RAMA UNIVERSITY

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FACULTY OF RNGINEERING AND TECHNOLOGY (DEPARTMENT OF CIVIL ENGINEERING)

METHODS OF PLANE TABLE SURVEYING

- Resection after Solving Three Point Problem: Locating the plotted position of a station point using observations to three well defined points whose plotted positions are known, is called solving three point problem.

- Let A, B, C be three well defined objects on the field whose plotted positions a, b and c are known. Now the problem is to locate plotted position of the station point P.

- Any one of the following methods can be used.

I. Mechanical (Tracing paper) method,

II. Graphical method, or

III. Trial and error method (Lehman's method).

MECHANICAL METHOD

- This method is known as tracing paper method since it needs a tracing paper. The method involved the following steps

- Set the table over station P and by observation approximately orient the table.

- Fix the tracing paper on the plane table and select P approximately, say as p'. From p', draw p' A, p' B and p' C. These lines may not pass through the plotted positions a, b and c since the orientation is not exact.

Loosen the tracing paper and rotate it so that the rays pass through respective points a, b and c. Now prick the point p′ to get the plotted position ‘p’ of station P.

Keep the alidade along pa and sight A. Then clamp the table. This is correct orientation.
Check the orientation by observing along pb and pc.

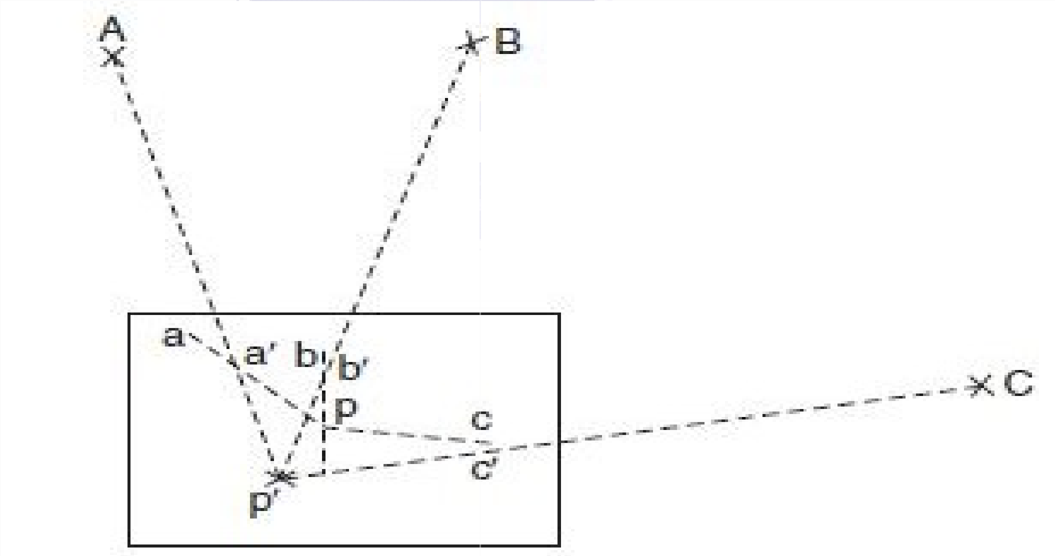

Fig. 14.13

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APHICAL METHOD

ollowing two graphical methods are available to solve three point problem:

Bessel's solution
Method of perpendiculars.

el Solution:

It involves the following steps:

Keep the beveled edge of alidade along ba and sight object at A. Clamp the table and draw bc′ along the line bc [Fig. 14.14 (a)].

Keep beveled edge of alidade along ab, unclamp the table and sight B. Clamp the table. Draw line ac intersecting bc′ at d [Fig. 14.14(b)].

Keep the alidade along dc and bisect C. Clamp the table [Fig. 14.14(c)]. This gives the correct orientation.

Draw resectors to get 'p'.

