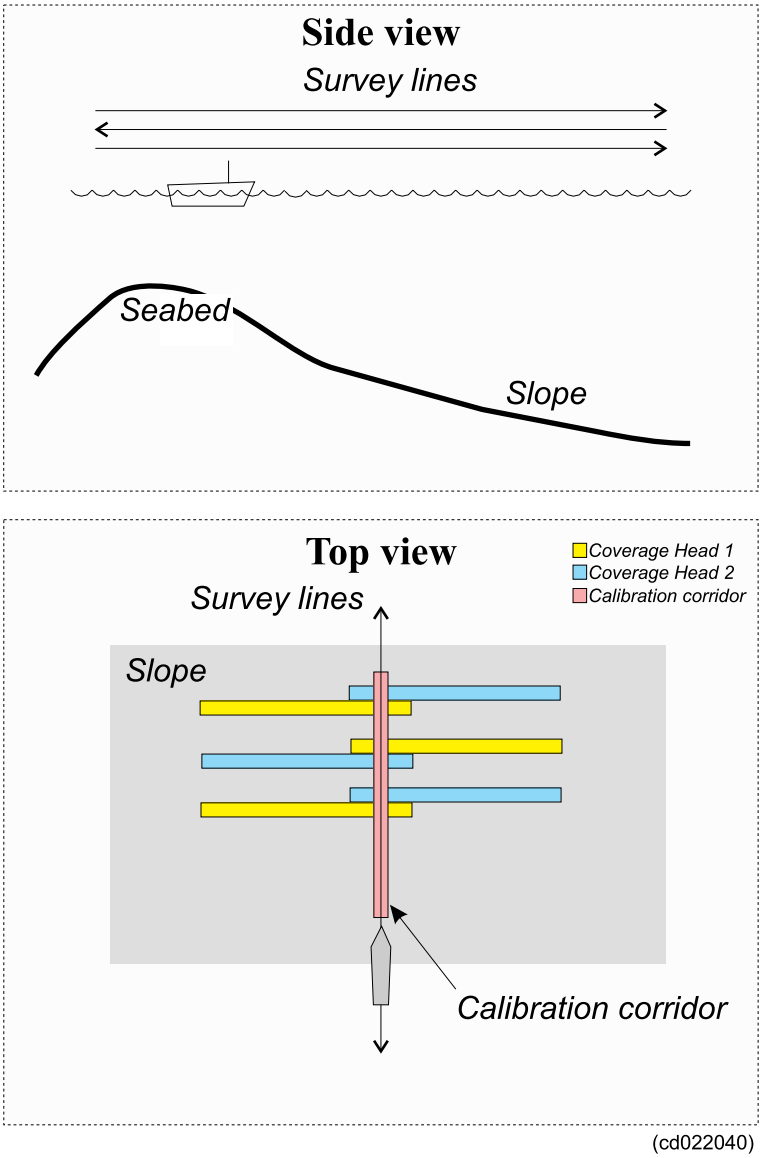
2 Survey two lines in opposite directions with constant vessel speed along each line. Survey these lines at the same speed.

3 For time delay calibration, survey a third line on top of the two with constant, but significantly lower speed.

The direction of the last line is not essential. Ensure that sufficient lead-in time to the line is used for the pitch sensor to stabilize.

4 Place a calibration corridor parallel to the survey lines, on top of the vessel track.

Figure 15 Pitch offset and time delay calibration procedure, alternative 1



5 Compare depth data from the two lines in the selected corridor.

Any alongtrack depth difference between the runs may be due to four different factors:

- Pitch offset

- Time delay between actual position and position when position datagram is supposed to be valid
- For multibeam echo sounders with transducers a position distance offset (either due to an error in the positioning system or an error in entered locations)
- Tide difference

6 Determine any time delay in the position system

Note that a depth error on a constant gradient slope, due to pitch offset, increases with increasing depths. Depth errors caused by position time delay increases with vessel speed, whilst errors due to distance offset is independent of depth and speed.

Comparing data from the two lines in the same direction, but with different vessel speed, will thus allow the time delay to be found.

7 Determine any pitch offset.

After the correction for time delay error has been applied to the data, the pitch offset can be determined from the two lines run in opposite directions.

Pitch offset calibration – dual head – Alternative 2

Preparations: Reduce the opening angle to ±50 degrees on the outer sectors. Open the inner angle to ±20 degrees on the inner sectors.

1 Find an easy recognizable point or feature on the bottom such as a peak or a depression.

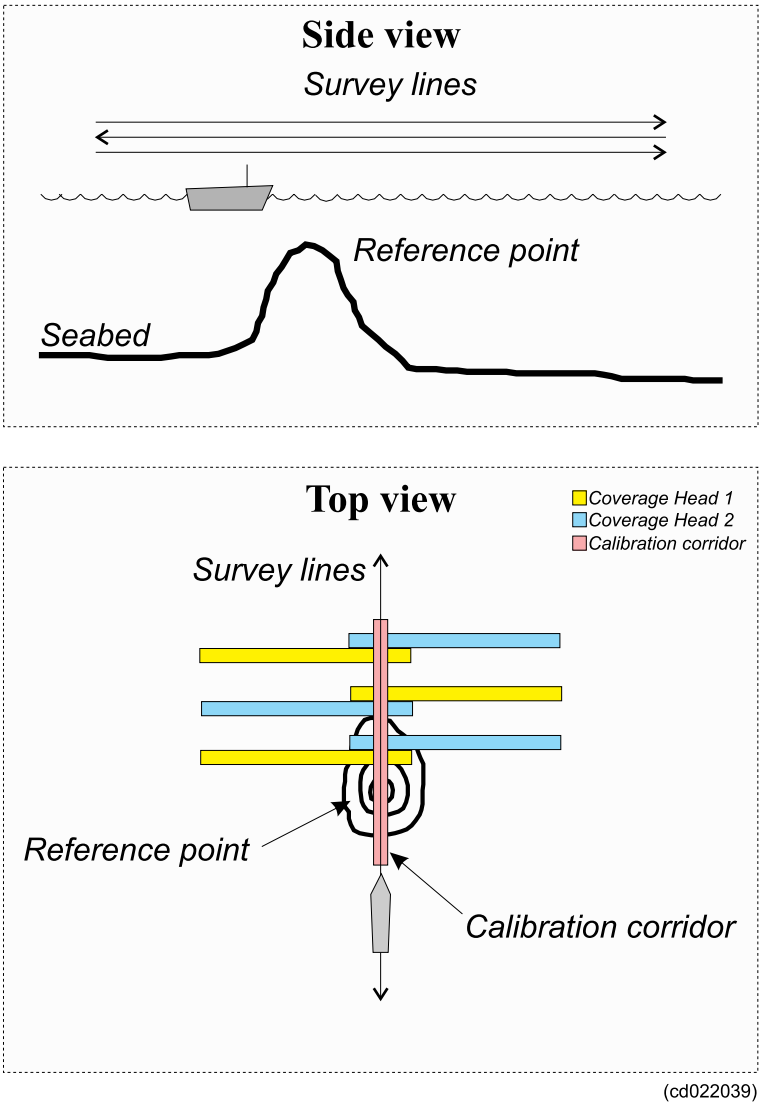
2 Survey two lines in opposite directions with constant vessel speed across the feature. Survey these lines at the same speed.

