XXII. *Results of the application of Captain* Kater's *floating collimator to the astronomical circle at the observatory of Trinity College, Dublin, and remarks relative to those results. By the Rev.* J. Brinkley, *D.D. F.R.S P.R.I.A. Communicated by the Board of Longitude February* 2, 1826.

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The results of the observations which I am about to state will, I think, be considered as affording a strong testimony of the importance of the floating collimator. As applied to my circle, it furnishes the means of ascertaining the index correction with as great precision as by reversion, and in several points of view is undoubtedly superior to that method.

The reversing principle of the Dublin circle serves very conveniently for a measure of the accuracy of the floating collimator, and appears to show satisfactorily, that in the application of this instrument to any circle, no error belonging to the instrument will be introduced into the results; or in other words, that the results obtained by the assistance of the collimator, will not be sensibly affected by errors introduced by the collimator itself.

In the series of observations which I send, will be found—

I. The mean zenith distances of a number of stars, which were deduced solely by the application of the index correction, as determined by the collimator. In this way the circle was used as a mural circle; and as the observations were made both with the face of the circle east, and with the face

west, the results may be considered the same as if they had been determined by two mural circles.

II. The inclinations of the line of collimation of the collimator, as determined on different days, are given. The permanency of this inclination from day to day is by no means necessary; but it taking place, appears to give additional value to the collimator; and the exactness with which it can be ascertained, puts beyond all question that the collimator is applicable to the most powerful instruments.

III. The index corrections of the circle, as determined on different days by the help of the collimator. The uniformity of these results is affected by the exactness of the adjustment of the vertical axis of the circle by the plumb-line; and possibly the line of collimation of the telescope of the circle, at least the index correction, may suffer occasional changes by a very small derangement in the parts of the instrument, so as to vibrate as it were about a mean state.

IV. The index corrections, as determined by reversing from several stars. These, as well as the index corrections determined by the collimator, are affected with the errors of division.

It may serve for illustrating the importance of the floating collimator, to consider that it furnishes the observer with a fixed star, which he can place in his horizon (in fact at any *given* altitude), unaffected by refraction, visible at *any instant*, and on which he can make his observations in a closed room. That this fictitious star can be observed with as great exactness as a fixed star of the first magnitude under the most favourable circumstances of daylight. I cannot but think, had such a discovery been announced, and the means of

doing it not imparted at the same time, astronomers would have received it as one of the most important discoveries of modern times in this science, and anxiously expected its details.

What I have adduced in these tables of observations, will, I hope, assist in enabling others to appreciate the value of this new astronomical power, which, unless I deceive myself, may be considered as even belonging to a future more advanced state of practical astronomy.

Explanation of, and remarks on Table I.

The index corrections used in obtaining these results were found by the collimator. The zenith distances of the intersection of the wires of the collimator were found in the north and south positions. Half the sum of these is the inclination of the line of collimation of the collimator, and half the difference is the index correction. A mean of the index corrections, as determined on several days, has been used. This is not exactly the method suggested by Captain KATER; but the mean results must, in effect, be the same as if the correction had been determined for each observation. In making many observations with a large instrument, it would not be convenient, or perhaps advisable, to make for every star observed two cotemporaneous observations with the collimator. In this manner, however, a greater consistency in the separate results might be expected; but, as far as I have examined, there is no very marked superiority. That a judgment may be had, in three instances marked S, the results are deduced in this way; and certainly the agreement between the zenith distances of each day appears somewhat greater, than

when the mean index correction is used; but still the final results are the same.

The zenith distances determined in the two positions of the circle differ by the effect of the errors of division of the circle. These affect both the observations of the star and of the collimator; and the quantity of error in the index correction arising from the errors of division, will always have a contrary effect in the east and west positions. This will account for the apparent diversity in some of the means of the zenith distances determined in the two positions. The greatest discordance is in the case of α Cygni. From thence it appears possible, that the error of a zenith distance determined by help of the collimator with the face of the circle in one position only may amount to $1\frac{1}{2}''$, arising from the errors of division in the Dublin circle. It is not probable that a greater error would be found to exist in any part of the circle; but the effect of errors of division in the index corrections, as determined by the collimator, necessarily disappears by taking the mean of the east and west results. Therefore the means of the two positions ought to exhibit the results the same as determined by the method of reversion. The comparison given in Table I. (notwithstanding some of the stars have been only observed a few times), proves in a most satisfactory manner the exactness to be obtained by the use of the collimator. Of the 20 stars, only two differ by $1''$ from the former determination, and these do not differ by more than $1\frac{1}{2}''$.

