Surveying Instructions

Our surveying equipment consists of a Topcon Total station and 2 pole-mounted prisms. The total station combines an electronic transit with a laser distance measurer. The operator sights on a pole-mounted prism. Horizontal (relative to a previously determined baseline) and vertical angles from the station to the prism are measured. By pressing a button on the total station, a laser sights on the prism, determining the distance to the prism. By combining the angles with the measured slope distance, horizontal distances and elevation (vertical) distances can be calculated.

Before going into the field.

• Make sure that the battery in the total station is charged. Turn on the POWER for the total station and see if 2 or 3 bars are visible in the BAT display.

Determining elevations

• Set up and level the total station
  Set up the tripod for the total station in a convenient spot from which you can see a point of known elevation and a large number of your unknown points. Attach the total station to the tripod. Carefully level the total station, first using the bullseye level and the tripod legs and then using bubble level and the leveling knobs on the base of the total station. Rotate the telescope through horizontal. If the station is not level, a b will appear in the vertical angle (V) display.

• Determine the horizontal distance to and the relative elevation of the known point
  Set the prism pole to a convenient height (the pole height is arbitrary, but should not be changed during the survey). Place the pole on the unknown point, holding it vertical (use the bullseye level). Aim the prism so that you can see the total station. Adjust the horizontal and vertical angles of the total station so that you can sight on the prism. Both angles are controlled by a pair of knobs. Loosen the larger (inner knob) to allow the transit to rotate freely. When you are close to the correct orientation tighten that knob and use the smaller (outer) knob to precisely adjust the angle. You should be able to read the horizontal and vertical angles.

  Next, press the key. After a few seconds, the upper display will show the slope distance. Press the key again for horizontal distance. This gives you the form the total station to the known point.

  Press the key a third time for relative elevation. Note: the line on the upper display indicates whether slope, horizontal, or vertical distances are indicated.

  This gives you the relative elevation of the total station. (e.g. If the elevation on the known point is 205 m and the station reads -2.346 m, then the station elevation is 205 + 2.346 = 207.346 m).
• Determine the distance to and elevations of the unknown points.
  Without changing the pole height, set the prism pole on an unknown point, holding it vertical (use the bullseye level). Aim the prism so that you can see the total station. With the total station sight on the prism. Press the key two times for the horizontal distance to the unknown point. Press the key again to determine relative elevation. Add that reading to the station elevation to determine the elevation of the unknown point. (e.g. If the station elevation is 207.346 m and the total station reads -4.533 m, then the unknown point elevation is: 207.346 - 4.533 = 202.813 m).

• Move the total station to determine the elevation of more unknown points.
  Move the station so that you can see one of your already measured points (this has now become a point of known elevation) and several more unknown points. Repeat the procedure outlined above (level the total station, determine the relative elevation of the known point and then determine the relative elevations of the unknown points.)