3 For time delay calibration, survey a third line on top of the two with constant, but significantly lower speed.

The direction of the last line is not essential. Ensure that sufficient lead-in time to the line is used for the pitch sensor to stabilize.

4 Place a calibration corridor parallel to the survey lines, on top of the vessel track.

Figure 16 Pitch offset and time delay calibration procedure, alternative 2



5 Compare depth data from the two lines in the selected corridor.

Any alongtrack depth difference between the runs may be due to four different factors:

- Pitch offset
- Time delay between actual position and position when position datagram is supposed to be valid
- For multibeam echo sounders with transducers a position distance offset (either due to an error in the positioning system or an error in entered locations)
- Tide difference

6 Determine any time delay in the position system.

Comparing data from the two lines in the same direction, but with different vessel speed, will thus allow the time delay to be found.

7 Determine any pitch offset.

After the correction for time delay error has been applied to the data, the pitch offset can be determined from the two lines run in opposite directions.

Heading offset calibration – dual head – Alternative 1

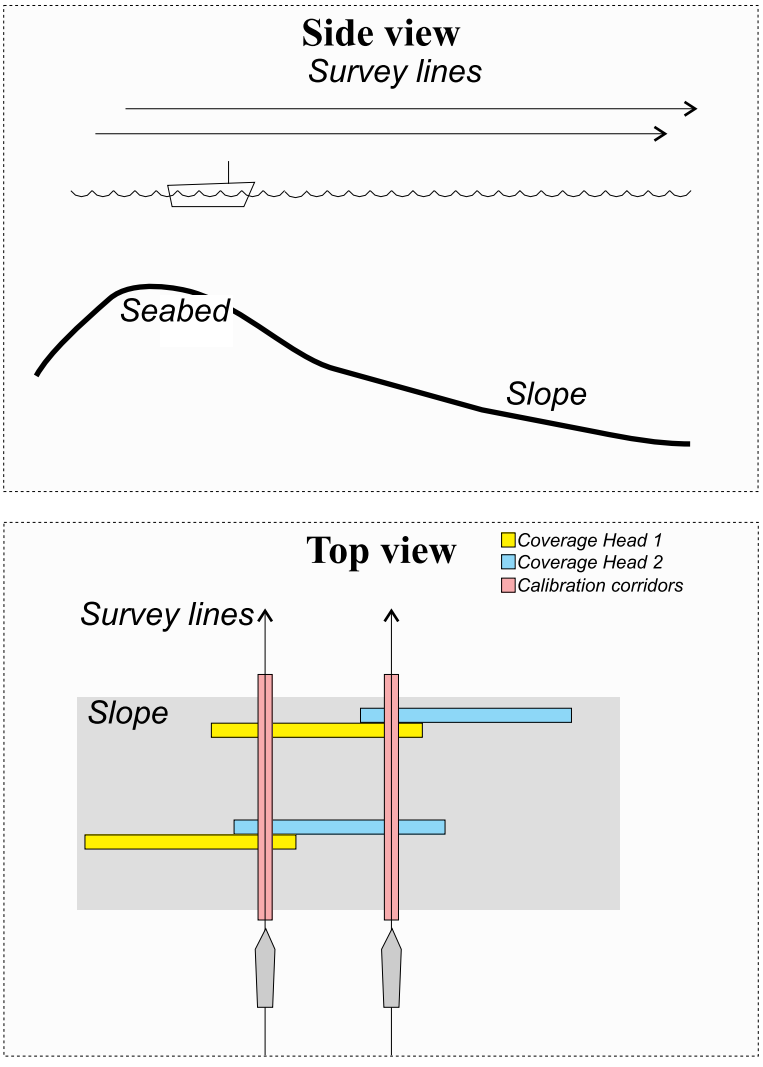
Note

The best check of the gyro is done using land survey methods while in harbour.

1 Run two parallel survey lines up or down a slope in the same direction, separated, but with overlap in-between. Survey these lines at the same speed.

2 Place a calibration corridor on top of one of the survey lines:

Figure 17 Heading offset calibration procedure – dual head alternative 1



3 Compare depth data from the two lines in the selected corridor.

Any heading offset will give a depth difference between the two lines.

4 Repeat step 2 and 3, i.e. create a calibration corridor on top of the other survey line to compare data for the other head.