In Table I. *f. w.* signifies that the observations were made by the fine wire of the telescope, which is about $\frac{1}{3000}$ of an inch in diameter, and was kindly furnished me by Dr. WOLLASTON:

where these letters do not occur, the observations were made by a grosser wire.

The mean index corrections for this latter wire, as determined by the collimator, were as follow:

To Aug. 22 inclusive, .	Index correct. South of zenith	E	$-56'',30$
		W	$+54,46$
From Aug. 25 to 29, ...		E	$-57,44$
		W	$+55,92$
From Aug. 29 to Oct. 7, face W, ...			$+59,90$
From Oct. 7 to Nov. 10, face E, ...			$-59,11$
From Nov. 10 to Dec. 3, face W, ...			$+58,62$
By the fine wire:			
From Oct. 15 to Nov. 10, face E, ...			$-15,10$
From Nov. 10 to Dec. 3, face W, ...			$+15,01$

The interval between the wires is 1′ 13″,92; and therefore previously to Oct. 15, the index correction for the fine wire is found by subtracting the index correction for the thick wire from the interval 73″,92. From Oct. 15 the index correction for the fine wire was found directly.

Explanation of, and remarks on Table II.

This table gives the inclination of the line of collimation of the collimator to the horizon, as observed on different days. It is not necessary that the collimation of the collimator should remain permanent from day to day; but when it is found to do so, it stamps an additional value on the instrument. It is only necessary that derangement should not take place in carrying it from one box to the other. This might be feared, when we consider how small a change in the relative position of the parts of the instrument would dis-

turb the observation. A displacement of the intersection of the cross wires of the collimator of only $\frac{1}{14000}$ of an inch, might occasion an error of 1″ in the inclination; so that it appears really wonderful that the collimation of the collimator has not for weeks together suffered perceptible derangement. The deviations from the mean are only such as may be safely attributed to the errors of observation and slight effects of change of temperature, except perhaps in one instance, the 27th July.

The determination of the inclination is independent on the position of the axis of the circle, and therefore also furnishes a criterion of the degree of exactness to which observations with the collimator may be made.

Explanation of, and remarks on Table III.

The index corrections given in this Table are those, by help of which the mean index corrections used for Table I. have been determined. It will be seen, that while the circle was frequently reversed (often many times in the same day), the corrections appear more variable than when the instrument remained for a length of time without being reversed. This was to be expected. An inexact adjustment of the vertical axis of the circle affects the index correction; and this is much more likely to take place when the circle is frequently reversed, than when not reversed. Indeed, from the reversals made for the purpose of trying the collimator, a source of error arose that was pointed out in the first instance by the collimator, and in so doing it furnished a strong testimony for itself.

It will be remarked, that in July and August the index

corrections for the face east differ from those for the face west. This is the circumstance alluded to, and requires explanation.

After the circle is reversed, the plumb-line adjustment is made, if necessary; and then the index correction ought to be precisely the same in quantity as before reversal, provided the parts of the instrument or the plumb line have suffered no derangement in the reversion. I had formerly particularly attended to this circumstance, which I was enabled to do by means of 4 gold dots placed by the maker on the face of the circle. The plumb-line having been made to bisect the adjusting dot on the *frame* of the circle, a gold dot on the lower part of the circle was also bisected by the plumb-line by moving the circle. The circle was then reversed; and if when the dot on the frame was bisected by the plumb-line the dot on the circle was also bisected by the plumb-line, the circle had turned without derangement, at least the plumb-line had suffered no derangement as to its point of suspension. The examination of this is tedious and delicate; and having satisfied myself that no error was to be feared, it was not usually attended to. However, when the observations with the collimator were commenced, it was soon found that the index correction appeared greater on the east side than on the west; and therefore that probably, in the act of reversing, a small derangement about the point of suspension of the plumb-line took place, less than a second in its mean quantity. This was fully confirmed from the examination by the gold dots. The result of this would have been to have made the zenith distances south of the zenith, when computed from the east and west readings, appear greater than they ought; whereas, not regarding the plumb-line as to reversal, and

using the collimator, the true results are obtained. This accounts for the inequality of the index corrections in the two positions of the circle.

