

# *Theodolite*

*Lecturers: Berchuk V.Y.  
Gutareva N.Y.*

# Plan?????

- 1. Definition;***
- 2. Parts of the instrument;***
- 3. The principle of operation;***
- 4. Tripod;***
- 5. Setup.***

# Definition

A **theodolite** is a precision instrument for measuring angles in the horizontal, vertical planes and distances with a help of stadia method.



Theodolite TE-05



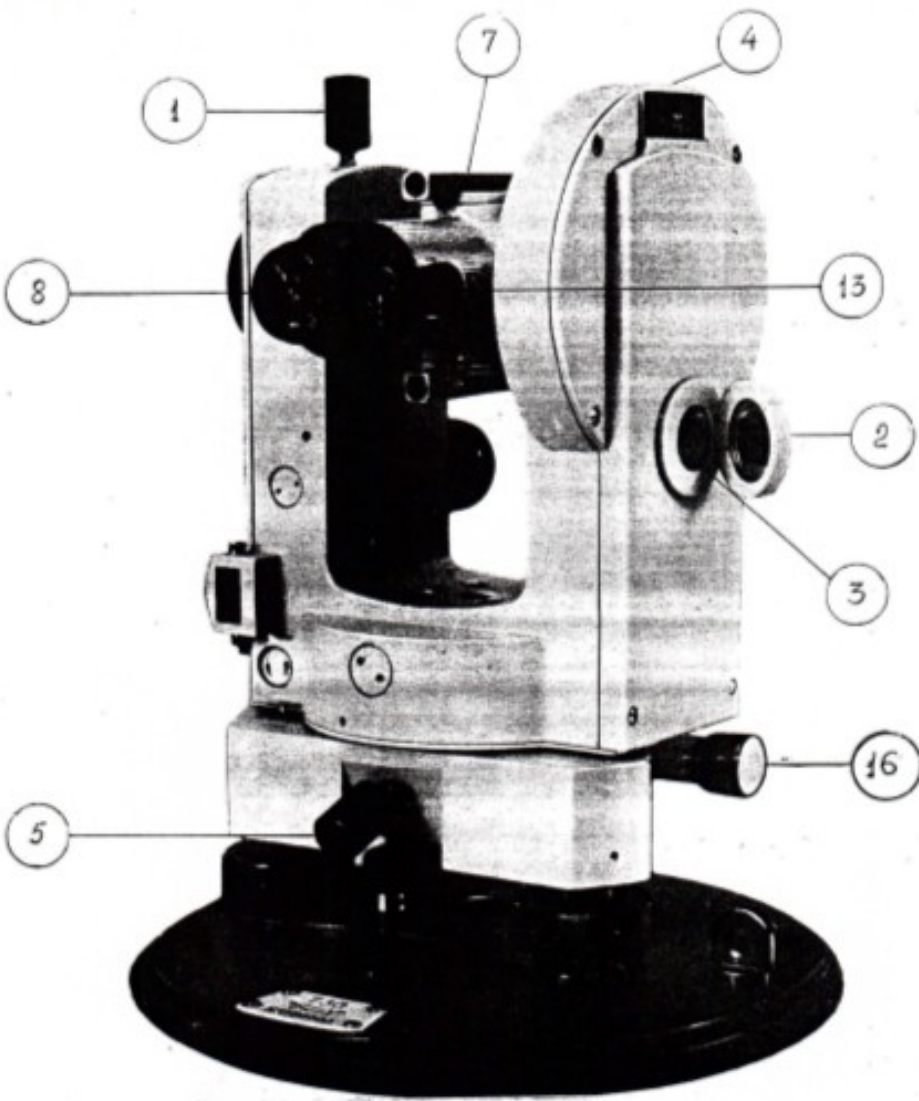
Theodolite OT-05



Theodolite 2T30

# Parts of the instrument of the first type

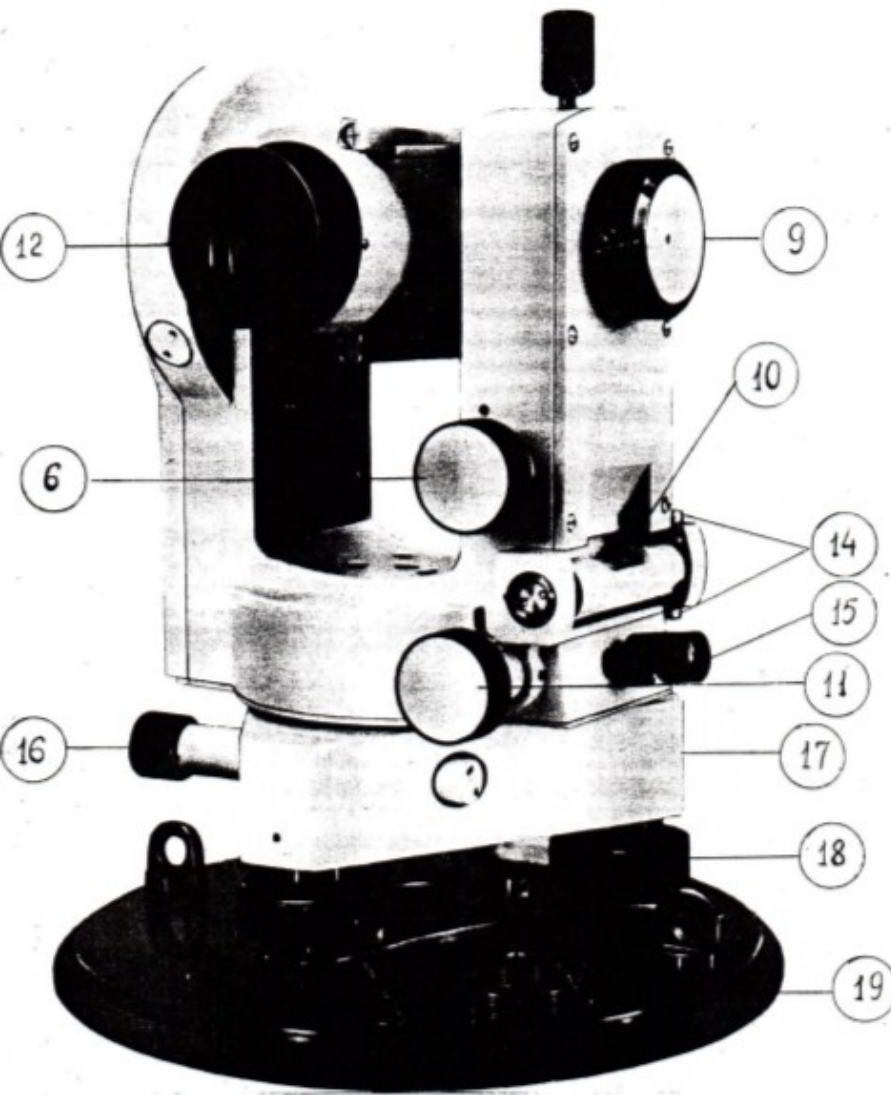
A theodolite consists of:



- 1 - telescope clamping screw;
- 2 - light-up mirror;
- 3 - illuminator;
- 4 - vertical circle (under casting);
- 5 - limb clamping screw;
- 6 - limb aiming screw;
- 7 - collimator sight (lower) (optical sighting);
- 8 - telescope's eyepiece (eyepiece of the sighting telescope);
- 13 - reading-off microscope eyepiece (eyepiece of the read-out microscope).

# Parts of the instrument of the second type

A theodolite consists of:



6 - telescope aiming (tangent) screw;

9 - focusing screw (rack ring or pinion);

10 - level at horizontal circle alidade;

11 - alidade aiming (upper tangent) screw;

12 - telescope objective;

14- cylindrical level adjustment screws;

