

SURVEYING-I

Compass Surveying

Compass Surveying

- In Compass survey chain or tape is used for linear measurements and compass is used for fixing direction.
- In compass freely suspended magnetic needle directs to north- south and the bearing of line is obtained by line of sight.

Compass Surveying....

- When large area are involved, compass surveying is used.
- Traversing is that type of survey in which a number of connecting survey lines form the frame work and the directions and lengths of the survey lines are measured with the help of an angle measuring instrument and a tape respectively.
- When the lines form a circuit which ends at the starting point, it is known as a closed traverse.
- If the circuit ends elsewhere, it is said to be an open traverse.

Types of North

True North: The direction of North pole from the observer

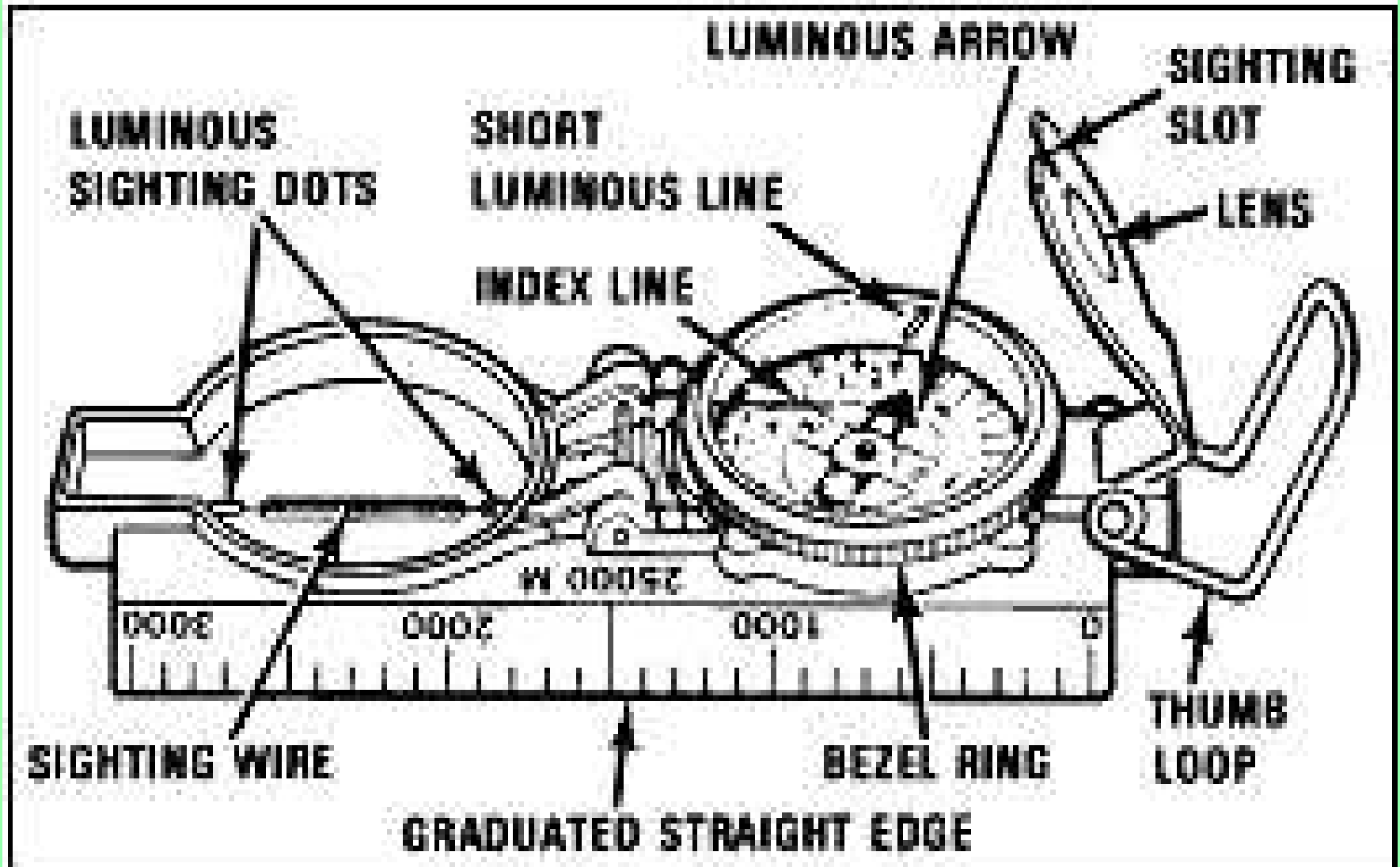
Grid North: The direction in which the grid lines point towards the top of map.