By precautions since taken, the circle now appears to turn without being subject to this inconvenience. It is only an inconvenience, because the quantity of correction is obtained by the gold dots; but not so conveniently or so satisfactorily as by the collimator. Latterly however the reversals have been but rare, as I considered it desirable to continue the circle for some time together in the same position, that the collimator might be tried under various circumstances. The steadiness of the line of collimation of the circle, and of the line of collimation of the collimator in the periods in which the circle remained in the same position, is remarkable.

Explanation and remarks on Table IV.

This Table shows the index error obtained by observing the same star in the east and west positions of the face of the circle. It is given to show the general agreement with the same determined by the collimator, taking a mean between the results by the collimator on the east and west sides. But this is not the accurate quantity to be applied to each observation, as will be understood by what was stated in the explanation of Table III. This fourth table also serves to show that there is great uniformity between the adjacent quadrants of the Dublin circle.

Additional remarks on Table I.

Some of the discordances of the east and west results may appear greater than would have been expected; but it is to

be considered that each is a single observation, not the mean of two; and with reference to the collimator, the errors of division have necessarily, and may also with respect to the star, have contrary effects. Add to these the sources of error arising from inexact bisection of the plumb-line dot, from the bisection of the star from reading off; and, in so large an instrument as the Dublin circle, from the effects of unequal temperature, to which may be also added the irregularities of refraction; and then we may rather wonder greater discordances are not sometimes to be found. The deviation from the mean very rarely indeed mounts to $3''$; and it is to be remembered, that a second in the circle is only about $\frac{1}{4000}$ of an inch. It may be objected, that with reference to mural circles, in which the reversing principle cannot be applied, the effect of the errors of division on the index correction cannot be done away. In mural circles the principal means of obtaining the index correction are observations of the pole star above and below the pole, and by observing by reflection. The difficulties that occur in the practice of these two methods, when contrasted with the use of the collimator, are surely not compensated by the advantage of obtaining perhaps the index correction more free from the errors of division. When we consider Mr. TROUGHTON'S improved method of dividing, and the application of six microscopes to a mural circle, we need not fear any appreciable error in determining by the floating collimator the index correction. Besides, as Captain KATER has pointed out, we may by changing the inclination of the collimators bring into use different parts of the circle, and so avoid the effect of errors of division.

By a comparison of the inclinations of the line of collimation of the collimator, as determined in October and November by both the fine wire and thick wire, it will be seen that, as far as errors of observation are concerned, an error of a second rarely takes place. It may therefore serve to illustrate the powerful optical principle, on which the application of the collimator is founded, to remark that, as the collimator furnished by the Board of Longitude is only about 13 inches long, a space of less than $\frac{1}{20000}$ of an inch is ascertained; for to such a degree of exactness the position of the cross wires of the collimator can be ascertained. Thus perhaps a most severe test of a micrometer screw might be furnished.

J. BRINKLEY.

Table I.

Mean zenith distances reduced to Jan. 1st, 1825, found by applying the index correction, as determined by the collimator, to the observed zenith distances, and reducing them by the equations.

1825. α Cassiopeæ.	Face of Circle. East.	Face of Circle. West.
Oct. 8	2 11 21,79	
9	21,67	
12	19,12	
14	22,35	
15	22,63	
21	20,99	
25	20,06	
Nov. 3	20,61	
7	23,32	
9	20,88	
11	....	2 11 22,76
14	....	21,56
16	....	21,86
17	....	22,93
24	....	22,50
25	....	22,24
Means	2 11 21,34	2 11 22,31
		21,34
	Mean	2 11 21,82
	By Catalogue	22,14

Using single observations of collimator made nearest to the time of observation of the star.

