Compass Surveying| Types of Compass | Advantages & Disadvantages of Compass Surveying | Example

Compass surveying

Compass surveying is the branch of surveying in which the position of an object is located using angular measurements determined by a compass and linear measurements using a chain or tape. Compass surveying is used in following circumstances:

- If the surveying area is large, chain surveying is not adopted for surveying rather compass surveying is employed.
- If the plot for surveying has numerous obstacles and undulations which prevents chaining.
- If there is a time limit for surveying, compass surveying is usually adopted

Compass surveying is not used in places which contain iron core, power lines etc which usually attracts magnets due to their natural properties and electromagnetic properties respectively. Compass surveying is done by using traversing. A traverse is formed by connecting the points in the plot by means of a series of straight lines.

Magnetic compass

Magnetic compass is used to find out the magnetic bearing of survey lines. The bearings may either measured in Whole Circle Bearing (W.C.B) system or in Quadrantal Bearing (Q.B) system based on the type of compass used. The basic principle of magnetic compass is if a strip of steel or iron is magnetized and pivoted exactly at centre so that it can swing freely, then it will establish itself in the magnetic meridian at the place of arrangement.

Major types of magnetic compass are:

1. Prismatic compass
2. Surveyor's compass
3. Level compass

Prismatic compass

Prismatic compass is a portable magnetic compass which can be either used as a hand instrument or can be fitted on a tripod. It contains a prism which is used for accurate measurement of readings. The greatest advantage of this compass is both sighting and reading can be done simultaneously without changing the position.

Major parts of a Prismatic Compass are:

- Magnetic needle
- Graduated ring
- Adjustable mirror
- Sliding arrangement for mirror
- Object vane
- Eye vane
- Metal box
- Glass cover
- Horse hair

Adjustments of prismatic compass

Two types of adjustments:

1. Temporary adjustment
2. Permanent adjustment

Temporary adjustments

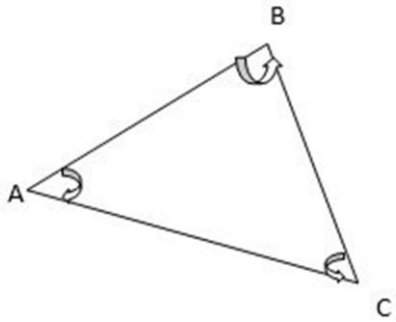
- **Centering:** it is the process of fixing the compass exactly over the station. Centering is usually done by adjusting the tripod legs. Also a plumb-bob is used to judge the accurate centering of instruments over the station.
- **Leveling:** the instrument has to be leveled if it is used as in hand or mounted over a tripod. If it is used as in hand, the graduated disc should swing freely and appears to be completely level in reference to the top edge of the case. If the tripod is used, they usually have a ball and socket arrangement for leveling purpose.
- **Focusing the prism:** Prism can be slide up or down for focusing to make the readings clear and readable.

Measurement of angles and Computation of area

The observations of a plot using compass surveying will be:

Here the bearings are observed in Whole Circle Bearing (W.C.B) system.

Line	Fore bearing	Distance measured (m)
AB	40˚ 0’	10.8
BC	110˚0’	8.2
CA	280˚0’	13.1



Surveying
Triangular Area

Surveying Triangular area with compass survey

Included angle = bearing of previous line – bearing of next line

= (280˚-180˚) -40˚ =60˚00’

00’

Sum= 180˚00’

Check: (2n-4) 90˚= (6-4) 90˚=180˚

Where n = number of sides of the traverse

Area Computation

Advantages & Disadvantages of Compass surveying

Advantages

- They are portable and light weight.
- They have fewer settings to fix it on a station
- The error in direction produced in a single survey line does not affect other lines.
- It is suitable to retrace old surveys.

Disadvantages

- It is less precise compared to other advanced methods of surveying.
- It is easily subjected to various errors such as errors adjoining to magnetic meridian, local attraction etc.
- Imperfect sighting of the ranging rods and inaccurate leveling also causes error.

Errors in compass survey

Errors can be arising due to various reasons during the process of surveying, they are classified as:

- Instrumental errors
- Personal errors
- Natural errors

Instrumental errors

As the name suggests they are arise due to the wrong adjustments of the instruments. Some other reasons are:

- If the plane of sight not being vertical, it causes error in sighting and reading.
- If the magnetic needle is not perfectly straight or if it is sluggish, readings may not be accurate.

Personal errors

They arise mainly due to the carelessness of the surveyor. They are:

- Inaccurate leveling
- Inaccurate reading
- Inaccurate centering

Natural errors

Natural errors are occurring due to the various natural causes which affect the working of compass. It has nothing to do with the surveyor and to minimize them, some corrections in calculations applied. They are:

- Local attraction
- Proximity to the magnetic storms
- declination