Tishk International University
Civil Engineering Department
Surveying II

Practical Part

Report -3-

Centering and Leveling of Theodolite

Advantages of Theodolite

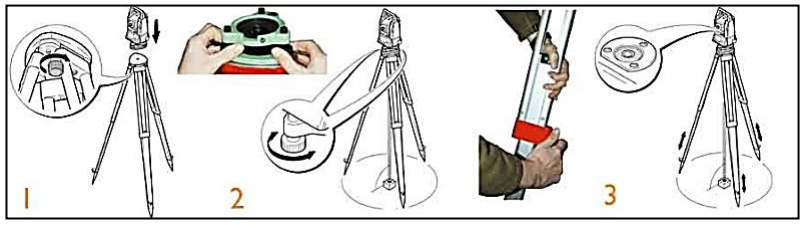
Theodolites have many advantages when compared to other leveling instruments:

- Greater accuracy.
- The importance of using the theodolite is to determine angles, distances, depths, etc. To know how the ground is and how to construct there.
- The theodolite is a useful tool. The instrument is capable of finding both vertical and horizontal angles, and when is combined with technical studies also can determinate horizontal distances and a differentiation elevations.
- Internal magnifying optical system.
- Electronic readings.
- Horizontal circles can be instantly zeroed or set to any other value.
- They are unaffected by wind or other weather factors, and they can be used on both flat ground and sloped ground.

Setup of the theodolite!

1. First, the survey team puts a mark in the floor, this point will be the vertex of the angle that will be determined, and this point will be the station “A”.

2. Then, the survey team places the tripod over the station “A”, opening the feet and secure them.



Approximate leveling by Tripod

- The **legs of the tripod stand are placed well apart and firmly fixed on the ground**.
- Then, approximately leveling is done using this stand, **To do this, two legs are kept firmly fixed on the ground and third is moved in or out**, clockwise or anticlockwise, so that the **bubble is approximately at the centre of its run.**

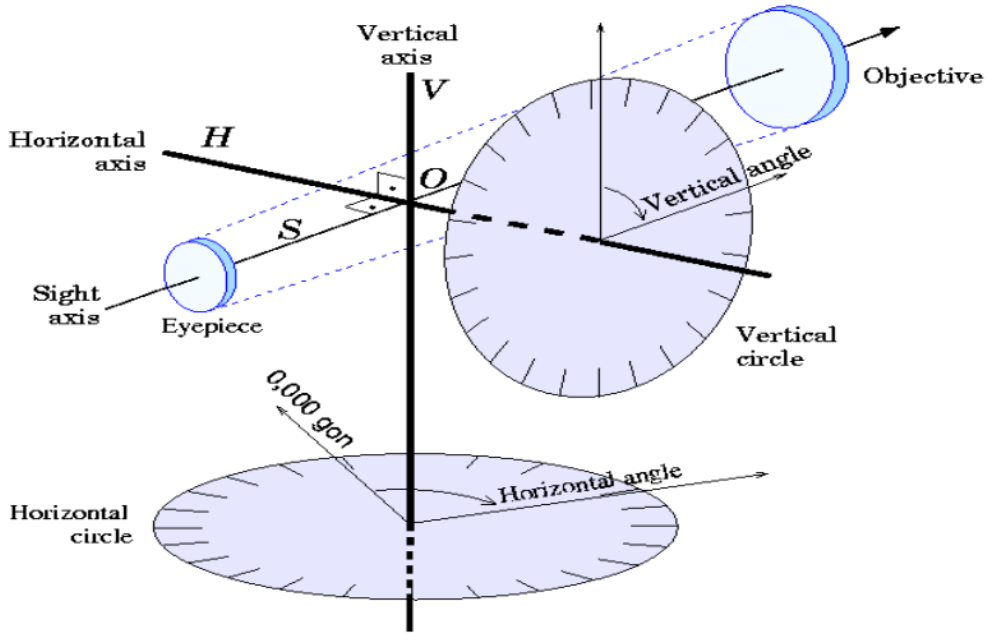
Setup of the theodolite!

3. Next, the survey team takes out the theodolite of its case and adapts it over the tripod with the screw and then elevates the theodolite up to survey's eyes.

4. The theodolite has to stay exactly over the mark of the floor; this can be possible putting a plumb tied with a fine wire below the theodolite and stays on the point.

Setup of the theodolite!