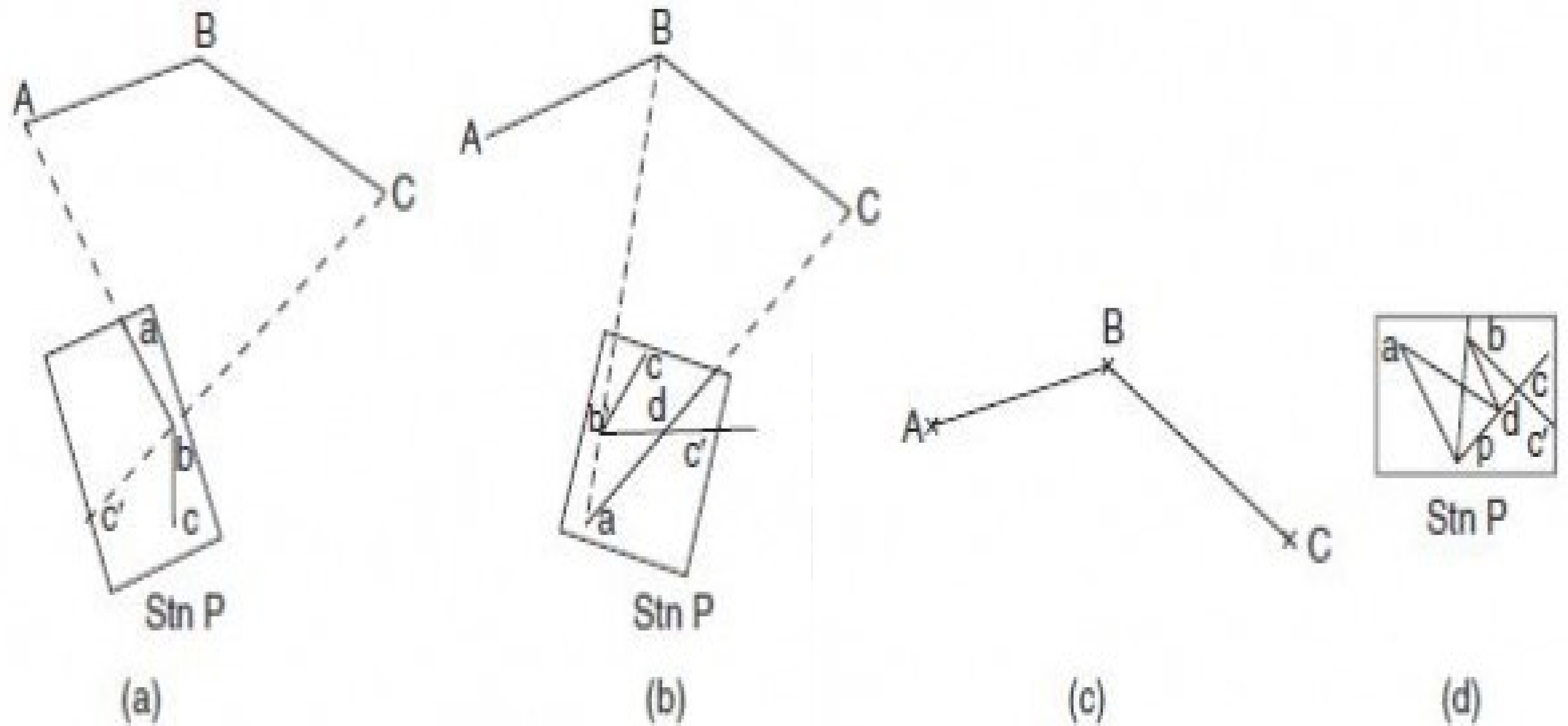

Fig. 14.14. Graphical solution (Bessel's method)

METHOD OF PERPENDICULARS

- This is another graphical method. It involves the following steps

1. Draw line ae perpendicular to ab. Keep alidade along ea and turn the table till A is sighted. Clamp the table and draw the ray Bb to intersect the ray Aac at
2. Draw cf perpendicular to bc and clamp the table when fcC are in a line. Draw Bb to intersect Ccf at F
3. Join cf drop bp perpendicular to ef to get the plotted position 'p'.
4. Orient the table such that pbB are in a line. Clamp the table to place it in correct orientation. Resections Aa and Cc may be used to check the orientation.

