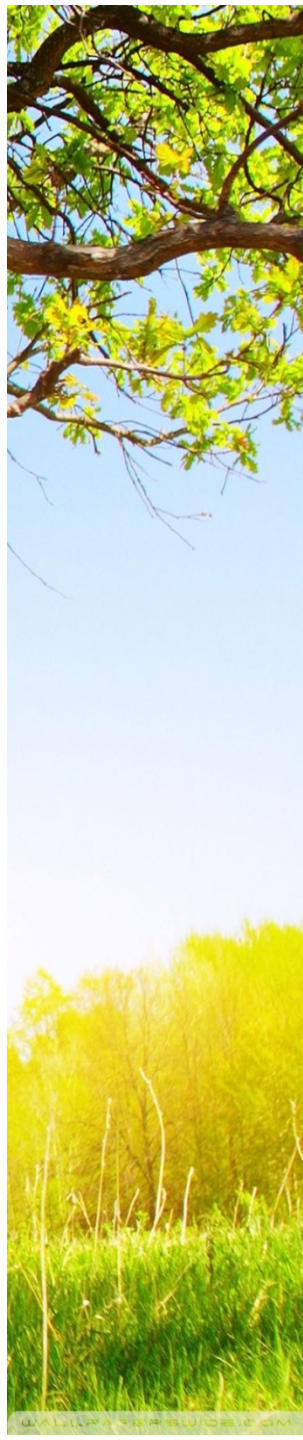
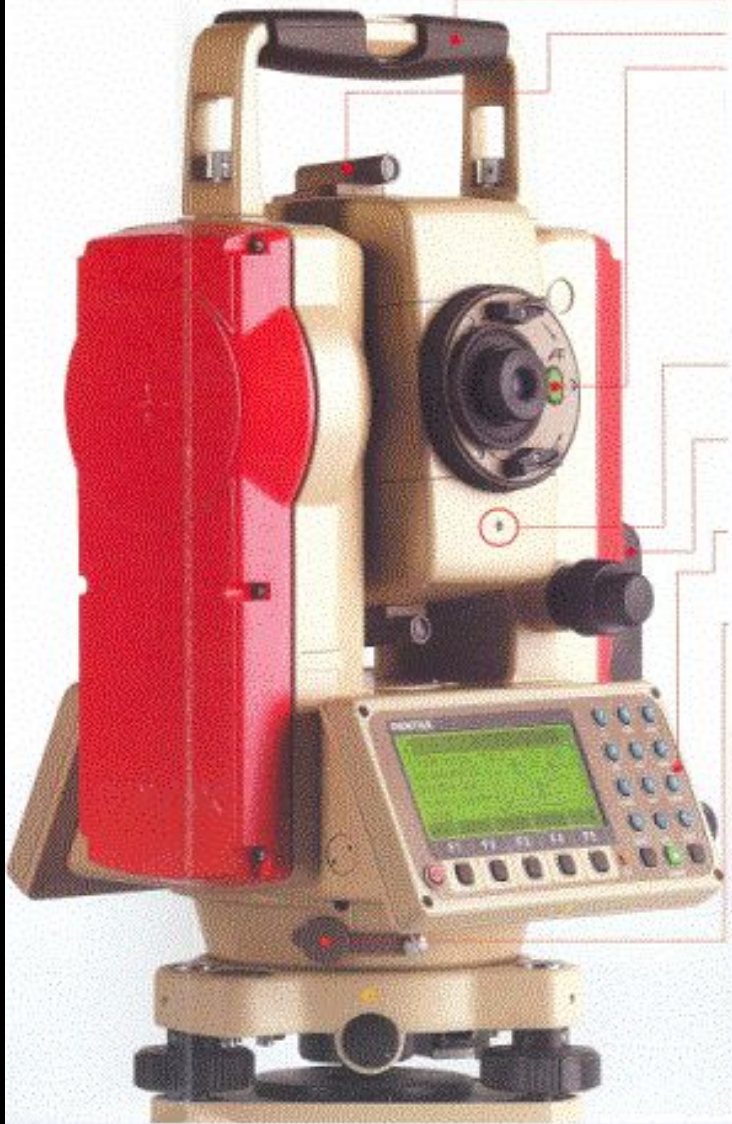


TOTAL STATION





Handgrip
Target collimator
Prismless autofocus EDM

LED for reflectorless measurement

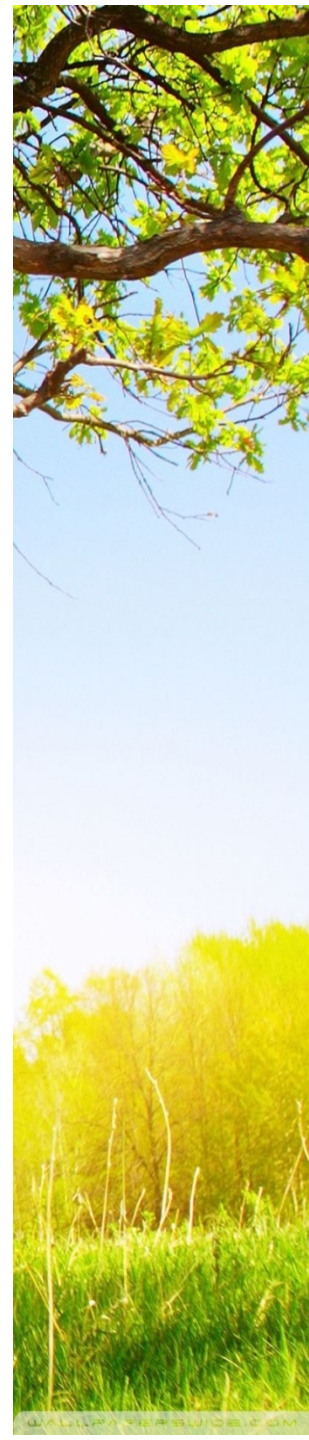
Ni-MH battery

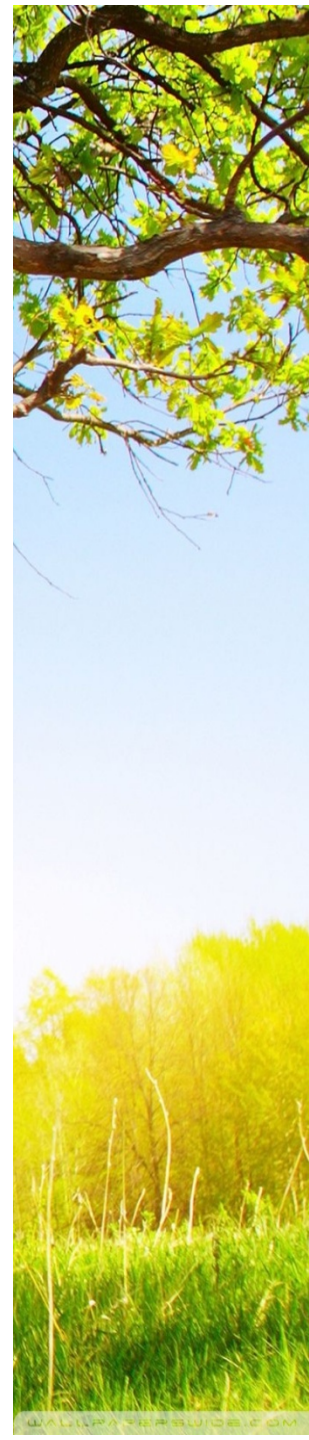
Graphic display with alphanumeric keyboard

Data upload and download through RS232 cable

Pentax R300 TS

Pentax Reflector prism



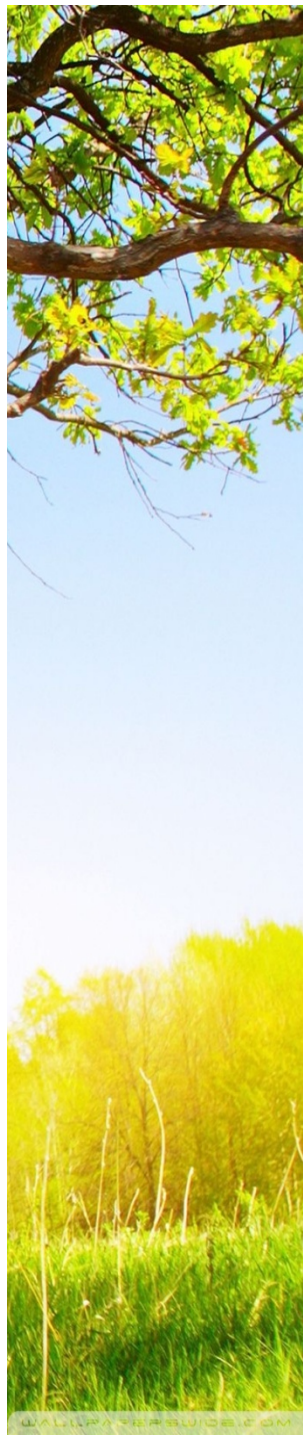


TOTAL STATION IS DESIGNED FOR MEASURING OF SLANT DISTANCES, HORIZONTAL , VERTICAL ANGLES OR ELEVATIONS IN TOPOGRAPHIC AND GEODETIC WORKS.

MEASUREMENT RESULTS CAN BE RECORDED INTO THE INTERNAL MEMORY AND TRANSFERRED TO A PERSONAL COMPUTER INTERFACE.

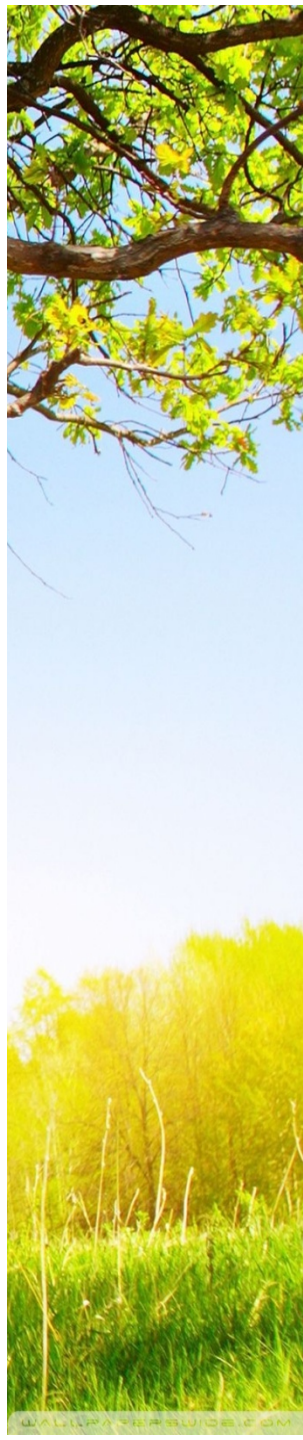
ANGLES AND DISTANCES ARE MEASURED FROM THE TOTAL STATION TO POINTS UNDER SURVEY, AND THE COORDINATES (X, Y, AND Z OR NORTHING, EASTING AND ELEVATION) OF SURVEYED POINTS RELATIVE TO THE TOTAL STATION POSITION ARE CALCULATED USING TRIGONOMETRY AND TRIANGULATION.

DATA CAN BE DOWNLOADED FROM THE TOTAL STATION TO A COMPUTER AND APPLICATION SOFTWARE USED TO COMPUTE RESULTS AND GENERATE A MAP OF THE SURVEYED AREA.



Total Station includes:

1. Linear Measurements
2. Angular Measurements
3. Height Measurements



Total station is a combination of :

EDM

Theodolite

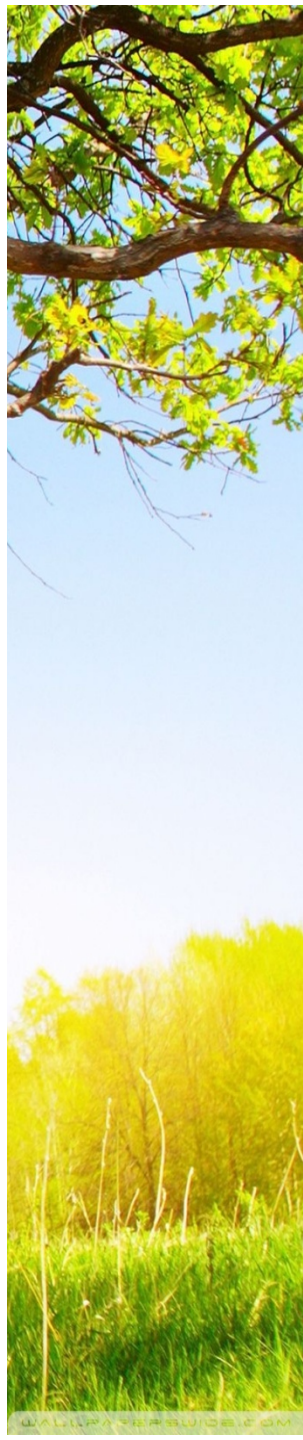
Auto Leveler

Microprocessor with specific memory

Battery/spare which works about 5 working

hours

About 100 models were released till now by different firms.



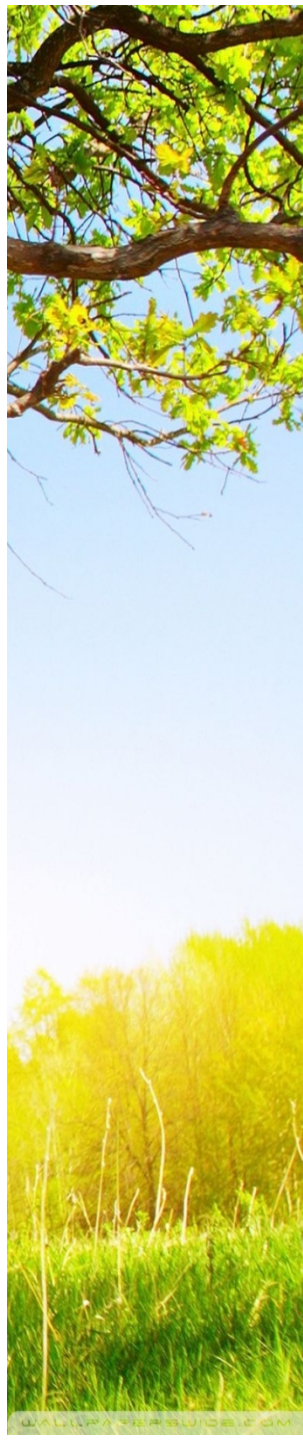
Basic components of Total station

- Prism reflector:

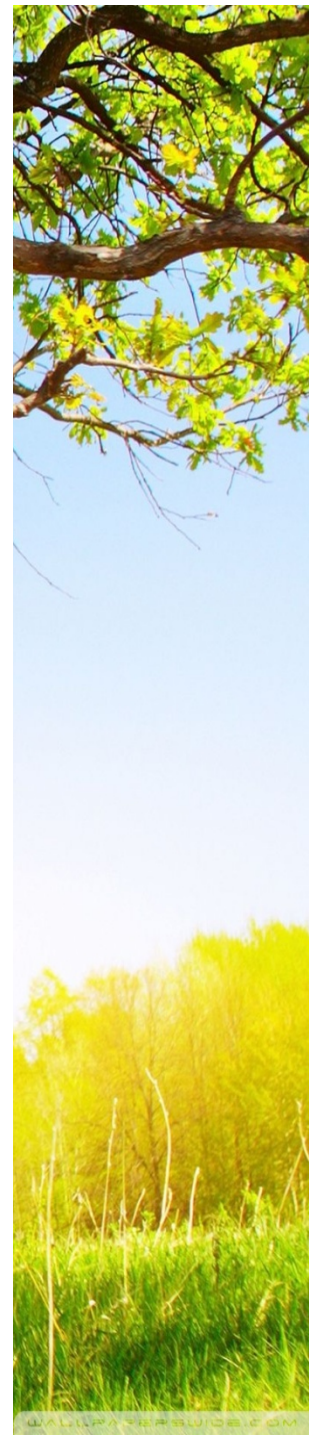
It is a combination of ranging rod, staff and and optical cuboidal mirror having 2/3 lifts with 5cms interval graduations.

adjustable height from 1.5m to 3.75m.

More number of prisms, will give more accuracy.



- GUN: data screen LCD
 - eye piece
 - telescope 24x to 43x
 - environmental box
 - microprocessor with memory card of 1 or 2 GB capacity
 - 1MB can store 800 points.
- Tripod: with different material
 - Aluminum tripod weighs 13 to 14lbs
 - Wooden tripod will be about 18 lbs.
- Optical and Laser plumb bobs.
- Battery –as an external attachment
 - with indicators
 - 1.5hours charged battery can work for 3to 5 hours



ACCURACY OF TOTAL STATION

More accuracy can be achieved by :

1. Careful Centering
2. Accurate pointing target
3. Average of multiple points
4. Better optical lens
5. Strong Tripod
6. Verticality of prism pole

1. Angular accuracy is from 1 to 20 Sec.
2. Linear accuracy is from 2mm to 10mm/per KM
3. Different instruments have different accuracy

	Angular	Linear	
		With 1 Prism	With 3 prisms
NIKON	1 Sec	± 2 mm	± 1 mm
LIEKA	1 Sec	± 2 mm	± 1 mm
SOKKIA	1 Sec	2 mm	± 1 mm

Accuracy varies with Price

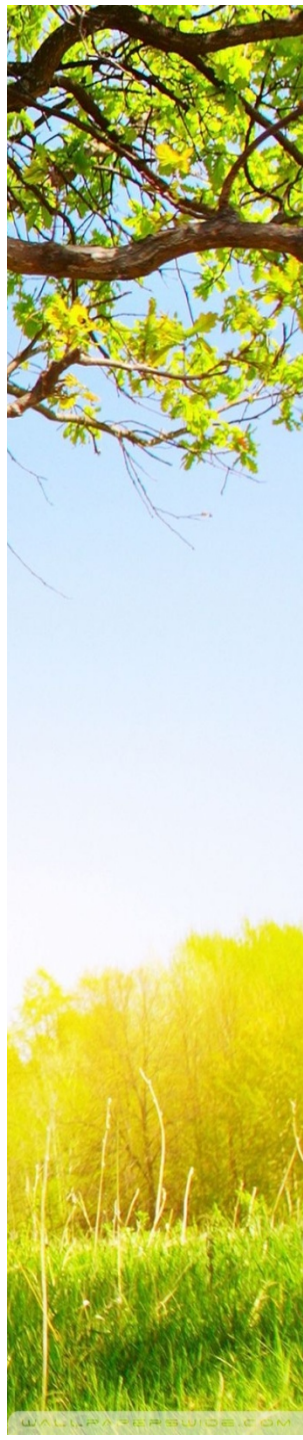
Distance measure with:

1. Single Prism – up to 2.5 Km
2. Two prisms - 5 to 7 Km
3. Three prisms - 10 to 12 Km



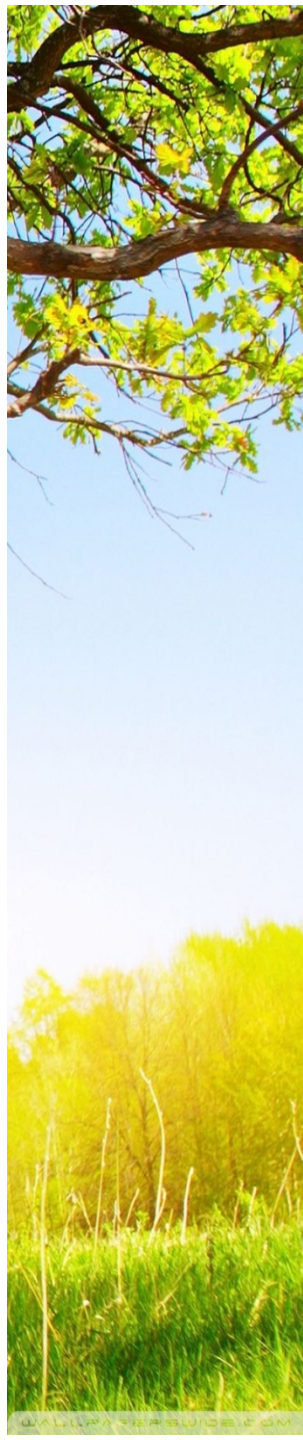
Functions of T.S:

1. It simultaneously measures angles & distances and Record
2. Correcting the measured distance with:
 1. Prism constant
 2. Atmospheric Pr.
 3. Temperature
 4. Curvature of earth
 5. Refraction correction
3. Computing the point elevation
4. Computing the coordinates of every point
5. Remote elevation measurement
6. Remote distance measurement
7. Area calculations
8. Data Transferring facility from instrument to S/W and S/W to instrument
9. Format of conversion of units



Accuracy of a Total Station:

- Accuracy depending upon the instrument and varies from instrument to instrument
- 1.The angular accuracy varies from 1" to 20 ".
- 2.Distance accuracy depends upon two factors.
- Instrumental error which ranges from
- $+ / - 10\text{mm}$ to $+ / - 2\text{mm}$.

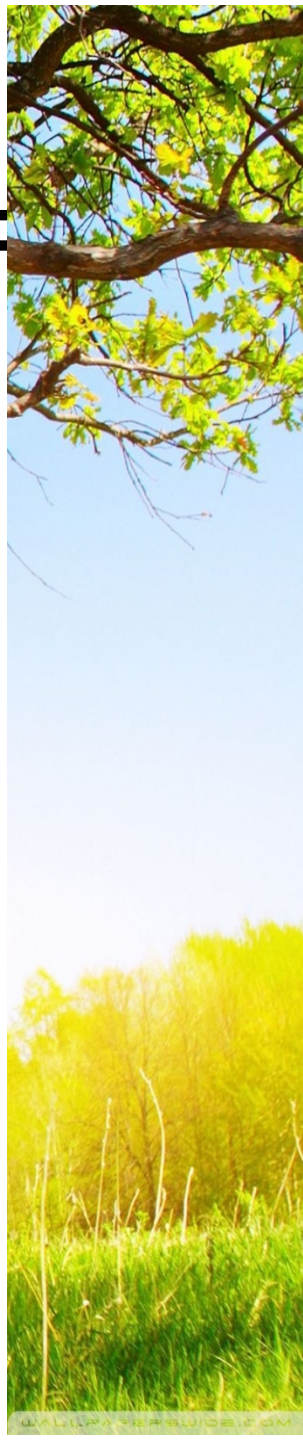


Operations involved while using Total Stations :

1. Establishing the site Datum:
 - a) Selecting the site Datum
 - b) Establishing North

2. Setting up the Total station:
 - a) Placing and leveling Tripod on Datum
 - b) Placing and leveling the Gun on Tripod
 - c) Linking the data connector to Gun

3. Data collector options and setting
 - a) Main menu
 - b) Basic settings



4. Creating and Operating Job files:

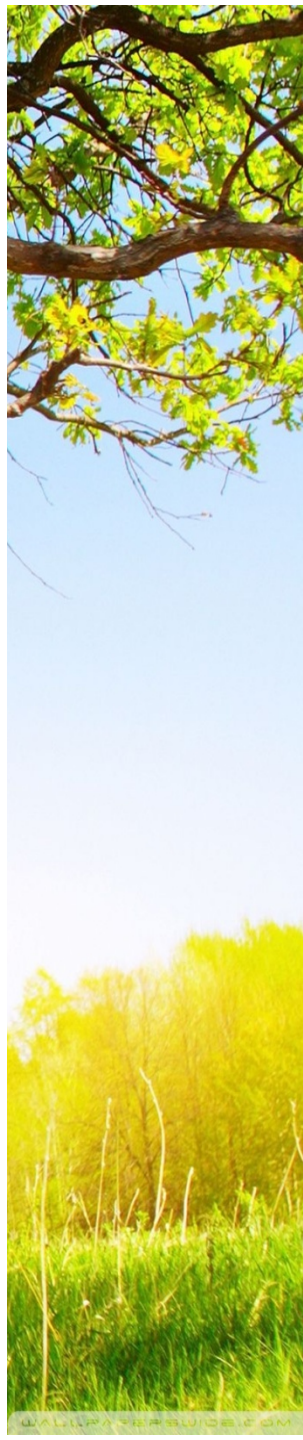
- a) Creating a new Job file
- b) Opening an existing file

5. Shooting points

- a) Identifying the important points to shoot
- b) shooting points
- c) Shooting additional points
 - d) Noting the special features

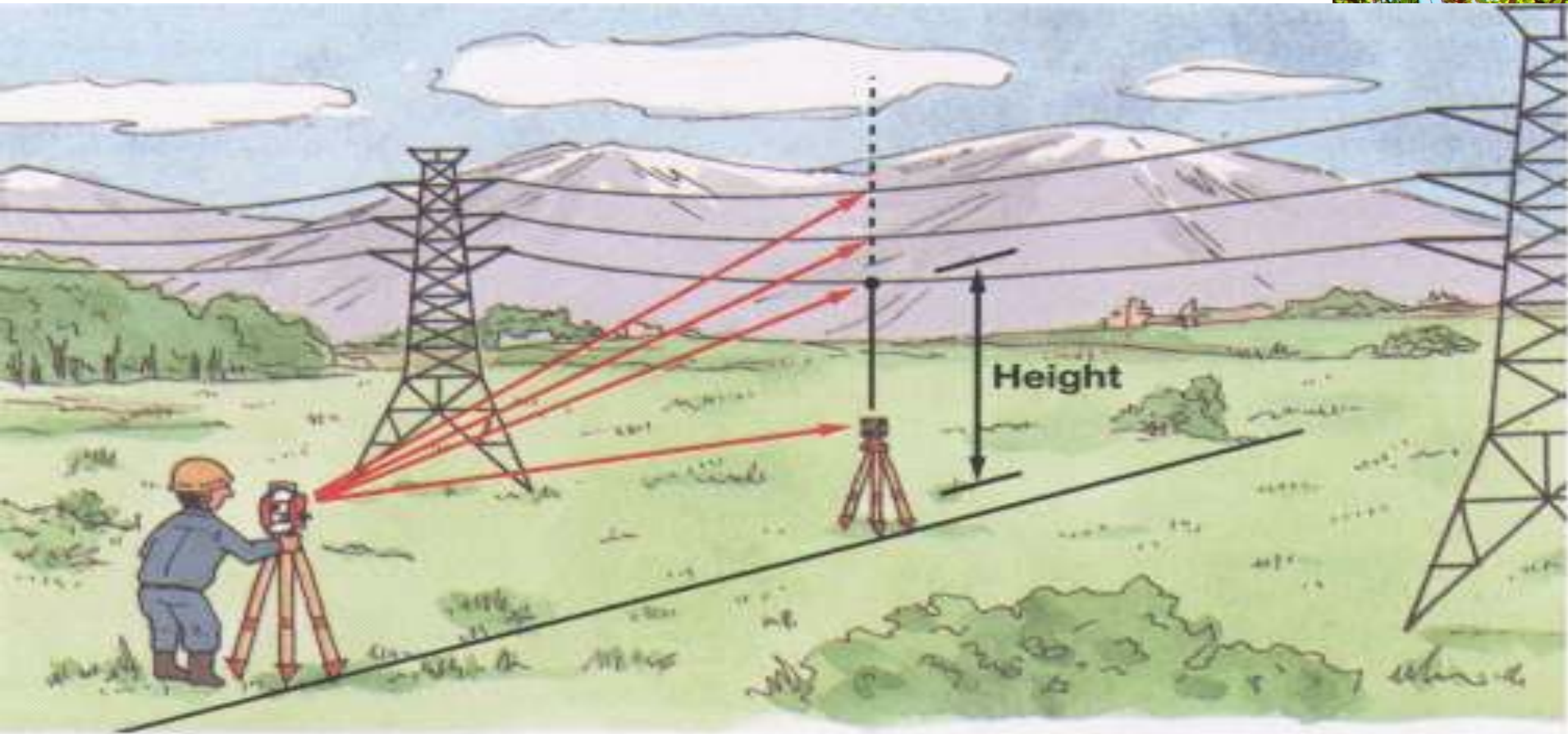
6. Post Processing – Data downloading, conversion

7. Plotting/Map generation.



REM

Remote Elevation Measurement

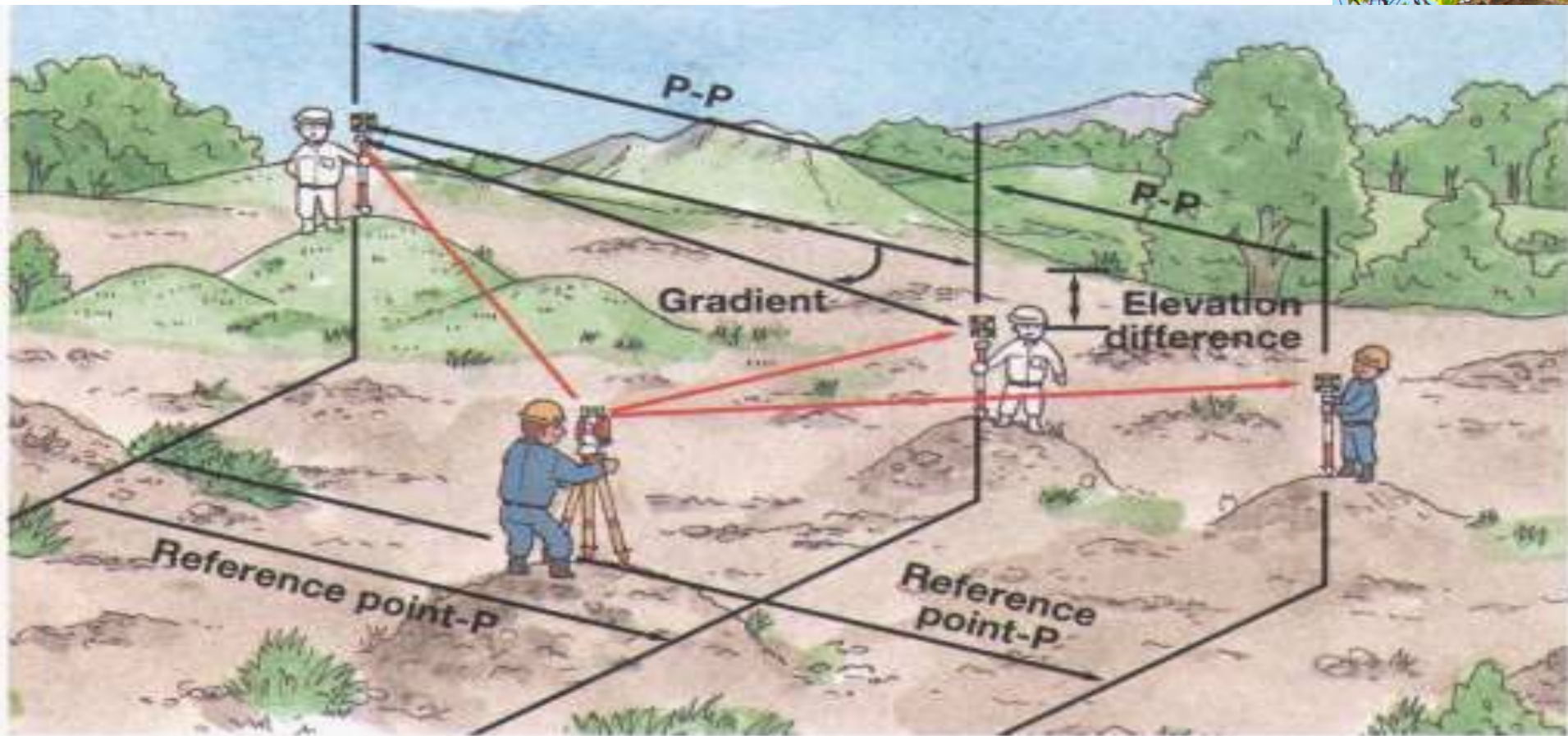


REM

With REM measurement, a Prism (reference point) is set directly below the place to be measured, and by measuring the Prism, the height to the Target object can be measured. This makes it easy to determine the heights of electric power lines, bridge suspension cables, and other large items used in construction.

RDM

Remote Distance Measurement

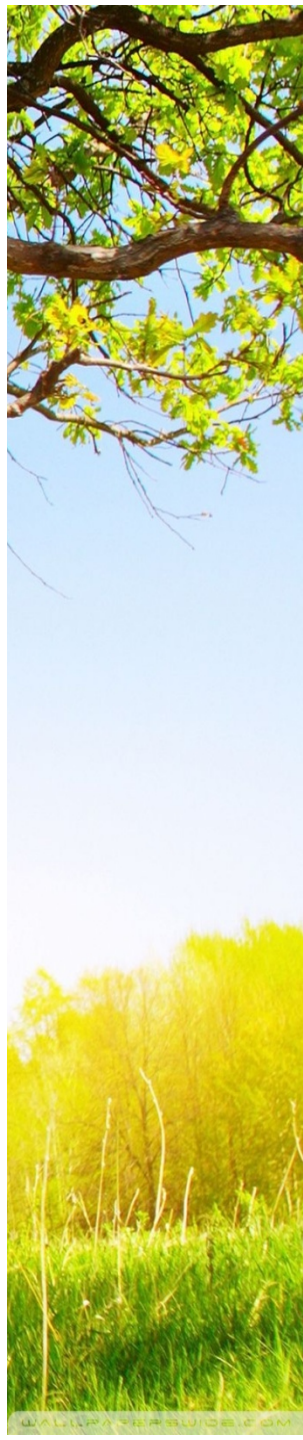


RDM

With RDM measurement, the horizontal distance, slope distance, difference in height and percentage of slope between the reference point and the observation point are measured. The distance between one observation point and another one is measured as well.

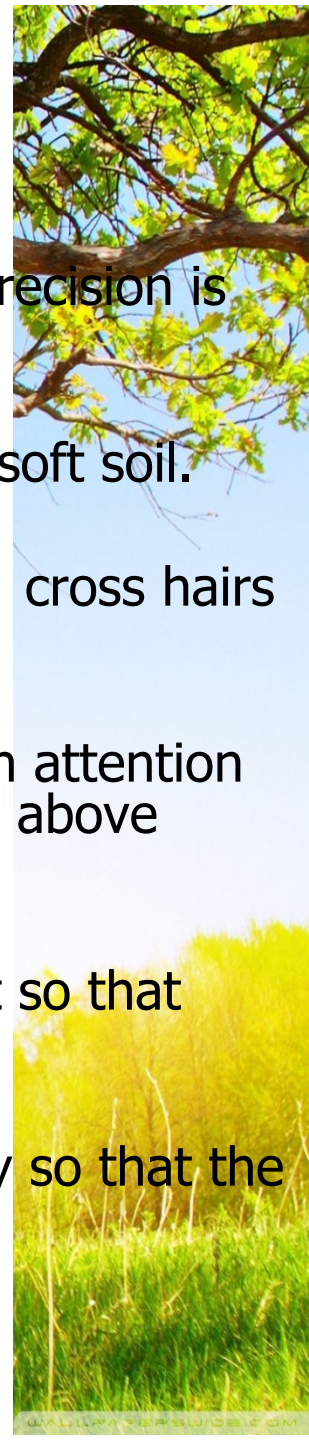
Application of Total station:

1. Updating mapping
2. Topographic survey
3. Hydrographic survey
4. Cadastral survey
5. Project construction survey
6. Road, Rail Survey
7. Mining survey



HOW TO SUPERVISE THE TOTAL STATION WORK

- Have keen observation on the prism boy's attitude. When high precision is required, use the prism tripod, to avoid human error.
- The position of prism shall always be on hard surface instead of soft soil.
- Focusing shall be exactly at the centre of prism, with the help of cross hairs and prism plate.
- While measuring the instrument height and prism height, enough attention shall be diverted. Also, have keen observation while entering the above data.
- Note the location and coordinates of station point and back sight so that specified intermediate points can be checked at later date.
- Obtain a soft copy of field work raw data from the survey agency so that the results can be checked at any time.
- Obtain more number of points to get an average.



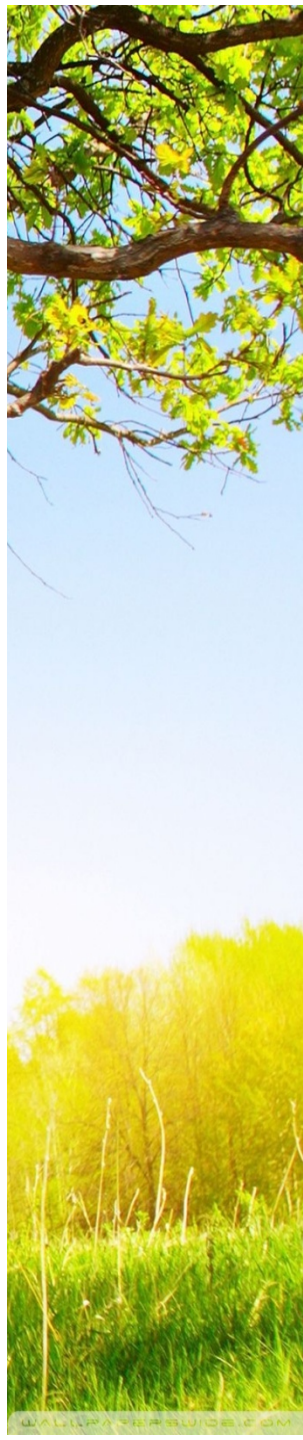
Computer software packages

The following post processing computer software packages are in use for various engineering applications.

1. Arc Pad, arc view, arc info
-conversion from raster to vector form

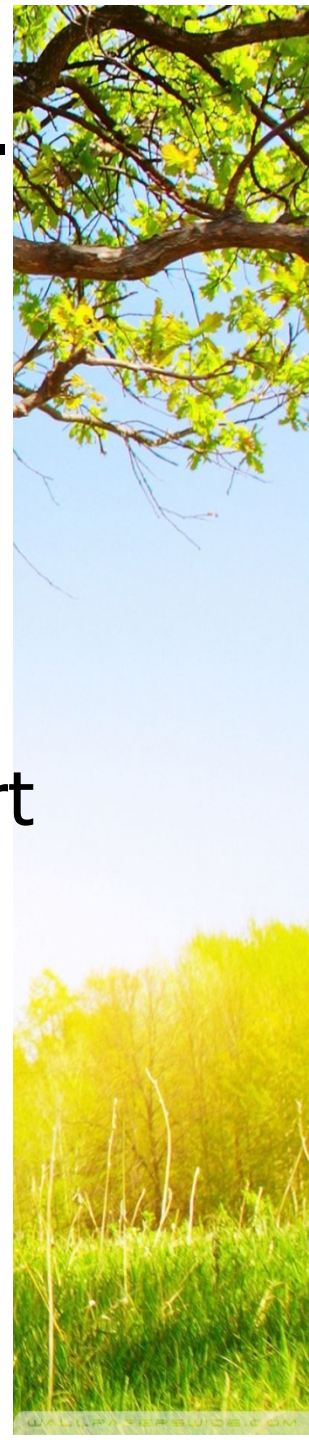
2. Micro Station - Map generation

3. Erdas – Image processing s/w



Limitations:

1. It is not a Rugged instrument (Sensitive).
2. Prism verticality is questionable.
3. Visibility is must.
4. More Expensive.
5. Requires calibration at every six months.
6. Amount of error is greater at short distances.
7. Height of instrument and prism is to fed.
8. Awareness on battery maintenance.
9. To establish north- compass is required.



SAFETY PRECAUTIONS

Focusing directly at the sun, can result - loss of eyesight on the spot.
Use a filter when observing the sun.

Never remove the hand grip carelessly. If the grip is loosely or incompletely attached, the instrument could fall and may cause a serious injury.

Make sure not to short the battery terminals. If these are shorted, the resulting high current would not only damage to the battery, but also start a fire.

If the instrument or battery comes in contact with water, wipe it off as quickly as possible and set it in a dry place for a while. When it is completely dry, put it back in the case.

Never disassemble the instrument, if you find a problem. Contact the dealer.

