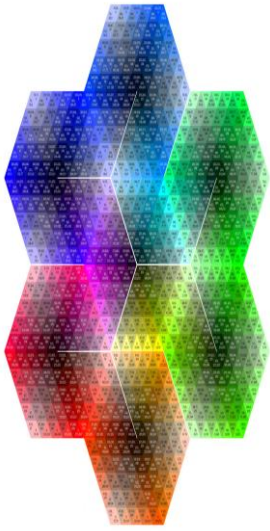
Benha University

Shoubra Faculty of Engineering



Surveying Engineering
Lecture 10: Total Station

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Total Station

The most powerful surveying instrument: The Total station system consists of an EDM embedded with an electronic theodolite under the control of a built-in microprocessor.

Total Station Components:

The total station consists of many components, each has its own function and role. Some of them function in the observation of surveying measurements, while the other function in data computations and storing.

Digital Theodolite: For measuring horizontal and vertical angles.

EDM: For measuring slope distances from instrument to the reflector.

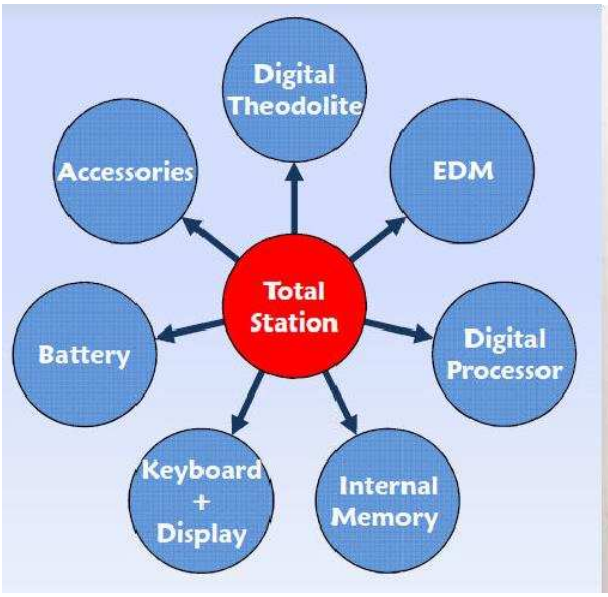
Digital Processor: For data computations, such as coordinates determination.

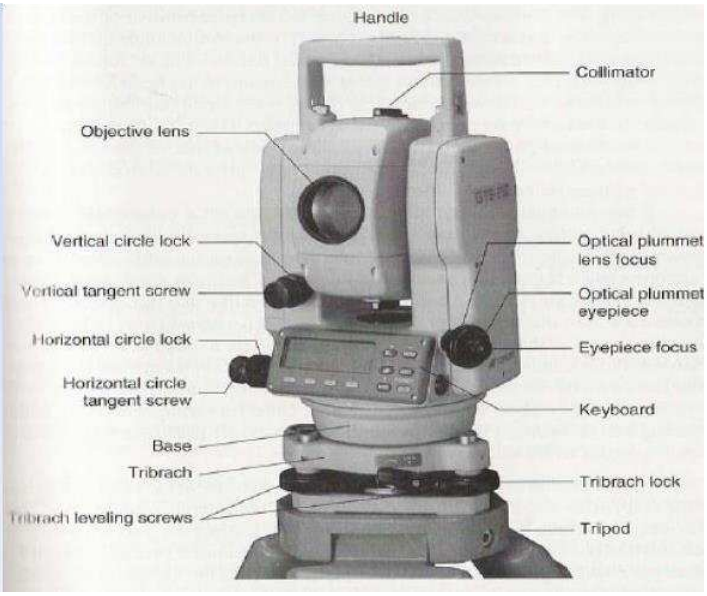
Internal Memory: For digital storing of data.