1825. α Cassiopeæ.	East.	West.
Oct. 8	2 11 21,89	
9	21,77	
12	19,81	
14	21,54	
15	21,87	
21	21,48	
25	20,95	
Nov. 3	20,38	
7	23,31	
9	22,70	
11	....	2 11 22,38
14	....	21,48
16	....	21,32
17	....	22,39
24	....	22,42
25	....	22,16
Means	2 11 21,57	2 11 22,03
		21,57
	Mean	2 11 21,80

1825. Aldebaran.	Face of Circle. East.	Face of Circle. West.
Aug. 5	37 14 15,80	37 14 15,21
6	14,48	14,81
7	14,67	13,86
Means	37 14 14,98	37 14 14,63
		14,98
	Mean	37 14 14,80
	By Catalogue	15,41

1825. Capella.	East.	West.
July 25	....	7 34 38,52
29	....	40,80
30	7 34 41,60	
Aug. 4	40,96	
5	....	38,47
6	40,58	
7	....	36,92
9	....	37,63
Means	7 34 41,05	7 34 38,47
		41,05
	Mean	7 34 39,76
	By Catalogue	40,72

1825. β Tauri.	East.	West.
Aug. 5	....	24 56 10,51
6	24 56 11,65	
7	....	24 56 10,89
		24 56 10,70
		11,65
	Mean	24 56 11,17
	By Catalogue	12,76

1825. α Orionis.	East.	West.
July 25	....	46 1 14,88
29	....	14,66
30	46 1 14,76	
Aug. 5	12,11	13,81
7	13,64	12,98
8	13,84	
10	11,94	
Means	46 1 13,26	46 1 14,08
		13,26
	Mean	46 1 13,67
	By Catalogue	14,95

1825. Sirius.	Face of Circle. East.	Face of Circle. West.
July 24	69 52 14,07	
25	....	69 52 12,29
27	11,22	
Aug. 22	11,27	9,59
Sept. 3	....	9,03
Means	69 52 12,19	69 52 10,30
		12,19
	Mean	69 52 11,24
	By Catalogue	10,87

1825. Procyon.	East.	West.
Aug. 5	47 43 13,01	
22	13,75	47 43 14,11
Sept. 3	f. w........	14,52
	47 43 13,38	47 43 14,31
		13,38
	Mean	47 43 13,84
	By Catalogue	13,97

Arcturus.	East.	West.
July 28	33 17 20,57	
29	....	33 17 20,62
Aug. 5	19,08	
Sept. 5	....	21,84
14	f. w......	20,83
21	f. w......	20,92
29	f. w......	22,55
Oct. 7	f. w......	24,94
21	21,45	
Nov. 5	f. w. 18,79	
9	f. w. 21,59	
10	f. w......	21,94
18	f. w......	22,61
29	f. w......	22,15
Dec. 2	f. w......	22,77
3	....	21,47
Means	33 17 20,30	33 17 22,06
		20,30
	Mean	33 17 21,18
	By Catalogue	21,03

Table I.—*continued.*

Mean zenith distances reduced to Jan. 1st, 1825, found by applying the index correction, as determined by the collimator, to the observed zenith distances, and reducing them by the equations.

α Cor. bor.

1825.	Face of Circle. East.	Face of Circle. West.
Aug. 22	26 4 39,31	26 4 40,24
23	36,09	39,75
29	f. w......	40,73
31	f. w......	39,73
Means	26 4 37,70	26 4 40,11
		37,70
	Mean	26 4 38,90
	By Catalogue	38,63

α Serpentis.

1825.	Face of Circle. East.	Face of Circle. West.
Aug. 29	f. w......	46 24 14,59
31	f. w......	13,30
Sept. 5	f. w......	14,70
	Mean	46 24 14,20
	By Catalogue	13,59

α Herculis.

1825.	Face of Circle. East.	Face of Circle. West. f. w.
Aug. 29	....	38 47 22,74
30	....	22,59
31	....	23,28
Sept. 5	....	24,28
6	....	25,22
7	....	22,66
8	....	24,61
10	....	25,01
22	....	22,28
	Mean	38 47 23,63
	By Catalogue	23,15

α Ophiuchi.

