

KG
11365
342

O 11

East Transit. (Errors)

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K 6 11365. 342

$$\frac{\cos^2(45 - \frac{1}{2}\delta)}{\sin \omega}$$

$$\dot{c} - c \sec \delta - \tan \delta = \frac{\sin^2(45 - \frac{1}{2}\delta)}{\sin}$$

$$\odot \cot(45 - \frac{1}{2}\delta) -$$

$$\alpha - M = \Delta \pi + m + \frac{1}{2}(c + a) \omega \tan(45 - \frac{1}{2}\delta) + (c - m) \tan(45 - \frac{1}{2}\delta)$$

$$\sec \delta + \tan \delta$$

$$1 \quad \infty$$

$$c - m$$

$$\sec \delta - \tan \delta$$

$$1 \quad 0$$

$$\tan\left(45 + \frac{1}{2}\delta\right) - \tan\phi$$

KO 11365.342

1866 April 17th

Reversed to All W

Levil

E

W

73

77.5

90

61.

163

138.5

24.5

6.12

-0.43

N M 86.0 82.5 86.8 92.8 89.9

Mid W 23.3 25.7 23.9 23.8 24.6

62.7 56.8 62.9 69.0 65.3

63.3

63.3

16.7

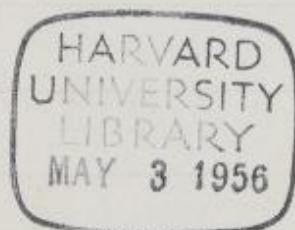
M W 23.8 24.9 22.0 23.4 22.8

N M 81.8 82.3 82.1 83.3 87.3

60.0 58.0 57.4 60.1 59.9 64.5

60.0

59.9



April 24 1866

Ill West.

E W

84.5	56.	140.5
84.	56.8	140.8
65.	75.	140.0
65	74.5	139.5
298.5	262.3	140.2
		~~140.3~~
8	136.2	4.5-2 - 0.30

all W	21.7	23.7	22.4	24.3	23.0
-------	------	------	------	------	------

all W	84.7	84.1	83.6	84.3	83.5
61.0	63.0	60.4	61.2	60.0	60.5

April 30 1866

Ill West

Mid W 21.6 22.0 23.8 24.0 23.9

N Mark 84.3 81.0 84.6 85.5 78.1
 47.2 62.7 59.0 60.8 60.5 54.2
 59.44

Mid W 24.8 23.6 26.0 22.0 24.8

S Mark 99.2 104.0 108.1 109.1 93.5
 42.7 74.4 80.4 82.1 67.1 68.7
 78.54

$$\begin{array}{r}
 E \\
 71. \\
 71 \\
 86 \\
 86 \\
 313 \\
 8)43 \quad (\begin{array}{r} 270 \\ 540 \\ 540 \end{array} = 0.36
 \end{array}$$

Mid W 22.3 21.9 21.9 21.8 22.2 22.6

S Mark 98.0 94.4 99.0 95.0 95.8 102.8
 33.3 75.7 73.5 77.1 73.2 73.6 60.2
 75.5-5

Mid W 23.3 21.9 23.9 22.9 22.0 22.2

N Mark 85.9 82.0 84.5 86.4 84.4 84.4
 61.9 62.6 60.1 60.6 63.5 62.4 62.2

Mid. W. 24.1 22.4 23. 23.4 22.8 22.8

N. Mark 84.6 84.8 83.8 83.8 86.6 84.7
 61.6 60.5 62.4 60.8 60.4 63.8 61.9

S.m. 101.1 100.9 103.9 101.2 99.9 101.2
 midw. 19.3 20. 22.9 25. 22.1 23.9
 475.0 81.8 80.9 81.0 76.2 77.8 77.3
 79.2 All East

Soll 632 61.7 61.2 60.1 59.9 62.2
 mid W 1240 22.5 23.8 23.3 23.1 23.1
 115 60.8 60.8 62.6 632 632 60.9
 61.9

mid W

S.m. 61.2 60.1 61.9 59.2 61. 3
 78 122.6 120.7 122. 123. 122.9
 61.5-6 61.4 60.6 60.1 63.8 61.9

At all 71.3 75.3 74.1 75.8 74.5 76.2
 all W 21.8
 27.2 48.49 mean

mk. 73.2 72.9 74.9 73.5 73.4
 23.1 13.2 23.4 24.2 24.
 50 50.1 49.7 51.5 49.3 49.4
 Bz or Mark 2c = 13.41
 " S " 2c = 13.65

Q	W	
82	64	
82.5-	64.5-	
77.5-	75-	
74	75.5-	
31 3.0	279.0	ϵ and
8) 34	4.25-	ϵ high
$c = -0.155$	u	c ill E
$n = +0.090$		
$m = -0.46$		
$a = -0.377$	W	of S

$\log. a. =$
 $" b =$
 $" c = -7.19033$
 $" \cancel{m} =$
 $" n = -2.95424$

May. 3rd Observation after
adjustment of wires to stellar focus.

South mark. 56.5 58.6 57.9

Middle wire 123.5 122.1 123.

$$67.0 + 63.5 + 65.1 = 195.6$$

mean 65.2

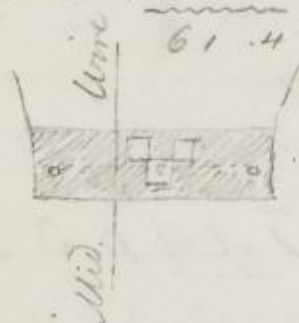


North mark. 61.8 62.1 60.8

Middle wire 123.2 123.9 122.

$$61.4 + 61.8 + 61.2 = 184.4$$

mean 61.4



Definition good.

1866phae.proj.:.343.

May. 15th 1866

Formula from W. McConnell's book

One div of level = $1''.00 + 0''.0037 (B-120)$

$$" " " " = 0.0\% + 0.0002 (13-120)$$

Length of Bubble = $B = E + W$

May. 15.

Left the level on the axis 15 minutes
before measuring.

	East End	W. End.
1. reading	69.5	42.6
	69.2	42.9
	69.23	43.1
		42.87

1. reading

69.5

42. 6

69. 2

42.9

69. 69. 23

43.1 42.87

2nd reading 5 minutes later
(before rehearsal)

68.1

43.2

3

over

Feb. 7

44

50.

60

52, 4

May. 15^b Fahrenheit + 68°.

Level.

1st reading. E. end. W. end.
66.7 44.

2nd (reversed) 53.9 56.1

120.6 100.1

100.1

4 / 20.5

E end high 5.1

2nd trial.

1st reading E. W.

