Ex.NO: 2	USE OF DUMPY OF LEVEL - LIMITATION - HANDLING – SHIFTING- SIMPLE LEVELLING - TEMPORARY ADJUSTMENTS
DATE:	

OBJECTIVE:

Study of levels and levelling staffs and its adjustments.

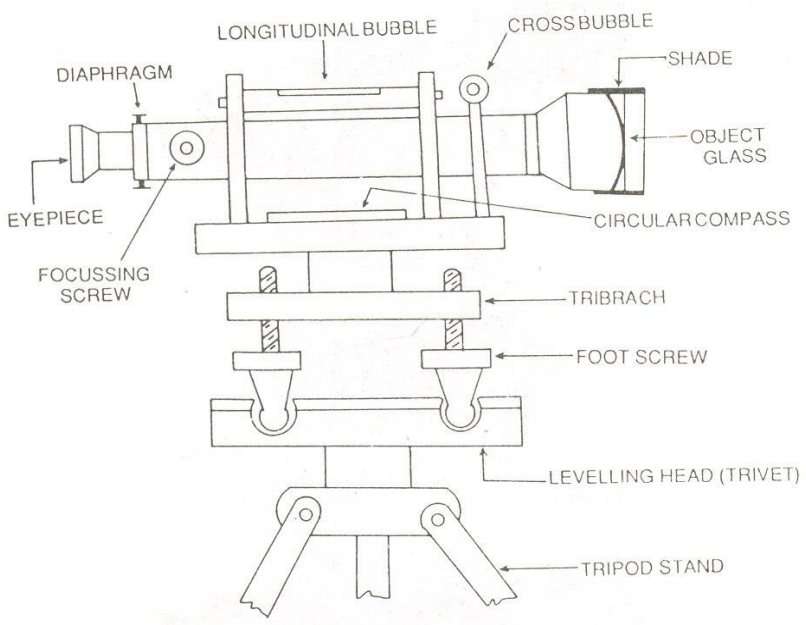
ACCESSORIES NECESSARY FOR LEVELLING

1. Dumpy Level
2. Levelling Staff.
3. Ranging rods
4. Arrows
5. Pegs
6. Chain or tape

DUMPY LEVEL

The dumpy level has a provision at the bottom to fix on the tripod stand. The levelling head contains two parallel plates. Bottom plate is called a Trivet. Top plate is called as a Tribrach. Three foot screws are used for making the telescope horizontal.

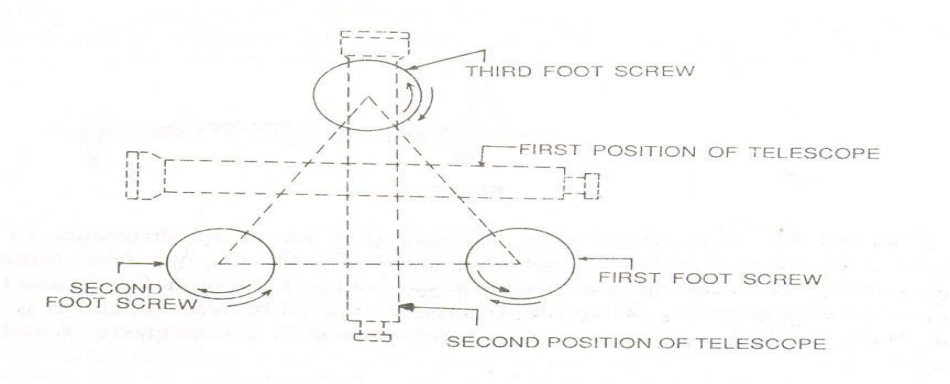
It also consists of a compass. This compass is used for finding the magnetic bearing of any line. It consists of a telescope. The telescope consists of an eyepiece, a diaphragm and an objective. The rays from any object pass through the objective and an image falls on the diaphragm. The diaphragm also contains cross hairs. The reading coinciding with horizontal collimating hair is the reading to be noted.



It also contains two bubble tubes. One is called longitudinal bubble and another is called cross bubble. When working with the level, the bubbles have to be brought to centre.

LEVELLING THE DUMPY LEVEL

1. Make the telescope parallel to any two foot screws.
2. Rotate both the screws inward and both the screws outward to bring the longitudinal bubble at the centre.
3. Turn the telescope to the earlier position and adjust the third screw to bring to the centre.
4. Follow the above steps many times until the longitudinal bubble remains at the centre for all positions of telescope.



Focusing the eye piece

A piece of white paper is held in front of the objective and eyepiece and the eyepiece is moved to and fro, until the cross hairs are clearly visible.

Line of collimation

It is an imaginary line passing through the intersection of cross hairs and optical centre of objective.

Axis of Telescope

It is an imaginary line passing through the optical centre of eyepiece and optical centre of objective.

LEVELLING STAFF

The leveling staff is a graduated wooden rod used for measuring the vertical distance between the points on the ground and the line of collimation. Leveling staves are classified into two groups: (i) The Target Staff, and (ii) The Self- Reading Staff.

1. Target staff

The target staff consists of a movable target. The target is provided with a vernier which is adjusted by the staff man, according to directions from the level man, so that the target coincides with the collimation hair. After this, the reading is taken by either the staff man or the level man. This staff is used for long sightings.

