

TheoOffice
Network adjustment
for
TheoLt project
&
GSI survey data

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General	4
TheoOffice workflow	5
The TheoOffice work space	6
Workflow options	7
GSI post process	8
create project	9
Source file tab: Attached file view	9
The Source file tab: Codes unassigned	10
The Source file tab: Codes assigned	12
The Network Data tab	13
The Network Data tab: Calculate the network	14
The Network Results tab	15
Actions on Network Data	16
The Station List tab	17
Attached GSI source file: Edit options	18

CONTENTS

Point list tab	20
Graphic view	21
2 point intersection	24
Offline TheoLt project process	25
Handling TheoLt Project data	26
Network results	27
Position verification table	28
Raw data tab	29
Transfer to AutoCAD/Bricscad	30
Appendix 1: Writing a GSI job on TPS 1200 series instrument	31

General

TheoOffice is a general purpose survey data processing package designed to handle the translation of GSI data from field acquisition to least squares adjusted control data, additionally it provides a code translator with export to AutoCAD for rapid plot production.

As a member of the TheoLt family of survey software TheoOffice provides added functionality to TheoLt project users(e.g. merging TheoLt project data with post process method GSI data for network control of TheoLt live CAD work) and an off line post process method for preparing :

- ◆ Adjusted least squares network data with full reporting
- ◆ GSI format file processing for station and point coded data
- ◆ Preview plots and AutoCAD DWG export.

TheoOffice is designed to work in 2 ways, via the TheoLt project or by import of GSI data¹ from TST survey.

Conditions for adjustment

Adjustment of station data requires 2 fixed stations to be set in the network the adjustment is distributed amongst the unfixed stations. Fully observed 3Dnetwork data is required, the adjustment will not be applied to:

1. 2D or partial data
2. Co-ordinate positions without associated observation data
3. Positions marked as 'exclude'
4. Data transferred without an applied calculation

¹ Conforming to the generic 8 or 16 character polar /Cartesian .frt form used by Leica from 2004 on.

TheoOffice workflow

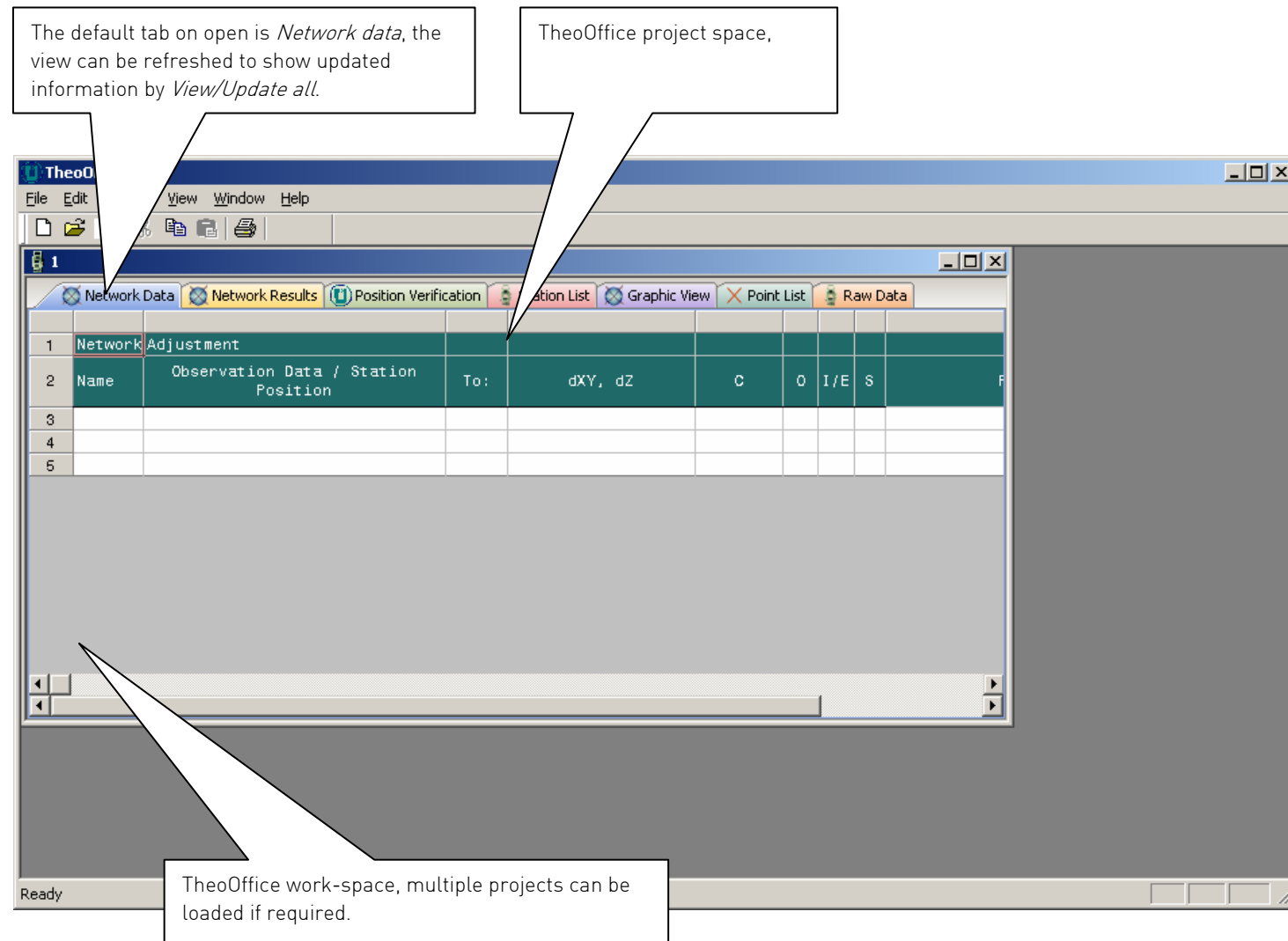
TheoOffice places all the steps of the processing path in a series of tabbed views. As actions are taken the project data is automatically updated and saved as part of the processing operation in the programme, 'save' and 'save as' are not used for this reason. Basic operation follows 9 steps from data review, code assignment (for GSI type data), network calculation and export.

1. Create project (see pg 9)
2. Attach GSI (see pg 9&10)
3. Check / Assign coding (see pg.11 &12)
4. Transfer to Network (see pg 13)
5. Calculate (see pg 15 &16)
6. Check (see pg 17)
7. View Network Diag (see pg 21)
8. Transfer Points (see pg 30)
9. Export /Apply as required.(option at any tab for both unadjusted and resultant view states) (see pg 16)

The TheoOffice work space

TheoOffice opens with a blank workspace which will allow multiple projects to be opened. The project data is presented via the view tabs at the top of each project panel.

The principal programme commands are accessed via the menu at the top of the workspace (*File Edit, Actions, View, Help*) with secondary functions available on use of a right-click action in the appropriate contexts.



Note that the source data tab is not available until source data file is attached to the project. The columns in the table views can be resized to permit reading of values and a tooltip method is used to show field content description where appropriate.

Workflow options

There are 2 principal routes for processing field data with TheoOffice:

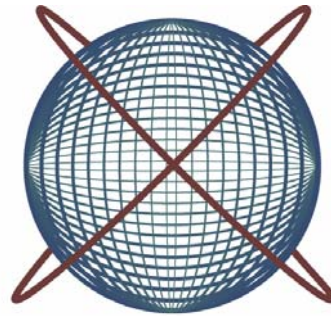
GSI post process

Where field data is collected and stored on the TST, exported as a GSI format file (see appendix 1 on how TST data for a simple control network is collected using a Leica TPS series instrument). Station and point positions are adjusted by the least squares network method and data exported as:

- ◆ DWG (if a supported version of AutoCAD/Bricscad is present on the system),
- ◆ Text or
- ◆ CSV formats.

Offline TheoLt project process.

Data collected in a TheoLt project may be processed off line using TheoOffice, the advantage being that the data can be merged with GSI data into to a single adjusted network. The TheoLt project data will contain a raw data file (if this has been selected as a data option during collection) which can be reviewed in TheoOffice.



GSI post process

GSI post process

Open/ create project

On opening the application a project must be used or created. The project data location is as set in *Edit /options/project path*.

Projects are created in the path using the *create new project panel* to enter the project name, description and creator details. If working with GSI the station, point numbering and datum fields may be ignored as this information will be contained in the GSI data.

Attach source file

From the File pull-down menu select *Attach Source File* and select the file by setting the browser to match the datafile extension (xxx.GSI or xxx.TXT)

Permitted File types are

- ◆ .dat
- ◆ .txt.
- ◆ .csv
- ◆ .gsi

On *open* an advice message warns of the action to copy the source into the project folder for processing.

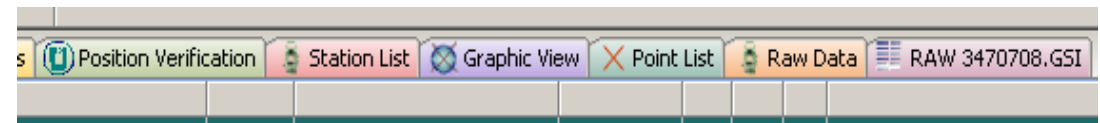
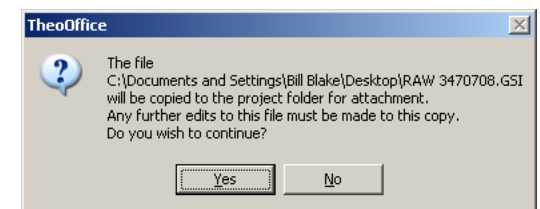
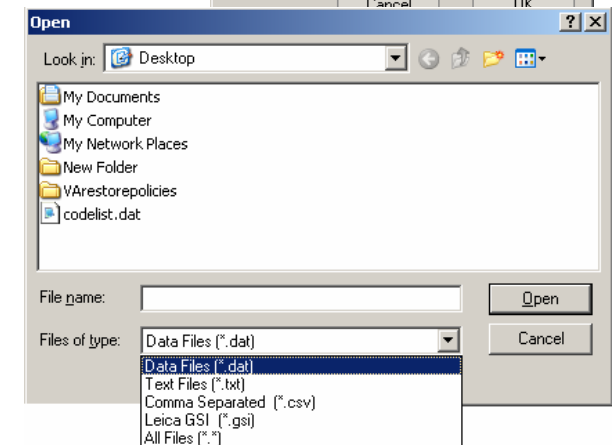
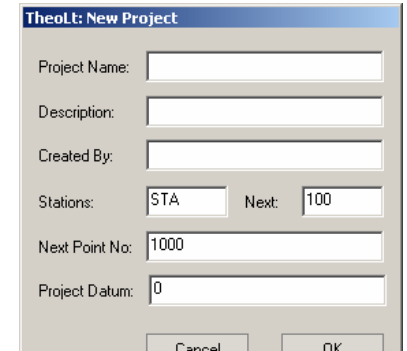
The *Attached file tab* will now be available in the TheoOffice work-space as indicated by the appearance of the source file view tab.

