Engineering Surveying -1 CE212
Compass Surveying

Lecture

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Compass Surveying

Chain surveying can be used when the area to be surveyed is comparatively is small and is fairly flat.

But when the area is large , undulating and crowded with many details , triangulation(which is the principle of chain survey) is not possible.

In such an area , the method of Compass surveying is used.

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.

Traversing

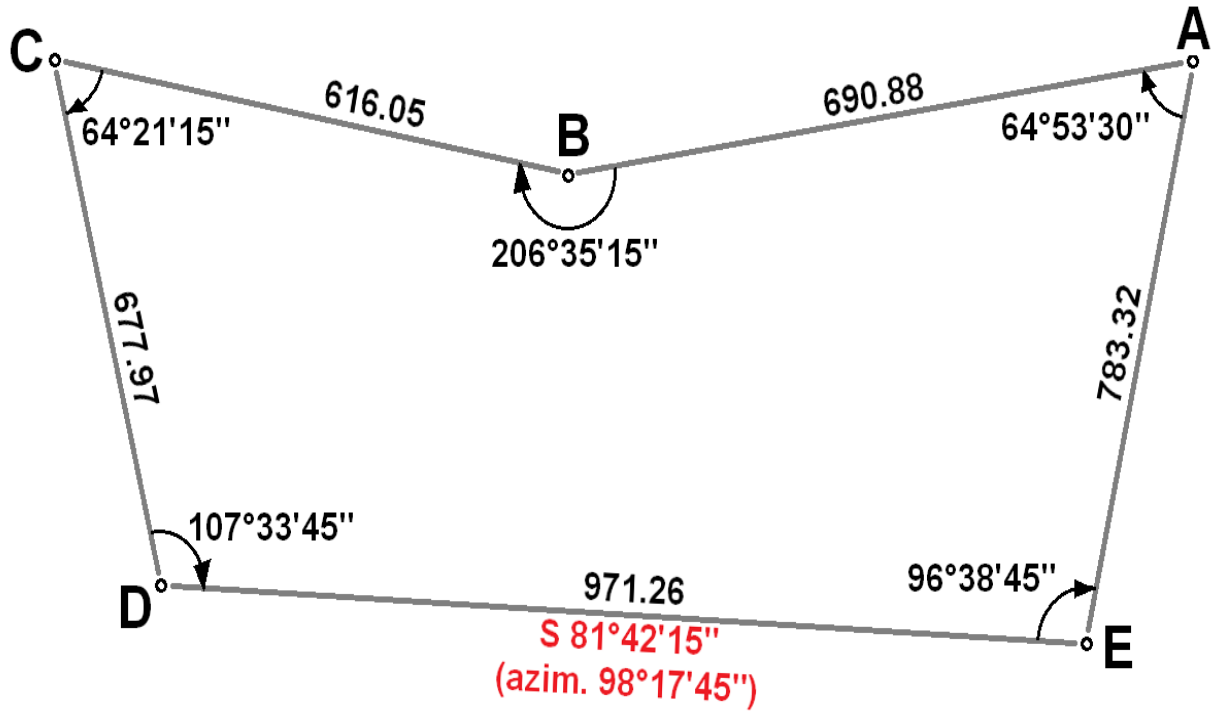
- **Traversing** is that type of survey in which a number of connecting survey lines form the frame work and the directions and lengths of the survey lines are measured with the help of an angle measuring instrument and a tape respectively.
- The routine of chaining and offsetting is the same as in chain survey
- Compass surveying is not recommended for areas where local attraction is suspected due to the presence of magnetic substances like steel structures, iron ore deposits, electric cables , and so on.