1825.	Face of Circle. East.	Face of Circle. West. f. w.
	....	40 41 30,16
Aug. 29	....	30,07
30	....	29,26
31	....	29,62
Sept. 5	....	31,43
6	....	31,42
10	....	30,30
14	....	29,09
22	40 41 33,53	
Nov. 4	30,71	
9		
Means	40 41 32,12	40 41 30,17
		32,12
	Mean	40 41 31,14
	By Catalogue	30,17

γ Draconis.

1825.	Face of Circle. East.	Face of Circle. West.
July 24	1 52 26,63	
25	23,74	
28	....	1 52 22,89
29	....	23,68
Aug. 2	....	22,76
17	27,28	
18	....	24,08
21	24,22	
29	....	23,29
31	....	24,05
Sept. 5	....	23,59
10	....	21,33
12	....	23,75
14	....	22,18
17	....	22,36
22	....	23,34
28	....	25,48
Oct. 4	....	24,69
21	f. w. 26,75	
Nov. 4	f. w. 26,95	
7	f. w. 26,73	
9	f. w. 26,22	
16	f. w.......	26,53
17	f. w.......	26,11
19	f. w.......	26,40
25	f. w.......	25,89
Dec. 2	f. w.......	26,80
Means	1 52 26,07	1 52 24,17
		26,07
	Mean	1 52 25,12
	By Catalogue	25,11

α Lyræ.

1825.	Face of Circle. East.	Face of Circle. West.
July 2	14 45 36,23	14 45 36,77
15	35,48	37,24
16	37,33	34,91
17	36,67	38,47
18	39,18	37,14
19	39,46	36,08
25	37,87	
27	....	38,00
28	40,90	
29	....	36,21
Aug. 2	....	36,91
6	38,00	
10	37,40	39,17
17	40,50	38,59
18	38,02	37,66
21	40,71	37,38
22	37,67	39,83
24	39,00	39,20
25	39,18	39,40
29	....	39,26
30	....	38,08
31	....	37,81
Sept. 5	....	34,98
6	....	37,55
8	....	37,46
12	....	37,29
14	....	38,41
16	....	37,30
22	....	34,85
27	....	41,06
28	....	40,38
30	....	39,28
Oct. 14	41,76	
17	40,09	
21	40,26	
Nov. 4	40,54	
7	40,46	
9	39,54	
11	....	38,56
12	....	39,55
16	....	40,07
25	....	40,53
Dec. 2	....	40,66
3	....	40,42
Means	14 45 38,92	14 45 38,18
		38,92
	Mean	14 48 38,55
	By Catalogue	38 32

Mean zenith distances reduced to Jan. 1st, 1825, found by applying the index correction, as determined by the collimator, to the observed zenith distances, and reducing them by the equations.

Table I.

1825. α Aquilæ.	Face of Circle. East.	Face of Circle. West.
Oct. 7	44 58 24,03	
14	21,02	
15	24,78	
17	21,77	
19	23,13	
29	24,48	
Nov. 4	24,69	
7	24,52	
9	23,87	
10	25,02	
12	....	44 58 24,83
15	....	25,90
Dec. 2	....	26,93
3	....	25,62
Means	44 58 23,73	44 58 25,82
		23,73
	Mean	44 58 24,77
	By Catalogue	24,26

1825. α Cygni.	East.	West.
Aug. 10	8 43 38,64	8 43 39,12
29	....	37,41
31	....	34,92
Sept. 3	....	39,12
4	....	37,83
6	....	36,89
10	....	38,64
13	....	37,49
22	....	36,51
26	....	37,69
29	....	39,18
Oct. 15	41,78	
25	41,36	
29	41,21	
4	41,02	
7	40,85	
9	43,49	
10	42,27	
11	....	38,19
12	....	38,87
14	....	38,19
16	....	39,42
17	....	39,16
Dec. 2	....	40,44
3	....	39,00
Means	8 43 41,33	8 43 38,23
		41,33
	Mean	8 43 39,78
	By Catalogue	40,26

Using single observation of collimator made nearest to the time of ob. of the star.

