

GY301 Geomorphology: Lab 4 Resection with the Total Station

Introduction

This lab will require that you position and level the total station instrument in a position that will be optimal for sighting 3 or more mirror targets to resection (triangulate) the instrument XYZ coordinates in the UTM coordinate system. After resection your goal is to shoot (i.e. “Menu” > “Coordinate” > “Observation”) the southeast and northeast corners of the LSCB. Also, you should use the single-distance offset method (page 77 Sokkia Manual) for determining the coordinates of the 9 trees used in the pocket transit closed traverse.

Total Station Setup Steps

Step 1: Locate and level the instrument in a position where you can sight the 3 mirror targets setup on survey benchmarks. You also need to select a position where you can shoot the position of a significant number of white target trees and at least one of the east corners of the LSCB. It is not possible to shoot all of the corners and trees from one instrument position. Each time the instrument is moved you must resection to calibrate.

From the “MEM” menu set the job name to match your group (i.e. “G1” for group 1). Check the “Known Data>View” option in the MEM menu to see if the benchmarks (ST1-ST20) are pre-entered. If they are not, enter the coordinates for the benchmarks occupied by the mirror targets as “Known Data”. Save the points as “ST01”, “ST02”, etc. The coordinates of all 20 benchmarks will be available online as a spreadsheet. Return to the “MEAS” menu using {Esc}.

Step 2: Go through the coordinate resection process (page 45 Sokkia Manual). Your standard deviation at the end of the procedure should be no more than several cm.s (0.01m) for easting or northing. Make sure that you set the instrument height through “MEAS” > [MENU] > [COORD] > “Stn. Orientation” > “Stn. Coordinate”. All units are in meters. Check the resection results with an instructor before proceeding. Save the instrument position as a point (ex. “I1” for instrument position #1).

Step 3: Use the “MEAS” > [MENU] > “Coordinate” > “Observation” to measure the LSCB corner. Save point with [REC] (ex. Point “LSCB_NE” for northeast corner of LSCB). Enter the coordinates in the below table to turn in.

Step 4: Use the single-distance offset command to shoot the position of any visible white trees from your instrument position. Save the position with [REC] as a point. Record the coordinates in the below table to turn in. The single distance offset command solves the problem of not being able to physically position the mirror target in the center of the tree. Some of the trees have significant radius relative to the accuracy of the TS so simply trying to hold the mirror target next to the tree does not accurately measure the tree coordinates. In the offset command the mirror target holder should position the target on any convenient side of the tree at a distance from the instrument equal to the instrument-tree distance. In the offset command the instrument

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operator will first shoot the mirror position to determine its coordinates, and then the operator must enter the offset distance measured from the mirror to the centerline of the tree. This distance should be measured to the nearest cm with the tape measure. The instrument operator next indicates whether the mirror target was left or right of the tree target, and then the instrument calculates the tree center coordinates.

Equipment Storage

All tripods, range poles, mirror targets, and tape measures can be stored in the ES trailer next to the LSCB. The trailer lock combo is "1098". Never leave the equipment trailer unlocked for any length of time.

When storing the range pole in its storage bag unscrew the ground point and store it in the side pouch to keep from tearing a hole in the bottom of the bag.

Both the range pole and instrument tripod legs should be shortened to minimum length and then secured with the straps so that the legs don't suddenly separate when you are transporting the tripod. The ends of both tripod legs are sharp so be careful when you carry them. The range pole tripod bag has a hard bottom for a reason- make sure you put in the tripod leg points first so that they are in contact with the hard bottom.

The mirror target and the TS instrument both have lens caps. Make sure both are protecting the lens before storing them.

The Total Station will always be stored in room #49 next to my office. The LSCB 49 lab combo is 1532 so you may get the instrument at any time you need it.

The TS instrument should be properly stored in its case. Loosen the horizontal and vertical clamps and align the 2 yellow dots "up" so that you can lower the instrument into the case. Snap secure all latches on the case, and then store in room #49. Try to keep dirt, pine straw, etc. out of the case by latching it shut while outside as soon as you remove the instrument from the case. Although all equipment is waterproof, it is not "rust-proof". If any equipment is wet from rain get paper towels from the restroom and wipe dry the equipment.

I will leave the battery chargers for the TS on the microscope bench in the #49 lab. Make sure that you start your batteries charging when done for the day.

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Resection Answer Table			
Easting	Northing	Elevation	Target
			Tree 1 white
			Tree 2 white
			Tree 3 white
			Tree 4 white
			Tree 5 white
			Tree 6 white
			Tree 7 white
			Tree 8 white
			Tree 9 white
			LSCB NE corner
			LSCB SE corner