5. The survey must observe through the optical plummet to make sure the mark is centered.

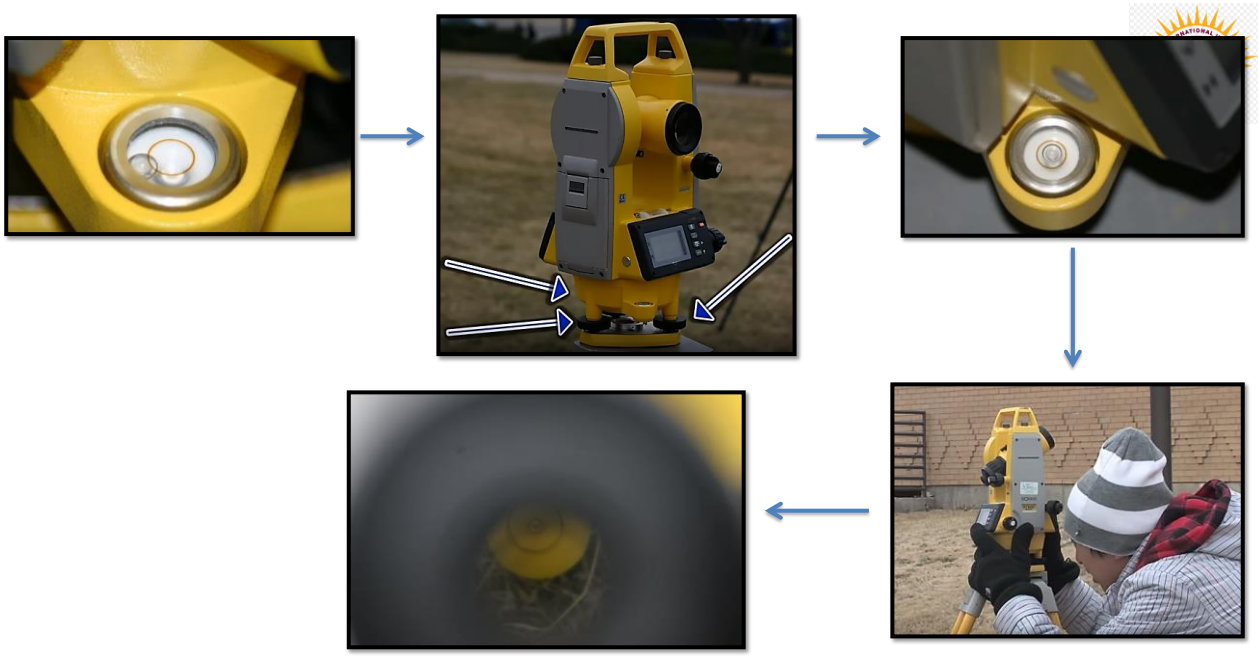


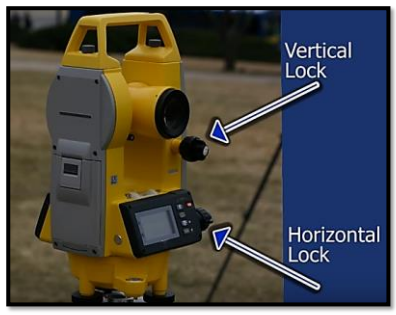
Setup of the theodolite!

6. To end the leveling of the theodolite is necessary to be leveled the tree bubble levels with the level's screws.

Turning on!

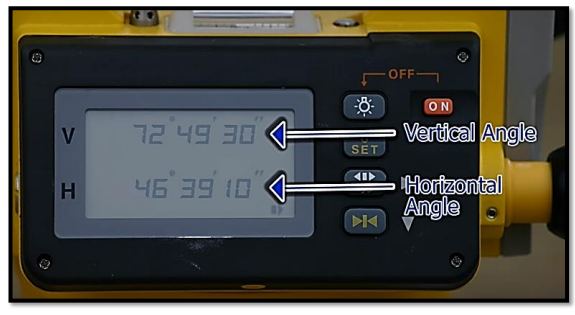
7. First put the batteries in its place, then turn on the theodolite and last, take the cover of the lens.




Vertical
Lock
Horizontal
Lock


OFF
ON
V
H
SET


OFF
ON
V
72 49 30
H
46 39 10
SET
Hold Angle
(Press Twice)


OFF
ON
V
72 49 30
Vertical Angle
H
46 39 10
Horizontal
Angle
SET

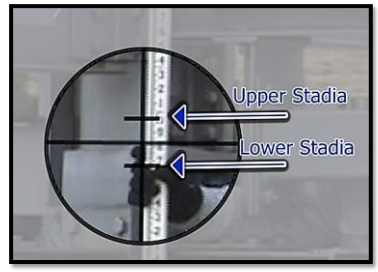
Setup of the theodolite!