	East.	West.
Aug. 10	....	8 43 38,26
29	....	38,2[illegible]
31	....	35,03
Sept. 3	....	37,84
4	....	36,55
6	....	37,71
10	....	38,19
S 13	....	39,12
22	....	38,87
26	....	38,32
29	....	37,57
Oct. 15	8 43 42,54	
25	40,41	
29	42,23	
Nov. 4	41,25	
7	40,86	
9	41,67	
10	40,05	
11	....	38,57
12	....	38,87
14	....	38,27
16	....	39,96
17	....	39,70
Dec. 2	....	40,62
3	....	38,28
Means	8 43 41,29	8 43 38,33
		41,29
	Mean	8 43 39,81
	By Catalogue	40,26

2 α Capricorni.	East.	West.
Aug. 29	....	66 27 58,55
31	....	57,41
Sept. 3	....	54,04
4	....	57,38
6	....	56,92
10	....	59,12
11	....	60,51
13	....	55,62
22	....	59,70
26	....	62,28
27	....	60,18
28	....	59,02
Oct. 4	....	59,12

1825. 2 α Capricorni—*continued.*	East.	West.
Oct. 7	66 27 58,61	
14	58,06	
15	60,28	
17	58,04	
29	58,40	
Nov. 4	59,44	
7	59,20	
9	60,74	
10	59,37	
12	....	60,65
Dec. 2	f. w......	63,57
Means	66 27 59,13	66 27 58,94
		59,13
	Mean	66 27 59,03
	By Catalogue	59,11

1825. α Pegasi.	East.	West.
Aug. 29	....	39 7 14,89
Sept. 27	....	17,35
28	....	17,34
29	....	16,55
30	....	16,97
Oct. 7	39 7 17,47	
8	16,10	
12	19,10	
13	18,29	
14	16,10	
21	17,53	
25	17,07	
29	14,94	
Nov. 3	16,52	
4	15,84	
7	15,36	
9	18,10	
10	17,87	
11	....	15,79
16	....	16,50
Dec. 3	....	13,83
Means	39 7 16,95	39 7 16,15
		16,95
	Mean	39 7 16,55
	By Catalogue	16,22

Mean zenith distances reduced to Jan. 1st, 1825, found by applying the index correction, as determined by the collimator, to the observed zenith distances, and reducing them by the equations.

Tab. I.

1825. α Andromedæ.	Face of Circle. East.	Face of Circle. West.
Oct. 8	25 15 45,78	
14	44,52	
21	46,22	
25	46,60	
Nov. 3	47,07	
4	46,70	
7	45,55	
9	46,71	
10	47,80	
11	....	25 15 44,63
14	....	45,14
16	....	46,17
17	....	45,05
24	....	46,17
25	....	46,04
Means	25 15 46,32	25 15 45,63
		46,32
	Mean	25 15 45,92
	By Catalogue	45,60

Using single observation of collimator made nearest to the time of observation of the star.

	East.	West.
Oct. 8	25 15 45,65	
14	45,35	
21	46,43	
25	45,71	
Nov. 3	47,30	
4	46,93	
7	45,56	
9	44,89	
10	46,58	
11	....	25 15 45,01
14	....	45,22
16	....	46,76
17	....	45,59
24	....	46,25
25	....	46,12
Means	25 15 46,04	25 15 45,82
		46,04
	Mean	25 15 45,93
	By Catalogue	45,60

1825. Polaris.	Face of Circle. East.	Face of Circle. West.
Oct. 7	34 59 17,44	
f. w.	18,51	
8	17,88	
f. w.	18,37	
15	18,98	
f. w.	18,85	
21	18,56	
f. w.	18,83	
Nov. 7	18,63	
f. w.	19,78	
9	17,87	
f. w.	18,60	
11	....	34 59 19,69
f. w.	....	16,92
14	....	18,94
f. w.	....	17,71
17	....	18,80
f. w.	....	17,53
Means	34 59 18,52	34 59 18,26
		18,52
	Mean	34 59 18,39
	By Catalogue	18,06

1825. Polaris, S. P.	East.	West.
Aug. 22	38 14 16,05	38 14 13,23
12	14,75	
f. w.	15,34	
20	15,09	
f. w.	16,19	
28	16,26	
f. w.	16,43	
Nov. 10	15,30	
f. w.	15,59	
10	....	14,75
f. w.	....	13,18
11	....	14,46
f. w.	....	13,75
18	....	17,25
f. w.	....	16,40
Means	38 14 15,67	38 14 14,72
		15,67
	Mean	38 14 15,20
	By Catalogue	14,94

Co. lat. by Polaris, 36 36 46,8.

