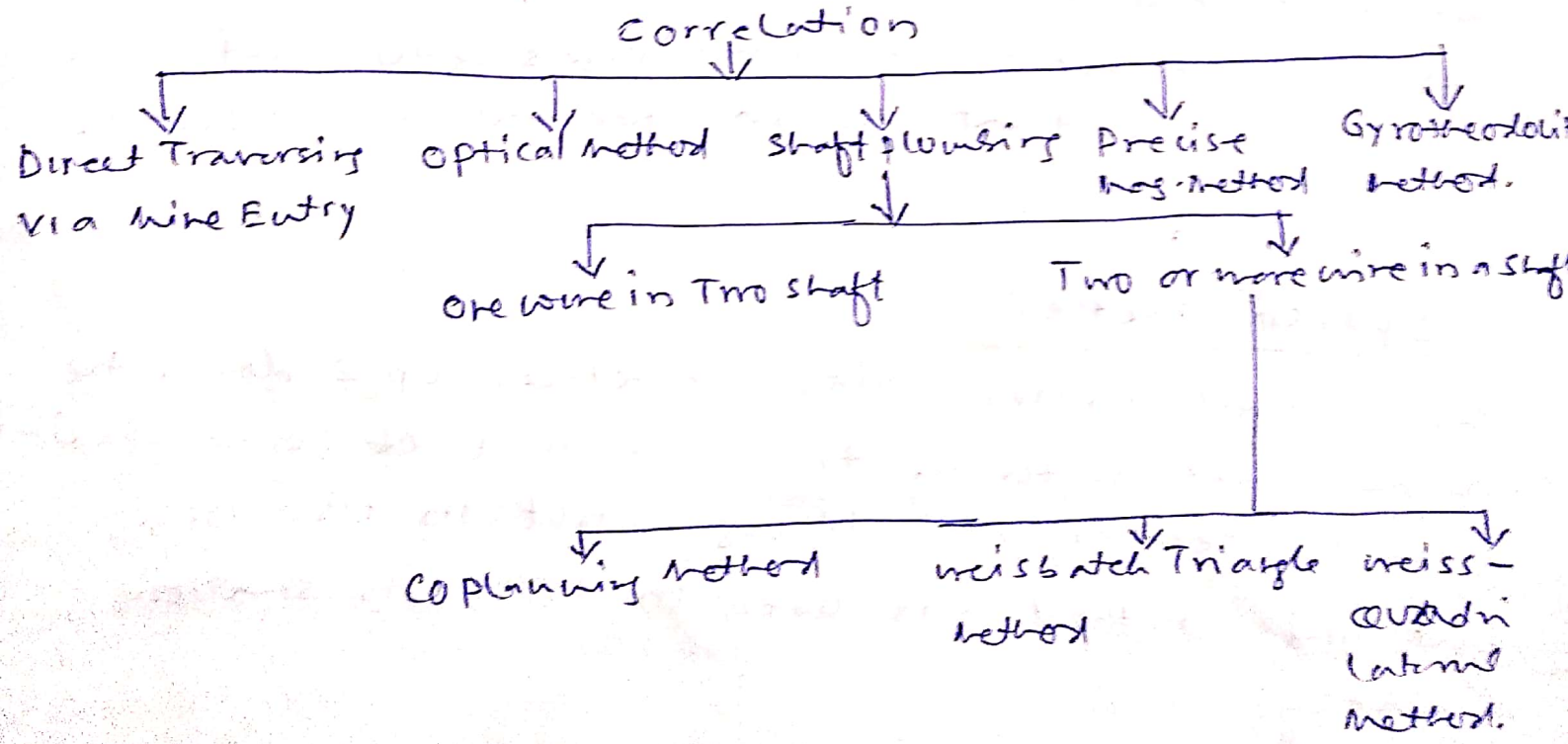
CORRELATION

The purpose of correlation survey is to determine with high degree of accuracy the relative position of the surface & u/g working features, so that the u/g roadways & the faces may be laid down accurately on the working plan & the statutory restriction imposed may be strictly followed in mine working.