Multiple file attachments: computation order

Multiple files may be processed in the same session allowing major and minor control networks to be processed in the same project.

The files will be processed in the order of attachment so that the 1st attached file can be used to compute fixed points that will be used by the second and so forth.

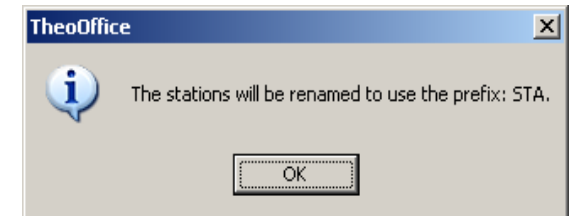
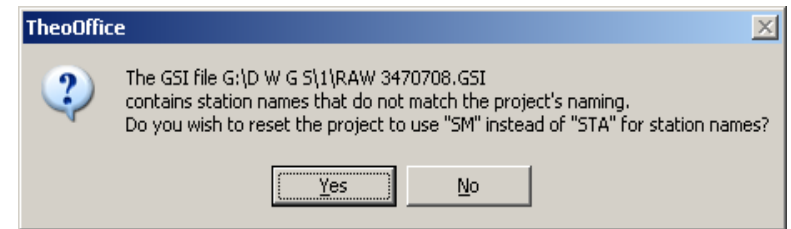
The computation requires a minimum of 2 fixed points for each network, the fixed points may be included from multiple source files to achieve this BUT each source file must constitute a computable network TheoOffice will not aggregate across source files to form a composite network.



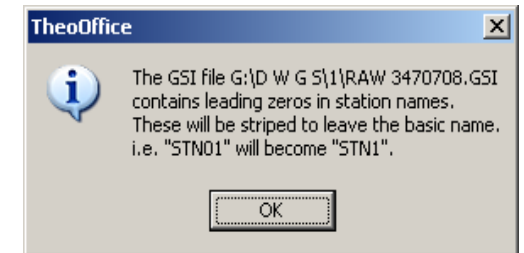
Source file tab: Attached file view

On selection of the Attached Source File tab TheoOffice will prompt for the Station prefix protocol if the Station / Point name format in the attached file do not match the format (prefix) specified in the project then a warning will be displayed. On the appropriate action of the station prefix and numbering advice the Attached File view panel is available.

The colour coding of the data will reveal the code allocation under the code list in the current project path.



TheoOffice - [T1]						
File Edit Actions View Window Help						
Network Data Network Results Position Verification Station List Graphic View Point List Raw Data RAW 3470708.GSI						
1	110001+000000000000SM02	84..10+000000001000.000	85..10+000000001000.000	86..10+000000000050.000	88..10+000000000001.435	
2	110002+000000000000SM01	21.044+0000000000000000	22.044+0000000009142310	31..00+000000000050.86	51.....+0000000000+0.000	87.....+000000000001.363
3	110003+000000000000SM03	21.044+00000000011336570	22.044+0000000009035480	31..00+000000000043.58	51.....+0000000000+0.000	87.....+000000000001.392
4	110004+000000000000SM11	21.044+00000000031528220	22.044+0000000008959340	31..00+000000000030.98	51.....+0000000000+0.000	87.....+000000000001.554
5	110005+0000000000001000	21.044+00000000035947030	22.044+0000000009107060	31..00+000000000030.27	51.....+0000000000+0.023	87.....+000000000001.800
6	110006+0000000000001001	21.044+0000000000001440	22.044+0000000009103260	31..00+000000000026.54	51.....+0000000000+0.023	87.....+000000000001.800
7	110007+0000000000001002	21.044+00000000035134210	22.044+0000000009052500	31..00+000000000023.49	51.....+0000000000+0.023	87.....+000000000001.800
8	110008+0000000000001003	21.044+00000000034545300	22.044+0000000009049310	31..00+000000000021.28	51.....+0000000000+0.023	87.....+000000000001.800
9	110009+0000000000001004	21.044+00000000033840400	22.044+0000000009036090	31..00+000000000023.27	51.....+0000000000+0.023	87.....+000000000001.800
10	110010+0000000000001005	21.044+00000000033752550	22.044+0000000009032470	31..00+000000000027.26	51.....+0000000000+0.023	87.....+000000000001.800
11	110011+0000000000001006	21.044+00000000033814300	22.044+0000000009027000	31..00+000000000031.87	51.....+0000000000+0.023	87.....+000000000001.800
12	110012+0000000000001007	21.044+00000000034209520	22.044+0000000008955300	31..00+000000000033.40	51.....+0000000000+0.023	87.....+000000000002.150
13	110013+0000000000001008	21.044+00000000034718080	22.044+0000000009003090	31..00+000000000034.19	51.....+0000000000+0.023	87.....+000000000002.150
14	110014+0000000000001009	21.044+00000000035309380	22.044+0000000009023110	31..00+000000000033.14	51.....+0000000000+0.023	87.....+000000000002.150
15	110015+0000000000001010	21.044+00000000035440160	22.044+0000000008805270	31..00+000000000029.19	51.....+0000000000+0.023	87.....+000000000001.800
16	110016+0000000000001011	21.044+00000000035255040	22.044+0000000008805180	31..00+000000000026.25	51.....+0000000000+0.023	87.....+000000000001.800
17	110017+0000000000001012	21.044+00000000034605110	22.044+0000000008756450	31..00+000000000024.44	51.....+0000000000+0.023	87.....+000000000001.800
18	110018+0000000000001013	21.044+00000000034232200	22.044+0000000008807150	31..00+000000000025.96	51.....+0000000000+0.023	87.....+000000000001.800
19	110019+0000000000001014	21.044+00000000034158050	22.044+0000000008809130	31..00+000000000029.95	51.....+0000000000+0.023	87.....+000000000001.800
20	110020+0000000000001015	21.044+00000000034630050	22.044+0000000008721150	31..00+000000000031.08	51.....+0000000000+0.023	87.....+000000000001.800
21	110021+0000000000001016	21.044+00000000034751420	22.044+0000000008809060	31..00+000000000029.70	51.....+0000000000+0.023	87.....+000000000001.800
22	110022+0000000000001017	21.044+00000000011741490	22.044+0000000008848390	31..00+000000000017.96	51.....+0000000000+0.023	87.....+000000000001.800
23	110023+0000000000001018	21.044+00000000011953310	22.044+0000000008820160	31..00+000000000013.53	51.....+0000000000+0.023	87.....+000000000001.800



The Source file tab: Codes unassigned

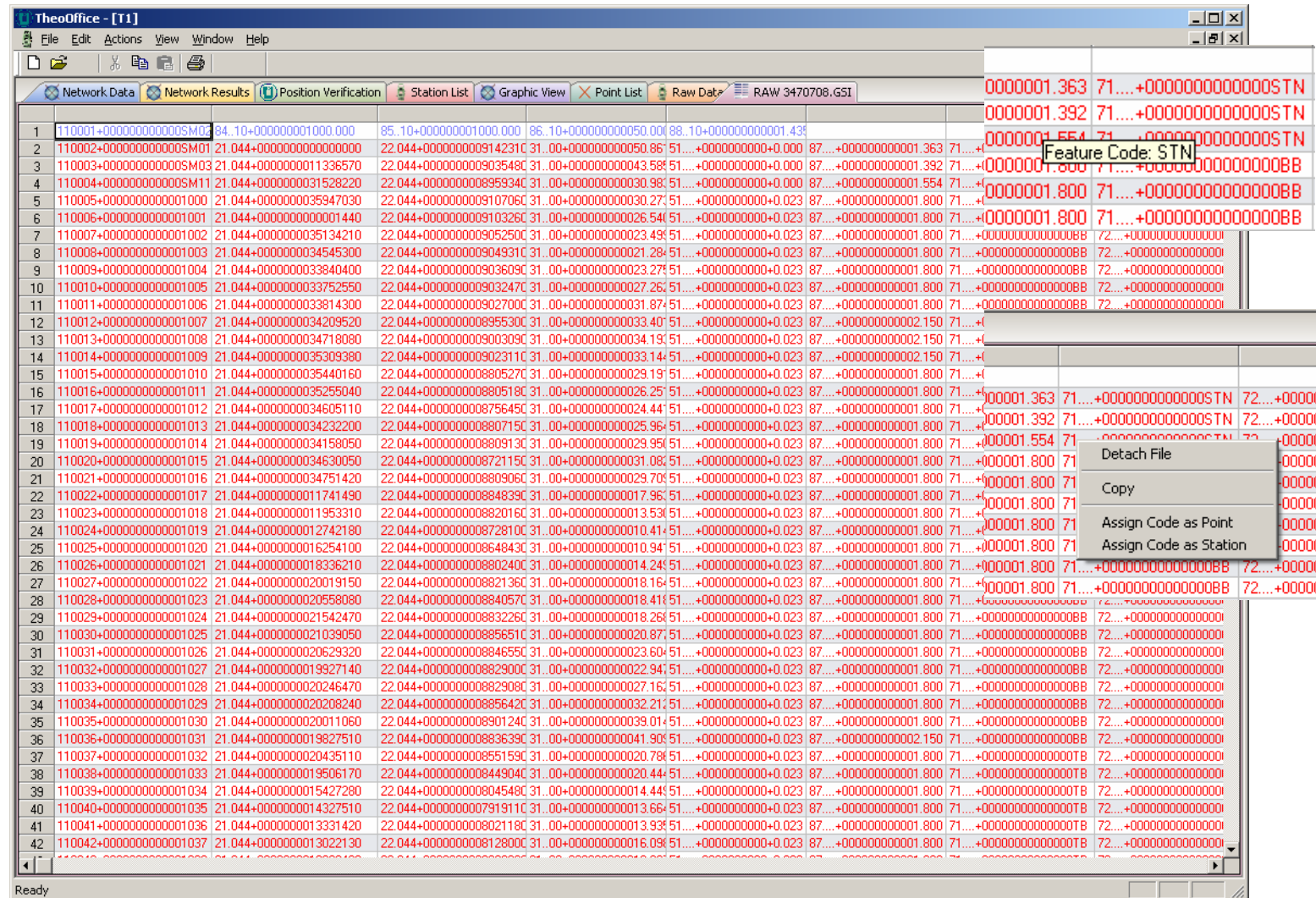
Allocating Point and Station codes

A code may be either a "point code" (for general observations) or "station code" which is used to build the control network.

Using the right click function to assign a code as either of these will add the code to the currentodelist.

The field allocated code is revealed by a tool-tip when the mouse pointer is over the appropriate field. A right-click will prompt for the code assignation.

Once the code is assigned the fields for that code will be coloured according to the setting in *Edit /options/Edit codelist*. The code list may be edited via the options to control colour, cad layers and strings (points joined by lines)



The Source file tab: Codes assigned

The Station and point coding is displayed by colour in the table and once coded the data filed will only offer a *detach file* option on use of a right click. If the file is coded in error it can be detached, a new project begun, re-attached and re-coded.