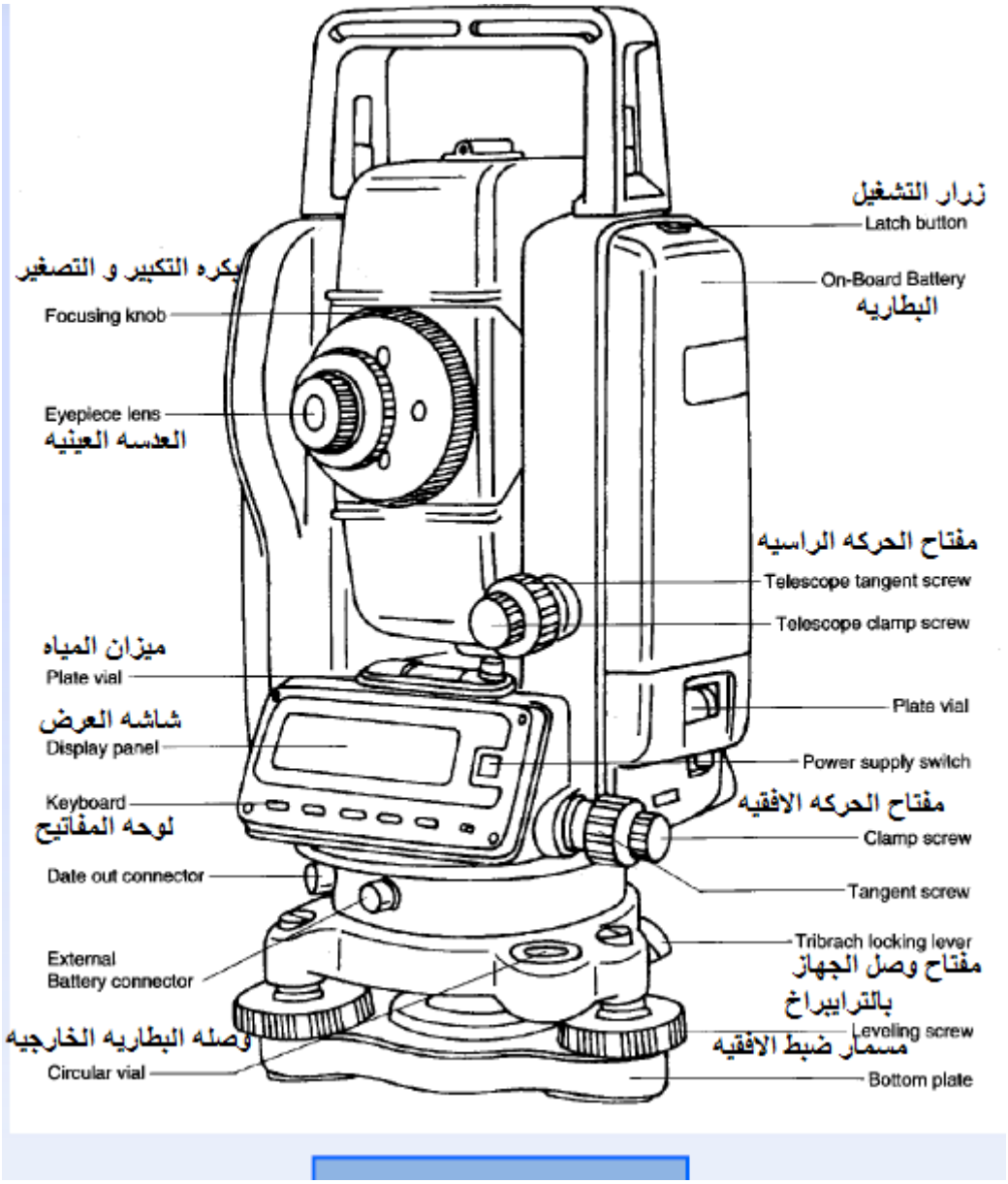
Input and output Units: Keyboard and display screen.

Battery: For power supply to generate the electromagnetic waves.

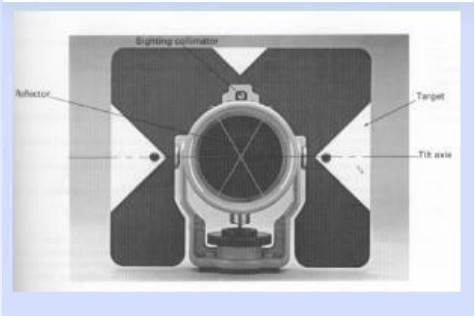
Accessories: External memory, Battery, Cables, Case, Cleaning tools and tripod.