A high degree of accuracy is reqd in correction survey otherwise the safety & stability of the mine working & of the important surface features may be hampered or jeopardized because of the disturbances & strata movement caused by mining.

The mine correlation involves the determination of the bearing & Azimuth of a line below the ground with respect to a true North & also of the co-ordinates of one of the end station of the line called Reference line or Reference base. The degree of accuracy reqd in correlati survey depends upon the purpose & the extend of the survey.



Direct Traversing via Mine Entry

When entry to a mine is gained by a level or a drift the method of correlation is carried out by making a precise theodolite traversing direct into the working ~~stations~~ starting from some one line of known bearing in the surface triangulation & making a return traverse so that the area should be closed polygonally

In the course of correlation survey, one or two u/g bases should be made for future references. When the survey are plotted on plan the u/g workings should be shown accurately with their true positions relating to the surface features.

The traverse must be carried out with great precision & all the temporary adjust-ments are done.

(a) centering the inst. station

(b) levelling

(c) measuring the length of each drift.

The angle between each pair of line should be measured at least 3 times with face ~~left~~ Left & 3 times with face right. by the method of Repition. The length of each drift should be measured several times & if rqd a spring dead wt may be fitted at both ends of the drift to be measured, so that no sag formation will occur.

Optical method.

This method involves sighting either up & down the mine shaft with the transist inst of some special form of telescope although not in use now, but this method was used in past in shallow mines.

1. set up the base line at the pit bottom connected to the ulg survey & in line position of two points A & B across the shaft bottom.

2. plumb the theodolite over a line of sight with the baseline & transit up to two targets F & G placed across the shaft top girder.

3. Many pointing on the target are made to obtain the mean position of F & G.

4. Repeat the operation 2 & 3 with the theodolite at point e.

5. The line joining the mean position of F & G on the shaft top is then produced either by a fine wire under tension or by coplaning in both direction

The optical method of correlation involves the use of special theodolite having auxillary telescope or have a tribatch with the central hole for transisting the telescope for having sights downwards, do not give satisfactory result because of the short base between the two reference points sighted at the bottom of the shaft with the inst. set at the shaft top. The optical method of correlation is not suitable for shaft exceeding 500 m

Single wire in two vertical shaft.