The default GSI format will place the filed allocated feature code in the filed with the prefix 71, this will be confirmed by the tool-tip.

Editing the code layer, colour, line or point allocation is possible using the *Edit/options/Edit codelist* function from the pull-down menu. Once the coding is complete the next step is to transfer the data to the network adjustment panel for computation.

The screenshot shows the TheoOffice - [2] application window. The 'Source file tab' is active, displaying a table with columns for station codes, point codes, and Cartesian station positions. The table is color-coded: green for station codes, red for point codes, and red for unassigned data fields. Callouts explain the color coding: green for station codes, red for point codes, and red for unassigned data fields.

Cartesian station position with default allocated colour

Station code allocated, the colour is set in Edit/options/Edit/code list

Point code allocated, the colour is set in Edit/options/Edit/code list

Unassigned data fields coloured with the default red.

The Network Data tab

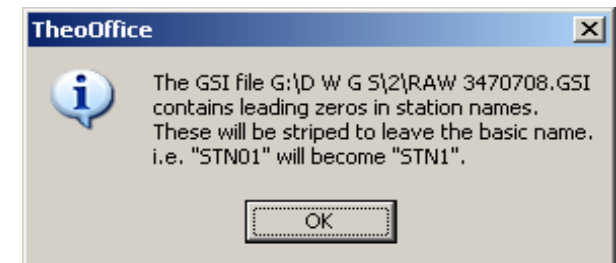
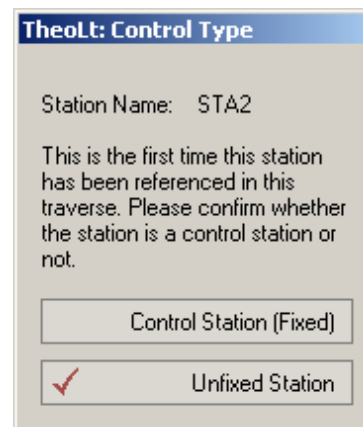
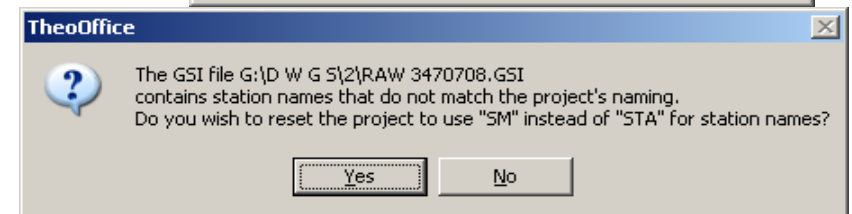
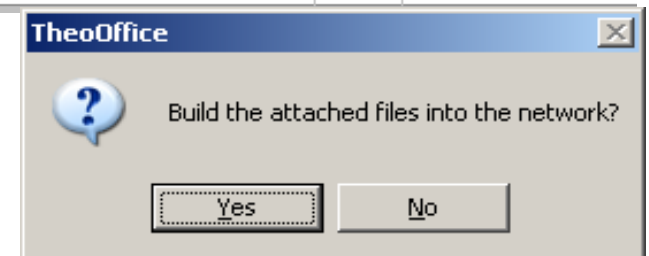
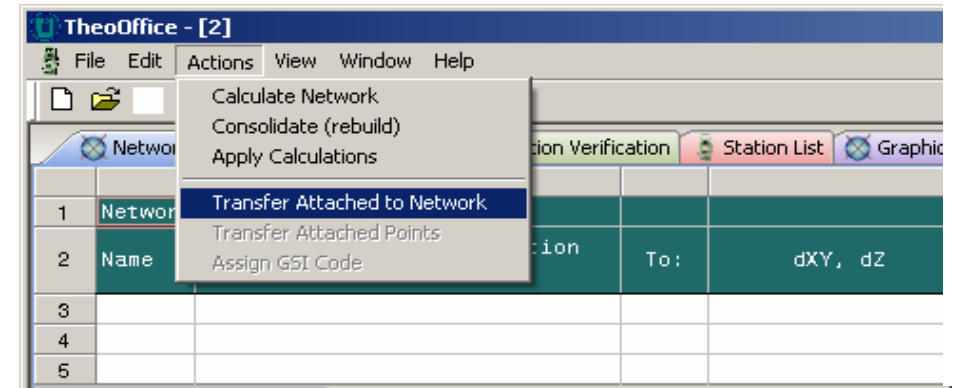
Transferring the attached file

Select the Network Data tab

Select *Action/ Transfer attached file* in the pull down menu

Confirm the action at the 'Build attached files into the network' message.

Check the Station prefix and Station numbering advice messages. TheoOffice will now prompt for the status of the stations in the network: a minimum of 2 stations must be set as 'Fixed'.



Calculate the network

Use *Actions/Calculate network* to resolve the adjusted co-ordinate positions of the data. the displacements are shown ion the *Result errors* column after the calculation is carried out.

You may remove observations with a double click in the I/E field and re-run the calculation to refine the result if you wish.

Additional information is available via tool-tips in the appropriate fields.

On completion of the calculation the details of the result are logged as a report on the *Network results* tab

[illegible]

A double click in the I/E field will remove an observation from the calculation

Additional information is displayed by tool-tip for data analysis

On use of the Calculate network command the results are displayed in the Result Errors column.

The Network Results tab

A detailed report of the result of the calculation is displayed in the Network results Tab

The table contents may be exported (*File/ Export*) as a .txt file for onward transmission.

The results are automatically saved with the project data until overwritten.

The report gives a summary of the station adjustments and a break down of the error distribution against the observations station by station.

Data								
Station Id	State Of Station	X	Y	Z	Error(X)	Error(Y)	Error(Z)	
STA2	ControlPoint	1000.00000	1000.00000	50.00000				
STA3	Overdetermined	1039.93483	982.54419	49.58704	0.00271	0.00208	0.00139	
STA31	Determined	1042.20385	969.59547	49.91905	0.00327	0.00375	0.00146	
STA4	Overdetermined	1132.49820	972.87832	49.02114	0.00341	0.00603	0.00250	
STA1	ControlPoint	999.99200	1050.82600	48.56500				
STA11	Overdetermined	978.27011	1022.08595	49.88251	0.00260	0.00261	0.00102	
STA12	Overdetermined	973.55980	999.75493	50.85786	0.00272	0.00415	0.00127	
STA13	Overdetermined	826.11589	979.05648	50.51335	0.00515	0.01805	0.00506	
STA14	Overdetermined	763.93091	1028.04211	44.66349	0.00616	0.02529	0.00569	
STA15	Determined	713.33157	905.85121	54.32747	0.01552	0.03174	0.00716	
Report of Station Data and Observation Data								
Station Id								
STA2								
Station Id	TotalStationHeight							
1	1.43500							
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]	
STA1	active	50.86100	360°00'00	91°42'31	1.36300			
STA3	active	43.58500	113°36'57	90°35'48	1.39200	0.00296	90°00'09	
STA11	active	30.98300	315°28'22	89°59'34	1.55400	0.00296	90°00'09	
Station Id								
STA3								
Station Id	TotalStationHeight							
1	1.39300							
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]	
STA2	active	43.58400	293°36'57	89°23'53	1.43500	0.00262	90°00'10	
STA4	active	93.06900	95°57'53	90°24'30	1.29600	0.00314	90°00'09	
Station Id								
STA3								
Station Id	TotalStationHeight							
2	1.35900							
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]	
STA4	active	93.06800	95°57'56	90°22'02	1.32800	0.00262	90°00'09	

Actions on Network Data

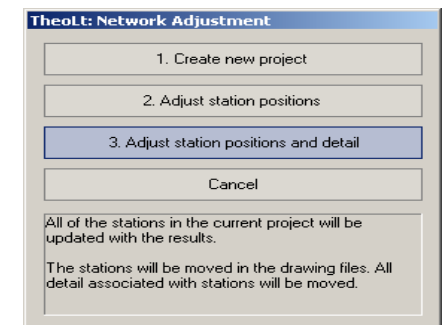
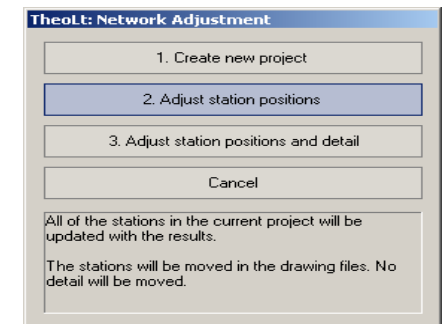
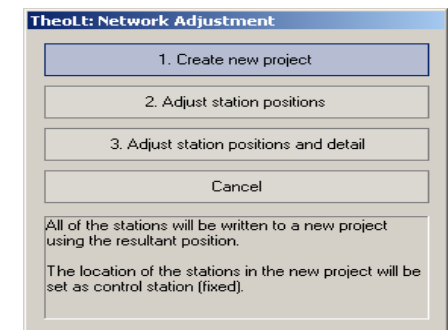
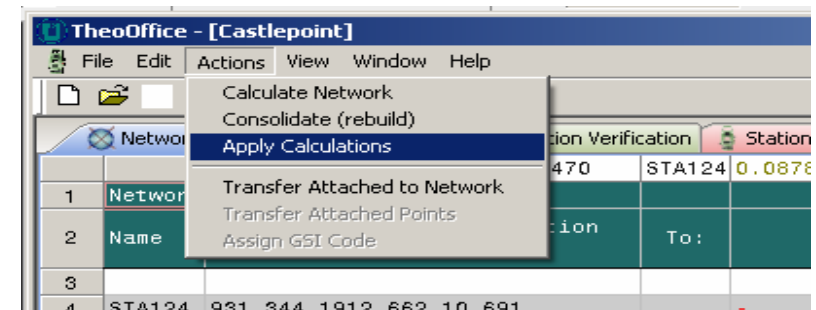
If you are happy with the distribution select Apply and choose an option, the calculated result can be applied in 3 ways:

1. **Create new project** which will fix the adjusted values in a new project folder
2. **Adjust station positions** in both the table AND the current drawing file
3. **Adjust station positions and detail**: provided the correct ARX application is active in AutoCAD the radial observations from each station will be adjusted to scale and orientation based on the station new positions achieved by the network distribution of error.

Options 2 and 3 will create a new drawing with the adjusted data by default.
After calculation the view option will plot the adjusted station positions as shown.

If the distributed error is excessive do not apply the calculation but remove the observations indicated as of excessive error by a double click in the I/E (include/exclude in computation) column marked as a red cross in the table, re run the calculation and check the result.

If there is insufficient data available to compute the network no calculation will be achieved.