60. 51.5

59.8 57.3

59.7 59.8 51.4

179 5 59.83 4 2 51.4

2nd read? (reversed) E. W.

60. 50.3

119.8 101.7

101.7

4 / 18.1

E end high 4.5

May. 15. N. Mark. -

Middleline 1.23.2 124 123.1

N. Mark. 71. 70 65.

May. 28.

Ill. E.

N. Mark 69.3 67.3 68.2
 Mid Wire 122.1 124. 122.
 52 8 56 7 54 8 1643
 54.8

S Mark 35.2 32.7 33
 Mid Wire 122.2 122.6 123
 87.0 90.1 90 267.1
 89.

Telescope on South mark -
 Level.

1st reading - E end. W. end -
 .59 59.9

reversed level.

2nd reading. 67.5 51.
 126.5 110.9 415.6
 3.9

Reversed Telescope -

Ill. W. -

N. Mark -	58	58.7	60.1
Mid wire	<u>22.2</u>	<u>23.6</u>	<u>21.9</u>
109 1	35 8	35 1	38 2
36.4			

S. mark	92.9	93.5	92.8
Mid wire -	<u>22.1</u>	<u>21.1</u>	<u>22.7</u>
213 3	70 8	72.4	70 1
71.1			

Telescope on S. mark

Level

1 st reading.	E. end.	W. end.
	56.	63

reversed level

2nd readings

E end	W. end
<u>72.</u>	<u>45.5</u>
128	108 5
4/19 5	
4.87.	

1866 June. 2nd

Examination of Rivots of

Reading of Small bubble
Pointer, end. of Level East

East. West.

36° 30' 57. 67.3

Level can 53.5 61.8

not be
applied
between these
points.

144.30 52.2 60.6

179° { 50.4 61.4

215.30 50.3 61.3

East. Transit. Ill. W.

Small. Bottle and of
Level. West.

East.	West.	53.5	61.8
		<u>69.</u>	<u>47.5</u>
~~71.4~~	~~49.7~~	-122.5	-109.3 = 13.2
69	47.5		End high 3.30

		52.2	60.6
		<u>65.9</u>	<u>45.1</u>
65.9	45.1	118.1	-105.7 4/11.4
			End high 3.10

		116.1	
		<u>105.7</u>	4/11.4
66.	44.3		End high 2.85

		118.1	
		<u>104.9</u>	
67.8	43.6		13.2 End high 3.30

1866. June. 4^h

E. Transit

Pointer	Cron Avel and East			
	East	West	Sum.	
324	57.1	70.7	127.8	

360	East	West.	
	55.9	68.8	124.7

Illⁿ W.

Cross level end West

East	West	sum	$E+E = 1321$
75.	51.3	126.3	$W+W = 1220$
			$+ \underline{101}$
		$E \text{ end high}$	2.52

East	West	$E+E = 1291$
73.2	50.2	123.4
		$W+W = 1190$
		$+ \underline{101}$
		2.50

over

1866. June. 5th
 Continuation of examination of

Pointer, Cross level. East.

East. West E+W.

35° 40'	55.	68.4	123.4
---------	-----	------	-------

144°	54	65.2	119.2
------	----	------	-------

180	53.2	65.4	118.6
-----	------	------	-------

216.	52.	63.8	115.8
------	-----	------	-------

324.30	50.9	63.5	113.4
--------	------	------	-------

Ill.ⁿ W.
East Transit Pivots.

Cross level W.

East.	West.	E+W.	E+E	127.7
			W+W	117.8
72.7	49.4	122.1	4	9.9
				2.47

E end high.

			E+E	124.7
			W+W	114.7
70.7	49.5	120.2	4	10.0
				E end high 2.50

			E+E	123.2
			W+W	113.3
70.	47.9	117.9	4	9.9
				E end high 2.47

			E+E	= 120.6
			W+W	= 110.3
68.6	46.5	115.1	4	10.3
				E end high 2.57

			E+E	118.8
			W+W	109.4
67.9	45.9	112.8	4	9.4
				2.35

June 6 Reexamination of
 Jean. Therm. Pointer, Cross level East. Sum

			West.	East.	
10.25	+64.7	180°	66.9	52.9	119.8

10.55	66	144	64.7	52.8	117.5
-------	----	-----	------	------	-------

11.25	67.3	36	63.7	51.8	115.5
-------	------	----	------	------	-------

11.55	68.3	360°	63.3	50.1	113.4
-------	------	------	------	------	-------

12.25	69.	324	60	52.2	112.2
-------	-----	-----	----	------	-------

12.55	67.6	216	61	50	111
-------	------	-----	----	----	-----

East. Transit Pivots. Ill. W.

Cross level West. Sum. time Thorne

West. East.

47.9 70.8 118.7 10.40 64.9

E+E = 123.7

W+W = 114.8

$$\begin{array}{r} 4 \overline{) 8.9} \\ - 2.22 \end{array}$$

47.1 69.4 116.5 11.10 66.5

E+E = 120.2

W+W = 111.8

$$\begin{array}{r} 4 \overline{) 10.4} \\ - 2.60 \end{array}$$

46. 68.9 114.9 11.40 67.8

E+E = 120.7

W+W = 109.7

$$\begin{array}{r} 4 \overline{) 11.0} \\ - 2.75 \end{array}$$

47 65.8 112.8 12.10 69.1

E+E = 116.9

W+W = 110.3

$$\begin{array}{r} 4 \overline{) 5.6} \\ - 1.4 \end{array}$$

43.3 68.4 111.7 12.40 67.2

E+E = 120.6

W+W = 103.3

$$\begin{array}{r} 4 \overline{) 17.3} \\ 4.32 \end{array}$$

45.2 65.1 110.3 1.10 66.9

115.1

106.2

$$\begin{array}{r} 4 \overline{) 8.9} \\ - 2.22 \end{array}$$

June 6.

Reading	W.	E.	standing 10 minutes sum
	65.	52.4	117.4
	64.7	52.8	117.5

11.29 placed level.

11.30, after 1 min W. 45.2 E 70.3

11.32 " 3 45.3 69.7

11.34 " 5 45.6 69.6

11.38 " 9 46. 69.1

11.40 " 11 46 68.9

52 62.6

E 51 4 9.9

W 61. 3 7.8

2.1 error.

W 42. 4

E 70

Sum	115.5	diff.	25.1	
"	115.0		24.4	Δ^E .7
"	115.2		24.0	.4
"	115.1		23.1	.9
"	114.9		22.9	.2

13.3

10.6

2.7 error which would
have been committed by reading
level at once after placing it -
supposing it stationary at the
end of 15 minutes.

