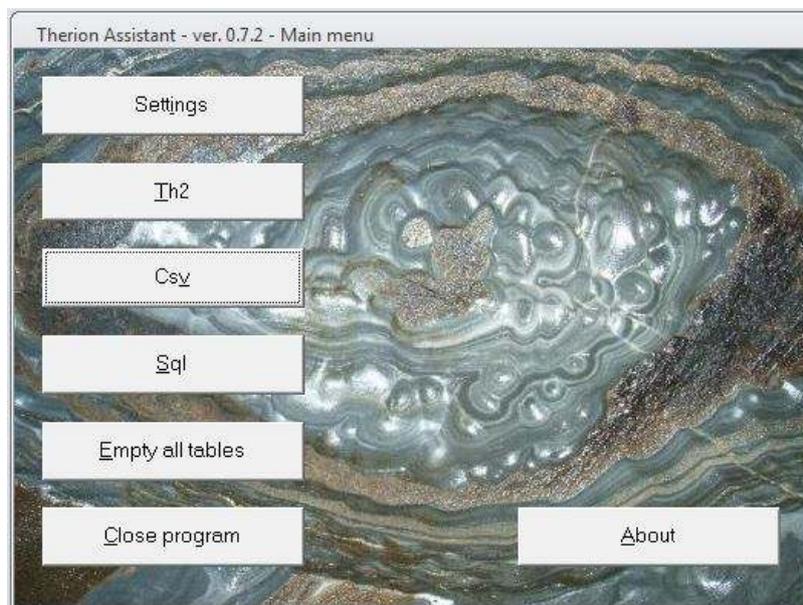


# Therion Assistant

## User Guide



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## **Copyright and licensing**

Therion Assistant version 0.7.1, 6.8.2018.

Therion Assistant is a program designed to aid drawing of cave maps in Therion.  
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## **Preface**

From time to time, when using Therion, the situation arises when two or more separate drawings (scraps) in separate files should have been in the same th2-file. To join them the coordinates for all items in one of the files have to be altered before joining because of the difference in "zero-point-distance". To correct the coordinates by the use of a spreadsheet is possible, but a bit tedious since several coordinate-pairs can be on the same line in the th2-file. And furthermore, spreadsheets are not very good when it comes to formatting output Therion-like. And then there is the case when one scrap should have been two. Therion itself does not seem to have shortcuts for either. When these needs became urgent a while ago a solution was made in Ms Access that handles the situation programmatically, and the Therion Assistant saw the light of day. Since then it has been continuously updated.

Therion Assistant is written in Microsoft Access and can be used by everyone with a full Access or an Access runtime version 2007 or newer. The program is not compiled, hence the source code is open.

Therion Assistant has been tested only in Windows environment. Whether it will work on a Mac or in emulated Windows under Linux is unknown.

The program is currently very much a beta version, but feedback is needed to improve and further develop it. Until now it is only tested with Therion settings and configurations used in the neighbourhood, and other users might find errors and/or shortcomings due to variations in the use of Therion.

To use the Assistant a basic knowledge of Therion and its file system is required.

Thanks to Torstein Finnesand for guiding me along Therion and testing the program and to Anders Grundstrøm for aiding with the inner life of Access & Visual Basic as well as the English language.

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## 1. Settings



### **The local decimal separator:**

The choices are; Comma or Dot. As Access does not handle mathematical operations where numbers are formatted any other way than the local standard, dots have to be transformed into commas, for instance in Norway, while computing, and back to dots before exporting the file to disk to be reopened in Therion.

It is vital that this setting is correct before using the assistant!

### **Default working folder:**

You can either write, paste or browse for the folder you want. If supplied this setting will open all file dialogues in the program in the working folder of your choice. If blank, the file dialogues will open in the default folder in your Office settings.

The setting does not affect the various exports in the Th2-form. Filenames are stored with their complete path when imported, and are exported to the same location.