	North pole dist. Jan. 1, 1825, by collimator. ° ′ ″	N. P. dist. by Catalogue. ″	Diff.
α Cassiopæ ..	34 25 24,68	24,36	+ 0,32
Aldebaran ..	73 51 1,30	1,91	— 0,61
Capella......	44 11 26,26	27,22	— 0,96
β Tauri	61 32 57,67	59,26	— 1,59
α Orionis....	82 38 0,17	1,45	— 1,28
Sirius	106 28 57,74	57,37	+ 0,37
Procyon.....	84 20 0,34	0,47	— 0,13
Arcturus	69 54 7,68	7,53	+ 0,15
α Cor. bor. ..	62 41 25,40	25,13	+ 0,27
α Serpentis...	83 1 0,70	0,09	+ 0,61
α Herculis ...	75 24 10,13	9,65	+ 0,48
α Ophiuchi...	77 18 17,64	16,67	+ 0,97
γ Draconis...	38 29 11,62	11,61	+ 0,01
α Lyræ......	51 22 25,05	24,82	+ 0,23
α Aquilæ....	81 35 11,27	10,76	+ 0,51
α Cygni.....	45 20 26,28	26,76	— 0,48
2 α Capricorni	103 4 45,53	45,61	— 0,08
α Pegasi.....	75 44 3,05	2,72	+ 0,33
α Andromedæ	61 52 32,43	32,10	+ 0,33
Polaris	1 37 28,40	28,44	— 0,04
		Mean diff.	— 0,03

The above polar distances are deduced from the zenith distances by applying the co-lat. 36 36 46,5; and the catalogue referred to is mine of 1823, given in the Phil. Trans. 1824.

J. BRINKLEY.

Table II.

	Inclination of Collimator. Face East.	Inclination of Collimator. Face West.
	′ ″	′ ″
July 22	7 10,00	7 9,80
24	10,15	9,08
25	9,74	10,43
27	10,00	6,80
28	10,12	11,79
P. M.	10,22	9,48
30	8,89	11,80
31	9,06	9,60
Aug. 2	......	10,71
3	11,37	12,47
4	11,47	
5	......	9,52
6	10,31	
7	9,56	
8	......	11,36
9	......	11,36
P. M.	......	10,89
10	8,61	
P. M.	10,85	
11	......	11,40

Several days of excessive high wind shaking the walls of the room on which the collimator was supported.

	Face East.	Face West.
Aug. 16	10,62	
17	10,22	
18	......	10,30
19	......	10,78
20	......	11,01
21	11,00	
Means	7 10,13	7 10,47

Cleaned mercury, and at same time cleaned bottom of collimator, which may have caused a small change in the inclination.

	Face East.	Face West.
Aug. 26	11,01	11,48
27	11,85	12,43
28	12,13	12,80
29	11,07	12,00
P.M.	12,16	

From this time the circle remained in the same position for a considerable interval.

	Inclination of Collimator. Face West.
	′ ″
Aug. 29	7 12,50
30	14,06
31	13,40
P. M.	14,28
Sept. 1	12,75
2	12,68
P. M.	13,60
3	11,94
4	11,38
5	9,45
6	12,45
7	12,18
8	12,10

Two days of storm.

	Face West.
10	12,88
11	12,35
14	12,03
21	12,93
22	10,99
27	8,83
28	10,49
Oct. 1	11,26
7	11,16
Mean	7 12,08

Reversed circle.
Circle turned without derangement of plumb-line, as ascertained by gold dot.

