AH2923 GNSS
Assignment 5

Precise Static data collection and RTK positioning with GNSS

Background
For many applications, especially in surveying, there is a need for precise position determination of different objects, or points. Static and/or RTK methods are commonly used for this purpose. Static observations are used if centimeter/millimeter accuracy is required, e.g. for determination of new control points or for monitoring the deformation/stability of constructions. The RTK method is routinely used in detail surveying (map updates), staking out of buildings etc. and for machine steering and precision farming.

Goal
The goal of this exercise is to learn how to operate a geodetic GNSS receiver. In particular, you will learn how to perform static GNSS observations, and how to perform RTK data collection / surveying.

Assignment
Your task is to:

- Update an existing map along Drottning Kristinas väg
- Create a terrain model of a neighboring area.

Use the *stop-and-go* method to measure the road, sidewalks and the light poles using the RTK method. Survey at least 10 points in total.

Use the *continuous kinematic* method to collect the data for a terrain model. The model will later be created using post processing software.

The results are to be delivered in the SWEREF99 18 00[1] coordinates.

Reference station
Set up the reference station on a suitable location and configure the reference station so that it stores the raw observations (code and phase) as well as transmits RTK correction data. In this case we use previously determined coordinates for the location of the reference station, and afterwards compute the coordinates using the data collected to control the quality of the known coordinates.

Start the rover
Mount antenna and controller on the range pole, turn on controller and run the program "Survey Controller" or "Trimble Access".
Verify settings in the controller under **Settings** -> **Survey styles** -> **RTK** -> **Rover options**.

[1] SWEREF99 18 00 is the projection zone used by the Stockholm municipality. It is a zone of the Transverse Mercator map projection, which is used to project the coordinates in SWEREF99 reference system

Survey type: RTK, Broadcast format: CMR+, Use station index: Any, Check box Prompt station index, Satellite differential: Off, do not check box Ignore health, Elevation mask: 10°, PDOP mask 6, Antenna type: R4-2 Internal[2], Measured to: Bottom of antenna mount. The remaining settings are not relevant for this survey.

Return to the main menu (click ESC a number of times).

Under **General Survey** -> **Jobs** -> **New job create a new job**. Name the job by your names, choose coordinate system (from library) Sweden (Sweref 99), zone 18 00, geoid model SW082000, project height = 50. Choose feature library: GlobalFeatures. Feature library is an optional step, not all versions of controllers contain this library.

Points along Drottning Kristinas väg
Now start the survey. Under **General Survey** -> **Measure, select RTK**… -> **Measure points**. You will be prompted to enter point ID, code and antenna height. Point ID will be automatically incremented after each measurement. Click measure to actually measure a point. Stand still with the pole in vertical mode while performing the measurements. The measurements will stop automatically when an accuracy below 1.5 cm in the horizontal has been obtained. Then store the point.

Survey at least 10 points along Drottning Kristinas väg.

Use the following feature codes when measuring the road and sidewalks:

TC	top curb
SW	sidewalk
SP	signpost
LP	light pole

In the post processing software you can use these codes to assign proper symbols and lines. Modify the line codes with ST to start a new line (for example SW ST) and with END to end the line (for example SW END).

Terrain model
Find an area with some variation in the terrain.

Under Measure, change the survey mode to **Continuous topo**. Here you can specify to store points by time interval and/or distance travelled. Use distance = 5 m.

Now walk around with the rover while positions are being determined. Remember to keep the pole upright while walking and keep the bottom of the pole as close to the ground as possible.

When you have measured all points, end the survey by returning to the main menu and click Measure-> End GNSS survey.

[2] Or in one of the controllers this should be R8/5800/..