## 2. Th2

The th2 form is the main form in the assistant. The "Browse for files" button opens a file dialogue with these options in the drop down list:

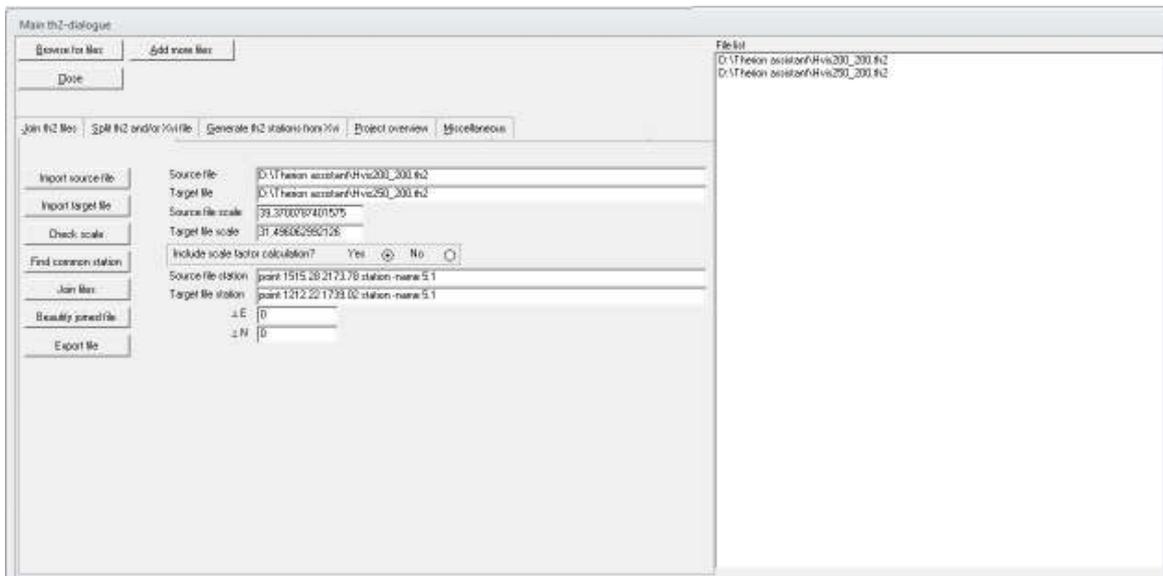
- Therion drawing files \*.th2
- Therion background files \*.xvi
- All files \*.\*

Clicking Open in the file dialogue populates the File list in the form, from where files can be chosen for import to the various functions. All imports are specific to the tab they are on. This means that all work on a specific file is done in the same tab. Switching between tabs will not affect the work done in any of them. Closing the form before any task is finished will in most cases mean restarting from scratch.

The "Browse for files" button will reset your list. If you, for some reason, want to add more files without resetting the list click "Add more files". The filenames (including drive and folder) will be checked, and any duplicates removed from the list.

All buttons and "tab's" with an underlined character can be activated by pressing "Alt" on the keyboard and typing the underlined character. This applies to all forms in the program.

### 2.1 Join th2 files



Unlike the word "join" in Therion, this means actually writing two files into one. The need arises when two drawings should have been one, usually because of a multilevel section of the cave or a lot of side passages.

Joining two files depends on both datasets having the same point of origin. As they seldom do, the difference has to be calculated and added to all items in one of them before they can be joined. The two files may also be created in Therion with different Scale/Resolution ratio. This must be taken into account. Note that the two files must have at least one common station. The "Source file" is written into the "Target file" when joining, and hence the target file is the only one exported. Should the source file contain more than one scrap, all of them are transferred. If one single scrap from a multi-scrap th2-file is to be copied, the wanted scrap must be isolated in a new th2-file before importing it. This should be fairly straight forward since neither the scale nor the background sketch is a problem.