June. 6.

^h 3.15	^m { 66.77 }	Cross level East.		
		E.	W.	Posites
		48.9	60.	108.9 180

4.	66	49.5	60.5	1100	260
----	----	------	------	------	-----

5.		50.5	62.1	1126	324
----	--	------	------	------	-----

Crown level W.

E

W

64

44.9

108.9

E+E 112.9

W+W 104.9

$$\begin{array}{r} 4 \overline{) 80} \\ 2.00 \end{array}$$

64.8

45.4

110.2

67.2

E+E 114.3

W+W 105.9

$$\begin{array}{r} 4 \overline{) 84} \\ 2.10 \end{array}$$

65.9

47.

5.15

112.9

64.4

E+E 116.4

W+W 109.1

$$\begin{array}{r} 4 \overline{) 73} \\ 1.82 \end{array}$$

June. 8. ^h 211ⁿ W.

n. Mark.	81.	83	82.	85.
Mid line	20.	22	22	21
	61	61	60	64

June. 9. Ill.ⁿ W. —

Cron level. E		}	Cron level W.	
East.	West		East.	West.
61.2	70.9			

Ill W.

N mark	76	76.5	76.6
Mid wire	21	23	23.
	55	53.5	53.6
	53.5		
	53.6		
	3/1621		
	54..		

June. 11. ^h 211ⁿ East

Pointer reading 360°.

Cross level East Cross level West

E. W. E. W.

45.6 56.3 61.4 40.3

Sum 101.9 100.7

E+E. = 107.0

W+W = 96.6

4 $\overline{) 107.0}$
 $\underline{- 96.6}$
 10.4

June. 11. 2ll^{me}
 V. Mark 61. 64.2 60 61.5
 Mid line 123 121.5 122 122.

62 57.3 62 60.5
 57.3
 62.
 60.5 .0.2.28

4) 241.8 3.2
 2ll East 60.4 0.456
 " West 54. 0.684
 .07296
 2) 6.4
 -3.2 .0228



-7

June 13. ^h 2nd W.

N. Mark.	101.6	101	100	103
Mid Wire	<u>22</u>	<u>22</u>	<u>22</u>	<u>22</u>
	79.6	79	78	81
				78
				79
				<u>79.6</u>

Seeing good.