Reflector and Target:



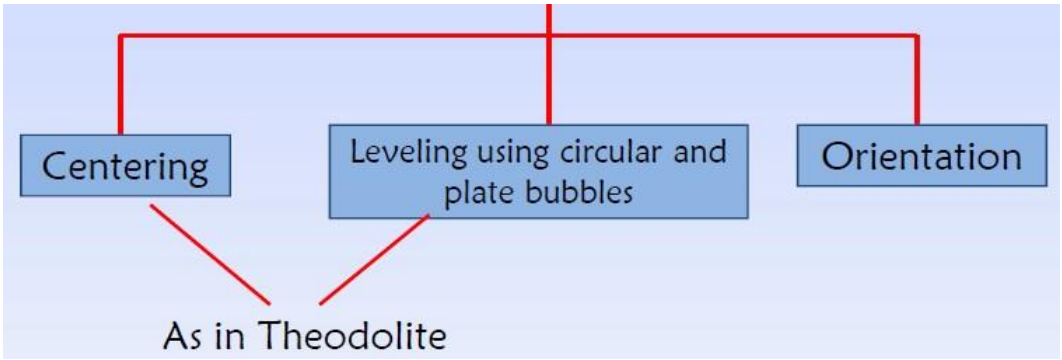
Modern Total Stations :

Robotic Total Stations:

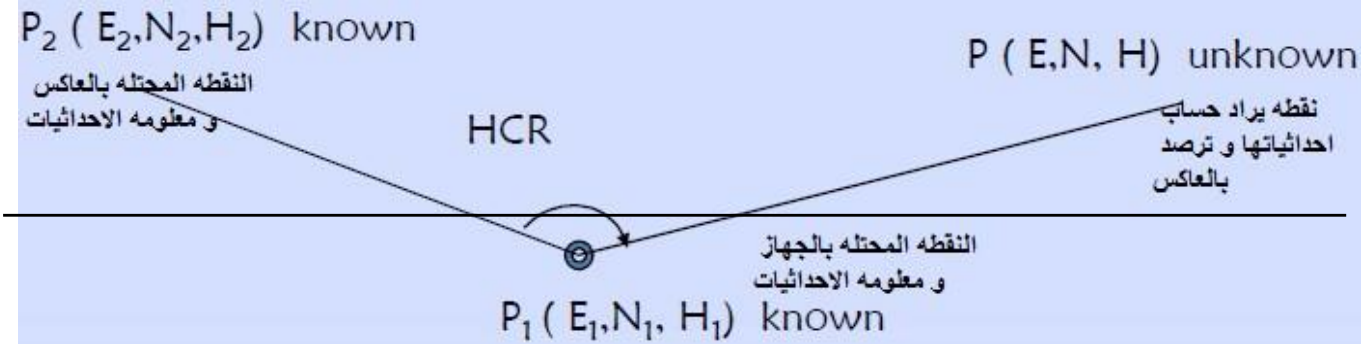
Some modern total stations are 'robotic' allowing the operator to control the instrument from a distance via remote control. This eliminates the need for an assistant staff member to hold the reflector prism over the point to be measured. The operator holds the reflector himself and controls the total station from the observed point.

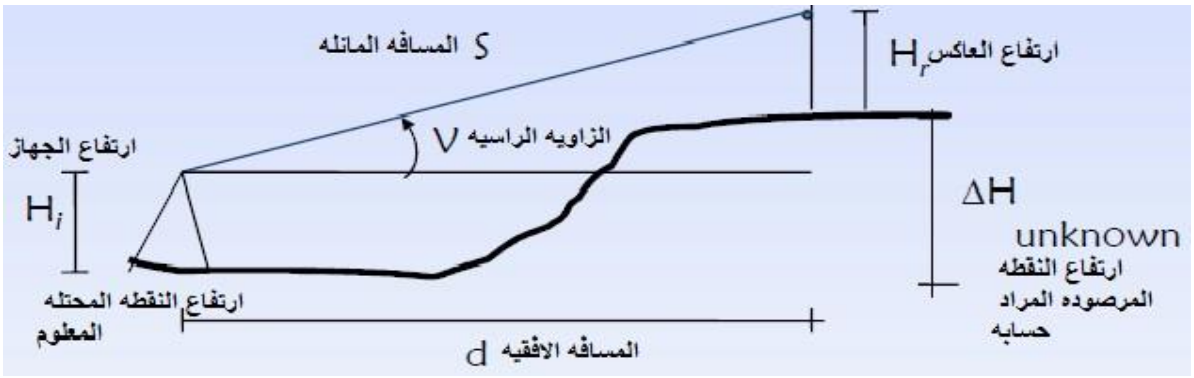
Setting up the instrument:

The temporary adjustment of the total station is performed at each occupied station. It consists of:



What is required?





