

Chapter-5

Transits and Theodolites

Transit and Theodolite are surveying instruments designed to precisely measure horizontal and vertical angles.

- Establish straight and curved lines
- Establish horizontal and distances (stadia)
- Establish elevation when used as a level

Transits:

- Four screw leveling base
- Metallic horizontal and vertical circles, read with vernier scale
- Plumb bob

Theodolite:

- 3 screws leveling base
- Glass horizontal and vertical circles, read directly or through micrometer
- Right angle prism (optical plummet)

5.2 Electronic Theodolite

- Electronic read out 1" eliminate mistakes
- Precision 0.5" – 20"
- Zero is set by button
- Repeat angle averaging
- Replacing optical (less expensive to purchase and maintain)

5.4 Repeating Optical Theodolite

- Has 3 screw leveling head
- Optical plummet, light weight, glass circles, micrometer
- Equipped with compensating device (automatic horizontal)
- 90° or 270° vertical angle of horizon
- Micrometer to read H + V angles
- 2 independent motion (upper and lower)

5.6 Direction Optical Theodolite

- Has only one motion (upper)
- To find an angle
 - Read the initial direction
 - Read the final direction
 - Determine the difference between two
- Direct optical theodolite generally more precise some models can read directly 0.2” and estimate 0.1”
- Several sighting are required for precision purpose
- Distribute initial reading around the circle to minimize the effect of circle graduation distribution. So initial reading near 0, 45, 90, 135,

5.7 Angle measurement with a Direction Theodolite

See Fig. 5.11

5.10 Laying off angles

5.11 Prolonging a Straight Line

5.12 Bucking in (Interlining)

5.13 Intersection of Two Straight Lines

5.14 Triangulation

5.15 Prolonging a Line past an Obstacle