The Station List tab

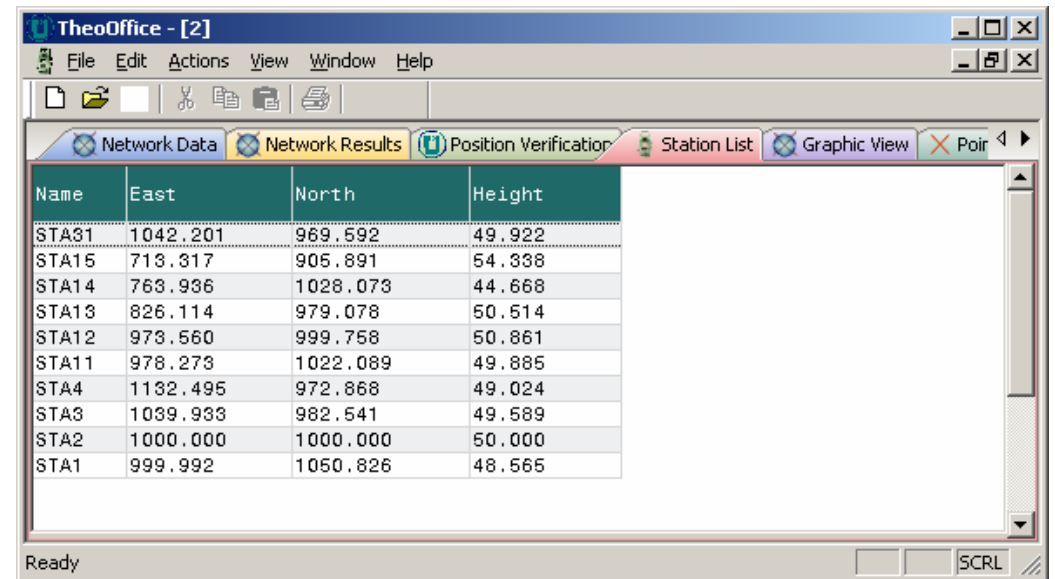
The station list Tab displays the stations in the network. The default view is the unadjusted stations, the adjusted co-ordinates are displayed on use of the *view /Show resultant positions* command.

Exporting the station list

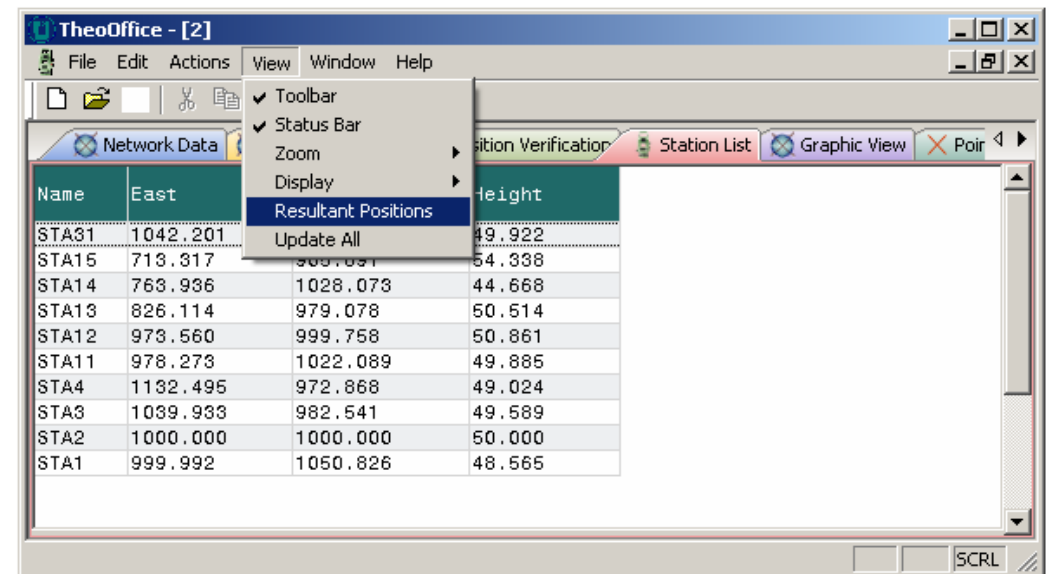
The unadjusted station list is exported by use of the File /Export command with the list view set at the default display. It is also stored in *Stationlist.dat* in the project folder.

The Adjusted station list is exported by use of the export command with the view set to show *resultant positions*. The adjusted station list is also stored at *network results.txt* in the project folder.

With computation complete and the station positions adjusted and verified the point data may now be processed. Returning to the Attached source file tab will allow the point codes to be allocated.



Name	East	North	Height
STA31	1042.201	969.592	49.922
STA15	713.317	905.891	54.338
STA14	763.936	1028.073	44.668
STA13	826.114	979.078	50.514
STA12	973.560	999.758	50.861
STA11	978.273	1022.089	49.885
STA4	1132.495	972.868	49.024
STA3	1039.933	982.541	49.589
STA2	1000.000	1000.000	50.000
STA1	999.992	1050.826	48.565



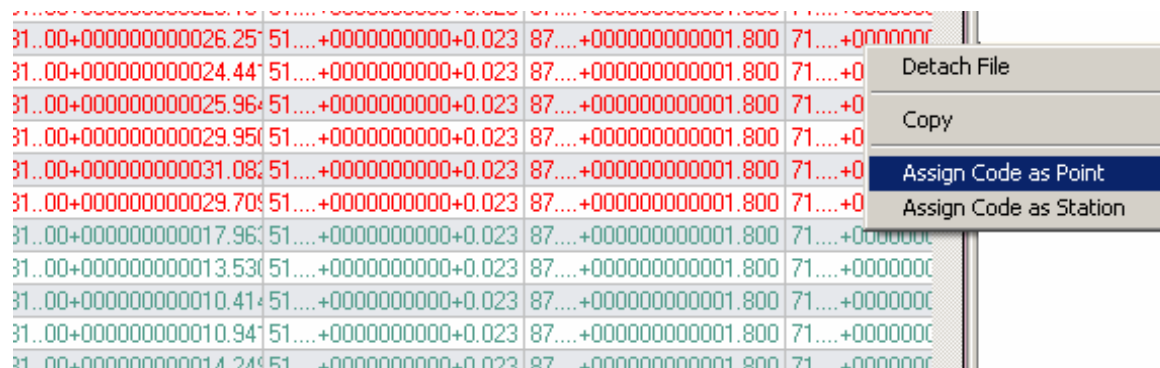
Name	East	North	Height
STA31	1042.201	969.592	49.922
STA15	713.317	905.891	54.338
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STA12	973.560	999.758	50.861
STA11	978.273	1022.089	49.885
STA4	1132.495	972.868	49.024
STA3	1039.933	982.541	49.589
STA2	1000.000	1000.000	50.000
STA1	999.992	1050.826	48.565

Attached GSI source file: Edit options

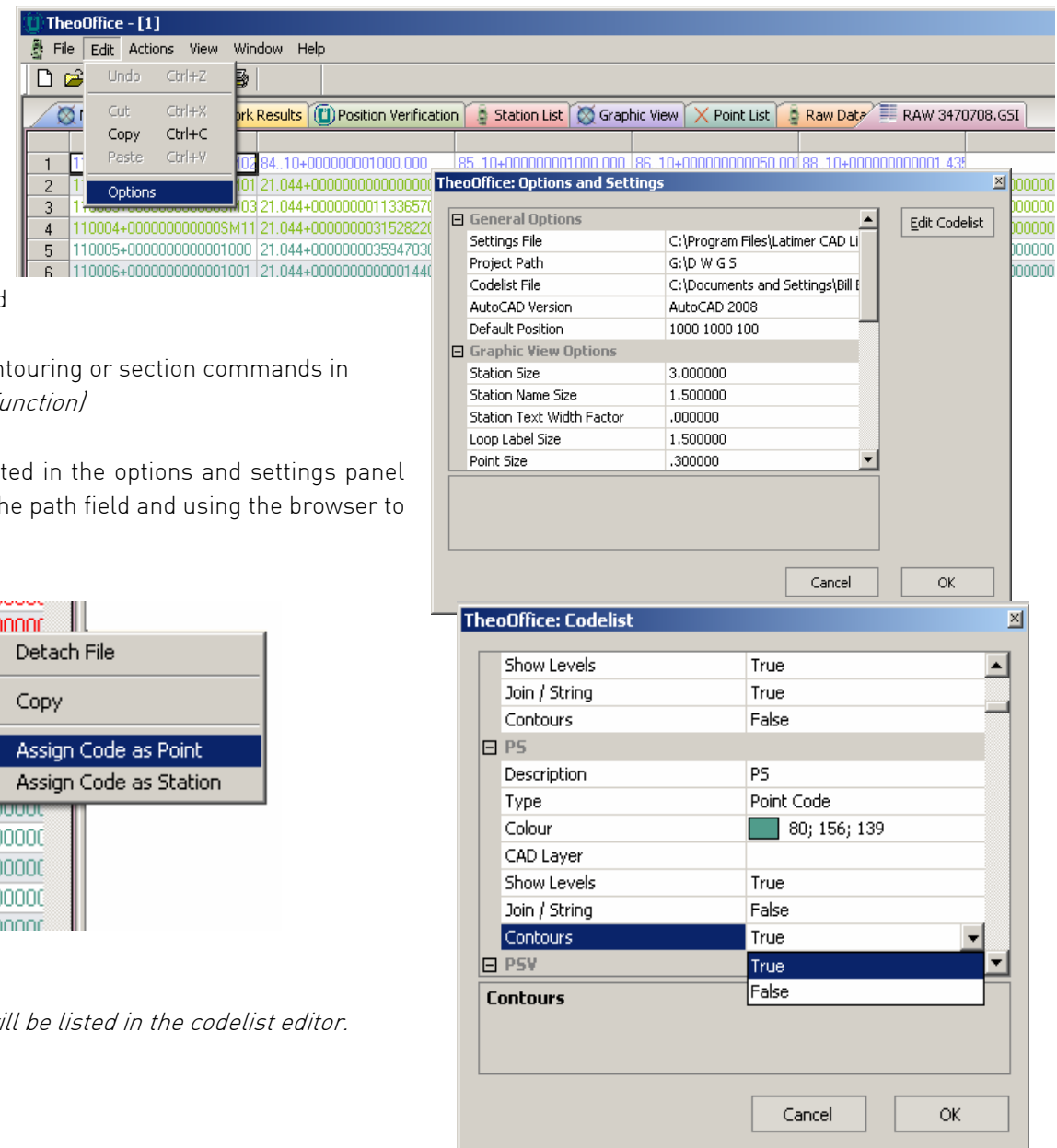
With the point codes allocated open the codelist editor (*Edit/Options/edit codelist button*) and set the code attributes as desired, the options are:

- ◆ CAD layer-Sets the layer lines and points are inserted on in CAD
- ◆ Colour-The colour the item is plotted in the Graphic View and Text View
- ◆ Line joining-Connects consecutive points of the same code
- ◆ Show level-Plots the Z Level next to the point in Graphic view (and CAD)
- ◆ Contour- Creates a TheoContour TIN ready for the surfacing, contouring or section commands in CAD. *(Note that the TheoContour arx must be loaded for this to function)*

TheoOffice allows the use of multiple codelists, the current list is as indicated in the options and settings panel under General Options 'Codelist file'. The list may be selected by clicking in the path field and using the browser to locate it.



Note that only those codes which have been assigned in the source file tab will be listed in the codelist editor.



