Baseline Software Guide

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Queensland
Government

Summary

The Baseline software is developed by the Western Australia Landgate Authority and is intended for reducing survey distance measurements made on an Electronic Distance Measurement (EDM) baseline for the purposes of standardisation and traceability of EDM Equipment distance measurements.

This guide contains installation instructions, some tips for using Baseline, minor troubleshooting and basic analysis of test reports.

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Installation

1. Create a default directory for the software files and calibration jobs. For example:
   C:\Calibrations

   a. It is advised that this directory be separate from Program Files as Microsoft Windows has antivirus precautions that limit non-verified software from reading and writing files here.

   b. All versions of the software should be stored in this directory.

2. To avoid duplication with future versions, **create a new folder** with an appropriate name in this directory, to ensure that software versions and calibration jobs processed with that version are stored together and in chronological order.

3. Download the calibration software from the website and save it to the folder created in Step 2.

4. Right click on the .zip file downloaded from the website and select **Properties**.

   a. If present, click on the **Unblock** button to ensure that the software is allowed to read and write to its data files.
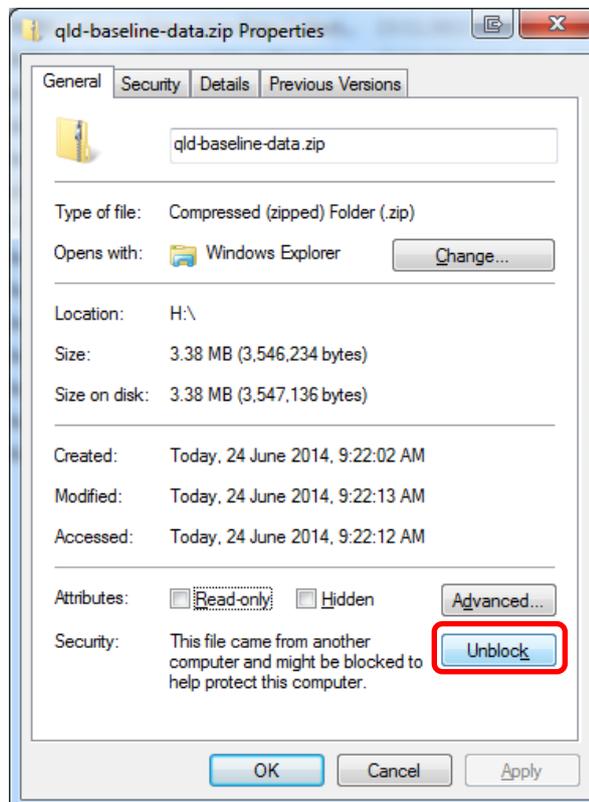
5. Extract the contents of the .zip file into the new folder created in Step 2.