**Check scale:**

After populating the File list and importing the files in question, click "Check scale". The program will then try to locate the corresponding xvi-files for both th2-files and read the scale/resolution ratio from them. This depends upon files originating from PocketTopo where a reference to the xvi-file can be found in the heading of the th2-file. If not, the scale has to be calculated manually from the difference between two stations in the centreline-file and the same two in each th2-file, the old fashion way. The scales can then be entered into the "Source file scale" and "Target file scale" boxes in the form. The formula for the calculation is a not a theme for this manual as we expect that it is known to most surveyors.

**Find common station:**

The question "Include scale factor calculation?" must be ticked "Yes" or "No" before the "Find common station" button can be used. This is because the differences on both axes are calculated here, and the answer is vital for the result. (In the case of manual calculation of the scales, the results must be entered into the boxes first.) If several common stations exist there will be a possibility to discard them one by one, but since the zero point difference is the same throughout each file, it is not essential which station is chosen. The differences,  $\Delta E$  and  $\Delta N$ , can be entered manually.

**Join files:**

"Join files" recalculates all coordinates in the source-file and does the actual joining to one file (table).

**Beautify joined file:**

"Beautify joined file" is an option, not a necessity. It does:

- Move all "points" to the beginning of the file, stations first, then other points such as remarks and so on.
- Put all "areas" next to the "line" with the same "id".
- Remove "lines" with less than two pairs of coordinates, "areas" without "id" and empty "scraps".
- Remove double blank lines in the file.

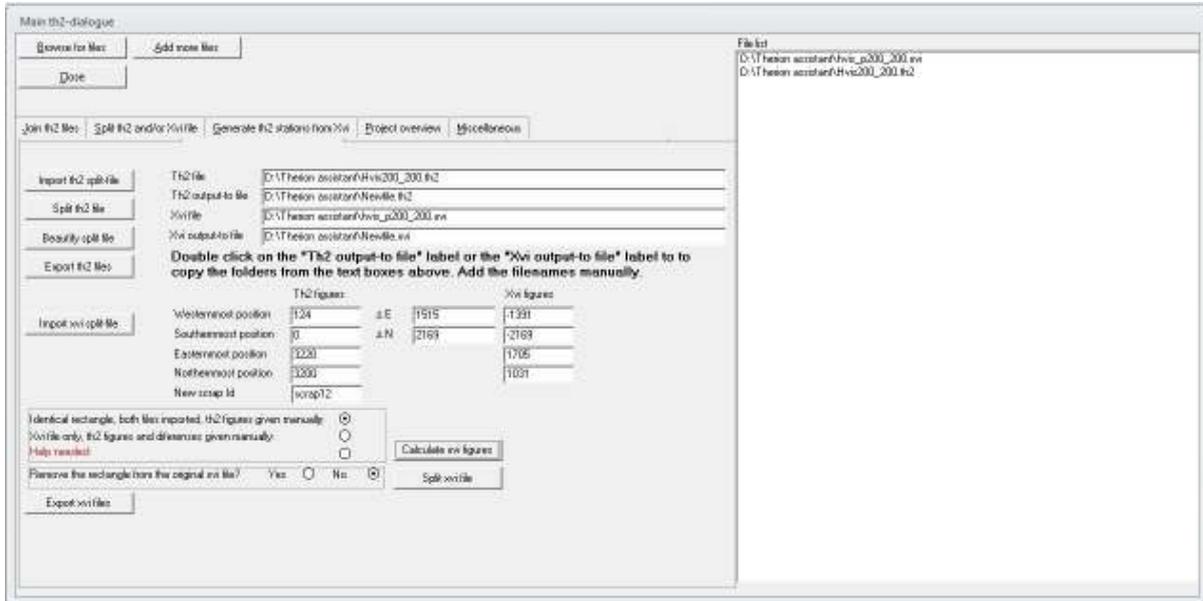
The same process is carried out wherever a "Beautify" button is found in the th2-form.

**Export file:**

"Export file" makes a backup of the original file by renaming it to \*.bak, and then writes the file back to disk. If a backup of the file already exists, the user will be given the choice of

automatically deleting of the old one, or sorting it out manually. This applies to all exports from the th2-form.