Heading offset calibration – dual head – Alternative 2

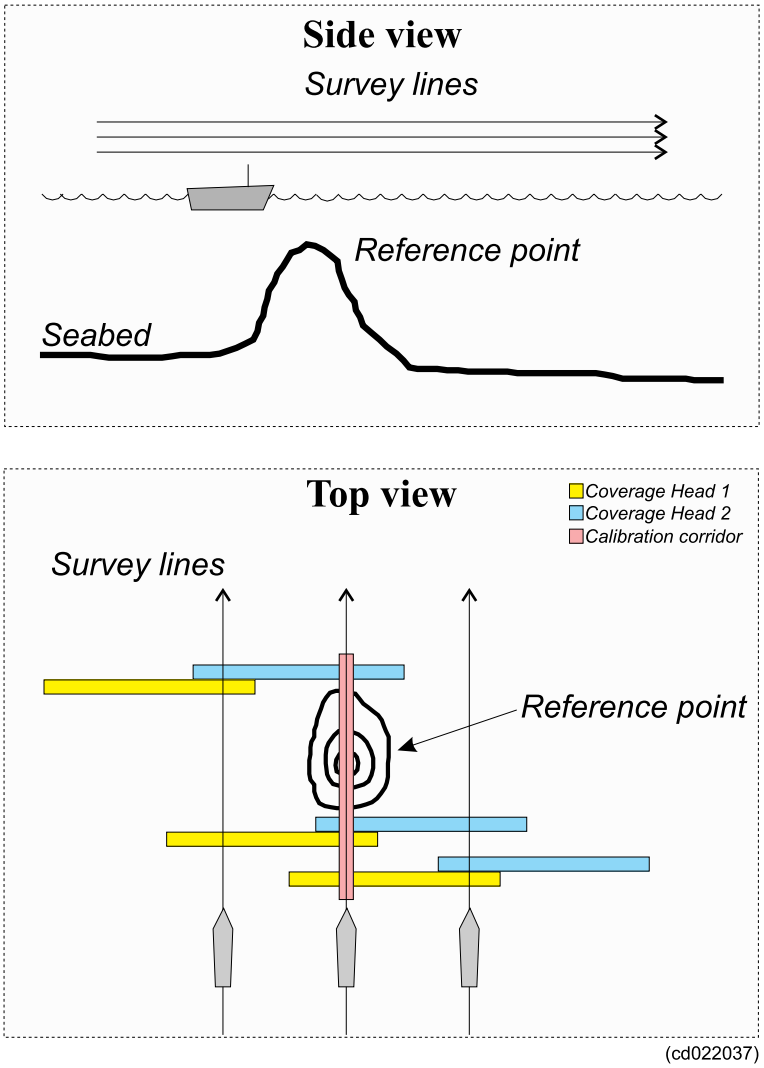
1 Find an easy recognizable point or feature on the bottom such as a peak or a depression.

2 Run three survey lines, one on each side of the feature, and one on top of it. Survey these three lines in same direction and at the same speed.

The lines should be separated, but with overlap in-between.

3 Place a calibration corridor on the survey line on top of the object.

Figure 18 Heading offset calibration procedure – dual head alternative 2

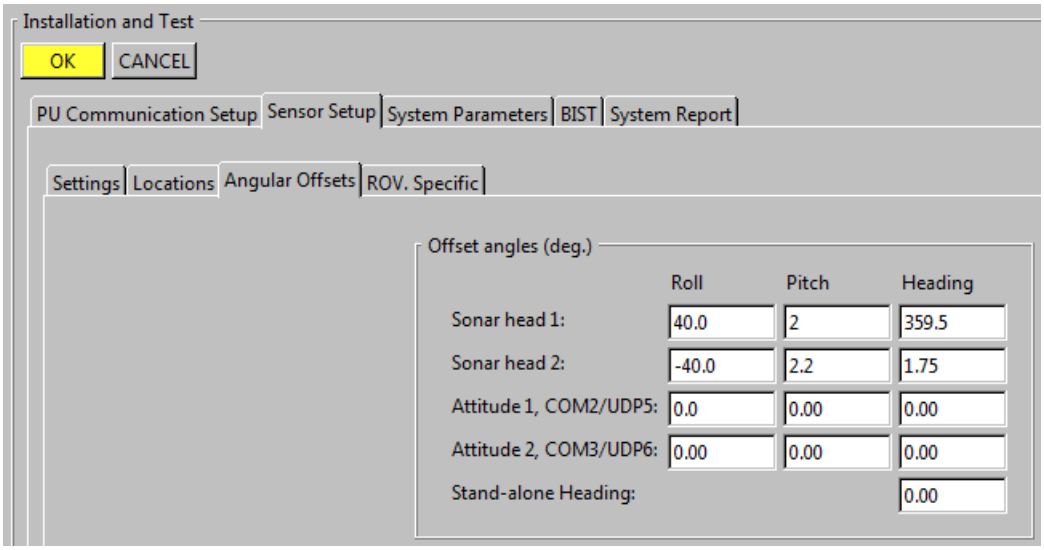


4 Compare depth data from the line in centre with the lines on each side of the object.

Any heading offset will give a depth difference between the two lines.

Example 1 Roll calibration – changing the installation parameters

Original installation parameters:



Roll calibration result:

- Head 1: 0.2 degrees
- Head 2: 0.4 degrees

Corrections:

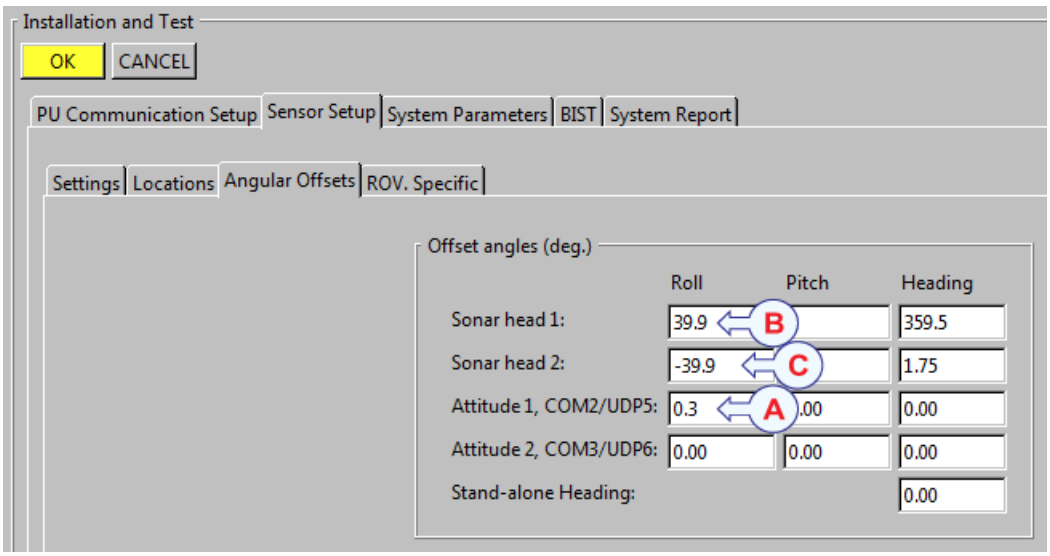
A Mean value for attitude sensor: (0.2 + 0.4) / 2 = 0.3