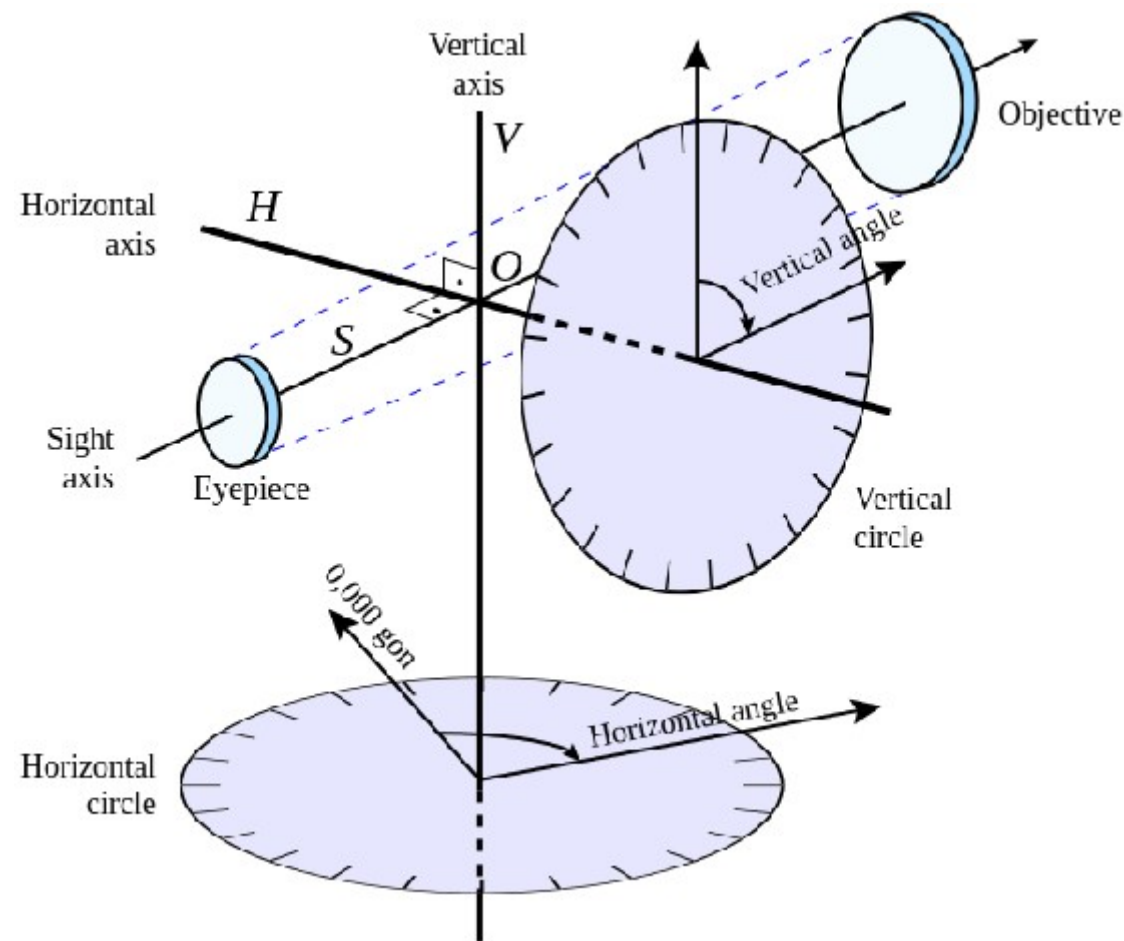
15 - orizontal circle alidade (upper) clamping screw;

16 - limb aiming (lower tangent) screw;

17 - levelling base; 18 -levelling screws;