Field Procedure:

1- Creating new file (job) for data storing:

2- Input the data of the occupied station:

Station name	=
E_coor	=
N_coor	=
H_coor	=
Inst. Ht	=

3- Input the data of the target station:

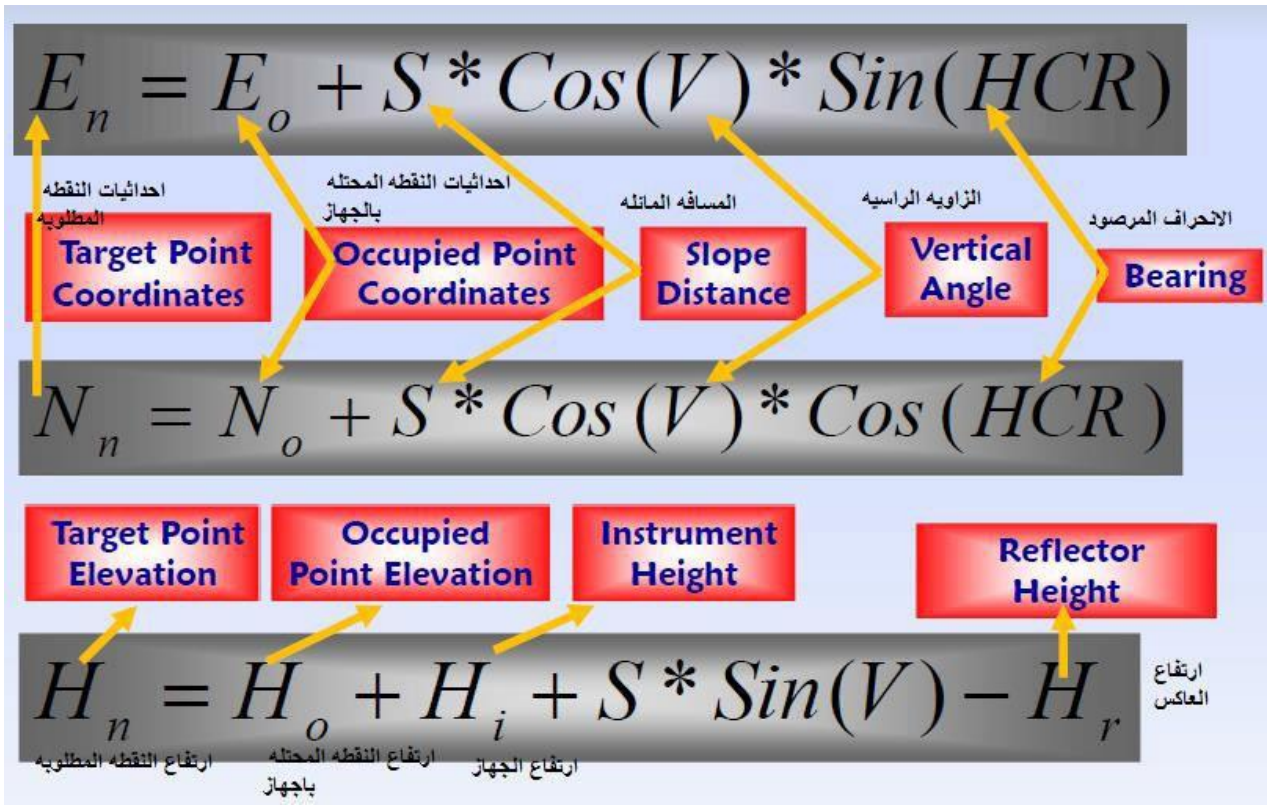
Station name	=
E_coor	=
N_coor	=
H_coor	=
Ref. Ht	=

4- Set orientation by sighting the target station (backsight). This rotates the horizontal circle and makes HCR of Total station = Bearing of the Baseline.

$$\alpha_{12} = \tan^{-1}\left[\frac{E_2 - E_1}{N_2 - N_1}\right]$$

5- Sighting the required station and recording The HCR, VCR and slope distance.

6- The total station will compute, display and record the E, N, H coordinates.