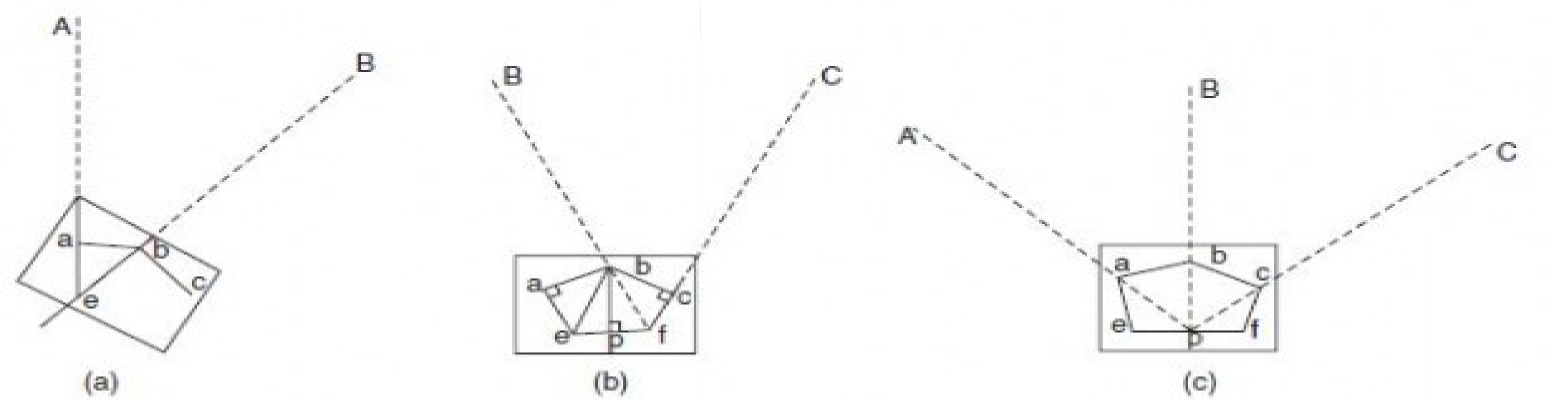

Fig. 14.15. Method of perpendiculars of solve three point problem

TRIAL AND ERROR METHOD

This method is also known as 'triangle of error method' and 'Lehman's Method'. It involves the following steps:

1. Set the table over point P and orient the table approximately, just by observation.

2. Draw the rays aA, bB and cC . If the orientation was perfect, the three rays would have intersected at a single point, i.e. at point 'p'. Otherwise a triangle of error is formed.

3. To eliminate the triangle of error an approximate position, ray p′, is selected near the triangle of error. Then keeping alidade along p′a object A is sighted and the table is clamped. Draw the resectors cC and bB to check the orientation.