B Correction for head 1: 02 – 0.3 = –0.1

Value to enter in installation parameters: 40 + (–0.1) = 39.9

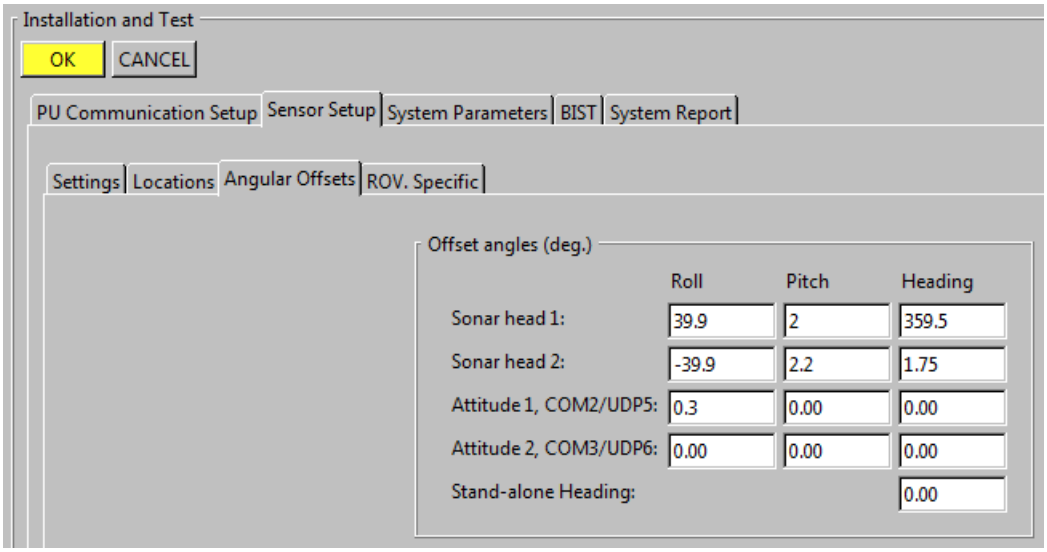
C Correction for head 2: 0.4 – 0.3 = 0.1

Value to enter in installation parameters: –40 + 0.1 = –39.9



Example 2 Pitch calibration – changing the installation parameters

Original installation parameters:



Pitch calibration result:

- Head 1: 0.2 degrees
- Head 2: –0.4 degrees

Corrections:

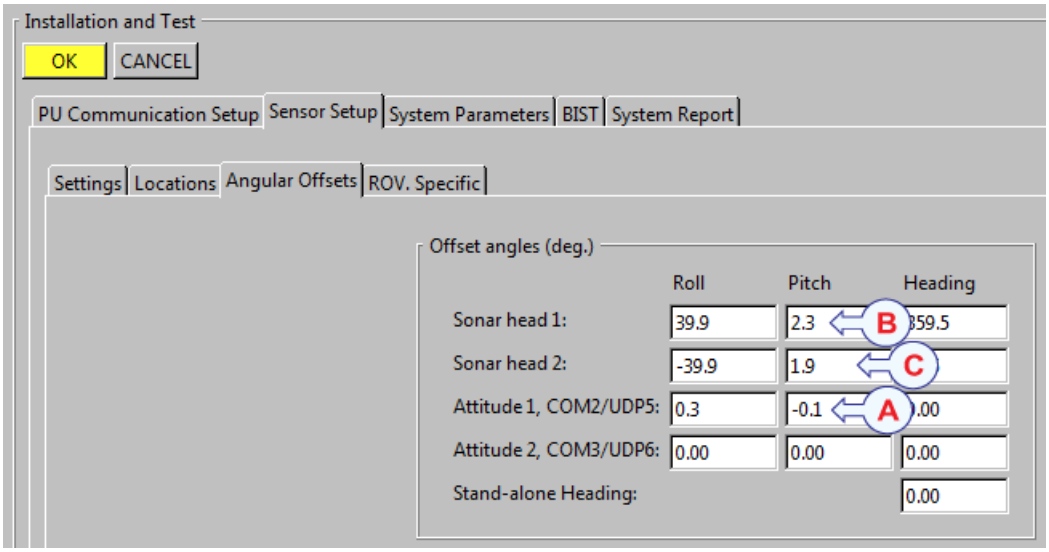
A Mean value for attitude sensor: (0.2 + (–0.4)) / 2 = –0.1

B Correction for head 1: 0.2 – (–0.1) = 0.3

Value to enter in installation parameters: 2 + (0.3) = 2.3

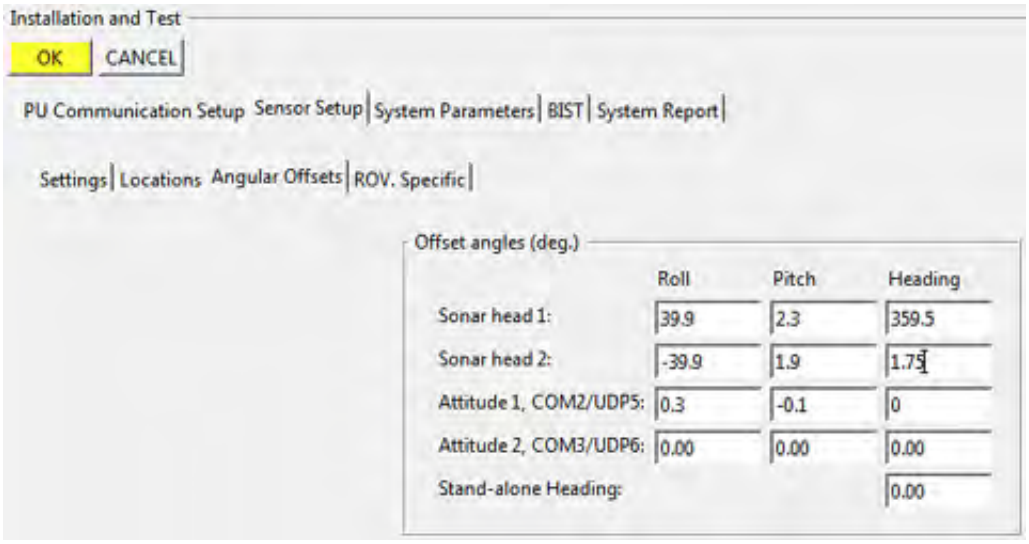
C Correction for head 2: –0.4 –(–0.1) = –0.3

