Prismatic compass

1. Needle
2. Pivot
3. Agate cap
4. Graduated disc.
5. Slit metal frame
6. Horse hair
7. Mirror
8. Reflection.
9. Eye Vane

10. Focusing Stud
11. Dark Sunglasses
12. Box
13. Glass cover
14. Lifting pin
15. Light spring
16. Brake pin or knob
17. Lifting lever.
18. Support to fit on tripod.

Date 3/3/2025

Experiment - 02(A)

Object :- To determine the magnetic bearing of a line using compass.

Apparatus :- Surveyor's compass or prismatic compass, plumb bob, ranging rods, tripods stand.

Theory :- Compass surveying is that branch of surveying in which the directions of survey lines are determined by a compass and their length by chaining directly on the ground.

Bearing :- The Horizontal angle between the reference meridian to the survey line is called bearing. There are two types of compass used in the compass surveying.

(i) Surveyor's compass :- This type of compass is consists of a circular box of about 100mm diameter. It has a graduated ring attached to a circular box. The magnetic needle moves freely on the privot. The ends of the compass needle are made pointed for taking the reading correctly. There is a simple metal vane with a fine hole used as eye vane. The object is to be sighted first with the object and eye vanes and the reading is then taken against the North end of the needle, by looking through the top glass vertically.

B 117°30' = FB of BC

BB of AB = 229°30'

49°30' = FB of A1

A

BB = 297°30' of BC
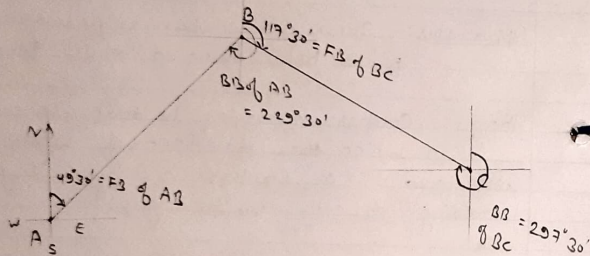
The Prismatic Compass :- The type of compass consists of same arrangement as in case of surveyor's compass except. that a triangular prism is fitted below the eye slit. The magnetic needle is attached to the circular ring. Reading are taken is whole circle bearing system.

Procedure :-

(1) Initially survey station is fixed. Compass is kept on a tripod and is kept over of one of the station (Say station A)

(2) Some temporary adjustments such as centering, leveling & focusing are performed on the compass. Centering is a process of marking the pivot exactly over the ground stations marki. It is done by hanging plumb bob from the pivot and centering it over station.

(3) After performing the adjustments, bring the object vane in line with the eye vane & object (say station B) & then reading are taken against the North end of the needle or according to the compass available.

(4) Shift the instrument at next station and repeat above process.

(5) Take force bearing as well as back bearing of line.

Precaution:-

(1) There should be not be any metallic material in the vicinity of the compass to prevent local attraction.

(2) Adjustments of the compass i.e., centering, leveling and focusing of the prism, should be done carefully.

(3) Bubble should be in center befor taking readings.

Observation table:-

Fore bearing and back bearing of lines are to be noted down.

Line	Fore bearing	Back bearing
AB	$49°30'$	$49°30' + 180 = 229°30'$
BC	$117°30'$	$117°30' \pm 180 = 297°30'$
CD		

Result:-

Magnetic bearing of line,

AB = $49°30'$, $229°30'$

BC = $117°30'$, $297°30'$

1. Needle
2. Pivot
3. Agate cap
4. Gratuated disc
5. Slit metal frame
6. Horec hair
7. Mirror
8. Reflecting prism with cap
9. Eye vane
10.

10. Focusing stud
11. Dark sunglasses
12. Box
13. Glass cover
14. Lifting pin
15. Light spring
16. Brake pin or knob
17. Lifting lever
18. Support to fit on tripod.

Experiment - 2 (B)

Object:- To measure and adjust included angles of
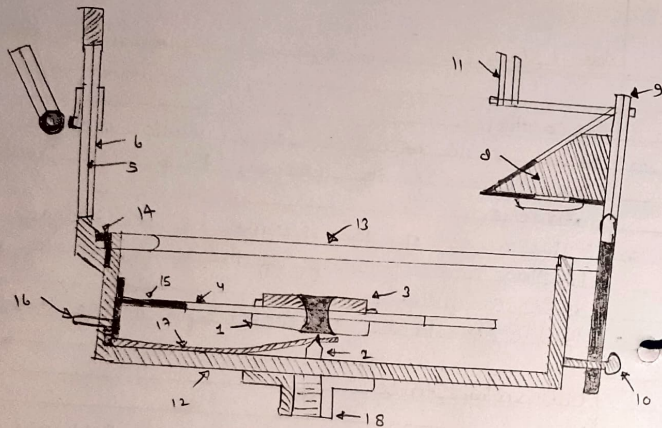traverse using prismatic compass

Apparatus :- Prismatic compass, measuring tape,
Arrows, plumb bob, ranging rods,
tripod stand.