	4	31	7.6
			<u>79.4</u>
			<u>16.</u>

reading of Micrometer head
for mean wire is .07

~~~~~  
2<sup>nd</sup> W

|                  |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|
| N. Mark          | 100.      | 99        | 99        | 100.      |
| <u>Mean Wire</u> | <u>07</u> | <u>07</u> | <u>07</u> | <u>07</u> |
|                  | 93        | 92        | 92        | 94.       |

June 13<sup>th</sup> 2ll<sup>n</sup> W.

Pointer. 324°

|               |      |              |      |
|---------------|------|--------------|------|
| Cron level E. |      | Cron level W |      |
| East          | West | East         | West |
| 52.1          | 66.6 | 70.9         | 50.1 |

E + E    1 2 3 0

W + W    1 1 6 7

4 / 6.3

E end high. 1.6

13 2ll<sup>n</sup> ~~West~~, East

Pointer

|               |       |              |      |
|---------------|-------|--------------|------|
| Cron level E. |       | Cron level W |      |
| East          | West  | East         | West |
| 54.5          | 65.9. | 70.1         | 49.4 |

E + E    = 1 2 4 6

W + W    1 1 5 3

4 / 9 3

2 3

June 13<sup>th</sup> W. E.

N mark 10 12.5 12 11.5

Mid wire 22 22 22 22  
98

N mark 12.7

Mean wire. 07.

Good seeing -

readings of micrometer head.  
wire a

When Ill.<sup>n</sup> is East.

mean wire is .05.7 divisions. — West.

When Ill.<sup>n</sup> is West.

mean wire is .93 east.

2/987

Collimation + 49.3 for Ill. W. U.C

" = 49.3 " " E U.C.

June 18. Ill. East. —  
Excellent seeing. —

South Mark 68, 68, 69.8, 69.8, 68.  
Mid. Wire 123

| Mid Wire S.M. | Mid Wire N.M. |
|---------------|---------------|
| 123.5 70.5    | 24.0 9        |
| 123.5 71.5    | 22.0 10       |
| 121.0 66.5    | 23.0 9.5      |
| 122.5 66.5    | 25.0 11.0     |
| 10.5 275.0    | 14.0 39.5     |
| 122.62 68.75  | 23.5 9.88     |

Ill W  
N Mark 14.6 15. 14.9 14  
Mid Wire 23.

mean reading on S Mark 0.54  
" " " N " 0.11

Ill W

| S.M. | N.M. | Mid Wire                                                                            |        |
|------|------|-------------------------------------------------------------------------------------|--------|
| 60   | 91   |                                                                                     | 91.8   |
| 55   | 92   |                                                                                     | 98.8   |
| 57   | 90.5 |  | 101.68 |
| 57   | 93.0 |                                                                                     | 50.84  |
|      | 92.5 |                                                                                     | 23.50  |
|      | 90   |                                                                                     | 27.34  |
|      | 91.8 |                                                                                     |        |

2lll

Smack 136 .133

mid w 23 23

~~2lll~~

Nmk

no

94 - 23 = 71

92

92.5

92

2lll W

91.8

1466

mid time

2lll, E mid

11.0 25

11.5 25

11.0 23

12.5 21.5

12.5 21.0

11.5 24.5

100 200

11.66 24.0



91.8

11.66

103.46

51.73

24.00

27.73

27.34

53.07

27.53

048.8

323

2nd to Moon

2lll E E = - 0.738

evolution

June 18, Ill E.

Seeing not good - head of micrometer screw  
adjusted to read 0 on the middle wire  
Ill. W

| N. Mark | mid wire | N. Mark |
|---------|----------|---------|
| - 11.5  | - 0.5    | 71.5    |
| - 9.0   | - 1.5    | 65.5    |
| - 10.0  | + 1.5    | 68.5    |
| - 8     | - 0.5    | 64.5    |
|         | + 1.0    | 68.0    |
| 38.5    |          | 336.0   |
| .096    |          | 672     |
|         |          | 096     |
|         |          | 576     |

$$c = 288$$

$$+ 048$$

$$0^{\circ}.336$$

$$c = 0^{\circ}.768$$

After correcting azimuth and collimation  
the distance from K Mark to mid wire is 0.29



June 19<sup>th</sup> Level 211W

Pointer 360°

Cross level East. Cross level West  
East West East West

47.9 60.6

63 45

62.7 44.9.

E+E 110.9

E+E 110.6

W+W 105.6

W+W 105.5

4  $\overline{) 5.3}$   
1.3

4  $\overline{) 5.1}$   
1.3

June 19.<sup>h</sup> 211 W

S mark Mid wire

119.5      22.1

119.      26

121.      28

76.1

N mark Mid wire

43.2 - 26.1

47      27.1

42.2      29.2

82.4

76.1

6/158.5

26.4

43.2 - 26.4      16.8

47      20.6

42.2      158

3/53.2

17.7

Ill. E.

S mark mid line

23. 126.4

28

21

K mark

95 126.4

95.2

96.1

2863

95.4 126.4 31.0

$$\begin{array}{r}
 17.7 \\
 2 \overline{) 13.3} \\
 \underline{6.6} \\
 4.8 \\
 \underline{1.8}
 \end{array}$$

June 20 211 E

Printer 360

Cross level E. Cross level W

E W E W

50.2 63.1 62.1 46.4

$$E + E \quad 50.2 + 62.1 = 112.3$$

$$W + W \quad 63.1 + 46.4 = 109.5$$

$$\begin{array}{r} 4 \overline{) 2.8} \\ \underline{4} \\ .7 \end{array}$$

June. 21. <sup>st</sup> Ill. E.

S. Blank Middle Wire

23.5

128

21.6

127.7

25.9

127.1

22.

126.6

20.1

126.1

24.

126.7

6137.1

61762.2

22.85

127.03

104.18

2

June 25

S Mark.

~~115~~

125.1

110

109

110

110.2

110.

109.8

27

82.8

Mid Wire E of  
S Mark 82.8

N Mark

Mid. Wire

to N Mark = 0

June 25. <sup>h</sup> 3<sup>ll</sup>. West.

N. Mark. Mid Wire

.27 .27

The middle wire bisects the centre  
of the N. Mark

S Mark Mid. Wire

109.4 .27

107.7

107.9

107.9

112.7

545.6

.109.1 - .27 = 82.1

previous page. 82.8

Mid. Wire E. of S. Mark. 82.4

Seeing. fair.

June 25<sup>th</sup> Ill. East

N. Mark. Mid Wire

89.9      127

89.

89.9

88.3

88.

5/445.1

89.0 —

127 - 89. = 38

Mid. wire E. of N. Mark 38.       $C = +.19$

S. Mark. Mid Wire

98.9      227

98.9

103.2

105.

105.

227 - 102.2 = 115.2

5/511 0

82.4

32.8

$C = +16.4$

102.2 Mid W. E of S. mark.

2/354  
+18.

collim<sup>n</sup> of mid wire or mean value of c

June. 27. <sup>h</sup> Brought Transit wires  
more exactly to stellar focus, by  
