

Overview of EDM Calibrations and NCDOT

Any total station used in setting and measuring NCDOT survey controls and baselines must be tested and calibrated on one of the NCGS EDM Calibration Baselines no more than three months prior to the measurement of those control points and baselines. Additionally, an EDM calibration should be performed after taking delivery of a new or used instrument, immediately after service, or anytime the operator feels the instrument is not working properly.

1. The EDM calibration has to be performed on one of the EDM calibration baselines set up by NCGS and NGS. Information about these baselines can be found at the NCGS website: <http://www.ncgs.state.nc.us/Pages/edm.aspx>. The EDM calibration data can be either collected using the Trimble Access EDMCheq program, or the data can be recorded in a field book or log sheet and then entered into the PC EDMCheq.exe program.
2. A typical calibration baseline consists of four monuments. There are six independent distance measurements that need to be observed between the four monuments. At a minimum these six measurements need to be observed at least once and included in the analysis.
3. As part of the EDM calibration process a report outlining the results of the EDM calibration has to be produced. This report can be generated from either of two computer programs provided by the NCDOT. Either or both of the programs can be used to create the required EDM calibration report. The calibration report is an ASCII file that is turned in when a baseline project is submitted.

PC version of EDMCheq.exe: This program is a desktop program which will process EDM calibration data files, and create the final EDM calibration report. The data files can be created and then imported from the Trimble Access EDMCheq program. Alternately, the data can manually entered into PC EDMCheq.exe.

Trimble TSC3 EDMCheq: This program runs on a Trimble TSC2 or TSC3 data collector. The program will both collect the EDM calibration data and it will process the data, creating the final EDM calibration report on the data collector which can then be transferred to the PC.

4. PC EDMCheq.exe is found in the NCDOT workspace. After downloading or updating the NCDOT workspace EDMCheq.exe can be found in the following folder:
C:\NCDOT_V8_WORKSPACE\LOCATION_STDS\Standards\appl. There is also a help file, PCCheqHelp.pdf, in the same folder describing the use of EDMCheq. EDMCheq.exe can be run by double-clicking on the file name from Windows Explorer. Make sure Baselines.dat is in the same folder as EDMCheq.exe as that file contains all the baseline data for each published baseline in NC.
5. EDMCheq, the Trimble TSC3 program, does not normally come installed on a TSC3. It is free to any surveyor requesting it. It has to be specifically installed on the TSC3. Following are the steps to get EDMCheq installed on the TSC3.

- a. The TSC3's serial number has to be turned in to Trimble through NCDOT. Provide the TSC3 serial number to NCDOT through Donnie Stallings at dstallings2@ncdot.gov.
- b. After Trimble has approved the serial number, the Trimble program 'Trimble Installation Manager' needs to be run. It will install EDMCheq onto the TSC3.
- c. Documentation for the EDMCheq program can be found in the NCDOT workspace. These files are: EDMCheqfielduse.pdf and EDMCheqReview.pdf. They are found in the folder, C:\NCDOT_V8_WORKSPACE\LOCATION_STDS\Standards\help. EDMCheqfielduse.pdf documents the collection of an EDM calibration while EDMCheqReview.pdf reviews and explains the EDM calibration report.

Frequently Encountered Issues When Performing an EDM Calibration

1. The single most common mistake made when performing an EDM calibration is using the incorrect atmospheric pressure. Barometric pressure, as reported on weather channels and displayed in airports is typically barometric pressure that has been converted to sea level. The barometric pressure required by EDMs is uncorrected at-elevation barometric pressure. This mistake becomes more critical at higher elevations. Following are three ways a surveyor can obtain the correct at-elevation barometric pressure:
 - a. Most modern smartphones contain a built-in barometer. There are many free barometer apps that can be downloaded and used to obtain at-elevation barometric pressure. Getting barometric pressure from a barometer app is different than obtaining barometric pressure from a weather or airport website. The barometer app is showing the at-elevation barometric pressure, the weather website is probably showing sea level barometric pressure.
 - b. A traditional barometer can be taken to the baseline and used to obtain at-elevation barometric pressure.
 - c. Sea level barometric can be obtained from a weather channel and then converted to at-elevation barometric pressure. The formula for this conversion is found on page 12-13 in the NCDOT manual EDMCheqfielduse.pdf found in the Help folder of the NCDOT workspace.
2. The EDM Calibration procedure that NC DOT is requiring is the exact procedure as described and outlined by NGS and NCGS. The goal of the procedure is to determine the accuracy of a given EDM. The procedure makes no physical or digital adjustment to the EDM. The result of the calibration is a statistical report specifying the accuracy of the EDM. The procedure is a test of the entire measurement process. It tests the EDM, tripods, tribrachs, and prisms as well as the surveyors using the equipment.
3. The majority of the time when an EDM fails a calibration it is the result of a user error, either bad atmospheric correction settings, a bad prism constant, or tribrachs and tripods out of

adjustment. All these items should be checked thoroughly before returning the EDM for service.