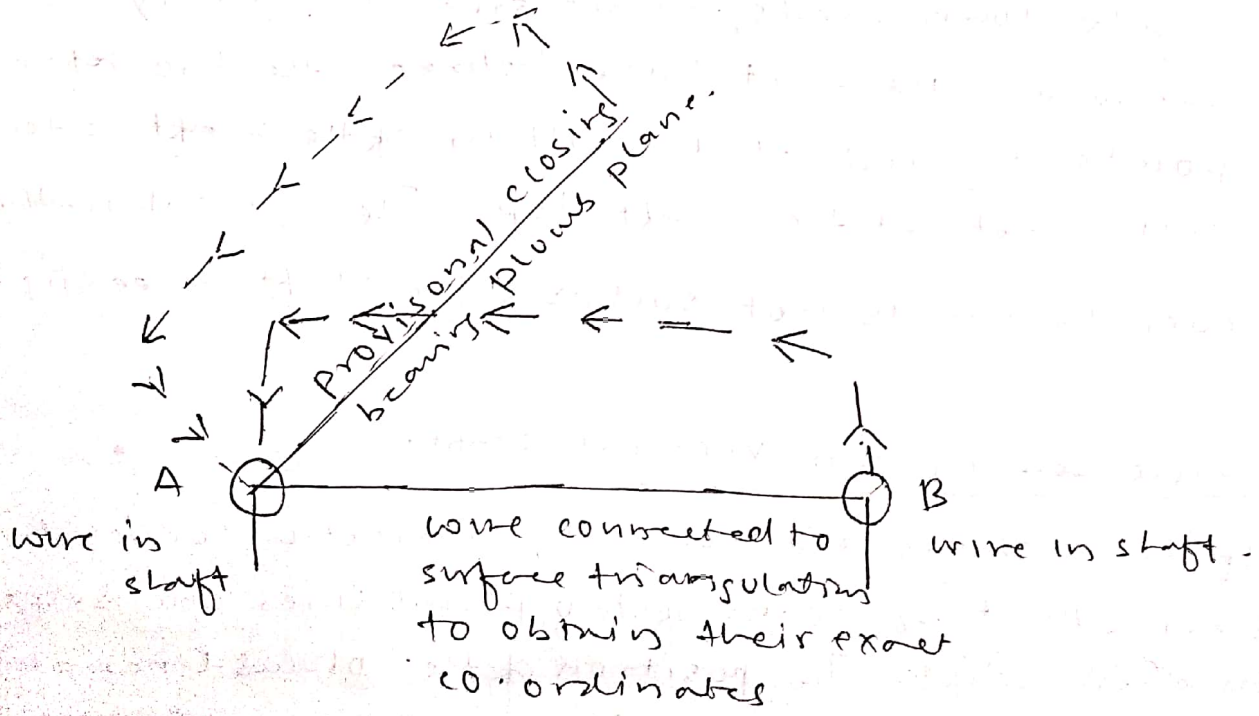
If both shafts are vertical, correction correlation is carried out by means of two plumb lines one suspended in each shaft. The position of the plumb lines at the surface is incorporated (to include) to the surface triangulation & the length & bearing of the line joining the two wires is calculated in relation to ordance

or an assumed meridian.

A traverse is then made under ground between the two wires & their co-ordinates are calculated by reference to an assumed meridian. The bearing of the plumb plane as calculated from the surface co-ordinates of the wire is taken as its true value. & compare with the bearing of the plumb plane, calculated from the co-ordinates of the U/g traverse.

The difference in bearing is taken to be error in direction of the assumed U/g meridian & the whole of the U/g traverse has to be swing through this angle to bring the surface & U/g plumb plane into coincidence.

If the surface co-ordinates is taken as the point of origin for the traverse calculation the co-ordinates of the other wire as obtain from the U/g traverse will not normally agree with its surface values. The U/g traverse therefore must be adjusted so that the difference is elliminated.



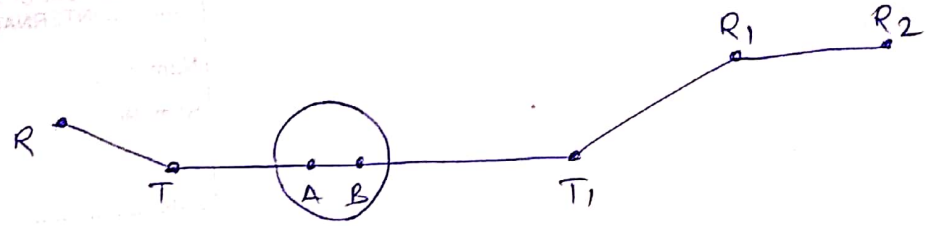
CO planning or Exact Alignment method.

In this method the object is to place the axis of the theodolite exactly in line with the plumb plane. The theodolite on the surface will be exactly aligned & by observing angle between the plumb plane & nearest station, the azimuth of the plumb plane can be determined.

The theodolite must be set up close to one wire about 3 to 3.5m away aligned firstly by eye, often ~~also~~ aligning the tripod by eye. The inst. is attached & accurately level. The two wires will be observed the telescope is pointed towards the first wire, the nearest wire is then brought into focus if the telescope is out of line.

A scale can be placed behind the wire the approximate amount of movement of the theodolite can be calculated. when both wires are in line view through the telescope which means that the line of sight lies in the plumb plane. This must be transferred to the UIS.