6. Right click on the EDMCalibration.exe file, select **Properties**, and then go to the **Compatibility** tab.

   a. Check the box **Run this program as an administrator**, then click **Apply**. This should allow the software to read and write to the data files in the case that Windows is preventing it. Also, ensure your user account has administrator rights, or this will have no effect.
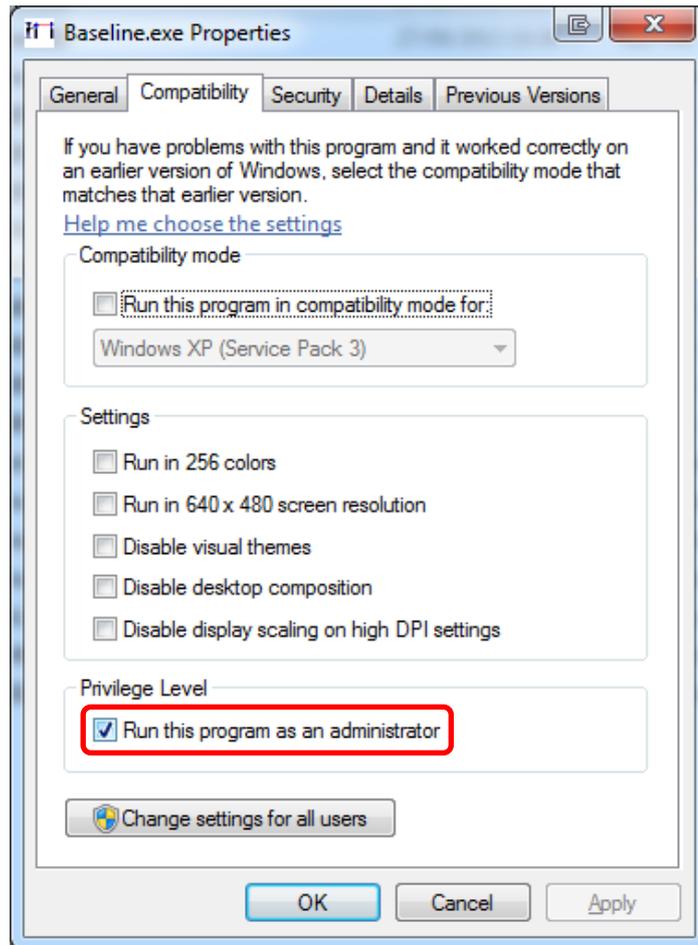
7. Run the software by double-clicking on **EDMCalibration.exe**.

Tips for running Baseline

The Baseline software has a built-in help file which should be consulted for issues using the software. However, a few tips for using this software, which may not be included in the help file, are:

- Make sure that the software executable and its shortcut are in a **folder** and NOT on the desktop.

- Always run the program as administrator:

- If the help files do not work from within the software, try opening **Baseline.chm** from windows explorer.

- It is recommended that you periodically check to ensure you have the **most recent version** of the software which should contain the current Regulation 13 values for the baselines.

- If your instrument is not listed in the software, make sure you have the required **instrument values** on hand before creating a new job to reduce distance measurements. The values required can be found in the software under the **Edit/Instruments** option and should be sourced from the relevant instrument manufacturer or distributor. Take care to ensure the values are in the correct units/format.

- Please ensure you identify if your instrument is a **Pulse Distance Meter**, as the software requires atmospheric corrections to be entered manually into the instrument during observations. **The software does not allow for post field correction of atmospheric conditions for Pulse Distance Meters**. If you have a pulse distance meter, you will need to correct for atmospheric conditions at the time of measurement.

Updating Baseline

The EDM calibration software will be updated periodically to include new baselines, remove old baselines and to update the Regulation 13 certified values for each baseline as they are recalibrated biennially.

1. Follow steps 2-6 of the installation guide above when a new version or update to the current version is uploaded to the website.

2. If any new instruments/prisms were created in the previous version and are no longer available, try copying all the instrument related files from the previous version database directory to the new software version database directory.

Doing this may retain any instruments you previously created/added using the software. If this fails, you will have to re-enter your instruments into the software.

Basic Analysis of Test Reports and Certificates

Among other tests, Baseline tests each instrument against a prescribed standard Recommendation No.8 of the Working Party of the National Standards Commission on the calibration of EDM Equipment 1 February 1983. This standard for EDME is ± 4mm + 20 ppm. Whether this standard is met or not is indicated by PASS or FAIL on the report and certificate produced by the software.

Given this standard is outdated and largely unsuitable for assessment with modern instruments, it is highly likely that this standard will always be met, even if errors are present in the dataset. As such, **it is strongly recommended that this assessment is ignored, and other elements of the report are examined** to assess the reliability of the test results and to gain an understanding of how the instrument has performed.

At minimum, the following elements of every test report should be examined.

Summary of A-Priori Standard Deviations

While you can't change the uncertainties that are set for an EDME comparison, you should still check that these are reflective of the actual test carried out. It is also important to understand the uncertainties and their effect on the results.

- For example: a comparison performed on a pillared baseline should have minimal or no centring error, but a small amount of error has been included here to accommodate for potential movement of baseline monuments.