## 2.2 Split th2 and/or xvi file



Splitting a th2- and/or an xvi-file is a bit more complex task. After importing the file(s), double click on the "Th2 output to file" label to copy drive and folders from the text box above, and then enter the new file name manually. The same method applies to the xvi-file.

The area to be moved into a new file must be a rectangle. The easiest way to find the figures is to move the mouse pointer over the rectangle corners in Therion in "Map editor" mode. The figures are shown in the lower right hand corner behind the "select object" in the format East : North. Enter all four positions into the relevant boxes. These figures are to be entered without decimals. For the th2-file the new scrap must be given a unique name. In the case of just a th2-file being splitted this is all the information needed. Clicking "Split th2 file", possibly "Beautifully" and then "Export th2 files" will do the trick. A backup will be made of the original file on disk by renaming it to \*.bak before writing the new version to disk with its original name. (See "Export file:" above.) The new file will be written to disk with the name from the "output-to" box. Lines and areas may be splitted between the two files. Any new file can later be joined with another.

NOTE: If the "Xvi output-to file" box is left empty, no background image will be referenced in the new th2-file. I.e. to get a background image, the xvi-file has to be splitted as well. Otherwise the background must be inserted manually in Therion.

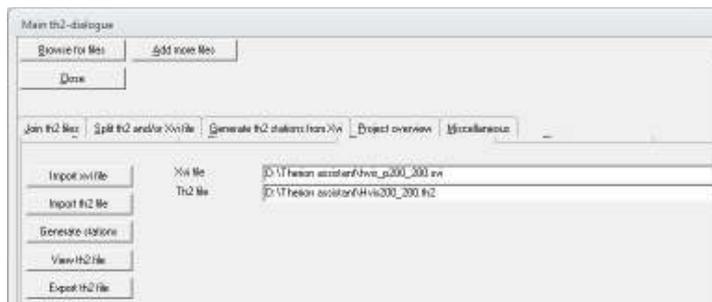
To split an xvi-file some more information is needed. Either the assistant can calculate the offset between the th2- and the xvi-file, or it can be entered manually. Ticking the choices in the option box to the left of the "Calculate xvi figures" will lead to the appropriate action.

- "Identical rectangle, both files imported, th2 figures given manually" will when clicking the "Calculate" button tell the assistant to calculate the th2-xvi offset from the coordinates of a station in both files, then calculate and write the corresponding xvi figures into their boxes.
- "Xvi file only, th2 figures and differences given manually" means that the th2-xvi offset is calculated and entered into the boxes as well as the th2 figures. "Calculate" will now only calculate and write the xvi figures into their boxes.
- "Help needed" will give some help on screen.

"Remove rectangle from the original xvi file?" chooses whether the background sketch is deleted from the original file. Usually this might be a good idea, but if one xvi file is to be divided into several new ones the original sketch should be left as it is, making it possible to create overlaps between backgrounds.

