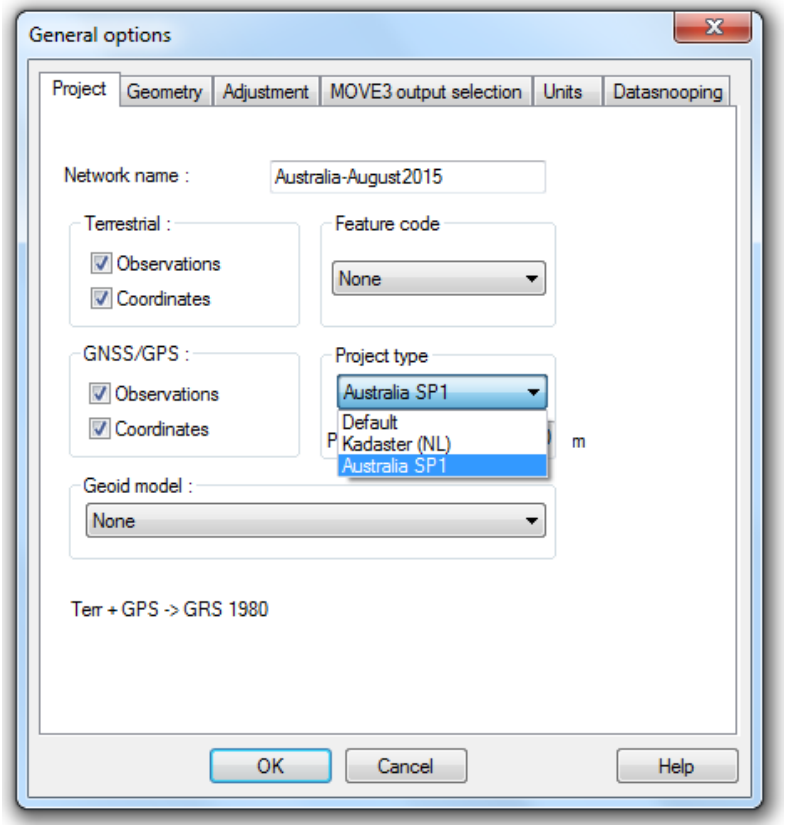
MOVE3 Report

Australian Standard of Practices Report

Settings for Standard of Practice 1.7 Australia

Under **OPTIONS GENERAL PROJECT** the Project type should be set to Australia SP1.



RELATIVE CONFIDENCE REGIONS (ERROR ELLIPSES) - 95.0%

Station	Station	A (m)	B (m)		A/B	Class	Psi (deg)	Hgt (m)
9001	1100	0.0010	0.0006	0.0106	1.8	3A - 3A	-87	0.0008
9001	152263	0.0009	0.0005	0.0102	1.7	3A - 3A	-81	0.0007
9001	85190	0.0009	0.0005	0.0102	1.7	2A - 2A	-9	0.0007
152263	1100	0.0006	0.0005	0.0051	1.2	2A - 3A	-8	0.0004