19 - base of the metal case

# The principle of operation



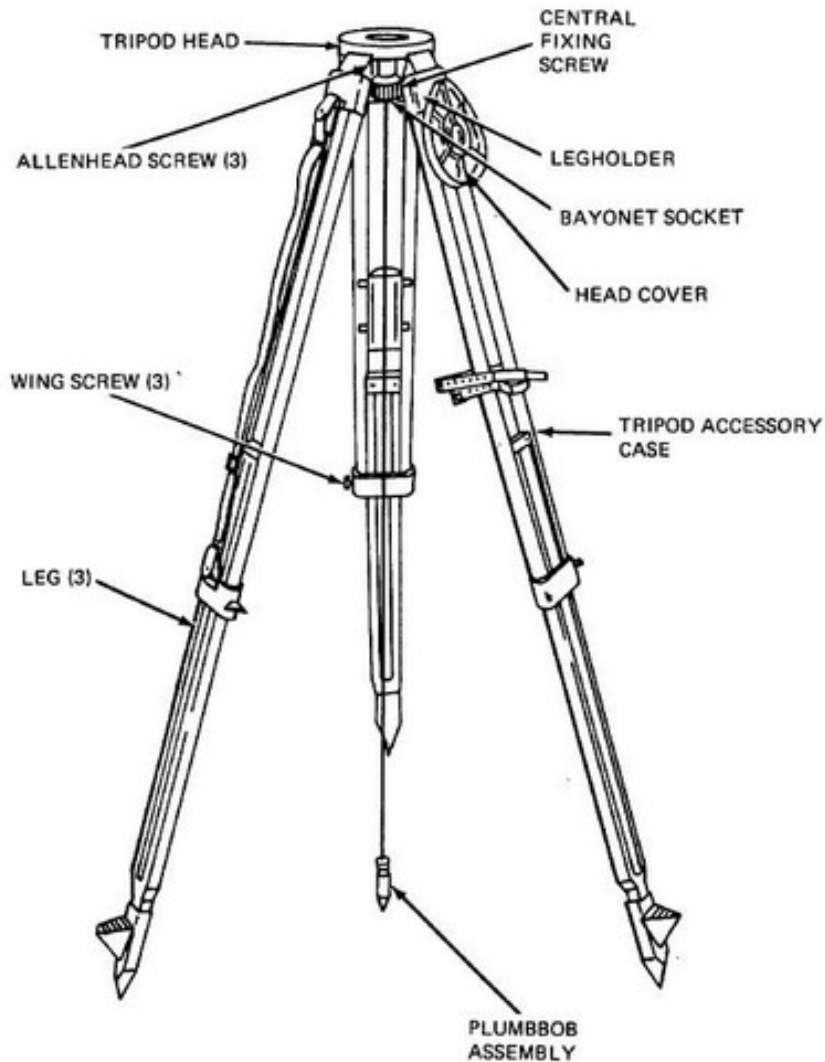
Theodolite consists of a movable telescope mounted within two perpendicular axes — the horizontal or trunnion axis, and the vertical axis. When the telescope is pointed at a target object, the angle of each of these axes can be measured with great precision, typically to seconds of arc.

# *Tripod*



A surveyor's tripod is a device used to support any one of a number of surveying instruments, such as theodolites, total stations, levels or transits.

# Tripod



Many modern tripods are constructed of aluminum, though wood is still used for legs. The feet are either aluminum tipped with a steel point or steel. The mounting screw is often brass or brass and plastic. The mounting screw is hollow to allow the optical plumb to be viewed through the screw. The top is typically threaded with a 5/8" x 11 tpi screw thread.



# Setup

## 1.1 Tripod setup

We learn how to set up the tripod and roughly center and level it over a small positioning mark, such as a divot in a penny glued to the floor, a nail head, or any other small fixed object.



# Setup

## 1.1 Tripod setup

- (a) Place the tripod over the positioning mark, setting the legs at a convenient height, and roughly center and level the tripod head by eye.
- (b) Suspend the plumb bob included in the theodolite box from the hanger beneath the tripod head.
- (c) Readjust the tripod to center the plumb bob over the positioning mark by moving all three tripod feet by the same amount in the same direction.
- (d) Firmly x the tripod feet in position. If necessary, adjust the heights of the tripod legs to re-center the tripod within 1 cm of the reference mark.
- (e) Tighten the leg clamps on the tripod.

# Setup

## 1.2. Seating and centering the theodolite

(a) Examine how the tripod is seated in its box.

(b) Lift the theodolite out of its box by the handle never by the telescope.

(c) Place the theodolite on the tripod head and screw in the centering screw while holding onto the handle.

Leave the centering screw just loose enough that the theodolite can still slide around the tripod head.

(d) Looking through the optical plummet, focus the centering index mark. Slide the theodolite on the tripod head until the reference mark is centered in the optical plummet.

(e) Fully tighten the centering screw. Look through the optical plummet again and adjust the theodolite foot screws for ne alignment with the reference mark.