Magnetic North: It is the direction in which the compass needle points towards the magnetic pole.

Compass



Parts of Compass



Instruments used for compass surveying:

The various instruments used in the compass survey are

:

- Prismatic compass
- Tape
- Ranging rods
- Tripod
- Arrows

Prismatic Compass

- Prismatic Compass comprises of a magnetic needle attached to the circular ring made up of aluminium.
- The needle is on the pivot and will orient itself in the magnetic meridian. Therefore the north and south ends of the ring will be in this direction.
- The line of sight is defined by the objective vane and the eye slit, both attached to the compass box.

- The object vane consist of a vertical hair attached to a suitable frame while the eye slit consist of a vertical slit cut in to the upper assembly of the prism unit, both being hinged to the box.
- When an object is sighted, the sign vanes will rotate with respect to the N-S end of ring through an angle which the line makes with the magnetic meridian.

- A triangular prism is fitted below the eye slit, having suitable arrangement for focusing to suit different eye sight.
- The readings increase in clockwise direction from 0° at South end 90° at West end 180° at North end and 270° at East end.

- The object vane frame can be folded on the glass lid which covers the top at box.
- The object vane presses against a bend lever which lifts the needle of the pivot and holds it against the glass lid.
- When bright objects are sighted dark glass may be interposed in to the line of sight.

Adjustments of Prismatic Compass:

The following are the adjustments usually necessary in the prismatic compass:

- Centering
- Leveling
- Focusing the prism.

CENTERING:

- The center of the compass is placed vertically over the station point by dropping a small piece of stone below the center of the compass, it falls on the top of the peg marking that station.

LEVELLING:

- By means of ball and socket arrangement the Compass is then leveled the graduated ring swings quite freely. It may be tested by rolling a round pencil on the compass box.

FOCUSSING THE PRISM :

- The prism attachment is slid up or down focusing till the readings are seen to be sharp and clear.

Observing Bearing:

- The compass centered over station A of the line AB and is leveled.
- Having turned vertically the prism and sighting vane, raise or lower the prism until the graduations on the rings are clear and look through the prism.
- Turn the compass box until the ranging rod at the station B is bisected by hair when looked through the prism.
- Turn the compass box above the prism and note the reading at which the hair line produced appears to cut the images of the graduated ring which gives the bearing of line AB.

There are two systems commonly used to express the bearing.

- **WHOLE CIRCLE BEARING:**

In this system the bearing of a line measured with the magnetic north in clockwise direction. The value of bearing thus varies from 0° to 360° .

- QUADRANTAL SYSTEM:

In this system the bearing of a line is measured eastward or westward from north or south whichever is near. The directions can be either clock wise or anti clockwise depending upon the position of the line.

Fore Bearing & Back Bearing:

- Every line has two bearings one observed at each end of the line.
- The bearing of the line in the direction of progress of the survey is called Fore Bearing (FB), while the bearing in the opposite direction is called Back Bearing (BB).
- Therefore BB of a line differs from FB by exactly 180° .