Types of Traverse

There are two types of Traverse:

1. **Closed Traverse**

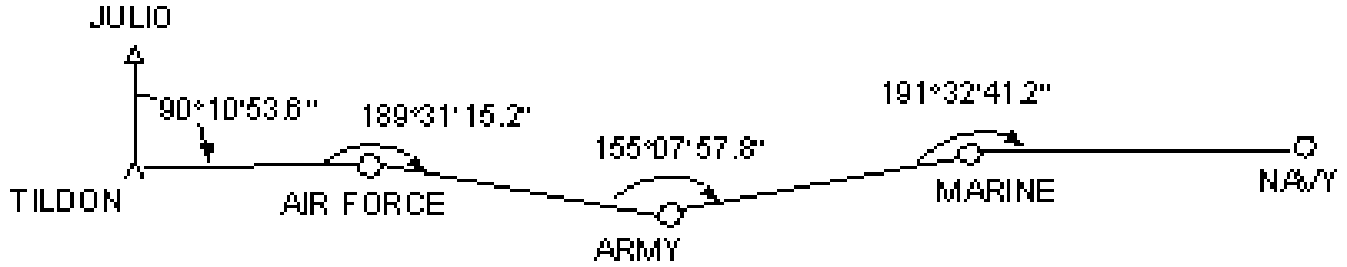
A traverse is close when it completes a circuit and returns to the starting point. The starting and end points are the same. It is particularly suitable for locating the boundaries of lakes, woods etc. It is used for moderately large area



Types of Traverse

2. Open Traverse

A traverse is said to be open or unclosed when it does not form a close polygon. It consists of a series of lines extending in the same general direction and not returning to the starting point. It is most suitable for the survey of long narrow strip of country e.g. Cost line, road, railway etc.



LEGEND:

△ = control station

○ = traverse station

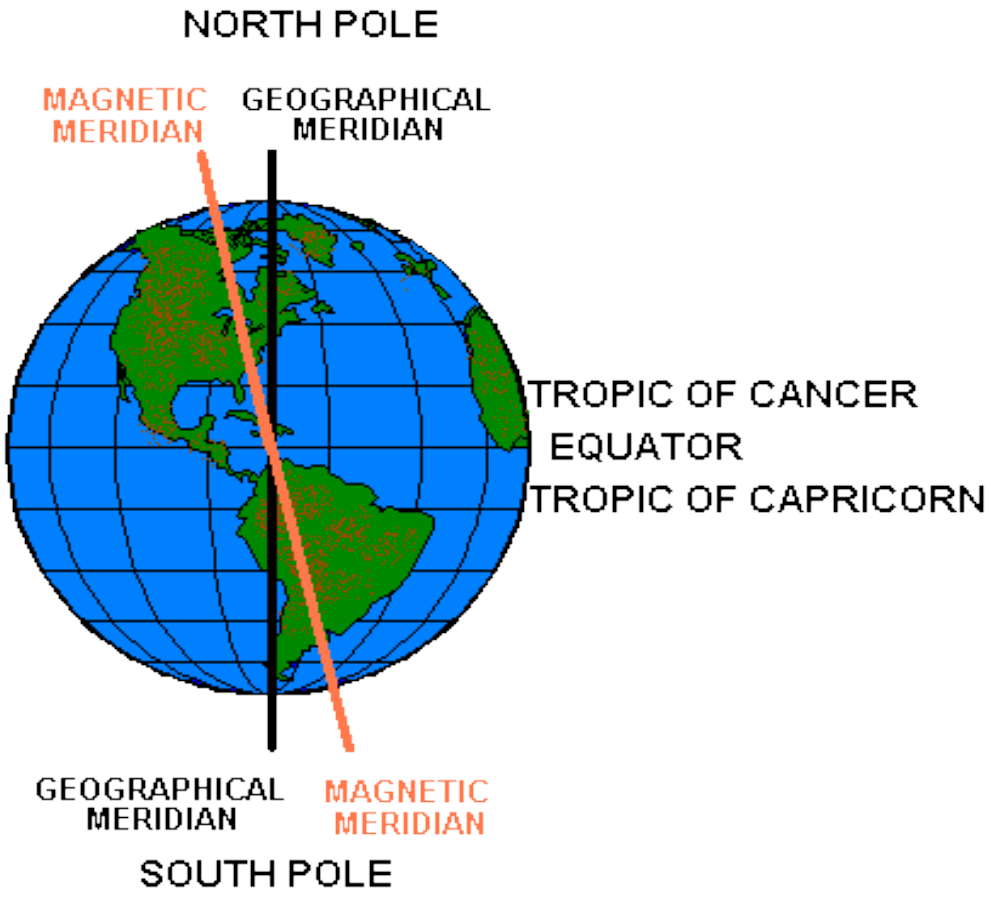
Meridian

Meridian is a line Joining North Pole and South Pole.