Value to enter in installation parameters: 2.2 + (–0.3) = 1.9



Example 3 Heading calibration – changing the installation parameters

Original installation parameters:



Heading calibration result:

- Head 1: 0.342 degrees
- Head 2: –2.240 degrees

Corrections:

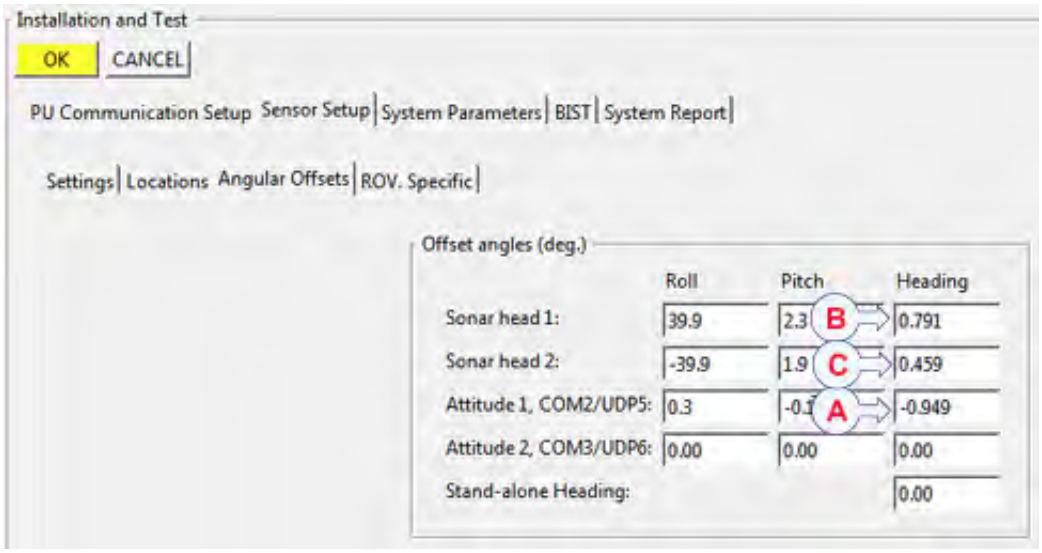
A Mean value for attitude sensor: (0.342+ (–2.240))/2= –0.949 degrees

B Correction value for head 1: 0.342–(–0.949) =1.291 degreees

Value to enter in installation parameters: 359.5 +1.291 =360.791
360.791 –360 =0.791 degrees

C Correction value for head 2: –2.240 – (–0.949)= –1.291 degrees

Value to enter in installation parameters: 1.75 –1.291= 0.459 degrees



Related operational procedures

- *How to determine calibration values using SIS Calibration frame* on page 165
- *How to determine calibration values using SeaCal automatic calibration* on page 168

Plan a survey

Introduction

A survey plan will normally define the following factors:

- The survey area
- Bottom conditions
- The survey lines
- The direction and order of the survey lines
- The survey lines required for system calibration
- The location and timing for sound speed profiles

When planning the survey lines islands, coastlines, shoals and other obstacles within the survey area that may have influence on safety or efficiency of the survey must be taken into account. The achievable coverage of the multibeam echo sounder and the overlap required between neighbouring lines is usually used to determine the line spacing.

A fully comprehensive survey plan is most useful in areas of deep waters or where the depth and hence coverage is fairly constant. In shallow waters where the depth changes rapidly and may not even be known, a comprehensive plan may not be as useful, especially if the survey is to be run with a small and agile vessel. A defined survey area boundary plus a few pre-planned lines for calibration may then be enough. Actual coverage is obtained on the spot instead of being used to determine the survey lines.

The SIS Planning module allows a survey to be split into sub-surveys or jobs. The survey area boundary may be defined as a polygon with any number of corners, as may areas which are not to be entered. Automatic line clipping at the polygon boundaries and automatic generation of parallel lines is supported.

During the survey, planned lines may be activated to generate steering information for the bridge and helmsman's display. The purpose of the Planning module is thus to provide help before and during the survey.

Factors to consider

- A survey is normally planned taking the following into account:
  - Echo sounder coverage
  - Seafloor topography
  - Sound speed variations
  - Weather conditions

- The requirements for calibration of the positions (time delay), heading, roll and pitch sensors must be considered, and how and where to gather sound speed profiles.
- Coverage capability determines line spacing, and as it varies with bottom reflectivity, this must be estimated. Usually 10% overlap between lines is sufficient, but if large variations in bottom reflectivity is expected, or reflectivity is unknown, it may be necessary to increase the overlap. The overlap must also be increased if the vessel's roll is excessive.
- If there are steep slopes on the bottom, it is strongly advised to run along these slopes, not up or down them. This is beneficial for keeping coverage reasonably constant along the survey lines, thus making survey planning easier. However, the main reason for this advice is that the echo sounder performance will usually be poorer when running up or down a slope rather than along. This is because less acoustic energy is reflected towards the transducer from steep slopes, causing poorer detections and the possibility of false detections in sidelobes. Sidelobe detections is however very rare in the Kongsberg multibeam echo sounders due to the advanced signal processing implemented. Note that if circumstances require that survey lines are run up or down a slope, reduction of vessel speed may be required to allow the echo sounder to track the bottom continuously.
- Coverage capability is also affected by weather conditions and possibly also by vessel speed. Heavy seas and possibly vessel speed lead to increased noise level, and may also cause aeration on the Sonar Head or the transducer array.
- Aeration is a function of sea state, but also of the heading with respect to the wave direction and the vessel speed. It is strongly advised that one builds a record of coverage and aeration problems versus sea state, heading with respect to wave direction, and vessel speed. This record may be helpful in ensuring that surveys can be performed efficiently with a minimum of line rejections and corresponding reruns and infills.
- Any drift rates of roll, pitch and heading should also be recorded to enable efficient planning of calibration intervals. If calibration is required before a survey, a suitable calibration area must be identified before reaching the survey area.
- A sound speed profile must always be taken within the survey area and loaded into SIS before the survey is started. In some areas the profile will vary, mostly due to fresh water inflows from rivers or currents from areas with different salinity. Surface sound speed variation may be strongly affected by solar warming. If variations can be expected, where and when sound velocity profiles are to be taken must be planned, and the survey line schedule adjusted to take this into account.
- If the measured sound speed value at the Sonar Head or the transducer array depth is continuously measured, it is recommended to compared this to what is observed by the profiling instrument to evaluate the need for observing a new profile.
- Note that in some cases the coverage capability of the echo sounder cannot be fully utilized, because remaining errors in roll and sound speed profile measurements, which are critical for maintaining the accuracy of the outer beams, become too large. The ray bending effect (Snell's law) may also reduce the online coverage since the energy can bend inwards.