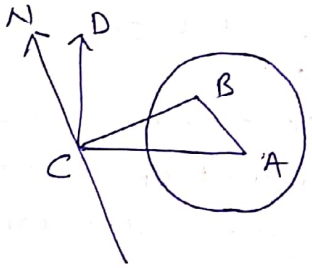
This can be done by measuring the horizontal angle BTiR, from the co-planned station below the ground. The plumb plane azimuth is determined on the surface & the azimuth of UIS lines can be determined. The length of the line can be measured & the co-ordinates of the stations are determined.



Weisbach Triangle OR Approximate Alignment Method

The method involves setting up the theodolite to one side of the alignment position, so that its line of collimation is almost in line with the plumb plane, the angle of deviation being of the order of one or two mints.

The arrangements of weisbatch triangle in its relation to the line CD joining two stations in the surface survey has been shown in fig. The azimuth of CD being known, the azimuth of the plumb plane AB may be calculated, provided that the lengths of the sides of the triangle ABC, the angle DCA & also the small angle BCA are accurately measured.



The sides of the Δ ABC must be measured very carefully with a tested steel tape. When the angle at A & C are very small, the sum of the length of the two short sides of the triangles is virtually equal to the length of the longest sides, the difference being so small as to be scarcely almost not measurable.

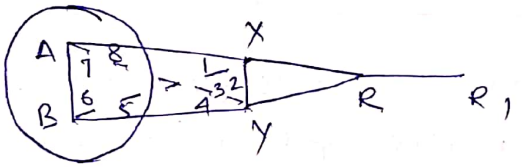
The distance between the weisbatch station and the nearer wire should be as short as possible which will normally be governed by focussing the telescope. The plumb plane BA must be as wide as possible. Although it lacks the simplicity of co-planning, this method if carefully & systematically applied, is no less accurate.

Weiss quadrilateral method.

The weiss quadrilateral is formed by the two wires of the two inst. stations. Theodolites are set up at station X & Y and the angles 1,2 & YXR are measured at X and the angles 3,4 & XYR are measured very carefully by construct Repetitions. The lengths of the sides of the quadrilateral and the diagonals are measured as a check on the angles although all the calculation involves the angular measurements.

The angles at R, YRX, XRR, & YRR, are measured. sufficient informations have now been obtained to calculate the azimuth of the plumb plane at the surface or the azimuth of RR, below ground.

Thus the azimuths of the lines are determined & eventually the co-ordinates of stations observations may be made from both sides of the shaft if possible. Several plumb planes may also be used.



Precise magnetic correlation

In this method the mag. bearing of surface & u/g base lines are determined and then a traverse is carried out from each to a single plumb wire suspended in the shaft. The mag. azimuth of each line is determi-ned and the difference applied to the grid bearing of the surface base will give the grid azimuth of the u/g base. The traverse will give the co-ordinates of the u/g stations. The method uses the tubular compass attached to the theodolite to determine the mag. bearing of the lines. Two theodolites will be used, one on the

surface and the other in ugs. The location of the surface base line & the ugs base line have got to be chosen with great care. If it is at all possible the surface base line ~~have got to be chosen with great care~~. should be vertically above the ugs base. The stations where the observations are to be taken must be free from local ~~disturbance~~ disturbances. It is easier to find out local attraction on the surface but it is very difficult to find a road free from local attraction due to pipe lines, power cables, steel supports etc. Thus ugs station must be tested to ensure that it is free from disturbing influence before correction. The time of observation should be chosen carefully because of the variation of the mag. needle.

Two or more wire in a single vertical shaft.

When entry to a mine is gained by one vertical shaft then the work of correlation becomes difficult.

Two plums wires must be suspended in the shaft & the vertical plane connecting the two wires is the plums plane, the azimuth of the plane must be determined. The width of the plane is very limited, say about 6m. Any lack in verticality will cause an appreciable discrepancy in the bearing of the plums plane.

The discrepancy in verticality will increase with the depth & therefore dipper the shaft more care is reqd in plumbing.