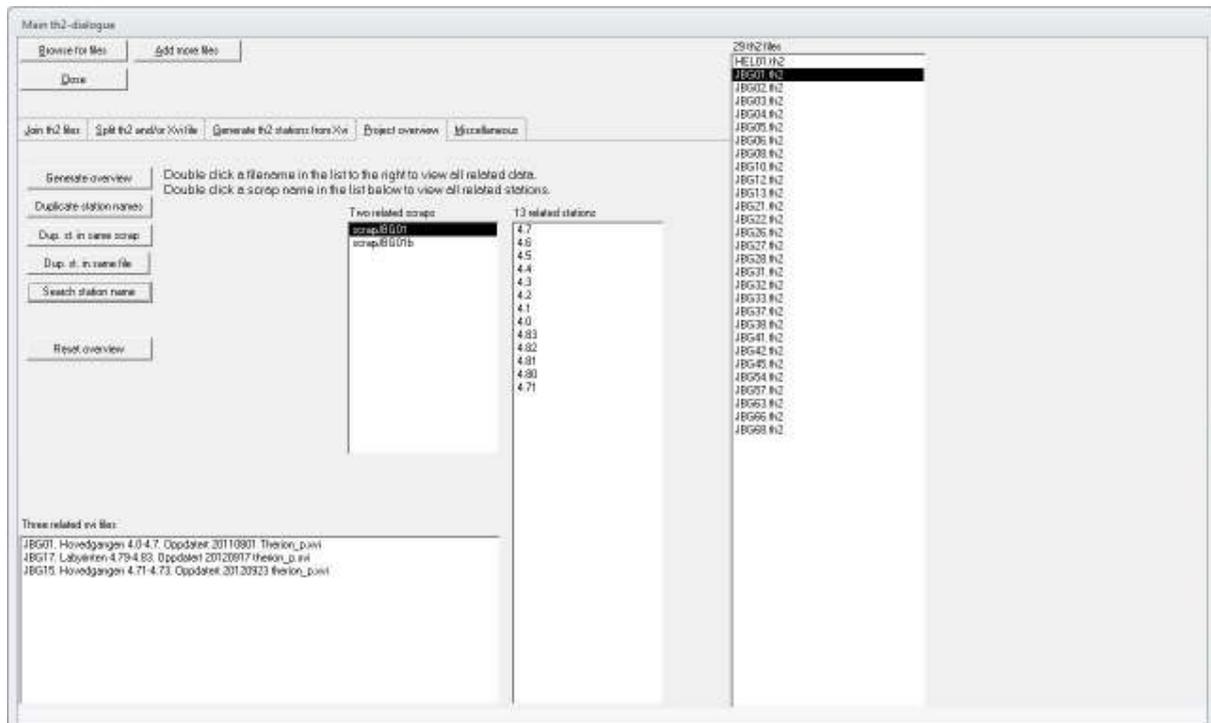
Splitting other backgrounds, such as jpg's, is not an option.

### 2.3 Generate th2 stations from xvi



This is an option when creating new files in Therion based on a survey done with PocketTopo. After creating a new th2-file and inserting a background image, i.e. the txt-file made by the Therion export in PocketTopo, save and close the th2-file. Then import both the th2 and the corresponding xvi-file into the assistant. "Generate stations" will generate all "point ... station" in the th2-file, leaving the cross sections. It is quick and more accurate than mouse clicking.

## 2.4 Project overview



To generate a project overview you must first populate the "File list" with all the relevant th2-files, by clicking "Browse for files".

### Generate overview:

Clicking this button will initiate a read-through of all files in the file list and importing the data needed into tables. The first file, and the first scrap in that file, will be activated by default. Moving through the files is done by double clicking on the wanted file name. The same applies to the scraps.

**Note** that the import expects the station name to be in text block no. 6 on the line in the th2-file. If the station name is separated from "-name" by a tabulator rather than a space an error rises.

### Duplicate station names:

The aim is to get a list of stations that are binding different scraps together. The complete dataset will be searched for station names that are used more than once. If the project includes several caves and the same station-series are used more than once, there will of course be a long meaningless list.

**Note** that the field containing station names is set to eight characters. Therefore names like 1.2@somecave will raise an error.

**Tip:** If you have several copies of the same project and are unsure if all copies hold the complete set of stations, you can populate the file list with two, or more, copies of the same

file from different folders by clicking "Add more files". Stations not showing up in the "Duplicate station names" search will be missing from at least one of the files.

**Dup. st. in same scrap:**

Clicking this button will search for duplicate station names within each scrap.

**Dup. st. in same file:**

Clicking this button will search for duplicate station names within each th2-file.