How to plan a new job in SIS

1 Select the **Planning module** frame.
The Geographical view must also be accessible.
2 Expand **Jobs**.
3 Press **New job**
4 Enter a descriptive name of the job
5 Select your preferred coordinate format
6 Expand **Objects**
7 Select **New line**, **New polygon**, **New line from** or **New object** depending on your plan.
8 Select the end points of your object by pointing the mouse in the geographical view, hold the **Ctrl** button while clicking on the **left mouse** button.
9 Hold the **Ctrl** button while clicking on **right mouse** button to bring up the **confirm changes** menu.
10 Press Accept to finish the object
11 Press the **New line**, **New polygon**, **New line from** or **New object** again to finish the process.
12 Select one of the planned lines or objects by **ctrl + left mouse** button.
13 Observe that the buttons that can be used to modify your plan becomes active.
14 Edit, move, extend, reverse, make parallel lines, etc. according to your plan.
15 Press **Save Job** or **Save Job as...**.
16 Transfer plan to the Remote Helmsman display when your plan is ready by expanding **Remote** and pressing **Transfer plan**

Related topics

- *Planning module window* on page 84
- *Keyboard and mouse in the Planning module view* on page 38

Run the survey

Operational procedures

- *How to retrieve a planned job* on page 185
- *How to monitor the survey progress* on page 186
- *How to run the PU simulator* on page 187

How to retrieve a planned job

1 Open the **Planning module** frame.
2 Expand **Jobs**
3 Press the **Open job** button.
A standard file open window appears.

4 Select the file where your planned survey lines are stored.

5 Verify that the correct job i loaded.

6 Expand **Remote**.

7 Press **Transfer plan** so send the planned lines and objects to the remote helmsman display.

Related operational procedures

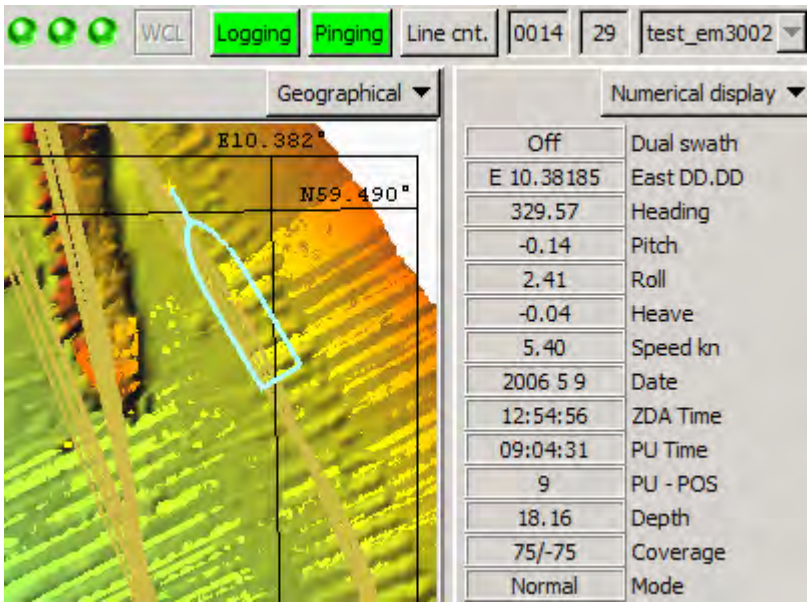
- *Plan a survey* on page 183

Start and stop logging

Observe the procedures in *Start and stop logging* on page 153.

How to monitor the survey progress

There are different ways to monitor the progress depending on the system you are running. The logging and system status is observed and presented in **Status information**. The following is a summary of the **Status information**:



1 Observe the **Geographical window**.

The **Geographical view** gives an overall control of the performance of SIS and the multibeam echo sounder

2 Observe logging, pinging and line number status.

On the right hand side of the toolbar there are three buttons which show the status of **logging**, **pinging** and **line number**.

3 Observe the **Numerical display**

In the **numerical display** view you may select the sensor data values you want to monitor.

4 Observe the **status lamps**.

Three **status lamps** on the main toolbar give status of hardware units (applies to multibeam echo sounders only).

5 Observe the **sound velocity**.

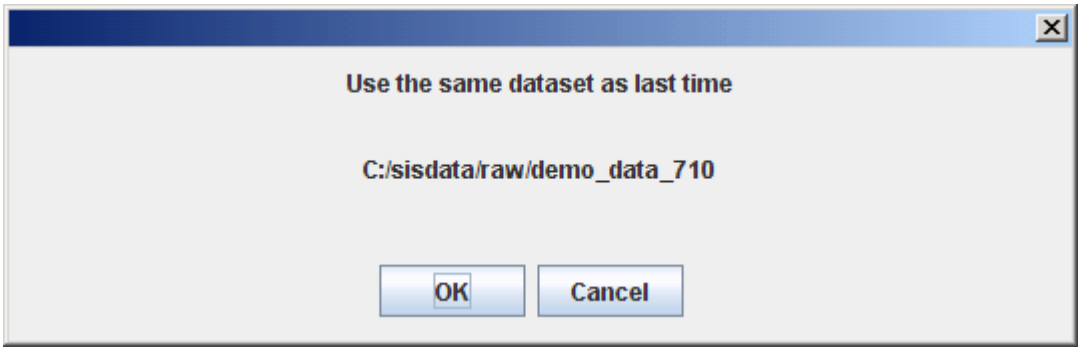
How to run the PU simulator

The PU Simulator is a replay program using logged raw data from EM multibeam echo sounders.

1 Start the PU simulator from the **Tools→Custom...→PU Simulator** menu.

`PU.exe` will start in the background.

If PU simulator has been run before on your SIS installation you will be prompted whether to continue from last set of raw data or to start a new replay.