	Face now East.	Fine Wire.
		″
Oct. 7	7 10,81	
13	11,07	
14	10,40	
15	10,62	10,40
17	11,67	11,33
21	9,93	10,00
22	8,60	9,12
24	10,48	10,21
27	10,57	10,98
28	11,43	11,92
29	11,58	11,50
Nov. 4	12,03	11,46
7	9,97	8,86
9	9,07	10,20
11	8,56	8,36
Means	7 10,45	10,36

Reversed circle.

	Inclination of Collimator. Face West. Thick Wire.	Fine Wire.
	′ ″	″
Nov. 11	7 9,97	9,66
14	11,55	11,53
P. M.	9,53	10,52
17	10,06	10,77
19	10,16	10,72
25	10,93	10,90
30	11,91	12,11
Dec. 2	9,38	8,71

Cleaned mercury.

	Thick Wire.	Fine Wire.
3	12,03	12,05
Means	7 10,61	10,77

Table III.

	Index Correction.	
	Face East.	Face West.
1825.	″	″
July 22	54,87	54,80
24	58,02	54,64
25	55,65	54,26
27	56,35	53,81
28	56,04	53,18
P.M.	59,28	55,72
30	55,31	52,98
31	59,16	52,90
*Aug. 2	......	55,37
3	56,40	54,96
4	55,20	
5	......	54,89
6	54,32	
7	53,93	
8	......	54,95
9	......	55,50
P.M.	......	55,93
10	56,38	
P.M.	56,26	
11	......	53,60
Several days of high wind.		
16	55,40	
17	58,02	
18	......	55,20
19	......	53,50
20	......	54,08
21	56,50	
Means	−56,30	+54,46
Adjusted plumb-line dot, by which the index correction is necessarily affected. Cleaned mercury, &c.		
Aug. 26	59,08	56,11
27	56,58	56,56
28	57,80	55,23
29	56,30	55,80
Means	−57,44	+55,92

* From this time the collimator was always lifted from the mercury, and replaced before the observation.

	Index correction.	
	Face East.	Face West.
Took off plumb-line, and cleaned notch.		
Aug. 29 P.M.	61,36	
Reversed circle, which remained with face west till Oct. 7.		
Aug. 29 P.M.	......	60,70
30	......	60,44
31	......	60,77
P.M.	......	60,01
Sept. 1	......	60,25
2	......	58,92
P.M.	......	59,77
3	......	59,97
4	......	58,62
5	......	58,98
6	......	60,72
7	......	59,08
8	......	59,70
2 days of storm.		
10	......	59,45
11	......	60,18
14	......	61,53
21	......	59,91
22	......	62,28
27	......	60,53
28	......	58,29
Oct. 1	......	58,57
7	......	59,03
	Mean	+59,90

	Index correction.	
	Thick Wire.	Fine Wire.
Reversed Circle, face now East.		
Oct. 7	59,21	
13	59,80	
14	58,30	
15	58,35	15,63
17	57,84	15,70
21	58,90	14,67
22	59,60	14,65
24	58,58	15,28
27	60,90	15,15
28	58,76	15,85
29	58,09	16,08
Nov. 4	58,88	14,78
7	59,10	15,33
9	60,93	13,87
11	60,33	14,23
Means	−59,11	+15,10
Reversed Circle, face now West.		
Nov. 11	59,00	14,98
14	58,62	14,80
P. M.	58,70	14,86
17	59,16	14,70
19	58,86	14,75
25	58,70	14,67
30	57,88	15,61
Dec. 2	58,80	15,18
Cleaned Mercury.		
2	57,90	15,55
Means	+58,62	−15,01

Table IV.

Index corrections by reversion to Aug. 21 inclusive.		
α Lyræ	13 Ob. East, and 13 West	″ 55,80
γ Draconis	2 E 3 W	56,41
Arcturus	1 W 1 E	55,36
Aldebaran	3 W 3 E	55,55
β Tauri	2 W 1 E	55,85
α Orionis	4 W 3 E	55,20
Capellæ	5 W 3 E	56,67
α Cor. bor	2 W 2 E	55,53
Sirius	1 W 1 E	56,22
Procyon	1 W 1 E	55,20
α Cygni	1 W 1 E	55,10
Mean by Collimators E 56,30 W 54,46 } 55,38	Mean...	55,72