After a MOVE3 adjustment with Class in the results summary

Settings for Standard of Practice 1 V2.1 Australia

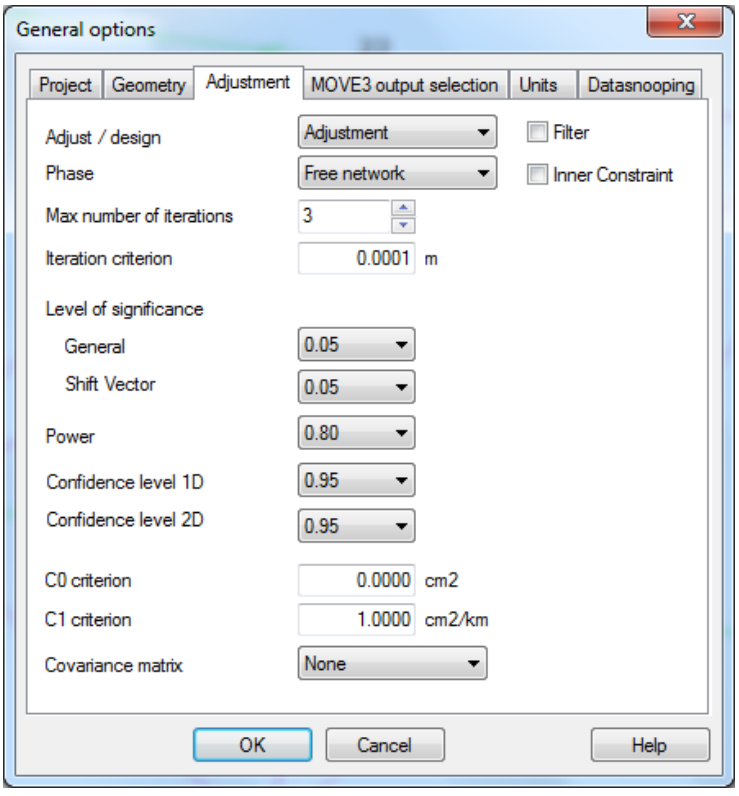
Options - General - Adjustment

To achieve the required tables for SU (Survey Uncertainty), PU (Positional Uncertainty) **Level of significance is set to 5%** and **confidence level 95%.**

Adjustment is done in two phases

1st phase To get the results table for **SU (Survey Uncertainty)** select **Phase: Free network**. This first phase will test your observations without any constraints to known stations.

2nd Phase To get the results table for **PU (Positional Uncertainty)** select for example **Phase: Absolute adjustment**.



1st phase the results table for **SU (Survey Uncertainty)** after a **Free network Adjustment**.

POSITIONAL UNCERTAINTY 95.0%

Station	PU East (m)	PU North (m)	PU Height (m)	Circular Radius (m)
21	0.0038	0.0024	0.0042	0.0042
22	0.0005	0.0006	0.0013	0.0007
23	0.0000	0.0000	0.0000	0.0000
24	0.0005	0.0006	0.0013	0.0007
25	0.0037	0.0065	0.0056	0.0072
26	0.0000	0.0000	0.0000	0.0000

2nd Phase the results table for PU **(Positional Uncertainty)** after a **Constrained adjustment**.

SURVEY UNCERTAINTY 95.0%

Station	SU East (m)	SU North (m)	SU Height (m)	Circular Radius (m)
21	0.0038	0.0026	0.0045	0.0043
22	0.0008	0.0008	0.0022	0.0010
23	0.0000	0.0000	0.0000	0.0000
24	0.0008	0.0008	0.0022	0.0010
25	0.0037	0.0065	0.0056	0.0072
26	0.0008	0.0008	0.0023	0.0010

The required tables for SU (Survey Uncertainty), PU (Positional Uncertainty) Level of significance is set to 5% and confidence level 95%.

The Adjustment is done in two phases

1st phase To get the results table for SU (Survey Uncertainty) select Phase: Free network. This first phase will test your observations without any constraints to known stations.

2nd Phase To get the results table for PU (Positional Uncertainty) select for example Phase: Absolute adjustment.

1st Minimally constrained 1st phase "local test" FREE NETWORK your observations agree eg:

- No gross errors
- all your measurements are appropriately weighted
- all measurements satisfy any predefined measurement criteria.

For the 2nd Fase (Constrained network) is used normally.

Which Constraint do you use Pseudo or Absolute?

The difference between Pseudo Constraint and Absolute Constraint is the computed standard deviation (standard ellipse) for the adjusted points. The computed coordinates itself are identical, since both are based on the assumption that the Control Points coordinates do not change in the adjustment.

SP1.7 only classifies the relative ellipses, so there is no difference in the classes between Pseudo and Absolute.

The SP 1 version 2.1 uses the Survey Uncertainty, and that will differ since Pseudo takes into account the quality (standard deviations) set for the control points, whereas Absolute assumes standard deviation 0 for the control points. SU values will thus be smaller for the Absolute Constraint.

Quality Control of Project

The Software

MOVE3 is software package developed by Sweco Nederland for the specifically for design & Testing 3D, 2D & 1D Geodetic Networks. MOVE3 fully complies with the requirements and specifications of the Delft theory of design and adjustment. This Theory is generally acknowledged as the most efficient tool for processing and Quality Control of Survey data.