Attached GSI source file: further Edit options

With the correct codelist present (Edit options, application general options, Codelist file) Individual GSI codes can be assigned.

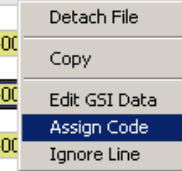
A right click on the selected line will bring up the options, once the edit is done it can be undone by a further right click and selecting the 'Clear line edits' option.

Edited lines are identified by a highlight colour.

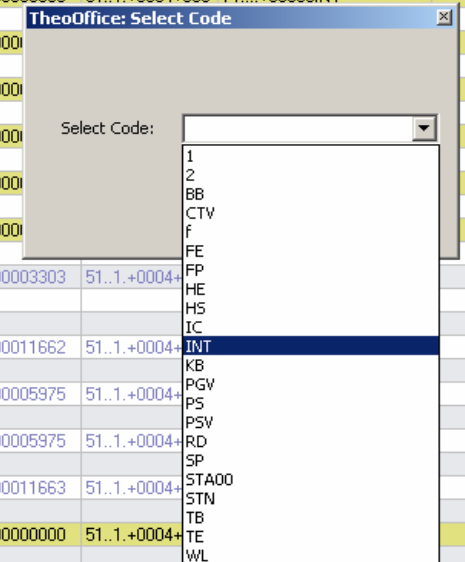
Observations can be taken out of the project by using the 'ignore line' option and restored by the 'Clear line edits' option. Ignored lines are indicated by greyed out text.

Individual observation values (Hz circle V circle and Slope dist) cannot be edited. Only codes, ppm value, station /target numbering and inst/tgt height may be edited.

157	410157+00000002	42....+00000000				
158	110158+00000120	21.324+07942410	22.324+28355460	31..00+00000000	51..1.+0004+000	
159	410159+00000002	42....+00000000				
160	110160+00000119	21.324+07612220	22.324+28525350	31..00+00000000	51..1.+0004+000	
161	410161+00000002	42....+00000000				
162	110162+00000118	21.324+06813370	22.324+28827230	31..00+00000000	51..1.+0004+000	
163	410163+00000002	42....+00000000				
164	110164+00000117	21.324+05642050	22.324+29250370	31..00+00	+000	71....+00000INT
165	410165+00000002	42....+00000000				
166	110166+00000116	21.324+04437310	22.324+29515590	31..00+00	+000	71....+00000INT
167	410167+00000002	42....+00000000				
168	110168+00000129	21.324+02806240	22.324+29828100	31..00+00	+000	71....+00000INT
169	410169+00000002	42....+00000000				
170	110170+00000128	21.324+02810370	22.324+26136430	31..00+00000000	51..1.+0004+000	71....+00000INT



165	410165+00000002	42....+00000000				
166	110166+00000116	21.324+04437310	22.324+29515590	31..00+00000000	51..1.+0004+000	71....+00000INT
167	410167+00000002	42....+00000000				
168	110168+00000129	21.324+02806240	22.324+29828100	31..00+00000000	51..1.+0004+000	71....+00000INT
169	410169+00000002	42....+00000000				
170	110170+00000128	21.324+02810370	22.324+26136430	31..00+0000		
171	410171+00000002	42....+00000000				
172	110172+00000108	21.324+07426260	22.324+26428200	31..00+0000		
173	410173+00000002	42....+00000000				
174	110174+00000107	21.324+06800060	22.324+26318510	31..00+0000		
175	410175+00000002	42....+00000000				
176	110176+00000106	21.324+05605560	22.324+26301280	31..00+0000		
177	410177+00000002	42....+00000000				
178	110178+00000105	21.324+04400160	22.324+26250240	31..00+0000		
179	410179+00000002	42....+00000000				
180	110180+00000003	21.324+18102470	22.324+08854570	31..00+00003303	51..1.+0004	
181	410181+00000002	42....+00001750				
182	410182+00000001	42....+00000005	43....+00000000			
183	110183+00000004	21.324+22430270	22.324+09006130	31..00+00011662	51..1.+0004	
184	410184+00000002	42....+00000000				
185	110185+00000203	21.324+32937460	22.324+07032500	31..00+00005975	51..1.+0004	
186	410186+00000002	42....+00001705				
187	110187+00000203	21.324+14937480	22.324+28927330	31..00+00005975	51..1.+0004	
188	410188+00000002	42....+00001705				
189	110189+00000004	21.324+04430270	22.324+26954120	31..00+00011663	51..1.+0004	
190	410190+00000002	42....+00000000				
191	110191+00000128	21.324+25949180	22.324+09508580	31..00+00000000	51..1.+0004	
192	410192+00000002	42....+00000000				
193	110193+00000129	21.324+25943190	22.324+07209050	31..00+00000000	51..1.+0004+000	71....+00000INT



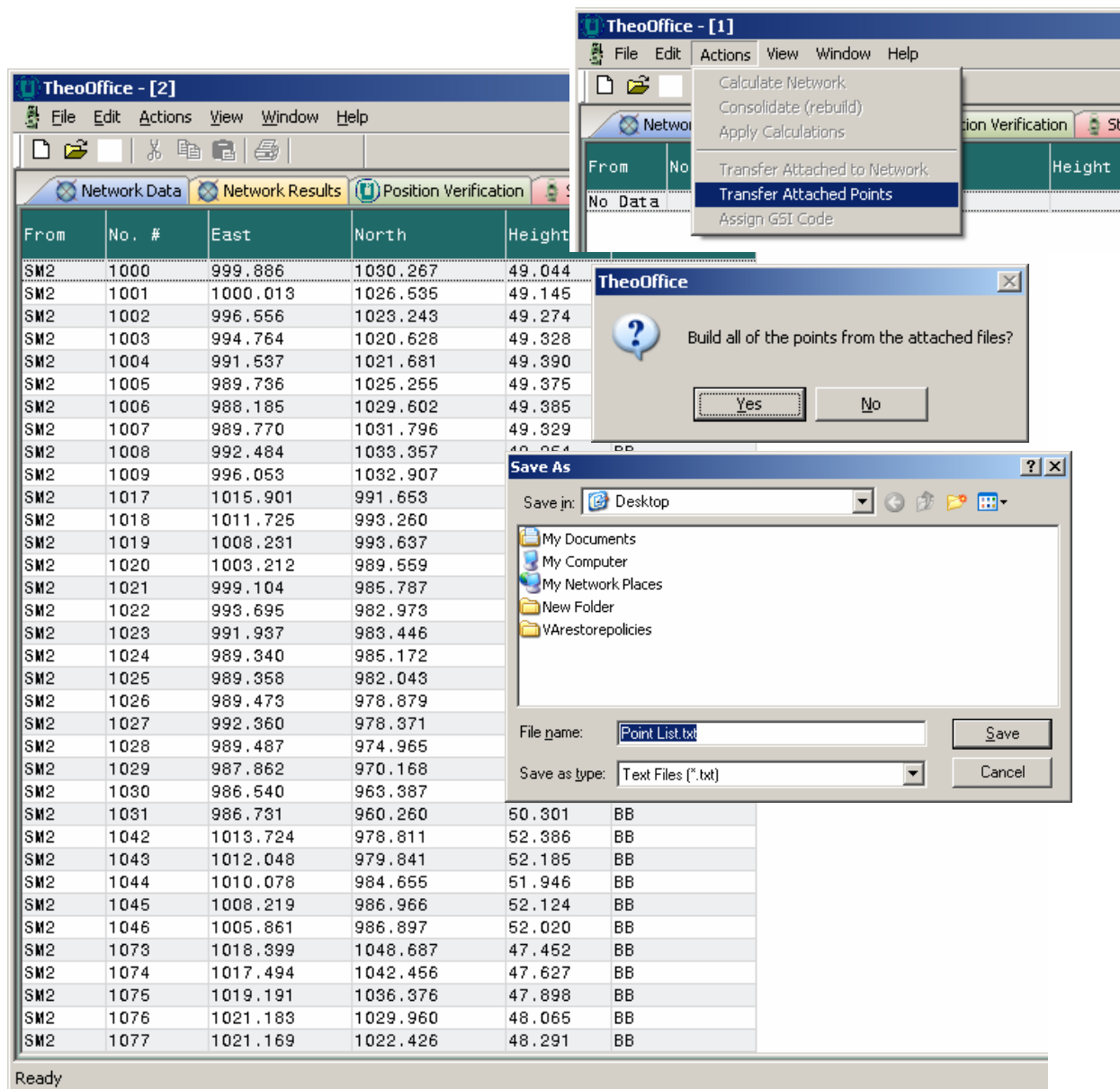
Point list Tab

The point coded data can be brought into the point view panel and exported as a point list.

Note that the point data cannot be processed until the station positions are known by loading the attached file into the Network data panel before transferring the points.

The list will show the station of origin, point number, E,H,h and code. The table shows those points which have been allocated a point code in the attached file view tab. After calculation in Network data view the post -adjust pointlist can be displayed using the *view resultant position* option under *view*.

The current point list view can be exported as a named.txt file for onward transmission.



Graphic View

Once the point and station codes are verified by reference to the appropriate lists a graphic view is available.