Make a survey

0 Set

8. Then, when the angle appears in the screen write the number, then press the button twice and the screen will show 0’00’00’’.

Note: write the upper stadia and the lower stadia to make studies.



Collimation in altitude

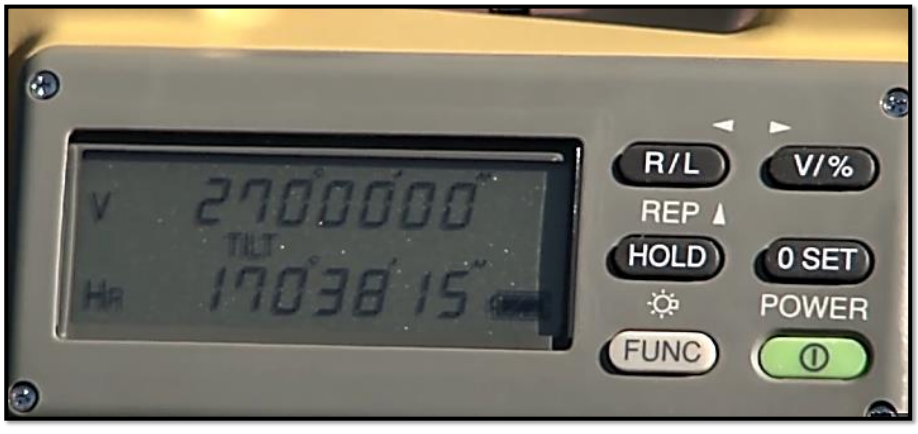
1. Set Theodolite in FL

2. Vertical angle = 90 00 00

3. Mark a horizontal line

4. Place the instrument in FR and plunge the telescope and set it on 270 00 00

5. Set it on 270 00 00

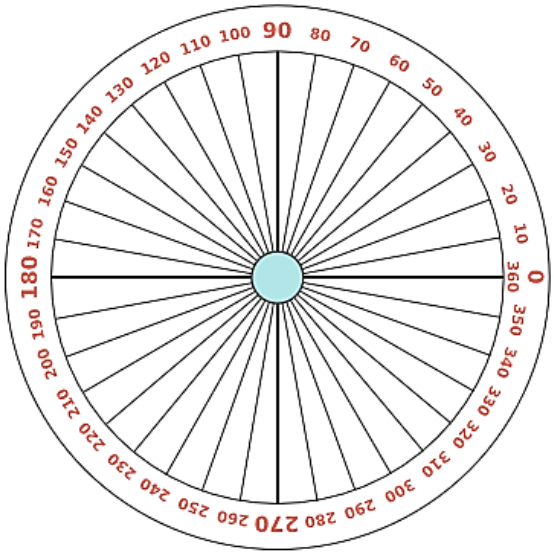


6. Place the second mark horizontal line

7. The acceptable accuracy number is should be smaller than 10 mm, here it is seen to be 5 mm.

Quite acceptable

Angle Measurement



- As we can see in the drawing, a full circle is divided into 360 parts, each of them denoting one degree, which is designated as 1°. So, a full angle has 360°, a straight angle has 180° and a right angle has 90°. The acute angles have less than 90° and the obtuse ones more than 90°, but less than 180°.

$$\left.\begin{array}{rcl} 1^\circ & = & 60' \\ 1' & = & 60'' \end{array}\right\} \Longrightarrow 1^\circ = 60 \cdot 60'' = 3600''$$

Sta.	Point	F.L.	F.R.	Angle F.L.	Angle F.R.	Average FL&FR
0	1	00˚ 00’ 00’’	180˚ 10’ 00’’	35˚ 13’ 20’’- 00˚ 00’ 00’’ = ***35˚ 13’ 20’’***	215˚ 26’ 00’’- 180˚ 10’ 00’’ = ***35˚ 16’ 00’’***	(35˚ 13’ 20’’+ 35˚ 16’ 00’’)/2 = 35˚ 14’ 40’’
	2	35˚ 13’ 20’’	215˚ 26’ 00’’			
	3	61˚ 19’ 00’’	241˚ 26’ 00’’	61˚ 19’ 00’’- 35˚ 13’ 20’’= ***26˚ 05’ 40’’***	241˚ 26’ 00’’- 215˚ 26’ 00’’ = ***25˚ 05’ 40’’***	(26˚ 05’ 40’’ + 25˚ 05’ 40’’)/2 = 25˚ 59’ 50’’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END
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