Errors in Compass observations:

The errors may be classified as

- Instrumental errors
- Personal errors
- Errors due to natural causes

Instrumental errors

- They are those which rise due to the faulty adjustments of the instruments. They may be due to the following reasons:
 - The needle not being perfectly straight.
 - Pivot being bent
 - Sluggish needle
 - Blunt pivot point
 - Improper balancing weight
 - Plane of sight not being vertical
 - Line of sight not passing through the center of graduated ring

Personal errors

- They may be due to the following reasons:
 - Inaccurate leveling of the compass box.
 - Inaccurate centering.
 - Inaccurate bisection of signals.
 - Carelessness in reading and recording.

Natural Errors:

- They may be due to following reasons:
 - Variation in declination
 - Local attraction due to proximity of local attraction forces.
 - Magnetic changes in the atmosphere due to clouds and storms.
 - Irregular variations due to magnetic storms etc.

Intersection method : To plot the given area using Compass

Instruments

- Prismatic Compass
- Tripod
- Chain
- Tape
- Arrows and Ranging rods

Procedure:

- Two station points X and Y are to be fixed.
- Chain must then be stretched along X & Y after ranging. Compass must be fixed on the tripod and then centering and leveling to the point X is to be carried out.
- FB of XY is then to be taken. At point X, bearing to the five points (A, B, C, D, E) are to be taken and entered in the tabular column.

Procedure:

- Compass is then to be shifted to point Y. Centering and leveling are to be done. BB of XY and bearing of five points are then to be taken.
- Then calculate the Reduced Bearing (RB). With a suitable scale, the points are to be plotted.

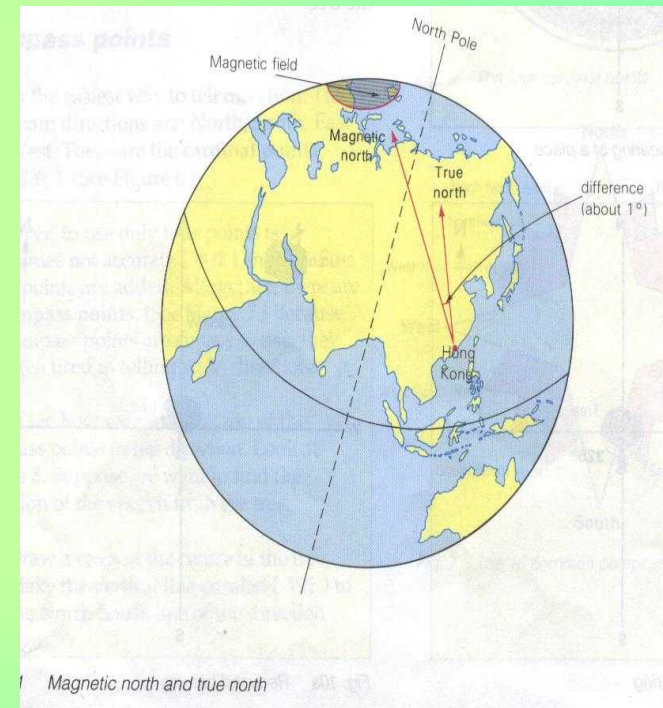
Result:

The given area can be plotted in the drawing sheet.

- The area of the given plot ABCDE =m²
- Length of AB =m
- Length of BC =m
- Length of CD =m
- Length of DE =m
- Length of EA =m

Points to be noted.....

- The Earth's North and South poles act like a huge magnet. One pole is positive and one pole is negative.
- Because magnetic and true North are not the same, corrections are made in surveying to compensate for this difference. The difference is referred to as magnetic declination.



Points to be noted.....

- All magnetic objects, such as belts, watches, keys, and other metal objects can interfere with the compass reading.
- Hold compass away from metal objects while taking a reading.
- The ability to use a compass effectively is an essential skill for wildlife managers, biologists, and other scientists who work outdoors.

Conclusion

In this session we learnt to:

- Define different types of North's
- List the different parts of a compass and various accessories used along with compass
- Describe a Prismatic compass
- Show the temporary adjustments of a compass
- Describe how to observe a bearing
- Explain errors in compass observations
- Plot a given area using Intersection method of compass surveying

Thanks