**Search station name:**

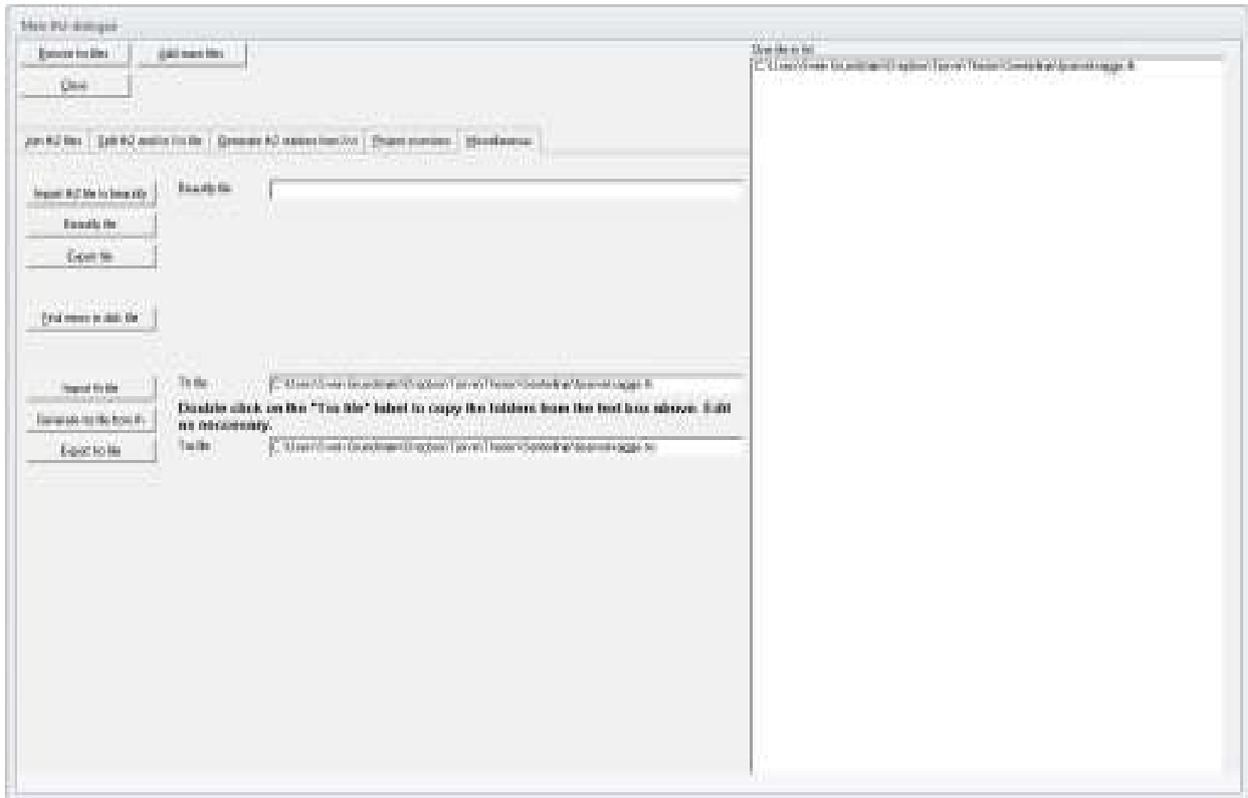
You can either select a station in the "stations list", and click the button, or you can click the button and type a station name of your choice. The result will be presented as; stationname, scrapname, filename and line number as well as a copy of the line in question in a message box. This makes it easy to see if duplicate stations have the same coordinates. It also simplifies the process of correcting the error.

**Note** that finding a copy of the line in question is dependent upon the original file list with the complete path to each file. This list is lost if the "Main th2-dialogue" form is closed, and a "Type mismatch" will occur if you search for a station after reopening the form. After editing a th2-file, some weird results may appear if searching for another station in the same file. That is because the search function holds the original line numbers from when the data was imported. When the file is altered these numbers change.

**Reset overview:**

Clicking this button deletes data in the overview tables, preparing for a new set of data to be generated. If another tab is activated, returning to the "Project overview" will reopen the last overview, unless "Reset overview" or "Empy all tables" on the main menu has been clicked.

## 2.5 Miscellaneous



From this tab it is possible to have a th2-file on disk searched for empty scraps and lines. A message box will report the anomalies and at which lines in the file they are. These can be corrected either in Therion in "Text editor" mode or in any text editor that shows line numbers. The encoding must be acknowledged, especially if there are special characters used. It is also possible to import a th2-file solely to have it beautified.