moving them a very little toward object glass.  
Then found <sup>the</sup> following values of wire  
intervals by Micrometer Screw.  
Highest power used.

### ~~~~~ Illumination. East.

The wires are numbered from the  
West in the order in which the  
star passes them with the inverted  
eye piece.

a omitted | Reading of Mic.  
b " | screw head.

c ~ 1212

1 ~ 924.1 ; 287.9

2 ~ 772. ; 152.1

3 ~ 627.7 ; 144.3 ; .0078

4 ~ 470.1 ; 157.6 ; 013.3

5 ~ 326.7 ; 143.4 ; 014.2

d ~ 23.1 ; 303.6

e omitted 43557

f omitted 627.7 - 642.2 = 5.5

2<sup>nd</sup> reading.

C 1212.7

1 924.

2 770.9

3 627.3

4 468.6

5 326.

d 22.1.

7/43516

$$627.3 - 621.7 = 5.6$$

Then adjusted micrometer head to read 0  
on the mean of wires as above determined

3<sup>rd</sup> reading

C, 1190.1

1, 902.

2, 751.

3, 604.

4, 447.

5, 304.1

d 01.1

7/4199.3

$$604 - 599.9 = 4.1$$

4<sup>th</sup> reading

C 1190.1

1 903.

2 749.8

3 605.

4 447.3

5 302.6

d 000.

7/4197.8

$$605 - 599.7 = 5.3$$

5.5

5.6

4.1

5.3

Hence, the mean wire

420.5

is .051 revolutions west of

5.1

the middle wire for 211<sup>th</sup> East.

according to the above determination.

2.28.5

-.051

2.28.5

1.142.5

.116.535

Hence, for VC. 211<sup>th</sup>.E an equatorial  
star should cross the middle  
wire <sup>5</sup>0.17 before the mean.

June 26. 211<sup>u</sup> E.

reading on S mark —

S mark. 89    111  
                   114  
                   116  
                   3141

S mark West of mean 113.7

S mark West of mid. 118.8

N mark mean 100

75

75.1

77.

227 1 75.7

N mark. West. of mean time 24.3

211<sup>u</sup> W.

N mark

109.9

109.7

108.1

27 7

9.2. N mark W of mean time

S mark

99.5

100.6

99

31299 1

99.7

S mark West of mean 94.0

S mark W of mid 94.9

From N. Mark. -

$$\begin{array}{r}
 24.3 \\
 24.3 \\
 16.7 \\
 \hline
 7.6 \\
 2 \overline{) 33.5} \\
 \underline{16.7}
 \end{array}$$

$$c = (\text{for } 24.3 \text{ W.}) - .076$$

From S. Mark.

$$\begin{array}{r}
 113.7 \\
 99.7 \\
 \hline
 14.0 \\
 14.0 - .070 \\
 \hline
 2 \overline{) 146}
 \end{array}$$

$$\text{mean value of } c = .073$$

$$\begin{array}{r}
 2.285 \\
 .073 \\
 \hline
 6.855 \\
 15995 \\
 \hline
 .166805
 \end{array}$$

$$c = -0.167$$

for VC. Ill. W.

June 28 2llw.

Cross. level. East. E. 42.5 W. 53.7

" " West. E. 54. W. 41.6

$$\begin{array}{r} 96.5. \quad 95.3 \\ 4 \overline{) 1.3} \\ .32 \end{array}$$

Cross level East. E 43.6 W 55.

" " West 57. 43.2

$$\begin{array}{r} 100.6 \quad 98.2 \\ 98.2 \\ 4 \overline{) 2.4} \\ .60 \end{array}$$

$$\begin{array}{r} 97.6 \\ 96.6 \\ 4 \overline{) 1.0} \\ .25 \end{array}$$

$$\begin{array}{r} 57.65 \\ 43.20 \end{array}$$

$$\begin{array}{r} 43.6. \\ 58. \\ 101.6 \\ 97.7 \\ 4 \overline{) 3.9} \\ 9.7 \end{array} \quad \begin{array}{r} 57.7 \quad 42.6 \\ 43.6 \quad 55. \\ 101.3 \quad 98.1 \\ 98.1 \end{array}$$

Readings. div 42.7  
0.32 55

$$\begin{array}{r} .60 \\ .39 \\ 3 \overline{) 1.17} \\ 39 \end{array}$$

East high.

2<sup>nd</sup> W June 28

C. level E. E. W. E+W=

" " W. E W. E+W=

C. level E. E 43.5 W 54.4 E+W=97.9

" W. E 56.8 W 43.2 100.0

100.3 — 97.6 = 2.7

4/2.7 = .67

2<sup>nd</sup> W. 28

C. level E. E 44.9 W 57.9

" " W. E 59.2 W 42.6

104.1 100.3

100.3

4/3.8

9.5

.32.

.60.

.67

.95

4/254

.63

June 29 2ll W.

Cr. level East E 46.7 W 60.4

" " West E 61.6 W 43.4

108 3

10 3 8

193.8

4.5

1.12

result

June. 28. Morning- (Pointer 360)  $b = -0.021$  <sup>Sec</sup>

" " Late Forenoon "  $b = -0.040$

" " Afternoon. "  $b = -0.044$

" " Late " "  $b = -0.063$

" 29 Forenoon "  $b = -0.075$

The above. levels., were taken 2ll<sup>n</sup> W., the level being allowed 30 minutes to settle between each reading. - Each result above is derived from two levelings independantly of the others. The result seems to indicate a uniform settled disturbance of the piers, the West pier having

sunk below the East between  
each leveling, and may  
probably be attributed to the  
long & heavy rain which only  
ceased this morning. — For  
many weeks previous the Eastern  
pier was settling relatively to  
the Western one.

July 2.

Cross level E. E. 43.7. W 45.3.

" " W ~~E~~. 46.7 40.8.

90.4 86.1

86.1

4/4.3

1.07

July 2 2110

S. mark. 97. Mid W

95.9

5.3

97.2

5.3

3/2921

156

Mean time 97.4

5.2

N mark

Mid time 5.2

15 2 30

14.2 14.2

12.6 12.6

4/568

14.2

July 7 1866

Illum. w. Middle thread east of north  
mer. mark 0<sup>R</sup>.09 (value of  $\pi$  = 2<sup>s</sup>.285)

Level

|              | E           | W           | E - W         |
|--------------|-------------|-------------|---------------|
| C Level East | 45.5        | 49.2        |               |
|              | 44.9        | 49.1        |               |
|              | 44.8        | 48.5        |               |
|              | <u>45.1</u> | <u>48.9</u> | - 3.8         |
| " West       | 50.8        | 40.2        |               |
|              | 49.8        | 40.3        |               |
|              | 48.8        | 40.2        |               |
|              | 48.2        | 39.2        |               |
|              | 47.8        | 38.6        |               |
|              | 46.5        | 39.0        |               |
|              | <u>46.5</u> | <u>37.1</u> |               |
|              | 48.3        | 39.2        | + 9.1         |
|              |             |             | <u>+ 2.65</u> |
|              |             |             | + 1.32        |

Inst. reversed.

E

W

Level E 40.2

41.5

40.241.3

40.2

41.4

- 1.2

C Level W

44.5

36.3

44.536.3+ 8.2  $\sqrt{+1.75}$ 

Illum. E Middle Thread east of north mer.  
mark 0<sup>R</sup>.30

Corr. Inequality of pivots Lp. W + 0.11

Lp. E - 0.11

East end of axis high Lp. W + 1.43

Lp. E + 1.64

Mum. E.