1- Point Setting out:

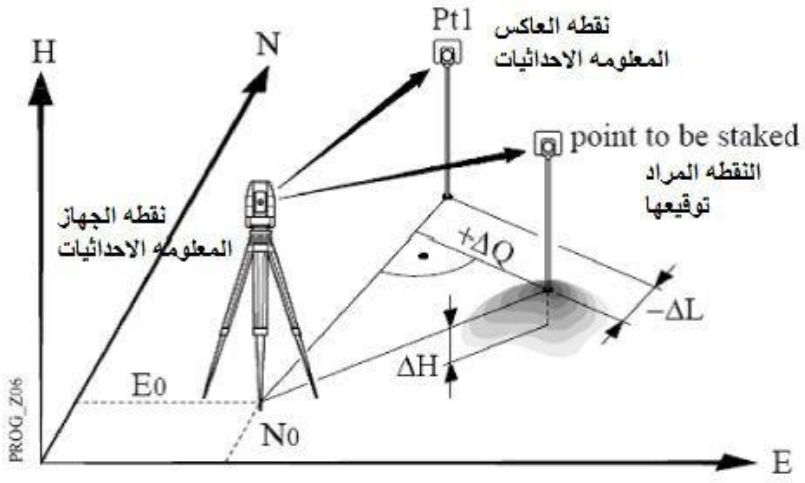
Enter the coordinates of the known occupied station

1-Enter the coordinates of the known target station

2-Set orientation

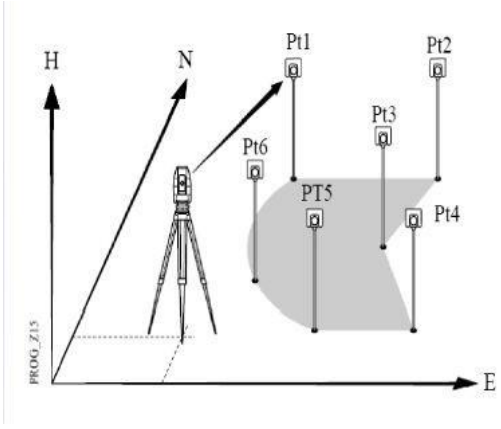
3-Enter the coordinates of the known required station

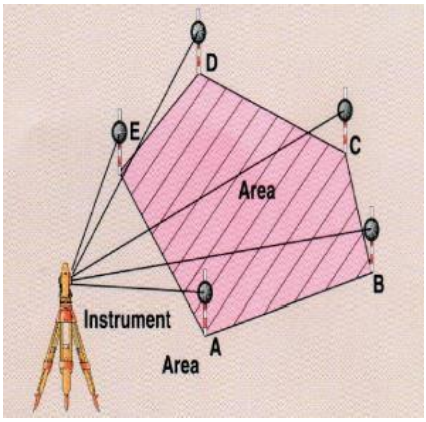
4-Set out the required point with angle and distance through trial



2- Area Computation:

Area computed using coordinates of points

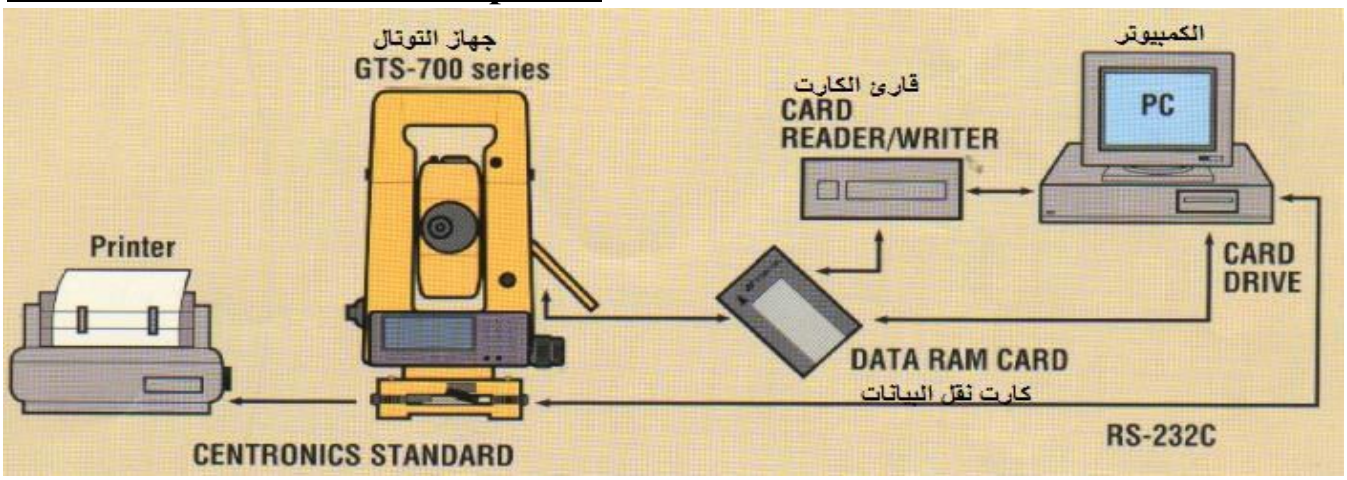




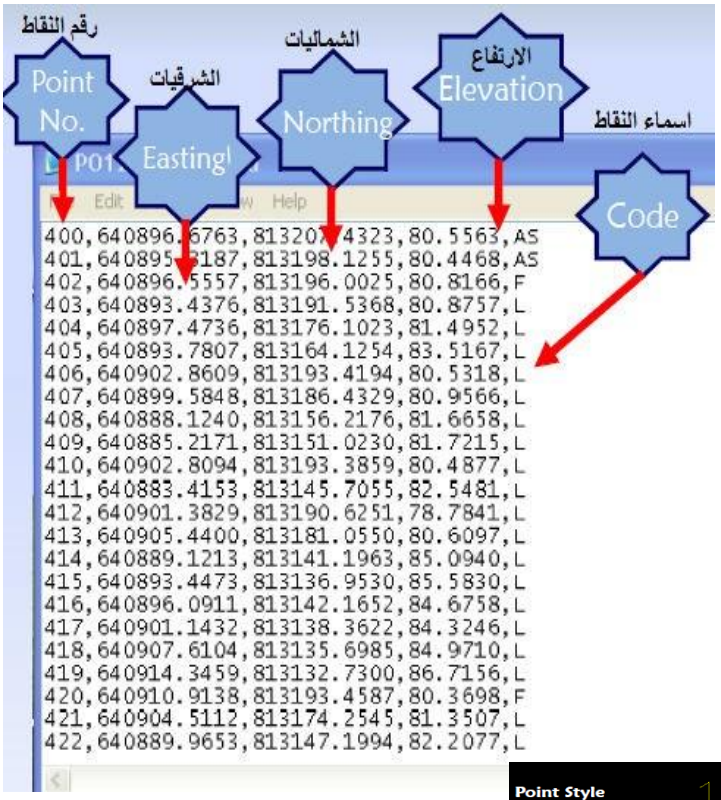
Output Format:

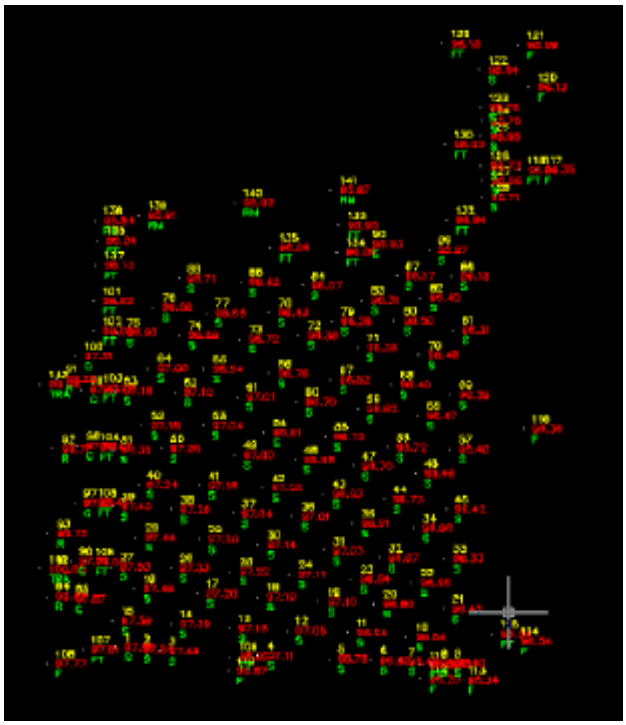
- **Raw data file (FILE.RAW):** includes raw information
  pt. No, HCR, VCR, Slope distance, Ht
- **Coordinates file (FILE.XYZ):** includes the coordinates of points
  pt. No, X, Y, Z, Description
- **DXF file (FILE.DXF):** (Drawing eXchange Format)
  Can be used to support CAD graphics
- **AutoCAD file (FILE.DWG):** AutoCAD DraWinG files
  Ready made AutoCAD drawings (only in specific models)

Communication with Computer:



Coordinate XYZ file:





Point Information: