

SOME ADVANCE SURVEYING INSTRUMENT

| INSTRUMENT | MODEL NO. | PICTURE |
|---------------|------------------|---|
| Digital level | Focus DL-15 |  A blue and black digital level instrument with a carrying handle and a lens. |
| Total station | Trimble M3 DR 2" |  A yellow and white total station instrument with a large lens and a keypad. |
| DGPS | Trimble R2 TSC3 |  A collage of four images showing the Trimble R2 TSC3 DGPS system: a receiver on a tripod, a receiver on a pole, a handheld controller, and a yellow carrying case. |

LEVELLING

NOTE:

- In present days MSL [Mean Sea Level] in India is established at Mumbai [Arabian Sea beach].
- Bench marks may be four types.
 - I. GTS Bench marks (Measure in 'ft').
 - II. Permanent Bench marks. (Reference to GTS BM) Like PWD , Railways Bench marks.
 - III. Arbitrary Bench marks.
 - IV. Temporary Bench marks.
- Permissible error of leveling in field work :
 - I. In Road survey = $6\sqrt{k}$ (k= distance in km)
 - II. In Railway survey = $4\sqrt{k}$
 - III. In Tunneling survey = $2\sqrt{k}$
- When the staff held in position inverted respect to the ground level Rise will be (-ve) & and fall will be (+ve).

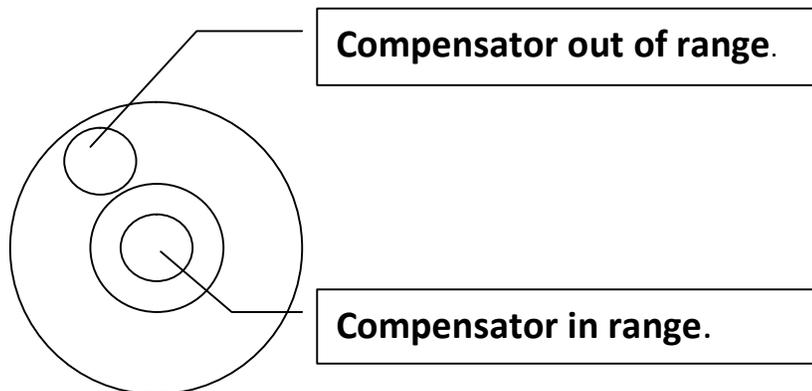
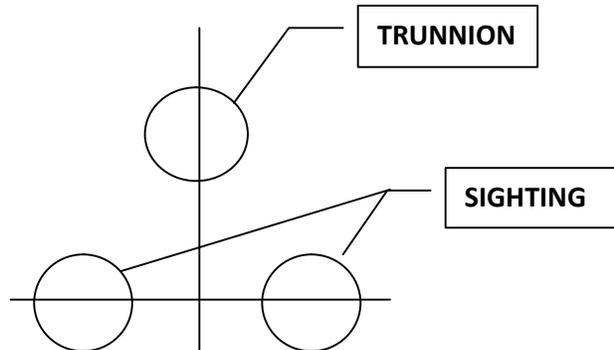
TOTAL STATION

Total Station is one of the most advanced surveying instrument .It's operating system are two types, one is **DOS** base and another is **WINDOWS** base and it's least count may be (1",2",3").

TOTAL STATION = EDM + THEODOLITE

- Function of Total Station:
 - I. Measuring Distance.
 - II. Measuring Angle.
 - III. Stake out.
 - IV. Topography Survey.
- For a Topography survey we have to need a prism or reflector mainly.
- It has two mode for bisecting the object .One is prism mode and another is non prism or DR(direct ranging) modes .
- Stake out: To locate a fixed point for marking the central line and find out the co-ordinate of this point is called stake out.

- Tilting error of a Total station can be eliminated by perfect leveling with the help of trunnion and sighting.