2 Press **OK** to continue last dataset.

The **PU control** will open and start output of selected raw data.

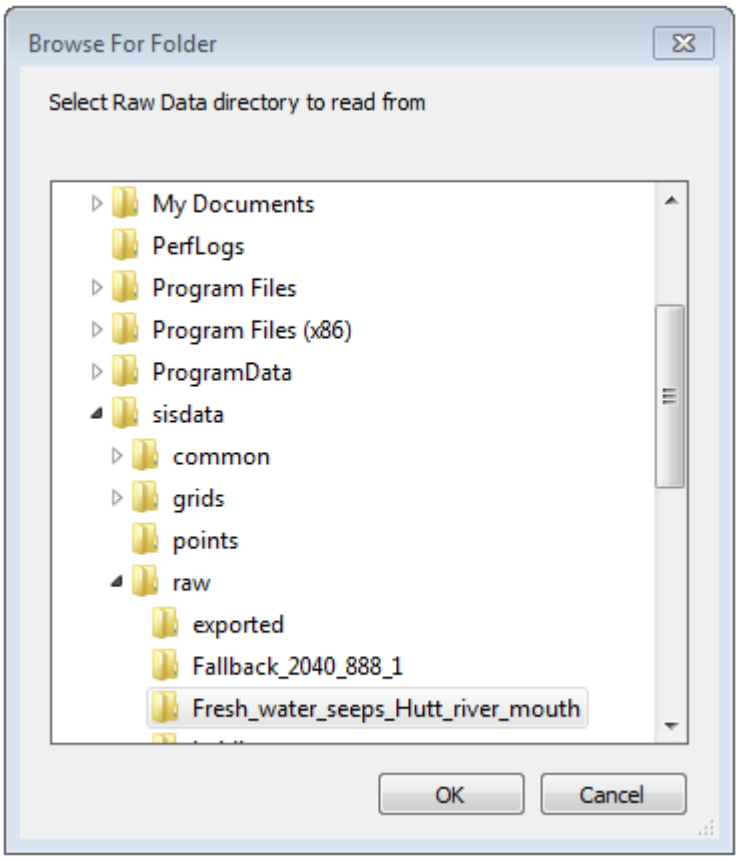
or

3 Press **Cancel** to select a different dataset.

The **PU control** will open.

4 Select the raw data files to replay be pressing **Start**.

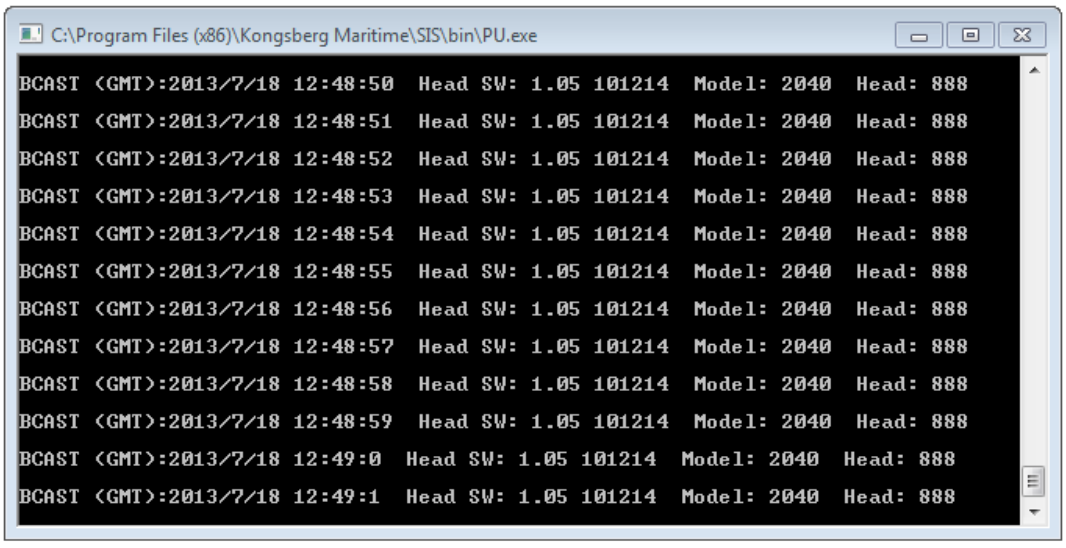
A file selection dialog box will open.



5 Browse to the directory of your raw data files.

6 Press **Open** to activate the replay.

7 Observe that raw data from selected type of echo sounder with head serial number 888 is broadcast in the `PU.exe` command window.



8 Return to the SIS to start and run the simulated echo sounder the same way as you start any other echo sounder.

Note that the serial number of a simulated echo sounder is 888 to distinguish it from an actual echo sounder.

9 Press **Rescan** to make SIS recognize the simulated echo sounder with serial number 888.

10 Select the simulated echo sounder with serial number 888 from the **Not started** drop-down box.

SIS will soon start running as for an online survey. You can operate SIS as with any other echo sounder.

11 If you have a slow computer, you can press **Pause** to allow SIS to catch up.

12 You can control the speed of the simulator by reducing the playback rate

13 Press **Stop** in the **PU control** window to stop the simulator

Related operational procedures

- *How to start the echo sounder* on page 139

Related topics

- *Time series view* on page 66
- *Numerical display* on page 62
- *Message service view* on page 63
- *PU sensor status view* on page 79
- *Sensor layout view* on page 88
- *Main toolbar* on page 27
- *Sound velocity profile view* on page 73

Export data

Data can be exported into various output data formats. The formats are described in the parameter section of this manual.

To export data use the **Import/Export** dialogue box found in the **File** menu.

Remote Helmsman Display

How to start the Remote Helmsman Display

The Helmsman Display must be connected to the echo sounder's operator station (normally the HWS). From the HWS Operator Station you can control what surveys to be displayed on the remote Helmsman Display as follows:

1 Import the survey to be shown

2 Select **Transfer grids** from the **Planning module**.

3 Verify that the same grids (terrain models) are displayed on the Remote Helmsman Display.

How to display planned lines on the Remote Helmsman Display

You can display all the currently planned lines on the Remote Helmsman Display:

1 Select **Transfer plan** from the **Planning module**

Current active line will always be sent from the HWS Operator Station to the remote Helmsman Display. The Helmsman is presented with guidance information, such as distance from planned line to current position and other information about current line.

