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Topic 1: Angular Measurements

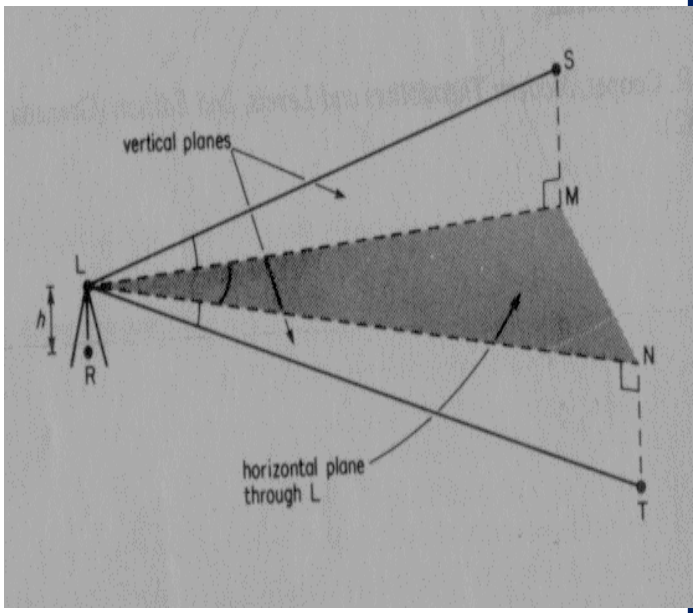
Contents

- ✓ Horizontal & vertical angles
- ✓ Directions/bearings
- ✓ Application of angular measurements

Observation Procedure

Principle of Angle Measurement

Figure below shows two points S and T and a theodolite set up on point R. The horizontal angle at L between S and T is angle MLN, where M and N are the vertical projections of S and T on to the horizontal plane through L. The vertical angles to S and T from L are angle SLM (and angle of elevation) and angle TLN (an angle of depression). In order to measure horizontal and vertical angles, the theodolite must be set over point R using a plumbing device and must be levelled to bring the angle reading systems of the theodolite into appropriate planes



Horizontal Angles

The mean horizontal circle readings are obtained by averaging the FL and FR readings. To simplify these calculations, the degrees of the FL readings are carried through and only the minutes and the seconds values are averaged. These mean horizontal circle readings are then reduced to the **R.O** in the reduced mean column to give the horizontal angles. The final horizontal angles are obtained by meaning the values obtained from each round.

By calculating the mean of the horizontal and vertical angles, we are actually removing or adjusting the horizontal and vertical collimation errors.

Booking and Reduction of Horizontal Angles

Stn	Obj	Face left			Face Right			Simple mean			Reduced mean		
LS 498	LS 497	000	00	00	180	00	07	000	00	04	000	00	00
	TP1	089	17	52	269	18	01	089	17	57	089	17	52
	RO	00	00	01	00	00	17	000	00	09	000	00	00
										-5			

$$Simple\ Mean = \frac{FL + FR \pm 180°}{2}$$

$(+)$ ***if*** $FL > 180°$ ***or*** $FR < 180°$

$(-)$ ***if*** $FL < 180°$ ***or*** $FR > 180°$

Uses of Angles

Applications of Angles

- ✓ The fields in which angular measurements can be applied are:
- ✓ Triangulation
- ✓ Topographic detail surveys and tacheometry
- ✓ Trigonometric heighting
- ✓ Geodetic control surveys
- ✓ Traversing
- ✓ Setting out surveys
- ✓ Construction and other engineering surveys
- ✓ Cadastral surveys
- ✓ Deformation surveys
- ✓ Mine surveys (Surface and underground surveys)