point, nor will any compass-survey tie unless, perchance, the errors balance. To join the line of the last course with the first will change the bearing of that course, and that would make it different to what it is on the ground, and would vitiate the plan. What must be done, is to balance all the courses, deducting or adding, as the case may be, a little to all of them. This cannot be conveniently or correctly done except by the method of Double Meridional Distances, as explained below.

Table I.

Stations.	Bearing.	Distance.	Latitudes. N.	S.	Departures. E.	W.
1	S. 63° 15′ E.	11.25		5.06	10.04	
2	N. 80° 00′ E.	11.03	1.91		10.86	
3	S. 50° 10′ E.	12.09		7.74	9.28	
4	N. 16° 00′ E.	6.10	5.86		1.68	
5	N. 42° 30′ E.	13.50	9.94		9.11	
6	N. 70° 20′ E.	11.38	3.85		10.71	
7	N. 3° 15′ E.	9.10	9.08		0.59	
8	N. 34° 30′ W.	10.45	8.61			5.91
9	N. 75° 15′ W.	28.45	7.24			27.51
10	S. 32° 30′ W.	38.15		32.17		20.49
Totals		151.50	46.49 44.97	44.97	52.27 52.27	53.91

Error in latitude 1.52   Error in depart. 1.64

Referring to Table I., it is prepared as follows: By means of a traverse table, or by sines and cosines, find out the latitude and departure for the angle of each course. By adding up the four columns find the difference between the N. and S. columns and also the E. and W. columns. In this instance there we find that the N.'s are 1.52 greater than the S.'s, and that the W.'s are 1.64 greater than the E.'s, causing a serious closing error as plotted by the protractor. (Fig. 1).

To divide the errors prepare a table precisely the same as the foregoing, except that the horizontal spaces are farther apart, and that the adding up of the old N., S., E. and W. columns are omitted. The additional columns are made subsequently. The new table is as Table II.

We have found by the first table that the N.'s and the W.'s are too long, and therefore must be shortened; while the S.'s and E.'s must be lengthened, all of them in the following proportions,—Sum of all the distances : any given distance :: total error of latitude or departure : error of latitude or departure of given distance.

Thus commencing with the latitude of distance 1, we have, as the sum of all the distances, = 151.50 : distance (1) = 11.25 :: total latitude error, = 1.52 : latitude error of distance (1) = .11.

Now, as the latitude of distance, or side, 1 is south, it must be lengthened, so it becomes = 5.06 + .11 = 5.17, as figured out on the new table.

Table II.

Station.	Bearing.	Distance.	—Latitudes— North. (+)	South. (−)	—Departures— East. (+)	West. (−)	Total latitude.	Total departure.	Double meridional distance.
1	S. 63° 15′ E.	11.25		5.06 .11 5.17	10.04 .12 10.16		− 5.17	+ 10.16	10.16
2	N. 80° 00′ E.	11.03	1.91 .11 1.80		10.86 .12 10.98		− 3.37	+ 21.14	31.30
3	S. 50° 10′ E.	12.09		7.74 .13 7.87	9.28 .14 9.42		−11.24	+ 30.56	51.70
4	N. 16° 00′ E.	6.10	5.86 .05 5.81		1.68 .07 1.75		− 5.43	+ 32.31	62.87
5	N. 42° 30′ E.	13.50	9.94 .14 9.80		9.11 .14 9.25		+ 4.37	+ 41.56	73.87
6	N. 70° 20′ E.	11.38	3.85 .12 3.73		10.71 .12 10.83		+ 8.10	+ 52.39	93.95
7	N. 3° 15′ E.	9.10	9.08 .10 8.98		0.59 .10 0.69		+ 17.08	+ 53.08	105.47
8	N. 34° 30′ W.	10.45	8.61 .11 8.50			5.91 .11 5.80	+ 25.58	+ 47.28	100.36
9	N. 75° 15′ W.	28.45	7.24 .29 6.93			27.51 .30 27.21	+ 32.51	+ 20.07	67.35
10	S. 32° 30′ W.			32.17 .34 32.51		20.49 .42 20.07	0.00	0.00	20.07

Sum of sides		151.50
Sum of northings		45.55
Sum of southings		45.55
Sum of eastings		53.08
Sum of westings		53.08