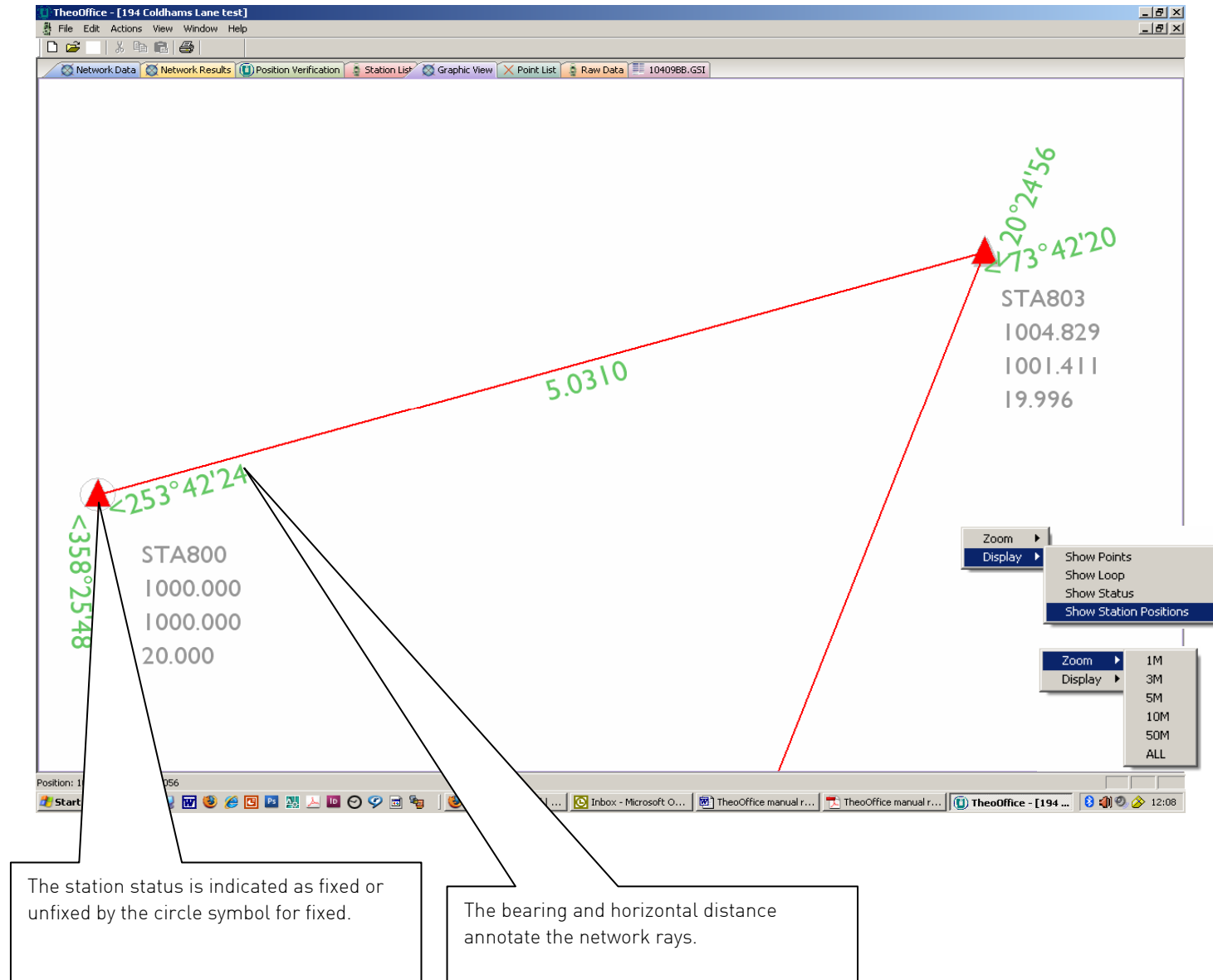
The size and colour of the symbols, text fonts etc. are set in: *Edit/Options/Graphic View Options*.

The view, scale and display options are available by a right click in the graphics area. The station description text can be moved by a click and drag action, pan and zoom are by pick/ drag and scroll wheel respectively.

Items in the Graphic View can be transferred to CAD assigning a layer to the item code. The layers are set in *Edit/options/ CAD layer*.

A CAD version of the graphic view is created on export to a current AutoCAD session via the *File/Export* function.

Note: AutoCAD and IntelliCAD version is set in: Edit/ Options /general Options/AutoCAD version

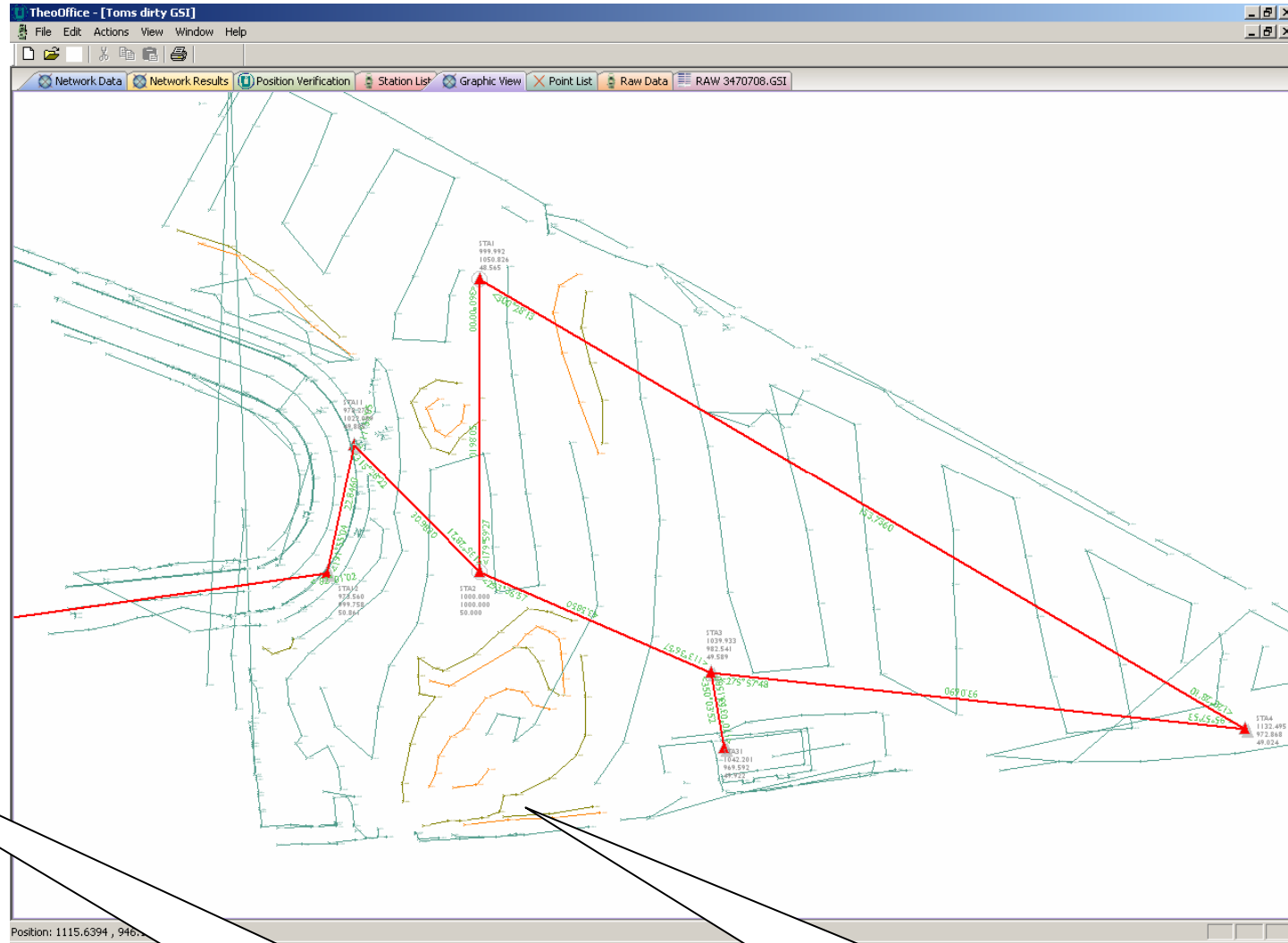
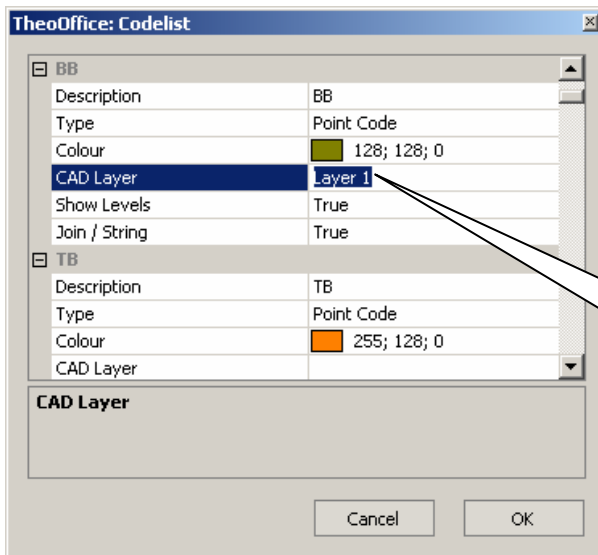


Graphic View: points and lines

If the code set in the *Edit/Options/Edit code list* is given the setting *joinstring= true* the point coded data will be displayed as line work.

Height data is displayed if the setting *show levels= true*.

If a CAD layer is set in *Edit/options/Edit Codelist* the export option will transfer the layers and its contents to the current AutoCAD session.



The Graphic view is transferred to the current CAD session by use of Export. The layers are set in *Edit codelist /CAD layer*.

The lines are produced by setting the *Edit codelist Join string* option set to *true*. The view is updated by *View /Update all* in the pull down menu.

Graphic View: Editing point and line display

Errors in line assignment can be identified and corrected from the graphic view. The point ID is revealed in the status line at the bottom left of the workspace panel when the mouse pointer is held over a point,

In the Attached Source file view the point ID can be found and the Feature code detected.

In *Edit/Options/Edit Codelist* the *join string* option can be reset as desired. The Graphic view will display the result *on View/Update all*.

The screenshot displays the TheoOffice software interface. The main workspace shows a network of points and lines. A 'TheoOffice: Codelist' dialog box is open on the right, showing settings for 'PS' and 'PSV' codes. The 'Join / String' option is set to 'False'. A status bar at the bottom left shows the coordinates: 'Position: 1023.2415 , 1083.2292'. A callout box points to the status bar, and another points to the 'Feature Code: PS' in the data table.

1269 : 1082.4650 , 986.8700 , 49.0420
The cursor will reveal the co-ordinated of objects in the graphics area in the notification area.

The point ID in the Attached Source file view will indicate the Feature code, the attributes of the code can be edited in the codelist editor.

Feature Code	Description	Type	Colour	CAD Layer	Show Levels	Join / String
PS	Point Code	Point Code	80; 156; 139		True	False
PSV					True	True

Feature Code: PS

2 point intersection

Procedure

1. Open project
Ensure correct code list is available (it is set in *Edit, options, application general options, codelist file* e.g. codelist .dat)
2. Set intersect observation coding to auto-detect:
Edit, options, General application settings, Treat angle only as intersection= true
3. Attach GSI file
4. In **GSI data tab** Check and Edit codes: make sure station IDs are correctly assigned by either code list or by line edits available via right click: they can be undone by 'clear line edits' option
5. Identify intersection shots (they will be angle only shots and have distance values of zero 31..000=zero) and assign them as intersects (this can be done by a right click on the table)
Action- Transfer to network: in **Network Data tab** set 2 stns as fixed check the table is complete.
6. Action-Compute network
7. Check the table in the **Network Results tab**
8. Action -Transfer to intersections: in **Intersections tab**. *Note that there will be no action if there are no angle only obs in the network!*
9. Once all above complete and checked ok, In **Point list** tab, *transfer to points* will transfer all discreet points in the GSI file (coded as points) and all computed intersections

The points may now be exported or the graphic view will show the results and enable checking before transferring to AutoCAD

TheoOffice - [300709_01]

File Edit Actions View Window Help

Network Data Network Results Position Verification Station List Graphic View Point List Intersect