For older projects where surveying has been done the "old fashion way", one might want to transfer the centreline to a PDA with Pocket Topo (PT) to continue surveying. The centreline data can be transferred to a Visual Topo file (\*.tro) if complying with these rules:

- The station numbers must either have numeric or alphanumeric identification of the series and in the case of numeric series there must be one and only one delimiter sign.
- In the case of alphanumeric series there can be one or no delimiter and the letters must be uppercase in the range A-Z. There program currently handles one or two letters.

Since PT handles only numeric series the letters are converted into numbers by taking the position in the alphabet for the last character and if there is two the leftmost position is multiplied by 26 and the figures added together: A = 1, Z = 26 AA = 27, BC = 55, ZZ = 702. The original station numbers can be found in the "comment" column.

When importing a tro-file into PT there must be an ID (fixed point), otherwise PT will not show the drawing. The workaround is to mark the first point in the centreline-file as the

entrance (ID). PT then shows the drawing regardless of where that station is. If one wants a more logical station as the fixed point, it can be manually altered in PT.

### 3. Csy

Centralink data from csv-file

Import csv-file. Click a label to sort data by that column ascending. Double click to sort descending.

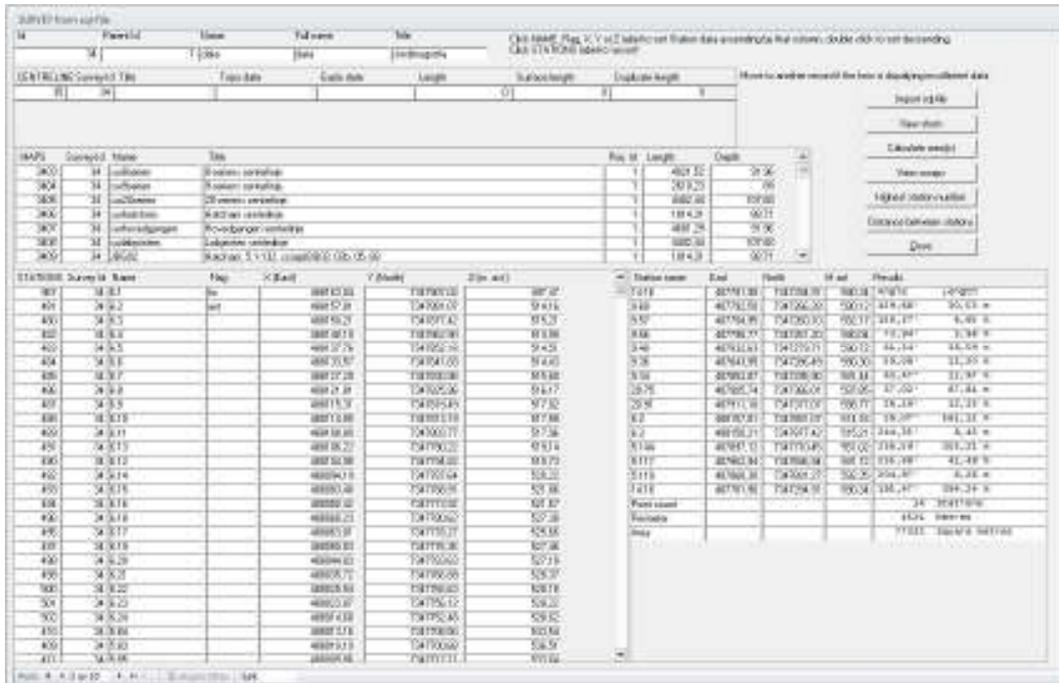
Close. Double click to sort descending.

Double click either From or To fields to apply a filter.