2. Self – reading staff

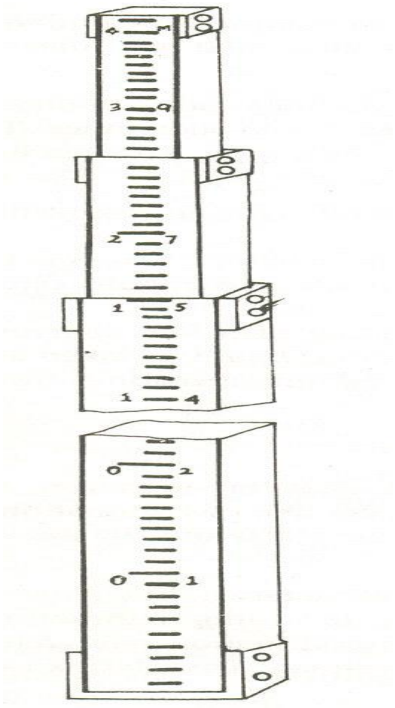
The following are the different types of self – reading staff:

(a) Sop-with Telescopic staff:

Such a staff is arranged in three lengths placed one into the other. It can be extended to its full length by pulling. The top portion is solid and of length 1.25 m, the central box portion is hollow and of length 1.25 m, and the bottom box portion is hallow and 1.5 m long. The total length of the staff is 4 m. The top portions are held in the vertical position by a brass spring catcher. The staff is graduated in such a way that smallest division is of 5 mm (0.005 m). The values in metres are marked in red on the left and those in decimeters are marked in black on the right.

(b) Folding Metric Staff

The staff is made of well–seasoned timber, and is of width 75 mm, thickness 18 mm, and length 4 m. It is divided into two parts of length 2 m having a locking arrangement. It can be folded or detached when required. It is graduated like the telescopic staff



Adjustment of the level

The level needs two type of adjustment

1) Temporary adjustment and

2) Permanent adjustment

Temporary adjustments of dumpy level

These adjustments are performed at each set-up the level before taking any observation.

A) Setting up the level: This includes

1) Fixing the instrument in the tripod:

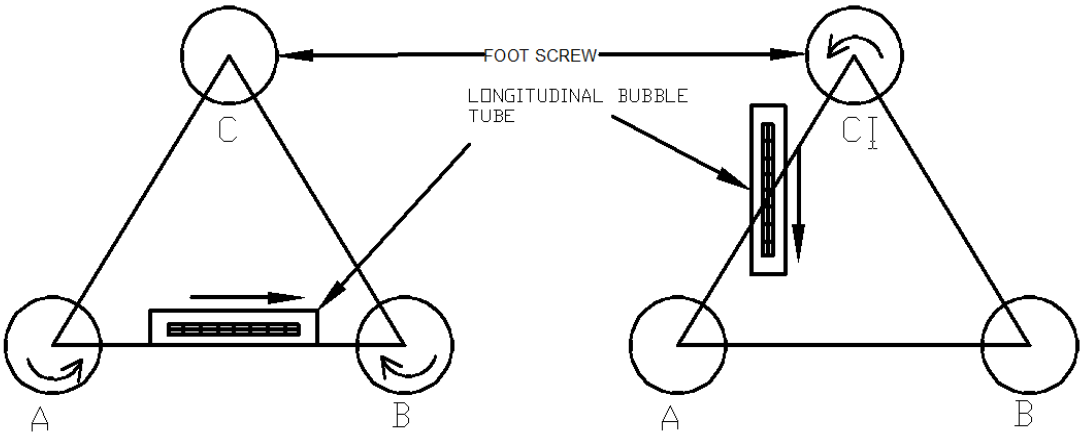
The tripod legs are well spread on the ground with tripod head nearly level and at convenient height. Fix up the level on the tripod.

2) Leg adjustment:

Bring all the foot screws of the level in the centre of their run .Fix any two legs firmly into the ground by pressing them with hand and move the third leg to leg to right or left until the main bubble is roughly in the centre. Finally the legs are fixed after centering approximately both bubbles. This operation will save the time required for leveling.

B) Levelling:

Levelling is done with the help of foot screws and bubbles. The purpose of levelling is to make the vertical axis truly vertical. The method of leveling the instrument depends upon whether there are three foot screws or four foot screws. In all modern instruments three foot screws are provided and this method only is described.



1. Place the telescope parallel to pair of foot screws.
2. Hold these two foot screw between the thumb and first finger of each hand and turn them uniformly so that the thumbs move either toward each other until the bubble is in centre.
3. Turn the telescope through 90°so that it lies over the third foot screw.
4. Turn this foot screw only until the bubble is centered.
5. Bring the telescope back to its original position without reversing the eye piece and object glass ends.

6. Again bring the bubble to the centre of its run and repeat these operation until the bubble remains in the centre of its run in both position which are at right angle to each other.
7. Now rotate the instrument through 180°, the bubble should remain in centre provided the instrument is in adjustment: if not, it needs permanent adjustment.

c) Focusing the eye piece:

To focus the eye piece, hold a white paper in front of the object glass and move the eye piece in or out till the cross hairs are distinctly seen. Care should be taken that the eye piece is not wholly taken out ,sometimes graduation are provided at the eye piece and that one can always remember the particular graduation position to suit his eyes, This will save much time of focusing the eye piece.

(d) Focusing the object glass:

Direct the telescope to the leveling staff and on looking through the telescope, turn the focusing screw until the image appears clears and sharp. The image is thus formed inside the plane of cross hairs, Parallax, if any is removed by exact focusing. It may be noted that parallax is completely eliminated when there is no change in staff reading after moving the eye up and down.

RESULT:

Thus the levels and levelling staffs and its adjustments were studied.