Monday July 7

1866

South Mark  $\delta$  |  $1^{\text{r}}20$  <sup>west</sup> ~~east~~ of mid wire.  
 to apparent left <sup>west of</sup> middle wire ~~east of~~  
 South Mark  $\wedge$  ~~east of~~  
 $1^{\text{r}}24, 1^{\text{r}}22, 1^{\text{r}}20.$

Mean of 3 Obs.  $1^{\text{r}}22$  9 M S

North Mark west of middle wire (to  
 apparent right)  $0^{\text{r}}26$   $0^{\text{r}}29$   $0^{\text{r}}27$

Mean of 3 Obs  $0^{\text{r}}27$  9 M S

Reversed to M. W.

North Mark west of middle wire

 $0^{\text{r}}06$   $0^{\text{r}}08$   $0^{\text{r}}07$ Mean of 3 Obs  $0^{\text{r}}07$  9 M S

South Mark west of middle wire

 $0^{\text{r}}97$   $0^{\text{r}}98$   $1^{\text{r}}00$   $0^{\text{r}}99$ Mean of 4 Obs.  $0^{\text{r}}98$  9 M S

Middle wire west of line of collim.  
 Illumination West.

From obs. on North Mark  $0^{\text{r}}10$ " " " South "  $0^{\text{r}}12$

Illum. West

Mean, middle wire west of line of  
collimation  $0^{\circ} 11$

From obsns. of July 7  $0^{\circ} 10.5$

Mean in seconds  $0^{\circ} 24.7$

From obsns. on Polaris July 2. L. C.  
mean of threads east of middle  
wire, Illum. west  $5^{\circ} 02 \cos \delta$   
 $= 0^{\circ} 12.4$

Mean of threads west of line of coll.  
Illum. west  $0^{\circ} 12.3$ ; or correction  
for collimation Illum. west  
 $= - 0^{\circ} 12.3 \sec \delta$

July 10 10 A.M. P.M. w.

Cross level E (telescope 45° S of zenith)

| E    | w    |
|------|------|
| 49.0 | 53.0 |
| 48.5 | 52.0 |
| 47.1 | 51.0 |
| 48.2 | 52.0 |

Cross level w.

|      |      |
|------|------|
| 50.0 | 45.0 |
| 49.2 | 44.5 |
| 48.8 | 43.7 |
| 49.3 | 44.4 |

Cross level E

|      |      |
|------|------|
| 42.0 | 48.5 |
| 41.5 | 48.0 |
| 41.5 | 47.2 |
| 41.7 | 47.9 |

Mean of Cross level E

|      |      |
|------|------|
| 44.9 | 50.0 |
| 94.2 | 94.4 |

West end high 0.05

Telescope  $45^\circ$  N of zenith.

| Cross level E        |                      |
|----------------------|----------------------|
| <sup>E</sup><br>42.5 | <sup>W</sup><br>45.8 |
| 42.0                 | 45.5                 |
| <hr/>                |                      |
| 42.2                 | 45.6                 |

~~2~~ Cross level W

|       |      |
|-------|------|
| 46.8  | 40.3 |
| 46.5  | 39.2 |
| <hr/> |      |
| 46.6  | 39.8 |
| <hr/> |      |
| 88.8  | 85.4 |

East end high  $0.85$

Mean East end high  $0.40$

Level corr =  $-0^R.40$

=  $-0^S.027$

The observations of July 9 gave  
 $m = -0.262$  which combined with  
 this value of  $b$ , gives  $m = +0.202$   
 and  $a = +0.330$  or line of coll.

E of S or W of N  $0^S.330$ . From obsns  
 on mer. marks we have

S Mark W of line of coll.  $+2^s.513$   
 N " W of line of coll.  $+0.388$

Hence

S. Mark W of S  $+2.183$

N " W of N  $+0.718$

July 13 4 P.M. Therm. W.

Setting  $324^{\circ} 25'$

or telescope  $54^{\circ} 25'$  S of Zenith.

cross level E.

|                     |                     |
|---------------------|---------------------|
| $\overset{E}{34.8}$ | $\overset{W}{38.3}$ |
| $34.0$              | $36.8$              |
| $34.4$              | $37.6$              |

cross level W

|                     |                     |
|---------------------|---------------------|
| $\overset{E}{37.8}$ | $\overset{W}{30.6}$ |
| $37.0$              | $29.7$              |
| $37.4$              | $30.2$              |
| $71.8$              | $67.8$              |

$b = -1.00$

Assuming  $a = +0.330$

$$b = -0.067$$

$$m = b \cos \varphi + a \sin \varphi = +.17$$

$$n = b \sin \varphi - a \cos \varphi = -.288.$$

July 16<sup>h</sup> 1866

Illumination west

Cross level. E. East 26.5 West 34.0

" " W. " 31.1 " 26.8  
57.6 60.0

57.6

60.8

Ill<sup>n</sup>. East.

Cross level. East. E. 34.9 W. 35.8

" " West E 46. W 42

8-9

79. 8

$$4 \overline{) 31}$$

377

62

77

462

$$b = -.04697$$

July. 16<sup>th</sup>

26. W.

S. Mark. Mean Wire

July 19<sup>th</sup> Ill.<sup>n</sup> East.

Obs. for error of level.

Cross-level East. E<sub>m</sub> 43.6 W<sub>m</sub> 51.8

" " " E<sub>m</sub> 54.4 W<sub>m</sub> 45.7

98

97.5

97.5

4 .5  
.12

July 19<sup>th</sup> 2ll. East.

Obs. for error in azimuth of Coll<sup>n</sup>.  
South Mark. 1.89 mean wire 0.

1.89

1.86

1.90.

1.89

1.88.4

1.90

7 / 1321.4

mean w. E of S. M<sup>t</sup> (1.88.8) 1.12

North Mark.

.71

.73

.69

.71

.70

.70

.73

7 / 4.97

100 - .71 = 29

July. 19. 2ll. W.

Obs. for error in azimuth coll<sup>n</sup>.

South mark .99

.96

.95

.94

.91

.97

.91

7/663

Midmark E of Smt .95.

N mark .09

.10

.12

.08

.09.

.10

6/58

Midmark E of N 11 .09, 7

$$\begin{array}{r}
 1.12 \\
 \underline{95} \\
 2 \overline{) .17} \\
 \underline{.085} \quad .085
 \end{array}$$

$$\begin{array}{r}
 29 \\
 \underline{09.7} \\
 2 \overline{) 19.3} \\
 \underline{.09.6} \quad .096
 \end{array}$$

$$\begin{array}{r}
 2 \overline{) 181}
 \end{array}$$

$$c = - + .090 \text{ M.W.} = -^s .205$$

S. Mk W of line of Coll<sup>n</sup> 2.35

line of Coll<sup>n</sup> E of Meridian. .26

S. Mark W of Meridian  $\pm 2^s$ . 09

(measured on S. Horizon)

N. Mark W of line of Coll<sup>n</sup> .44.8

line of Coll. W of Meridian. 26.

N. Mark W of Meridian 70.8

(measured on N. Horizon)

July 24 Tuesday  
Level.

|             |      |      |
|-------------|------|------|
| C. Lo. east | E    | W    |
|             | 46.4 | 53.6 |
|             | 45.3 | 52.5 |

|             |       |       |
|-------------|-------|-------|
| C. Lo. west | 91.7  | 106.1 |
|             | 58.1  | 36.1  |
|             | 59.0  | 36.3  |
|             | 107.1 | 72.4  |

$b = -3^{\text{d}}.8$       208.8      178.5

$= -0^{\text{s}}.25$       July 25 P.M. E.

|                               |      |
|-------------------------------|------|
| S Mark w of middle wire       | Mean |