The Helmsman may freely set his own colours, shading, scale and area to display. He can choose to see a completely different area than what is currently surveyed. This makes it possible for the Helmsman to do his own quality assessment of the surveyed data and to take action if required.

If the logging stops for whatever reason, the Helmsman Display will no longer update. This allows the Helmsman to follow the progression of the survey.

Related topics

- *Helmsman display view* on page 64
- *Planning module window* on page 84

Installation of the Remote Helmsman Display is described in the SIS Installation Procedure, document number 164891.

Exporting survey results

How to export survey results after a survey

There are several different possibilities and formats available for exporting the results form a survey:

1 Raw data as recorded using the binary instrument data format described in the Operator manual – EM series Datagram Formats, published on the webpage www.kongsberg.com under multibeam echo sounders. Examples of compatible software systems are Neptune B and CARIS HIPS.

2 Flags – The flag is compatible with Neptune B. Data cleaning (flagging out soundings) performed by SIS, can be inspected and/or modified in Neptune B.

3 All soundings in xyz-format. The following variations can be selected:

- Depth in centimetres
- Tide corrected depth (cm). (Correction are derived from predicted or real time tide.)
- Geoide and RTK corrected depth (cm).
- Seafloor to geoide distance (cm).

- Seafloor to ellipsoid distance (cm)

4 Grid node value from Grid Engine, binary or ASCII format.

5 Contour lines in DAF format. The DAF format is compatible with the DKART software for electronic charting.

6 Terrain model generated by CUBE.

7 Raw data converted to .XTF format. This is an option which includes a converter program.

Exit SIS

How to exit the SIS software

SIS can be exited by one of the two following methods:

1 Stop logging and pinging.

2 Select **File→Quit**,

or

3 Press the **Close** button in upper right corner of the SIS window.

How to shut down the HWS

The SIS HWS (Hydrographic Work Station) is first powered down:

1 Switch the power *Off*

2 Switch off all peripherals

How to shut down the Processor Unit (PU) or the Transceiver Unit

1 Open the door on the Processing/Transceiver Unit

2 Switch the power *Off*

3 Alternatively, use the Remote Power switch

Appendix A Terminology and abbreviations

Terminology

All multibeam echo sounder systems use transducer arrays but in some models the transducers are integrated in sonar heads.

→Refer to the installation manual to find out more about your system .

Abbreviations

The following abbreviations are used in this document:

1PPS

One Pulse Per Second synchronization signal

ABDC

Area Based Data Cleaning

APB

NMEA Autopilot format B sent by SIS/planning stations to allow them to be used to control an autopilot unit

AUV

Autonomous Underwater Vehicle

BD

Bottom detection

BIST

Built-In Self Test

BS

Backscatter

BSP

Beamforming and Signal Processing

CCU

Central Command Unit, a SIS background process that controls all echo sounders

CMG

Course made good, course from beginning of planned line

COG

Course over ground

CPU

Central Processing Unit

CUBE

Combined Uncertainty and Bathymetry Estimator, an alternative data gridding method

CW

1 Clockwise

2 Continuous Waves (describing pulse properties)

CCW

Counterclockwise

DBS

NMEA datagram; Depth below surface

DBT

NMEA datagram; Depth below transducer

DDS

Data Distribution System; a SIS background process responsible for logging datagrams sent by the echo sounders

DPT

NMEA datagram; Depth

DST

Distance to end of line

DTK

Desired track, direction of planned line

DTM

Digital Terrain Model

DXF

Data Exchange File, a three-dimensional graphics file format

EA

A type of singlebeam echo sounder

EM

A type of multibeam echo sounder

ETA

Estimated time of arrival

GGA

NMEA position datagram

GGK

NMEA position datagram

GMT

Greenwich Mean Time

GPS

Global Positioning System (in this manual GPS includes all kinds of positioning systems)

GUI

Graphical User Interface

HDDS

Handle Data Distribution System; a SIS background process that reads data from disk and process the data to xyz for SIS gridding

HDM

NMEA datagram; Heading, magnetic

HDOP

Horizontal Dilution Of Precision read from position datagrams

HDT

NMEA datagram; Heading, true

HWS

Hydrographic Work Station; the SIS operator PC

IP

Internet Protocol

IRLS

Iterated Reweighted Least Squares

KSGPL

Kongsberg SIS Graphic Programming Language

LBDC

Line Based Data Cleaning

LOD

Level Of Detail

ODBC

Open DataBase Connectivity, a standard database access method

OpenGL

A 3-D graphics language

PU

Processing Unit (for multibeam echo sounders with a Transceiver Unit, the PU is included in the TRU)

RAM

Random access memory

RGB

Red, green and blue (primary colours on a computer monitor)

ROV

Remotely Operated Vehicle

RTDC

Real Time Data Cleaning, the real time processing tool in SIS

RTK

Real Time Kinematic

RX

Receiver

SCSI

Small Computer System Interface, a parallel interface standard

SH

Sonar Head

SIS

Seafloor Information System, the front-end for all echo sounders

SISDB

SIS Database, the database used by SIS to store parameters

SOG

Speed over ground

SQL

Structured Query Language, a standardized query language for requesting information from a database

SSP

Sound speed datagrams used by SIS (Sxx datagrams)

SV

Sound velocity

SV&P

Sound velocity and depth (pressure) sensor

SV&T

Sound velocity and temperature sensor

TCP

Transmission Control Protocol

TRU

Transceiver Unit

TVG

Time Variable Gain

TVG FG

TVG Fixed Gain

TVG NIB

TVG Normal Incidence Backscatter

TVG OB

TVG Oblique Backscatter

TVG RN

TVG Range To Normal Incidence

TX

Transmitter

UDP

User Datagram Protocol, a connectionless protocol

UPS

Uninterrupted Power Supply

UTC

Universal Time Coordinated

UTM

Universal Transverse Mercator (a common projection used in map presentations)

VRML

Virtual Reality Modeling Language, a specification for displaying 3-D objects

WGS84

World Geodetic System 1984

XTE

Cross track error, measured, distance to planned line

ZDA

NMEA datagram; UTC and local date/time data

Appendix B INDEX (Interactive)

Q

R

S

T

V

W

Z

SIS - Seafloor Information System
Operator Manual

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