- A general indication as to whether or not the uncertainties are reflective of the field testing may be determined by the Chi-Squared test 'Estimated Variance Factor'. The closer this value is to 1.0, the more accurately the uncertainties set represent the observations

Instrument Corrections

Check that the least squares estimated calibration parameters (instrument corrections) are reflective of the values set by the manufacturer. As a general rule, test results where instrument corrections are more than double what is set by the manufacturer may require further investigation. For example, if a 1mm + 1ppm instrument is tested and achieves corrections of 3mm + 5ppm, then further examination may be required.

Least Squares Statistics

The Least Squares Statistics, in particular the Chi-Square test, can be used to determine how well the A-Priori uncertainties represent the observations and can also be a good assessment of the overall reliability of the EDME Comparison.

Chi-Square Test

Check to see if the least squares adjustment passes or fails the Chi-Square test. If this test passes, it indicates that the A-Priori uncertainties are an accurate representation of the dataset and results are more reliable. The corresponding A-Posteriori Variance Factor will be close to 1.0 if the Chi-Square test passes.

A failed Chi-Square test can be because the dataset provided is better than expected or worse than expected.

1. If the Chi-Square test fails and the A-Posteriori Variance Factor is less than 1.0, it indicates that the dataset is better than expected, to the point where the A-Priori uncertainties are no longer an accurate reflection of the dataset. Tightening the A-Priori uncertainties would see this value increase and pass the Chi-Squared test. There is no need to obtain a pass in the Chi-Square test if this result is achieved.

2. If the Chi-Square test fails and the A-Posteriori Variance Factor is above 1.0, then this indicates that the dataset is worse than expected according to A-Priori uncertainties set. A relaxation of the A-Priori uncertainties would lower this value. Users experiencing this result should investigate the cause of the fail.

The version of the Baseline software that is made available, does not allow changes to the A-Priori uncertainties. If the Chi-Square test fails because the data is worse than expected, then the user should investigate the reason why. This may include, but not limited to, significant sources of error in their equipment, measurements or methodology, or movement of baseline monuments.

Summary of Least Squares Estimated Residuals

Check if there are outliers in the Least Squares Estimated Residuals. Outliers are not always incorrect observations. Statistically, 3 in 1000 observations should be valid outliers, assuming outliers are

outside of 3 Standard Deviations (99.7%). However, outlier observations may be removed from the dataset and the test re-run, provided that sufficient observations remain and there is reasonable justification for omitting the outlier/s.

As an example, pillar X is suspected of movement because most outlier observations involved this pillar. So, all observations at/to pillar X were omitted which improved the result dramatically, justifying the removal of those outliers.

Troubleshooting

Date format Error:

1. Ensure you are using the latest version of the Baseline software.

2. Ensure the Baseline program and any shortcuts are in a local folder directory. Do NOT place on the desktop.

3. Run the program as administrator:

    a. Right click on the Baseline shortcut and select Properties

    b. Select Shortcut

    c. Then select Advanced

    d. Select Run as Administrator

    e. Then click Ok then Apply.

4. Ensure the regional date format is set to English (Australia) with default settings. To ensure the update takes effect delete all the downloaded Baseline files from the local directory before changing the region settings. Then reinstall Baseline once the region settings are updated.

    a. In the Control Panel menu, select Clock, Language, and Region

    b. Select Region and Language

    c. Then select Formats

    d. Change the format to: English (Australia) and click Apply.

5. If the format is already English (Australia) there may be a need to re-activate these settings.

    a. Change the format to: English (United States) and click Apply.

    b. Change the format back to: English (Australia) and click Apply.

If you have any concerns or queries, please contact your local Department of Resources Regional Calibration Officer or email: Geodeticsupport@resources.qld.gov.au.

Help file not working:

1. The baseline software help file is a Windows 32-bit Help file (*.hlp) and requires the "WinHlp32.exe" software to display it. This software is not included in 64-bit versions of Windows and must be installed to be able to view *.hlp files. This error can be searched in

Google to find the solution, which is to download and install the help file software "WinHlp32.exe".

All concerns and queries relating to EDME Comparisons and the Baseline software should be directed to your local Resources Regional Calibration Officer or email: Geodeticsupport@resources.qld.gov.au.