BUBBLE TUBE

- Centering & Leveling: Firstly set up the tripod stand on a fixed point with approximate leveling & centering with eye .After fix the instrument on tripod stand. After that leveling has to done by adjusting the tripod legs. when the bubble is compensator in range position ,ON instrument pressing the green button > General survey > Instrument > Electronic level. After it show the laser on ground. Then fix the laser on that point with help of two legs of tripod stand and again level and centering the instrument simultaneously. Then the centering and leveling will be done. And all the time we have to keep the electronic level range in +10" to -10".
- Job set up + Fixed station by resection method:
ON instrument > General survey > Job > New Job > (create job) > Accept > Measure > Resection >(given all data) > Accept > Given all face value & measure.

DGPS

(Differential Global Positioning System)

- DGPS is a most important and advance instrument of surveying. Surveying work should be done ,when the instrument are connected with 6 satellite and more same as GPS.
- Segment of DGPS: Controller & Receiver .
- Error of DGPS:
 - I. Obstruction.
 - II. Communication.
 - III. Elevation mask.
- When the instrument is connect with 6 satellites then it gives DOP values. They are PDOP, VDPO, HDPO.
- Working mode of DGPS.
 - I. Static.
 - II. PPK (Post processed kinematic) 8 -10 mm.
 - III. RTK (Real time kinematic) 1-2 cm.
- For establishing co-ordinate of a point we use static mode.

- For a Topography survey we use PPK mode.

- DGPS all instrument:

For base station:

- I. Tripod stand.
- II. Optical plummet.
- III. Tribrach Adapter.
- IV. Base or Receiver.

For Rover:

- I. Bipod stand.
- II. Range pole. (Made of carbon fiber)
- III. Roaming Rover.

- Settings in controller:

Start > Setting > Survey style >
Static/PPK/RTK > Accept > Base option >
Survey type (RTK/RTK & Infill RTK & login) >
Fast static / PP Kinematic > Antenna type > R2
internal > Give data > Enter > Accept > (15s &
10°) > Accept > Rover option > First static >
same as give data.

- Job Setup:

Press green button & ON the controller >
General survey > Job > New job > Job name ,
co –ordinate (select from library) > System
(World Wide or UTM) > Zone > 45°N >
Datum (WGS 1984 7P) > Project height >
Enter > Store.

- Measuring :

ON Base > Start Base Receiver > Give all data .

After that,

ON roaming Rover > Measure points > Give all data > Enter & Wait for Initialization > After measure points.

- NOTE:
- PDOP value <3 is very good for work
& must be in <6.
- UTM (Universal Transverse Mercator).
- WGS (World Geodetic System).
- GNSS (Global Navigation Satellite System).
- GPS (Global positioning System).
- Features code:
 - i. Center of road = CR
 - ii. Left side of road = LR
 - iii. Right side of road = RR
 - iv. Embankment bottom = EB
 - v. Embankment top = ET
 - vi. Tree = TR
 - vii. Light post = LP

- viii. Telephone post = TP
- ix. Natural Surface = NS
- x. Building = B
- xi. Hut = H
- xii. Building Corner = BC
- xiii. Canteen = CAN
- xiv. Girls Hostel = GH
- xv. Boys Hostel = BH
- xvi. Gate = G
- xvii. Control Point = CP
- xviii. Temporary Point = TP
- xix. Workshop Building = WSB
- xx. Bathroom = BT
- xxi. Boundary Wall = BW
- xxii. Chamber = CH
- xxiii. Septic Tank = SP
- xxiv. Direction Board =DB
- xxv. Kilometer Pillar = KMP
- xxvi. Drain Bottom = DRB
- xxvii. Drain Top = DRT

- xxviii. Tube Well = TB
- xxix. Main Gate = MG
- xxx. Kutcha Road Center = KC
- xxxi. Kutcha Road Left = KL
- xxxii. Kutcha Road Right = KR
- xxxiii. Moram Road Left = ML
- xxxiv. Moram Road Right = MR
- xxxv. Moram Road Center = MC