Theory:- Compass surveying is that branch of surveying
in which the directions of survey lines are
determined by a compass and their length by
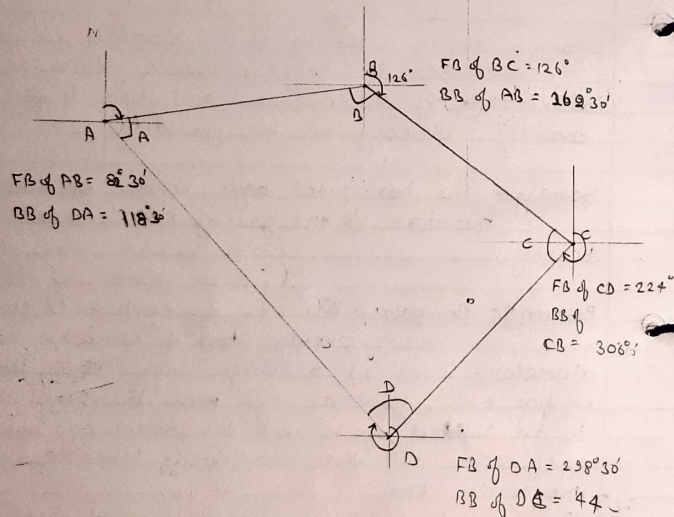chaining directly on the ground.

Bearing:- The horizontal angle between the reference
meridian to the survey line is called
bearing.

Prismatic Compass:- This type of compass is consists
a circular box of about 100mm
diameter. There is a simple metal vane with
a fine hole used as eye vane. The object is
to be sighted first with the object and the
eye vanes and the reading is taken against
the North end.
This type of compass is consists of triangular
prism is fitted Below the eye slit. The magnetic
needle is attached to the circular rings.
Reading are taken is whole circle bearing system.

FB of BC = 126°
BB of AB = 162°30'

FB of AB = 82°30'
BB of DA = 118°30'

FB of CD = 224°
BB of
CB = 306°30'

FB of DA = 298°30'
BB of DE = 44.

Procedure :-

(1) Initially survey station is fixed. Compass is kept on a tripod & is kept over one of the station. (Say station A)

(2) Some temporary adjustment such as centering, leveling and focusing are performed on the compass. Centering is a process of marking the pivot exactly over the ground station mark. It is done by hanging plumb bob from the pivot and centering it over station.

(3) After performing the adjustments, bring the object vane in line with the eye vane & then reading are taken against the North end of the needle or according to the compass available.

(4) Shift the instrument at next station & repeat above process.

(5) Take fore bearing as well as back bearing

(6) Measure the bearing distance between two stations with the help of tape or chain as done in chain surveying. Take all the readings of different stations and lines by repeating the same procedure.

Precautions:-

1) There should not be any metallic meterial in the vicinity of the compass to prevent local attraction.
2) The chain should not be pulled more that the standard pull.
3) Adjustment of the compass i.e. compa centering, leveling & focusing of the prism, should be done carefully.
4) Bubble should be in center before taking reading.

Observation & Calculation:

Fore bearings, back bearings and length of lines are to be noted down. Necessary corrections are to be made if there is any error in measurement.

Observation Table-

line	Length	Fore bearing	Back bearing
AB		$\theta_1 = 82°30'$	262°30'
BC		$\theta_2 = 126°$	306°
CD		$\theta_3 = 224°30'$	44° 30'
DA		$\theta_4 = 298°30'$	118° 30'

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Calculations :-

(1) Calculate the included angles between consecutive lines of the traverse e.g. Angle between AB & BC $\angle ABC = \alpha$ (FB of BC - B.B. of AB)

(2) Find the sum of all the included angles.

(3) Check that sum of included angles =

$$(2n-4)\ 90°$$

   here n is no. of sides of the traverse)

(4) If ~~above~~ equation are not satisfied calculate the corrected bearings of the line.

(5) Calculate the included angles of traverse.

(6) Plot the traverse on the sheet.

Result :-

Corrected included Angles of traverse.

$\angle A = \cancel{61°30'}\ 36°$ $\angle C = 82°$

$\angle B = 136°30'$ $\angle D = 105°30'$

$\angle C =$

Viva Question

Q1 What is bearing of survey line?

Ans The horizontal angle made by a survey line with reference to magnetic north pole in a clockwise direction is called as bearing of line.

Q2 How many types of a compass are used in surying.

Ans The two compass types used in surveying compass are prismatic compass and surveyor's compass. Prismatic compass most commonly used one for surveying.

Q3 Which compass is based on W.C.B. system?

Ans Prismatic compass is based on whole circle bearing system. (Surveyor's compass - RB/QB syst)

Q4 What is the least count of prismatic compass?

Ans The least count of prismatic compass is 30' i.e. thirty minutes.

Q5 What is fore & back bearing in surveying?

Ans Bearing is measured in the direction of progress of opposite the survey are known as F.B. & bearing measured opposite to the direction of the survey. are known as back ward bearing (B.B.)

$$FB = BB \pm 180$$

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Q6 Define the meridian?

Ans The line or plane passing through the geographical North pole, South pole and any point on the earth surface, is known as true meridian.

Q7 How many meridians are used in surveying?

Ans 3 meridian are used. True, magnetic and arbitrary meridians. True meridian passes through true North and South pole. Magnetic meridian passes through magnetic North to south. Arbitrary meridian is used for rough purpose.

Q8 What is magnetic declination?

Ans The Horizontal angle between the true meridian & magnetic meridian is called 'declination'.

Q9 What is local attraction?

Ans The disturbing magnetic influence due to the presence of a magnetic needle is known as a local attraction.

Q10 How would you recognize the presence of local attraction in an area?

Ans If the forebearing (FB) & back bearing (BB) don't differ by exactly 180°, the local attraction is present in the area.

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