Inter	Point	Resultant Position	Error(s)	Station	Observation	Station	Observation	Station	Observation
1	101	-	-	STA2	76°13'15 -13°	STA2	76°13'06 -13°	STA3	113°16'54
2	102	1003.828 998.817 71.477	0.000 0.000 0.013	STA2	107°10'35 -16°	STA2	107°10'38 -16°	STA3	120°39'51
3	104	1004.196 993.193 69.993	0.000 0.000 0.019	STA2	148°21'13 -9°	STA2	148°21'10 -9°	STA3	173°22'57
4	109	-	-	STA2	76°52'19 5°	STA2	76°52'01 5°	STA3	113°21'45
5	110	-	-	STA2	103°58'42 5°	STA2	103°58'29 5°	STA3	119°38'21
6	111	-	-	STA2	125°43'22 3°	STA2	125°43'14 3°	STA3	129°43'60
7	112	1003.557 1001.063 112.825	0.001 0.001 0.004	STA2	73°22'20 47°	STA2	73°21'59 47°	STA3	112°09'18
8	113	1003.819 997.325 108.286	0.001 0.001 0.001	STA2	125°00'38 41°	STA2	125°00'16 41°	STA3	127°47'31
9	114	1004.005 996.312 109.360	0.001 0.001 0.001	STA2	132°38'40 33°	STA2	132°38'20 33°	STA3	136°09'35
10	115	1004.137 993.208 112.691	0.000 0.000 0.003	STA2	148°39'23 23°	STA2	148°39'18 23°	STA3	173°01'46
11	121	-	-	STA2	124°21'23 -3°	STA2	124°21'13 -3°	STA3	128°49'56
12	105	-	-	STA4	224°00'26 -7°	STA4	224°00'16 -7°	STA5	266°34'22
13	106	-	-	STA4	236°06'05 -6°	STA4	236°05'56 -6°	STA5	275°57'20
14	107	-	-	STA4	248°00'15 -6°	STA4	248°00'06 -6°	STA5	295°40'60
15	108	-	-	STA4	254°26'34 -5°	STA4	254°26'26 -5°	STA5	316°30'11
16	128	-	-	STA4	208°10'39 -8°	STA4	208°10'37 -8°	STA5	259°49'18
17	129	1004.331 990.526 126.740	0.001 0.000 0.006	STA4	208°06'37 28°	STA4	208°06'24 28°	STA5	259°43'19
18	116	1004.509 988.190 123.604	0.001 0.001 0.005	STA4	224°37'47 25°	STA4	224°37'31 25°	STA5	267°00'24
19	117	1004.652 985.971 121.886	0.001 0.001 0.003	STA4	236°42'12 22°	STA4	236°42'06 22°	STA5	276°36'58
20	118	1004.868 982.900 125.136	0.001 0.001 0.004	STA4	248°13'54 18°	STA4	248°13'37 18°	STA5	296°22'42
21	119	1005.003 979.760 132.550	0.002 0.001 0.007	STA4	256°12'37 15°	STA4	256°12'22 15°	STA5	323°08'57
22	120	1005.154 977.748 139.891	0.002 0.001 0.012	STA4	259°42'56 13°	STA4	259°42'41 13°	STA5	339°48'17
23	122	1005.051 979.678 191.602	0.000 0.000 0.007	STA4	256°13'44 5°	STA4	256°13'36 5°	STA5	323°08'35
24	127	1005.293 976.011 149.677	0.002 0.002 0.019	STA4	262°07'42 12°	STA4	262°07'32 12°	STA5	323°08'35
25	125	1005.265 976.708 160.492	0.001 0.001 0.007	STA4	261°07'50 9°	STA4	261°07'44 9°	STA5	323°08'35

Ready

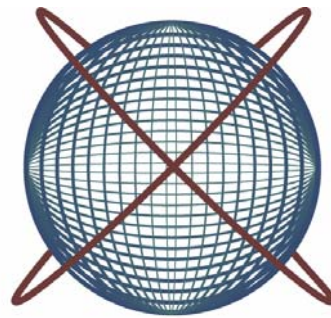
A dash in the vertical angle field indicates a 'face 2' observation

Greyed out data indicates a disabled observation

Poor intersections can be dropped from transfer to the point list by using the disable option by right clicking on the *Station observed from field (STN)*

Intersections Tab

Once the GSI data is transferred to the network and computed the intersected data can be analysed and edited in the Intersections Tab. Shots can be disabled by a right click in the station name and the error column will reveal the effect of removing the shot.



Offline TheoLt project process

Handling TheoLt Project data

TheoOffice can be used to process TheoLt project station data for the computation of network control data off line. In all respects other than the *attach source file*, *position verification table* and *raw data view* the process follows the same path as for GSI processing. TheoLt Project data does not use codes so it is possible to process network data immediately on opening the project.

On opening a project (see GSI post process **Open/ create project** on p5 for further info on this) the network data is visible in the Network Data tab, the view may need to be updated (*View/Update All*)

Project Path

A TheoLt project may be moved from a field PC to make use of TheoOffice: the TheoLt Project folder must be copied into the project path set in *Edit/Option/Project path* to open from the project list.

The network is calculated (*Actions/Calculate network*) and the results displayed in the Network Results tab.

The table may be exported in .txt,.html,.csv ,xls and .dat format by use of the *File/Export* command.

	Name	Observation Data / Station Position	To:	dXY, dZ	C	O	I/E	S	Result	Result Errors
1	Network Adjustment									
2										
3										
4										
5	STA703	991.345 1017.026 99.944		0.000 0.000 0.005					991.345 1017.026 99.930	0.000 0.000 0.000
6		288°08'39 89°44'27 17.194	STA701	0.0001, 0.0065		1		1		
7		288°08'43 89°44'25 17.194	STA701	0.0001, 0.0067		0		1		
8										
9	STA702	997.176 1007.871 99.972		-0.000 0.000 -0.000					997.176 1007.870 99.970	0.000 0.000 0.000
10		330°24'28 90°09'37 10.855	STA703	0.0001, -0.0080		0		1		
11										
12	STA701	1002.783 1004.190 100.006		-					1002.783 1004.190 100.000	0.000 0.000 0.000
13		317°28'23 90°14'19 17.194	STA703	0.0001, -0.0003		1		1		
14		317°28'24 90°14'15 17.194	STA703	0.0000, -0.0000		0		1		
15		212°46'28 89°48'18 5.030	STA700	0.0002, 0.0019		0		1		
16										
17	STA700	1000.000 1000.000 100.000		-					1000.000 1000.000 100.000	0.000 0.000 0.000
18		340°15'51 90°28'02 8.362	STA702	0.0002, 0.0000		1		1		
19		340°15'51 90°28'02 8.362	STA702	0.0001, -0.0000		0		1		
20		33°35'52 90°10'25 5.030	STA701	0.0000, -0.0000		0		1		
21										
22										
23										
24										
25										
26										
27										
28										
29										

Network Results

A detailed report of the result of the calculation is displayed in the Network results Tab

The table contents may be exported (*File/Export*) as a .txt file for onward transmission.

The results are automatically saved with the project data until overwritten.

The report gives a summary of the station adjustments and a break down of the error distribution against the observations station by station.

Data							
Station Id	State Of Station	X	Y	Z	Error(X)	Error(Y)	Error(Z)
STA2	ControlPoint	1000.00000	1000.00000	50.00000			
STA3	Overdetermined	1039.93483	982.54419	49.58704	0.00271	0.00208	0.00139
STA31	Determined	1042.20385	969.59547	49.91905	0.00327	0.00375	0.00146
STA4	Overdetermined	1132.49820	972.87832	49.02114	0.00341	0.00603	0.00250
STA1	ControlPoint	999.99200	1050.82600	48.56500			
STA11	Overdetermined	978.27011	1022.08595	49.88251	0.00260	0.00261	0.00102
STA12	Overdetermined	973.55980	999.75493	50.86786	0.00272	0.00415	0.00127
STA13	Overdetermined	826.11589	979.05648	50.51335	0.00515	0.01805	0.00506
STA14	Overdetermined	763.93091	1028.04211	44.66349	0.00616	0.02529	0.00569
STA15	Determined	713.33157	905.85121	54.32747	0.01552	0.03174	0.00716
Report of Station Data and Observation Data							
Station Id							
STA2							
Station Id							
1	TotalStationHeight						
	1.43500						
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]
STA1	active	50.86100	360°00'00	91°42'31	1.36300		
STA3	active	43.58500	113°36'57	90°35'48	1.39200	0.00296	90°00'09
STA11	active	30.98300	315°28'22	89°59'34	1.55400	0.00296	90°00'09
Station Id							
STA3							
Station Id							
1	TotalStationHeight						
	1.39300						
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]
STA2	active	43.58400	293°36'57	89°23'53	1.43500	0.00262	90°00'10
STA4	active	93.06900	95°57'53	90°24'30	1.29600	0.00314	90°00'09
Station Id							
STA3							
Station Id							
2	TotalStationHeight						
	1.35900						
To-Station	active?	SlopeDistance	HorizontalAngle[Deg]	VerticalAngle[Deg]	TargetHeight	SlopeDistanceError	HorizontalAngleError[Deg]
STA4	active	93.06800	95°57'56	90°22'02	1.32800	0.00262	90°00'09

Position verification table

Records of the orientation observations are available and exportable in .txt, .html, .csv, .xls and .dat format by use of the *File/Export* command.

The orientation data can be used to revise the included /excluded observation sets in the Network Data tab prior to re-calculation if required.

TheoOffice - Backgarden traverse\310309bb3

File Edit Actions View Window Help

Backgarden traverse\310309bb3

Network Data Network Results Position Verification Station List Graphic View Point List Raw Data

1	Position	Report							
2	Current Station	Observed Station	Observed Position	Recorded Position	Plan Error	Vertical Error	Total Error	Date	Time
3									
4	STA702	STA703	991.344,1017.026,99.935	991.345,1017.026,99.944	0.00065	-0.00857	0.00859	31/03/09	15:59
5	STA702	STA700	1000.001,1000.000,100.002	1000.000,1000.000,100.000	0.00052	0.00184	0.00191	31/03/09	15:59
6	STA702	STA700	1000.000,1000.000,100.002	1000.000,1000.000,100.000	0.00050	0.00200	0.00207	31/03/09	15:58
7	STA702	STA700	1000.001,1000.000,100.002	1000.000,1000.000,100.000	0.00054	0.00212	0.00219	31/03/09	15:58
8	STA702	STA703	991.345,1017.026,99.935	991.345,1017.026,99.944	0.00018	-0.00805	0.00805	31/03/09	15:57
9	STA702	STA703	991.345,1017.026,99.935	991.345,1017.026,99.944	0.00027	-0.00810	0.00810	31/03/09	15:57
10	STA702	STA703	991.345,1017.026,99.931	991.345,1017.026,99.944	0.00027	-0.01211	0.01211	31/03/09	15:57
11	STA702	STA703	991.345,1017.026,99.935	991.345,1017.026,99.944	0.00009	-0.00805	0.00805	31/03/09	15:56
12									
13									
14	STA703	STA701	1002.783,1004.189,100.012	1002.783,1004.190,100.006	0.00013	0.00668	0.00668	31/03/09	15:47
15									
16									
17	STA701	STA700	1000.000,1000.000,100.002	1000.000,1000.000,100.000	0.00019	0.00193	0.00194	31/03/09	15:41
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									

Ready

Raw data tab

TheoLt projects contain a raw adapt file and this can be viewed in the Raw data tab.