| 1.18, 1.17, 1.15, 1.21, 1.18. | 1.18 |

|                          |      |
|--------------------------|------|
| N Mark w of middle wire  |      |
| 0.33 0.35 0.38 0.34 0.34 | 0.35 |

Rev. to P.M. w

|                          |      |
|--------------------------|------|
| N Mark w of middle wire  |      |
| 0.08 0.12 0.09 0.08 0.08 | 0.09 |

|                          |      |
|--------------------------|------|
| S Mark w of middle wire  |      |
| 0.84 0.90 0.88 0.86 0.86 | 0.87 |

Seeing good.

From star obs'ns of July 22 & 24  
M. E. we have

Mean of threads after middle thread  
in time : + sec  $\delta$

|                                                         |                       |       |
|---------------------------------------------------------|-----------------------|-------|
| +0.91                                                   | $\epsilon$ Urs Min    | 7.42  |
| +0.36                                                   | $\delta$ Ophiuchi     | 1.10  |
| +0.43                                                   | $\omega$ Draconis     | 2.77  |
| +0.67                                                   | $\psi$ Draconis       | 3.27  |
| +0.11                                                   | $\gamma^2$ Sagittarii | 1.16  |
| +0.23                                                   | $\mu^1$ "             | 1.09  |
| +3.53                                                   | $\delta$ Urs Min      | 16.86 |
| [-0.03] $\alpha$ Lyrae<br>rej. "not very well observed" |                       |       |
| +0.10                                                   | Groomb 2320           | 2.69  |
| +0.16                                                   | $\tau$ Herculis       | 1.46  |
| +0.10                                                   | $\alpha$ Scorpii      | 1.11  |
| +0.41                                                   | $\nu$ Draconis        | 2.80  |
| -0.40                                                   | $\alpha$ Camelopardis | -2.47 |
| <hr/>                                                   |                       | <hr/> |
| 7.41                                                    |                       | 44.20 |

Mean by weights  $0^s.168$ , for  
an equatorial star.

9M. w.

From obsns. on N. Mark. 9M. West  
Middle wire west of line of coll.  $0^{\circ}13$   
 $= 0^{\circ}30$

From Obsns of S. Mark  $0^{\circ}155 = 0^{\circ}35$

Mean of wires east of middle wire  
 $0^{\circ}17$ ; hence  
9M. w.

Mean of wires west of line of coll —  
 $0^{\circ}16$  or correction for coll.

Mum. west =

—  $0^{\circ}16$  sec  $\delta$

|                 |       |                 |
|-----------------|-------|-----------------|
| (c — Diurn. At) | 9M. w | — $0^{\circ}14$ |
| "               | " E   | + $0^{\circ}18$ |

From the obsns. of July 22 and 24

n would appear to be —  $0^{\circ}20$

But from the value of a below, &  
the value of b July 24 we should have  
 $n = -0^{\circ}34$

Assuming for the marks

N Mark w of N  $0^s.70$

S " " " S  $2.10$

We have from obsns. of July 25

$a = + 0^s.23$  from S Mark

$+ 0.20$  " N "

Assuming  $n = - 0.30$   $b = - 0.20$

$m = b \sec \varphi - n \tan \varphi = 0.00$

$a = + 0.22.$

These values of  $m$  and  $n$  are assumed in reducing the obsns. of July 24.

For July 22 assuming  $b = - 0.05$

$n = - 0.20$

$m = + .12$

$a = + .22$

July 26 Ill w.

S Mark w of middle wire

0.92 0.94 0.90 0.92 0.96

N Mark w of middle wire

0.09 0.10 0.13 0.08 0.12

July 28 Ill w

C L. West  $\begin{matrix} \varepsilon \\ 61.8 \end{matrix}$   $\begin{matrix} w \\ 35.2 \end{matrix}$  $\begin{matrix} 61.5 \\ \hline \end{matrix}$   $\begin{matrix} 34.9 \\ \hline \end{matrix}$ 

123.3 70.1

C L East.  $\begin{matrix} 39.2 \\ \hline \end{matrix}$   $\begin{matrix} 60.9 \\ \hline \end{matrix}$  $\begin{matrix} 39.2 \\ \hline \end{matrix}$   $\begin{matrix} 61.4 \\ \hline \end{matrix}$ 

78.4 122.3

201.7 192.4

$$b = -1.16 = -0.077$$

For July 26 b was assumed

 $-0.10$ ; n from obs. =  $-0.13$ 

$$\therefore m = -0.2$$

For July 29

$c$  was assumed  $-0.25$

$n$   $-0.05$

$m$   $-0.01$

$$\therefore a = +0.03$$

July 30<sup>h</sup> 1866. S.H. 2ll. W

Cross level East. E. 32.3 W. 53.4

" " West E. 59.0 W. 36.1

91.3 — 89.5

$\delta = 1.8$   
 $\delta = .045$

Pointer reads  $324^{\circ}$

$\delta = -.0315$

July 30. 211. W. -

|          |              |              |
|----------|--------------|--------------|
| S. Mark. | .95.5        | .96.         |
|          | 1.00.        | .97.         |
|          | .99.         | .95.5        |
|          | .98.         | 1.00.        |
|          | <u>1.01.</u> | <u>1.00.</u> |

$$(4.93.5 + 4.88.5) \div 10 = \overline{.982}$$

S. Mark West of mean wire  $\overline{.982} =$

|          |            |            |
|----------|------------|------------|
| N. Mark. | .17        | .14        |
| " "      | .15        | .14        |
| " "      | .15.       | .12        |
| " "      | .14        | .12        |
| " "      | <u>.13</u> | <u>.15</u> |

$$(.74 + .67) \div 10 = \overline{.141}$$

N. Mark. West of mean wire  $\overline{.141} =$

Reversed

July 30 All<sup>n</sup> E.

N. Mark.

.70 .71

.69 .72

.72 .74

.73 .71

.73 .73

$$(3.57 + 3.61) \div 10 = \frac{1.000}{.718}$$

N. Mark West of mean W. <sup>r</sup>. 2822

July 31<sup>d</sup> 1866. — S.H. — 2W<sup>u</sup>E

Pointer 360°

Cross level East E 38.2 W 53.3

" " West E 54.4 W 34.7

926

880

88.

#

4.6

6

-0.080

July 31<sup>st</sup> 2ll. E.

S. mark Mid. Wire Mean W

.91 206 200

.95 205

.91 206

.94 207

.92 207

463

10315568

Hence S mark is  $1.14$  W of middle  $107.4$  W of mean

N Mark Mid. Wire Mean Wire

75 106 0

74 107

75 104

76 106

75 105

5/375

5285/153 = .30.6

10-08/75 = 25