MOVE3 is accredited by Survey manufactures such as Leica because it can properly handles all complex mathematics associated with 3D networks.
MOVE3 carries out all 3D Adjustments in a True 3D mathematical model, without simplifications or compromises. This model is rigorously ellipsoidal
making it possible for original observations to retain their original form. It is critical that testing only original data which will allow clear interpretation of possible rejections.

In summary what is carried out in MOVE3

1. Least Square adjustment giving the best possible result with redundant observations

2.Statistical Testing: **F-Test, W-Test, T-Test Chi-Test** . These are checks on the results making it 'error-free'
F-Test Is the alarm bell for the whole network a rejected F-Test can mean:

- gross errors in the observations or blunders
- an incorrect mathematical model
- Standard Deviations to optimistic

W-Test 1D Test on Every observation
W-Test is to quickly and precisely find errors in the observations A summary is provided of largest possible error. Errors are not erased but 'de-selected' out of the adjustment if need be.

T-Test Observations such as GNSS/GPS baselines it is not enough to test the DX-,DY-, DZ-elements of the vector separately. It is imperative to test the baselines as a whole as well. T-Test is a 3- or 2- dimensional test. Thus excellent for finding errors in known stations Antenna Height Errors will be given also

Chi-Test
Is the standard deviation of the unit weight or Network reference factor. The closer this value is to 1.0 the better, bigger than 1.0 observations are not good as what you weighted smaller than 1.0 observations are better than weighted.

3. The Precision and Reliability parameters chosen by the user quantify the quality of the result

There are three types of statistical tests which are implemented in MOVE3: the F-test, W-test and T-test.

F-test if it is under or close "the critical value" then your network model is accepted if rejected then there are observation errors or your standard deviations are possibly to optimistic. The F-Test is smaller than the lower bound this is acceptable the surveyor has met the defined criteria set in the network. The F-Test is lower than the critical upper value meaning there are no possible outliers.

W-test Is unique to MOVE3 stand-alone and will not be found in other software. The W-test will identify the observation errors picking out the most likely ones. is. You deselect the problem perhaps it's a Zenith angle or distance which gives the problem. After doing this you do the adjustment again.

This deselecting is important because you keep your original survey intact and you may find out latter by further checking that the distance was ok and it was a wrong point number that gave the problem so you would unselect the distance with the correct point number and run the adjustment through.

The T-test is the 3D equivalent of the W-test. It will test your GNSS/GPS baselines

W-test is similar to a normalized residual (residual divided by its standard deviation). If the W-test value is larger than the critical value it is likely that an error has been made in this specific observation.

However in least squares adjustment the error in an observation is also distributed to observations in the neighborhood. Therefore the largest W-test value should be investigated first.

This is the reason why the Test Summary lists the rejected observations in an descending order. Best practice is to remove or repair the largest rejected observation and then run a new adjustment to see the effect and repair other problems if needed.

Please note the role of properly setting standard deviations. If the standard deviations are set to small, small residuals will lead to rejections. If the standard deviations are set to high, large errors may remain undetected.

MDB and MDBn are typical Delft Theory quantities that describe the reliability of the observation. MDB indicates the size of the error in an observation that could be detect in the testing. The value is related to the standard deviation used (the smaller the standard deviation the smaller the MDB) and the number of observations that control each other (adding additional observation will improve reliability). MDBn is the MDB divided by the standard deviation. For uncontrolled observations the MDB is infinite, in MOVE3 indicated by the text “Free Obs”.
With the numbers of redundancy that you are using in mining there is no need to worry about the MDB and MDBn

Displaying a table in Word or Excel

Copying to Word is just selecting the full table with by pressing the left mouse button and then drag to the end (it gets blue) and then copy from the right mouse menu (if the table is selected, you can then click the right mouse and a menu pops up, select Copy from the that menu or use Crtl-C) and then paste it into Word.

To copy to excel just click the right mouse button and the right moue menu will pop up. If Microsoft Office is installed it will have an option to Export to Microsoft Excel and Excel will open up with the data from the table.