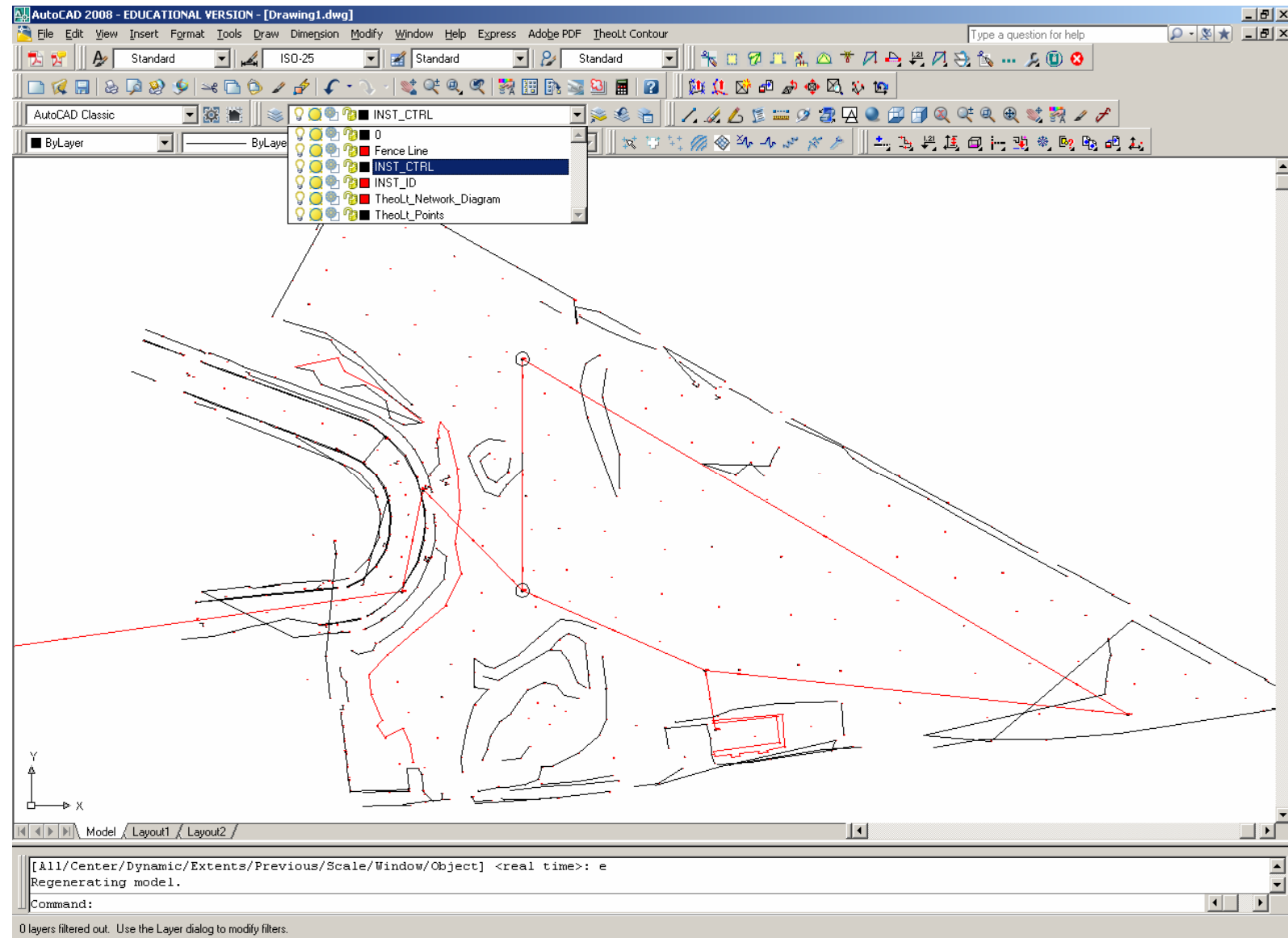
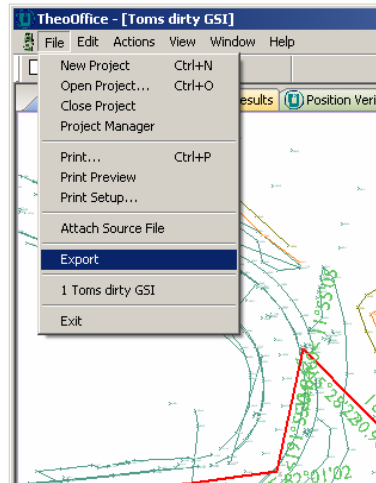
If the data file tab is checked and the appropriate data file content is selected in TheoLt during data collection the project folder will contain the raw instrument data.

Data	Date	Time
%R1P,0,0:0,1.597624440124793,1.56680729781899,8.2776999999999408,2□	23/01/2009	13:12:55
*** Orientation: STA500 at 13:13:01 23/01/2009		
%R1P,0,0:0,4.801281770687213,1.563275213794141,34.0488999999997566,2□	23/01/2009	13:15:40
110001+00000002 21.324+27505355 22.324+08934069 31.00+00034049 51.....	23/01/2009	13:16:12
110002+00000003 21.324+27505361 22.324+27025538 31.00+00034049 51.....	23/01/2009	13:16:26
110003+00000004 21.324+09132138 22.324+08946156 31.00+00008278 51.....	23/01/2009	13:17:04
110004+00000005 21.324+09132044 22.324+27014012 31.00+00008277 51.....	23/01/2009	13:17:24
110005+00000006 21.324+18132099 22.324+09025548 31.00+00034049 51.....	23/01/2009	13:20:14
*** Orientation: STA501 at 13:20:17 23/01/2009		
110006+00000007 21.324+09417140 22.324+08939081 31.00+00014452 51.....	23/01/2009	13:20:44
110007+00000008 21.324+09417260 22.324+08939007 31.00+00014452 51.....	23/01/2009	13:21:36
110008+00000009 21.324+09417170 22.324+27021010 31.00+00014452 51.....	23/01/2009	13:21:58
110009+00000010 21.324+18132135 22.324+09025489 31.00+00034049 51.....	23/01/2009	13:22:24
110010+00000011 21.324+18132135 22.324+26934130 31.00+00034049 51.....	23/01/2009	13:22:42
110011+00000012 21.324+20655384 22.324+09021110 31.00+00014451 51.....	23/01/2009	13:25:03
*** Orientation: STA502 at 13:25:04 23/01/2009		
110012+00000013 21.324+11558093 22.324+09022234 31.00+00030413 51.....	23/01/2009	13:25:26
110013+00000014 21.324+11558162 22.324+09022235 31.00+00030413 51.....	23/01/2009	13:25:56
110014+00000015 21.324+11558184 22.324+26937437 31.00+00030413 51.....	23/01/2009	13:26:09
110015+00000016 21.324+20655390 22.324+09021073 31.00+00014451 51.....	23/01/2009	13:26:30
110016+00000017 21.324+20655337 22.324+26938590 31.00+00014452 51.....	23/01/2009	13:26:45
%R1P,0,0:0,5.008332457691696,1.564351216398337,30.4124999999997827,2□	23/01/2009	13:29:56
*** Orientation: STA503 at 13:29:59 23/01/2009		
110017+00000018 21.324+28657214 22.324+08937504 31.00+00030412 51.....	23/01/2009	13:30:30
110018+00000019 21.324+28657219 22.324+27022136 31.00+00030412 51.....	23/01/2009	13:30:48
110019+00000020 21.324+18247325 22.324+09036528 31.00+00013803 51.....	23/01/2009	13:31:25
110020+00000021 21.324+18247426 22.324+26923192 31.00+00013804 51.....	23/01/2009	13:31:54
110021+00000022 21.324+11243196 22.324+08923027 31.00+00013803 51.....	23/01/2009	13:33:44
*** Orientation: STA500_1 at 13:33:46 23/01/2009		
110022+00000023 21.324+11243150 22.324+08923023 31.00+00013803 51.....	23/01/2009	13:34:08
110023+00000024 21.324+11243164 22.324+27037038 31.00+00013803 51.....	23/01/2009	13:34:25
110001+00000002 21.324+08516101 22.324+08953418 31.00+00014455 51.....	23/01/2009	15:31:48
*** Orientation: STA502_1 at 15:31:52 23/01/2009		

Transfer to AutoCAD

The export function in the Graphic View will transfer the data to a current AutoCAD session.

A default layer is created for codes without assigned layers.



Appendix 1: Writing a GSI job on TPS 1200 series instrument

1.Inst. Configuration

Main menu option 5: 'Configuration' Interfaces: Edit:

- Set GSI format = 'GSI 16 polar' BEFORE setting:
- Use (RS232) interface = no

Set Mask: Survey settings/display settings/Mask 1

2.Create a new job

Main menu option 3: 'Management'

Select 1 Jobs, CONT

Select New (f2)

- Key in job name... hit CE key to start the Alpha function keys
- Finish each field with 'enter' save with 'store' (f1)
- Device = CF card
- Code list Tab Add/create code list
- STORE (f1). Select the job with CONT

3.Occupy 1st stn.

Main menu option 1:'Survey'

At the Survey Begin screen check the job and code list are as required.

Select 'Set up'

At the station set up screen:

- Fixedpoint job= current job name
- Method= Set azimuth
- Station Co-ord= from Job,
- CONT

4.Enter starting co-ords

At the Select station screen:

Enter the Inst Height and

- Station ID=hit enter to get to the station list
- select 'New' (f2) and key in the starting co-ordinates
- STORE, CONT takes you to 'Set Stn&Ori-set azimuth' screen

5.Set station code

At the 'Set Stn&Ori-Set Azimuth' screen page to the **Stn Code tab** and

- set the code to STN,

6.Shoot Azimuth

Switch to RL, declare an arbitrary point ID, point 'North', set the Azimuth =0 and take a shot.

7.Set out and observe backsight STN

For all shots from here on always enter the correct:

- Point ID number
- CODE (page to the code page) STN
- Reflector height
- DIST. fires the instrument REC records the obs set ALL does both.

8.Shoot foresight STN

At the Survey screen:

Check the point ID is correct for the next station (the auto-counter it will increment from the last Stn number regardless).

Enter the target (reflector) height.

The code must be set from the **Code tab** before returning to the

Survey tab to hit ALL to measure and record the observation set. When done advance to foresight and repeat steps from 4 to 8 for each station except for the orientation method.

9.Second and subsequent orientation

Occupy the foresight stn Switch to 'Setup' program

- Use **known backsight** method NOT Azimuth for all stations after the 1st

Sight the last stn and enter the correct:

- Point ID number
- CODE (page to the code page) STN
- Reflector height
- hit SET.

Accept INFORMATION 5018 panel

'Station and orientation has been set'

10.Convert dbx files to GSI

The job is written to the CF card as binary encoded DBX files. To get something readable it is converted. Main menu option 4: 'Convert'

- Export data from job CONT
- Export to=CF Card
- Directory=Data
- Job=Current
- Format file=Select .FRT file from list (use generic GSI 16 Polar & Cartesian)
- Edit export file name to *xxx.GS/* from the default *xxx.txt*

For further help and advice please contact:

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