4. Above step is repeated till triangle of error is eliminated.

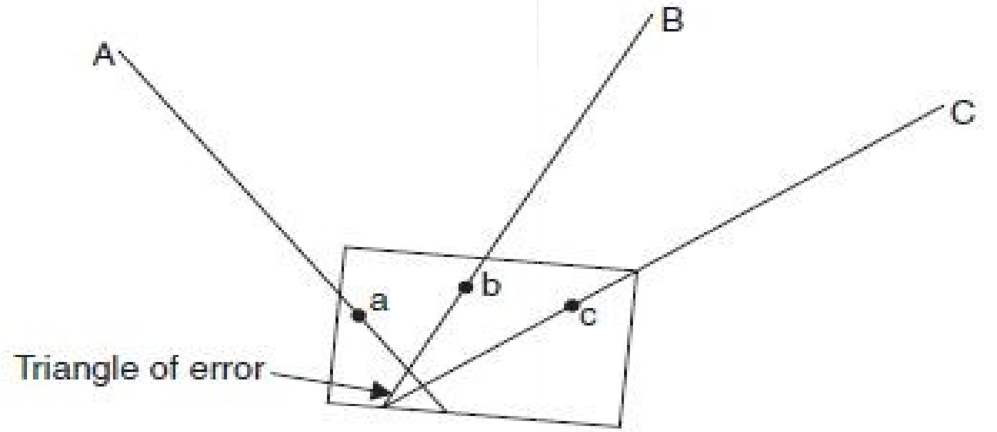

Fig. 14.16

METHODS OF PLANE TABLE SURVEYING

Lehman presented the following guidelines to select ‘p” so that triangle of error is eliminated quickly.

- Rule 1: The distance of point sought ‘p’ is in the same proportion from the corresponding rays as the distance of those from the plane table station.
- Rule 2: The point sought ‘p’ is on the same side of all the three resectors.
- Defining the triangle ABC on the field as great triangle and the circle passing through them as great circle, from the above two rules of Lehman, the following sub-rules may be drawn.
- If ‘P’ lies within the great triangle, the point ‘p’ is within the triangle of error (p1 in the Fig. 14.17).
- If the plane table station P lies outside the great triangle the point sought ‘p’ is outside the triangle of errors (p2).
- If the ‘P’ is on the great circle, the correct solution is impossible (p3 and p4).
- If ‘P’ is outside the great circle, ‘p’ is nearer to the intersection of rays to the nearest two points (P5).
- If point P is outside the great circle and the two rays drawn are parallel to each other the point sought is outside the parallel lines and on the same side of the three rays

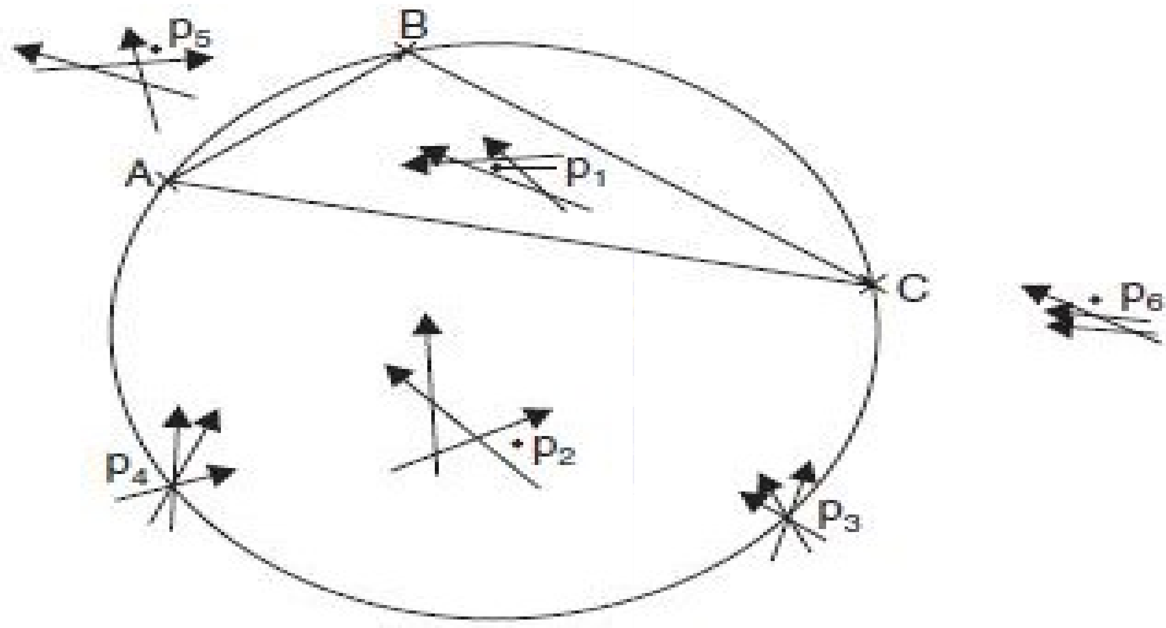

Fig. 14.17

THANK YOU