From	To	Length	Azimuth	Disto
14.1	4.179	1.38	109.14	23.22
14.10	8.72	2.74	71.94	14.51
14.10	14.9	15.30	32.51	-2.09
14.11	14.10	8.00	17.25	-0.34
14.12	14.11	17.08	29.20	-0.82
14.13	14.12	17.31	20.69	-1.11
14.14	14.13	18.06	24.30	0.26
14.15	14.14	15.35	23.70	0.51
14.16	14.15	12.53	34.64	-0.86
14.17	14.16	10.08	334.35	1.96
14.17	9.65	5.09	47.48	0.88
14.18	14.5	1.91	35.78	-3.17
14.19	14.18	3.89	28.10	-7.72
14.2	14.1	5.87	11.83	-11.15
14.20	14.19	10.10	19.73	1.53
14.21	14.20	4.87	24.03	1.61

- Clicking the Import csv-file button opens a file dialogue where the wanted csv-file can be chosen. "Open" in the file dialogue imports the data.
- Clicking a column-label sorts data by that column ascending, double clicking sorts the data descending, making it possible to study different properties of the cave and/or the dataset. To "unsort" simply close and reopen the form.
- Double clicking either From or To textboxes enables filtering data by that column. The filter returns all records in the filtered column starting with the given value.

## 4. Sql



This form has several functions. Apart from the obvious Import button, you can:

- View shots; brings data from the shot table in the place where station data is when the form is opened. This is a toggle button; it changes to "View stations" when clicked. To view all shot-data in may be necessary to move through all records in the form because shots are related to centrelines and only shots related to the centreline in the current record is shown. All labels in the shots subform can be clicked to sort data by that column ascending. Double click labels to sort data descending.
- View stations; brings back stations. The labels; Name, X(East), Y(North) and Z(m. asl.) can be clicked to sort data by that column ascending. Double click labels to sort data descending. To "unsort" click on the STATIONS label.
- Calculate area(s); asks whether stations with the flag "Fix" are to be excluded from the computation. Fix stations are usually on the surface, and not a part of the cave survey. All stations with exclusively "srf"-shots are automatically excluded from area and perimeter. Area and perimeter is calculated from a convex polygon in plan-view. All boundary stations are listed. If stations originate from several different caves in the same project and therefore have different "Survey id" there will be one area for each. When a new file is imported the old areas are deleted. The polygon calculated is based on the centreline, i.e. the station coordinates. Hence the perimeter and area does not include passage dimensions. The algorithm to find the boundaries of the polygon is based on the principle in "Jarvis March". The area is calculated by this formula:

$$A = \frac{1}{2} \sum_{i=0}^{n-1} (x_i y_{i+1} - x_{i+1} y_i), \text{ where } (x_n, y_n) = (x_0, y_0)$$

- View scraps; brings back the scraps into the form if displaying areas. After clicking, the caption of the button changes to "View areas" and areas can be viewed, if calculated.
- Highest station number; brings up a form where the separator sign for station numbers in the project must be chosen (it even has the choice of "None"). All used series in the project are listed along with the corresponding highest number for each. The program handles alphanumeric series as well as numeric, but only numeric station numbers.
- Calculate the distance between stations. This button brings up another form where station names can be selected or typed. Clicking "Calculate distance" will give you; Differences in all three axes, Plan distance, 3d distance, Bearing and Slope. Here you can quickly find the answers to the two most commonly asked questions in cave surveying; how far is B from A and which passage in the 3d maze is above which. Another use for this form is finding the distance and angles between any two points. The textboxes where the X, Y and Z values for both stations are shown are open for editing. That means you can write any values you want and have them calculated. The distances are calculated and shown in any unit because they are just numbers. The bearings are from 0 to 360 degrees, zero = north and clockwise rotation, slope is 0 to  $\pm 90$  degrees.

If an import fails the uppermost row will display a series of zeroes and the Title; "Import failed". The reason will probably be that the sql-file selected did not match the criteria. Note that the first record in the form usually contains only the top survey level. The interesting data is often in record two or later.

## **5. Empy all tables**

Clicking this button removes data from all tables in the database, except for the system tables, and also clears all filenames in the main th2-dialogue.