There are two types of Meridian

1. **True Meridian**

The plane that passes through true North Poles and True South Poles at the time of Observation is called True Meridian or Geographical Meridian

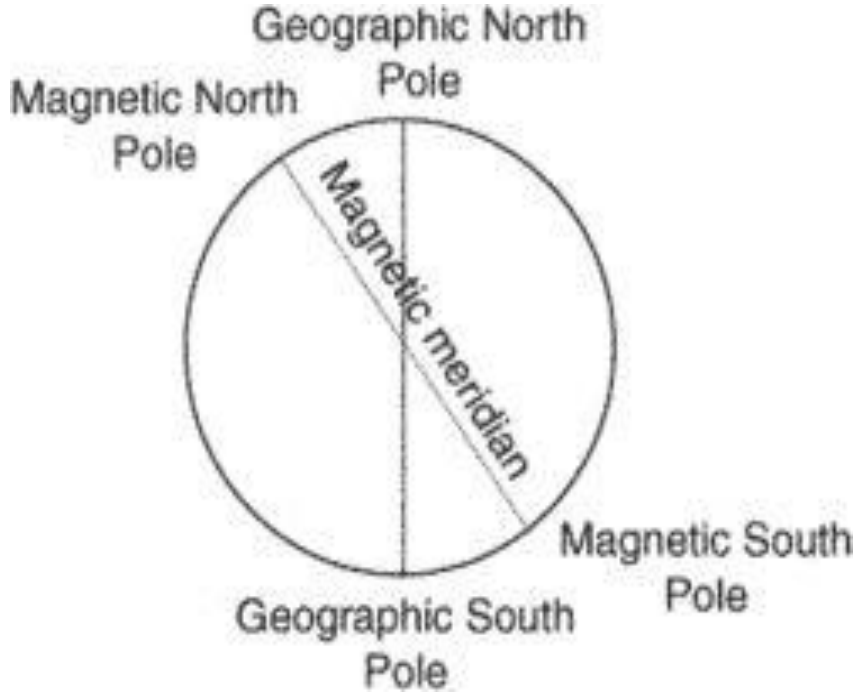


Meridian

2. Magnetic Meridian

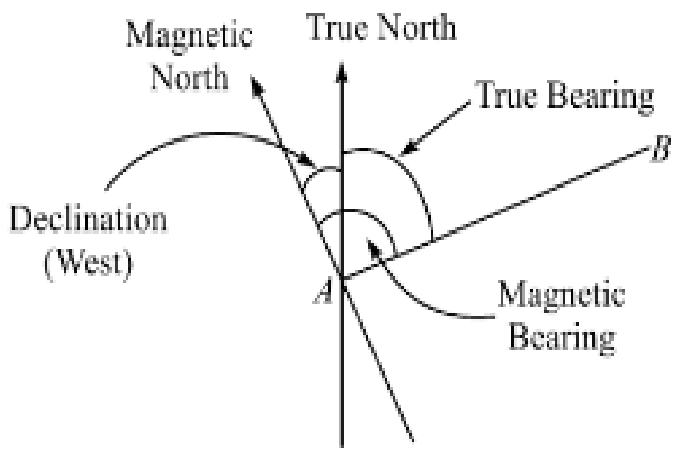
The direction indicated by a magnetic compass is called as magnetic meridian.

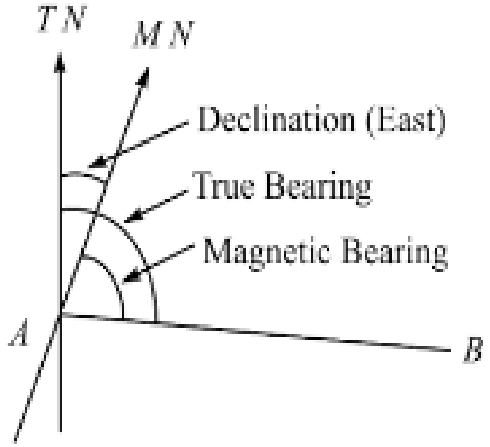
The angle which a line makes with the magnetic meridian is called a magnetic bearing of the line or simply bearing of a line.

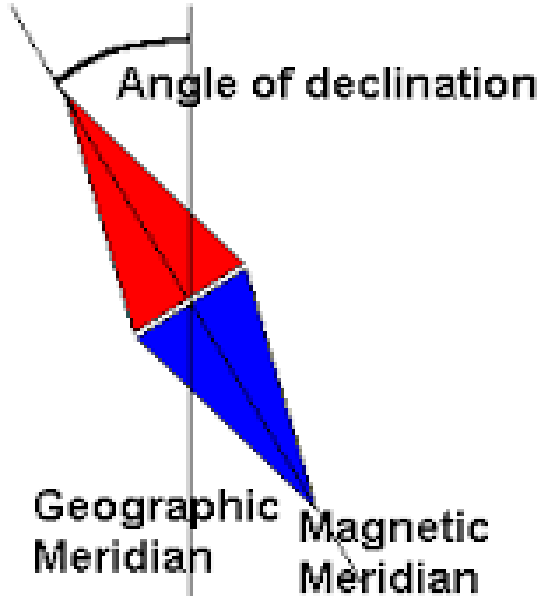


Magnetic Declination

The difference between True Meridian and Magnetic Meridian is called Magnetic Declination







(a) True bearing = Magnetic bearing ± Declination

Note [Use the positive sign when declination is east, and the negative sign when declination is west.]

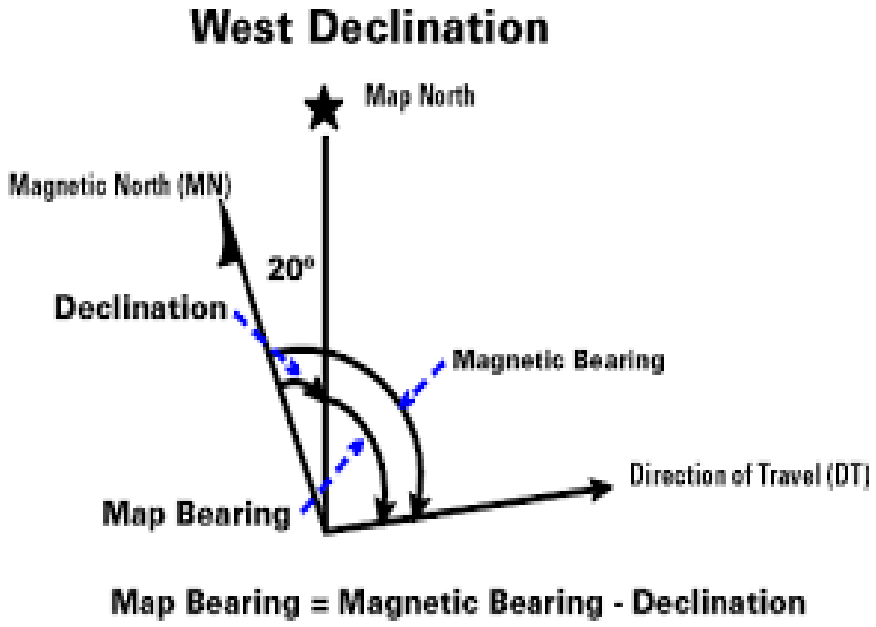
Bearing

Bearing is a Horizontal Angle measured from the North

If Bearing is measured from True Meridian than it is called True Bearing and if it is measured from Magnetic Meridian than it is called Magnetic Bearing.

There are two systems commonly used to express the bearing.

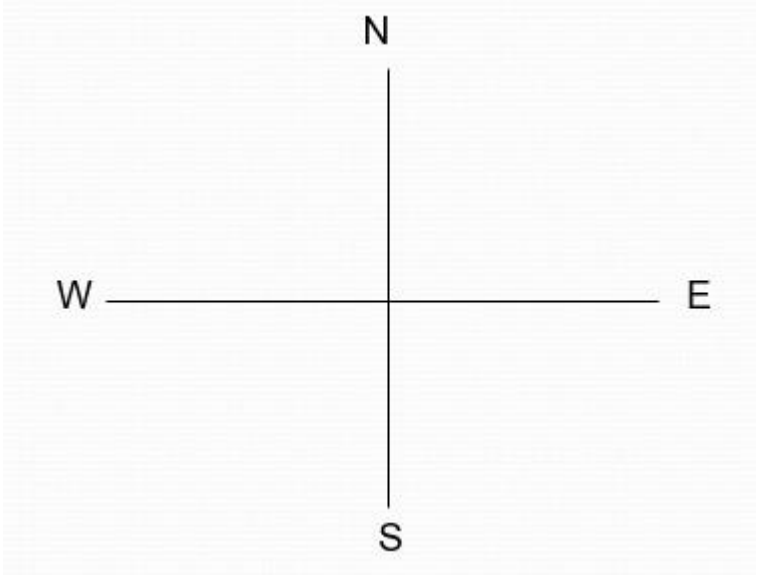
- Whole circle system
- Quadrantal system



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^o to 360^o.

Its value varies from zero to 360°, increasing in clockwise direction. Zero is north direction, 90° is east, 180° is south and 270° is west.



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.

The value of bearing thus varies from 0° to 90°.

The quadrant of survey line is also mentioned after the numerical value of the angle.

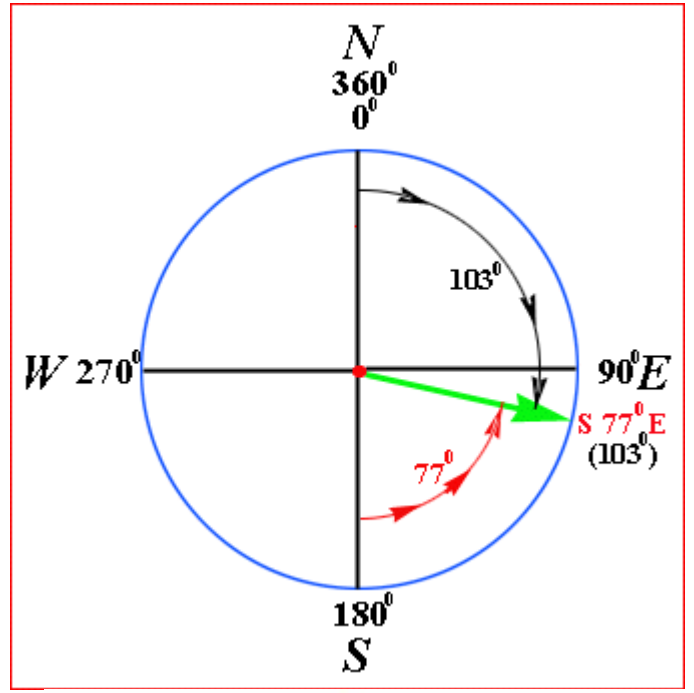
There are 4 quadrant

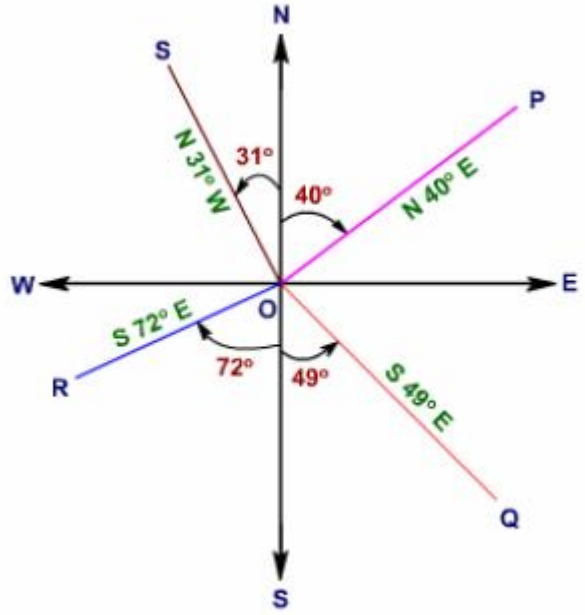
1St Quadrant = NE

2nd Quadrant = SE

3rd Quadrant = SW

4th Quadrant = NW





Reduced Bearing

The angle exceeding 90^o is reduced to a value under 90^o this is called as reduced bearing (RB).

CASE	WHOLE CIRCLE BEARING (WCB)	REDUCED BEARING (RB)	QUADRANT
I	0 – 90	WCB	NE
II	90 – 180	180 – WCB	SE
III	180 – 270	WCB – 180	SW
IV	270 - 360	360 - WCB	NW

Types of Compasses

There are two types of Compasses

1. The Prismatic Compass
2. The Surveyor’s Compass

Assignment # 02

Problems: 01

Convert the following WCBs to QBs:

a) WCB of AB = 45° 30’ N 45° 30’ E
b) WCB of AB = 125° 45’ S 54° 15’ E
c) WCB of AB = 222° 15’ S 42° 15’ W
d) WCB of AB = 320° 30’ N 39° 30’ E

Problem 02:

Convert the following QB to WCB

a) QB of AB = S 36° 30’ W — 216° 30’

b) QB of AB = S 43° 30’ E — 136° 30’

c) QB of AB = N 26° 45’ E — 26° 45’

d) QB of AB = N 40° 15’ W — 319° 45’

Problem 03:

Q. The magnetic bearing of a line AB is 135˚ 30’. What will be the true bearing, if the declination us 5˚ 15’ W.

A. True bearing of AB = Magnetic bearing – Declination

= 135 ˚ 30’ - 5 ˚ 15’ = 130 ˚ 15’

Fore Bearing & Back Bearing

Every line has two bearings one observed at each end of the line.

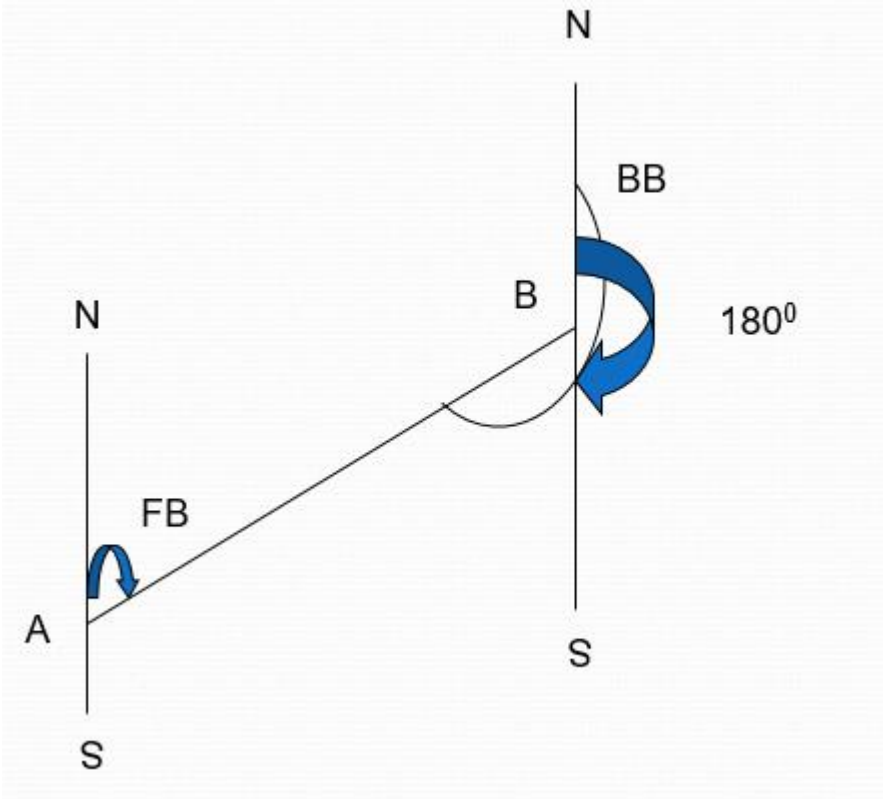
The bearing of the line in the direction of progress of the survey is called Fore Bearing (FB), while the bearing in the opposite direction is called Back Bearing (BB).

Therefore BB of a line differs from FB by exactly 180^o.

BB = FB +- 180^o

Use plus sign if FB < 180^0

Use minus sign if FB > 180^0



Thank You