Hence N Mark is  $30.6$  W of Mid. W.  $25$  W of mean

July 31. 2llw.

S. mark. mid wire mean wire

95 5.5 0

96

96

95

94

5/476

95.2 S. mark. w. of mean wire

107.4 - 95.2 = 12.2

N. mark

12

10

8

8

9

5/47

09.4 N mark. w. of mean wire.

.250 - 094 = .156

122

2/278

= 7.139

For 2ll<sup>u</sup>W c

=

August 21<sup>st</sup> Sph 2ll. W. (Pointer 360°)

Cross level East ~~E. 31. E. 52.4~~  
 " " ~~West W. 52.4 W.~~

Cross level East. E. 31. W. 52.4  
 " " West. E. 48.5 W. 32.9  
 79.5 85.3

Aug. 1<sup>st</sup> 2ll. W. Seeing excellent

S. mark. Mid wire mean

96 . 5.5 . wire 0

96 . 5.7

97

96

96

95.8.

S. m is  $95.8^{\pm}$  West of mean or  $90.3^{\pm}$   
West of Mid. wire

~~S. mark~~ Mean wire Mid wire

~~Mean wire~~

Mean wire Mid wire S. mark

0

$5\frac{1}{2}$

11

12

10

12

11

S. mark is  $11.2^{\pm}$  West  $5\frac{1}{2}$  5.6 11.2  
of mean or  $5.7^{\pm}$  West of Middle wire.

Reversed

Aug 1. All. E.

| S. mark. | Mean wire | Mid wire |
|----------|-----------|----------|
| .84      | 200       | 205.5    |

.84

.84

.85

.84

.84.2 S mark is west of mean  
 wire 1.15, 8 of mid wire 1.213

| N mark | Mean wire | Mid wire |
|--------|-----------|----------|
| .8113  | 1.000     | 1.055    |

780

779

760

762

763

5/3844

76.9

Hence N mark is .231  
 west of mean wire .286 west of  
 mid wire

S mark Ill. W 95.8.

" " E. 115.8

$$2 \overline{) 20.0}$$

$$C = (\text{for Ill. E}) + .100$$

N. Mark Ill W 112

" " E 231

$$2 \overline{) 119}$$

$$+.059$$

$$+.100$$

$$+.059$$

$$2 \overline{) 159}$$

$$C = +.080 = +.18 \text{ for Ill East} \quad \text{see}$$

July 31 C was found = +.14 for Ill. E. see

Taking the means of these -

C is assumed to be see +.16 Ill E.

Aug. 2<sup>nd</sup> M.E.

N. mark      Mean Wire      Mid Wire

.75      100      106

74

75

77.

74

.75 Mean Wire is .25 East of N.M.

S. mark      Mean Wire      Mid Wire

.886      2.000      2.055

.887      .885

.879      1.115

.889

.882

5/4423

885

Hence Mean Wire is 1.115 E. of S. m

Revised.

228.5

15995

Aug. 2<sup>nd</sup> 22<sup>nd</sup> W.

N Mark Mid Wire Mean Wire

. 110 055 0

. 101

110

111

102

$$\begin{array}{r} 57 \\ \hline 554 \\ 101 \\ \hline \end{array}$$
 Hence mean wire is . 111 East

 of N Mark.  $C = \frac{.250 - .111}{2} = -.069$  22 W

S Mark

Mean Wire Mid Wire S Mark

00. 055 980

969

961

980

970

$$\begin{array}{r} 57 \\ \hline 4860 \\ \hline \end{array}$$

. 972 East

 Hence mean wire is \_\_\_\_\_  
 of S Mark  $C = \frac{1.115 - .972}{2} = .071$ 

143

071

069

$$C = - \frac{.07}{5} \text{ mean of N \& S.}$$

Aug 2 211 E.

Cross level  $\Sigma \epsilon$ , 33. W 54.8

$$\begin{array}{r}
 52 \quad 37 \\
 85 \quad 918 \\
 85. \\
 4 \overline{) 68} \\
 17 \\
 7. \\
 \hline
 119
 \end{array}$$

b = 2.12

From above observations of  
N. & S marks the following  
values are found

$$a = +.286^s$$

$$c = -.160^s$$

also.  $b = +.109^s$

$$m = (b \cos \varphi + a \sin \varphi) = +.374^s$$

$$n = (b \sin \varphi - a \cos \varphi) = -.137^s$$

August. 3<sup>rd</sup> The Microm-  
eter and reticule of the  
Transit were removed  
for the purpose of putting  
in a better set of wires  
and guarding more  
effectually against ~~error~~  
change of collimation

August. 4. 1866. Replaced lines  
put.

|   |        |        |          |
|---|--------|--------|----------|
| 1 | 1. 5 8 | 1. 5 8 | 2 28     |
| 2 | 3. 1 5 | 1. 5 7 | 13 68    |
| 3 | 4. 7 3 | 1. 5 8 | 22 8     |
|   | 6. 3 2 | 1. 5 9 | 3. 6 4 8 |

4 / 6 3 2 1. 5 8.

|           |          |           |
|-----------|----------|-----------|
| 1. 5 5    | 1. 5 5.  | 1. 5 6.5  |
| 3. 1 5. 5 | 1. 6 0 5 | 1. 5 8 7  |
| 4. 7 1. 5 | 1. 5 6 0 | 1. 5 7 0. |
| 6. 2 9.   | 1. 5 7 3 | 1. 5 8 0  |

|         |        |       |
|---------|--------|-------|
| . 9 4   |        | 0 1 0 |
|         |        | 0 1 0 |
| 2. 5 3. | 1. 5 9 |       |
| 4. 1 1  | 1. 5 8 |       |
| 5. 7 0  | 1. 5 9 |       |
| 7. 2 7  | 1. 5 7 |       |

27.

24

29

23.5.

Reading of micrometer head for  
Coincidence on line  $\epsilon$ . (244.4)

.744 (c)

0.000

3.948 (1)

3.204

3.200

5.523 (2)

1.575

4.780

7.109 (3)

586

6.354

8.687 (4)

578

7.956

10.282 (5)

595

9.531

13.460 (d)

3.178

12.713497537 44.534

7.108

6.362

6.354

.008

32 1  
39 2  
41 3  
35 6

30 9  
41 1

$$\begin{array}{r} 2.285. \\ .004 \\ \hline .009140 \end{array}$$

0.000

3.196

4.760

6.360

7.931

9.523

12.745

$$7 \overline{) 44.515}$$

6.359

6.362

2 \overline{) 12.721}

6.360

360

359

001

3.192

4.771

6.364

7.939

9.529

12.739

44.534

6.362

Readings for med line

370

356

371

360

1457

364

Means. of. 7 Wires

Mid. Wire. 6 354.1  
 6 360.1  
 6 364.1  
 6 364.4  
 1442

360.5

362  
 359  
 362.  
 3/ 1083  
 1361 (w 21)  
 360.5  
 .0005

228.5

.5

20011425

From the above readings  
 the distance from mean to  
 middle wire is found =  $\frac{7}{10000} = .0005$   
 $\frac{5}{10000} = .0001$  which though probably  
 too small a quantity for accurate  
 positive determination yet  
 indicates a very satisfactory  
 coincidence of the mean & middle  
 wires.

S.P.H.

Aug 4 Seeing good Power 153  
 Mid. Wme 0. N. Mark .278

.281

.280

.282

.282

5/1403

Mid Wire East of N. Mark .284

026

.307

Mid Wire, - 2.8 1.144 .156

- 2. .139 1.103

- 2.7 .140 1.103

- 2.9 .133 1.103

- 3.1 .125

12 8 125

681

1.136

026

Mid Wire to M. 1.162

$$\begin{aligned} \text{Assumed Az. of S. m.} &+ 2.10 = +.919 \\ \text{" " " N. m.} &.70 = +.306 \end{aligned}$$

Mid. Wire is 307° of N. mark  
S. m. is 306. W. " True N.

Hence Mid. Wire is 001 East of true N.

Mid Wire is 1.162 E of S. m.  
S. m. is 919 W. " True S.

Hence Mid. W. is .243 E " " "

$$\text{Hence } a + c = +243$$

$$a - c = -001$$

$$2a = 242$$

$$a = .121$$

$$c = .122$$

$$\text{Hence. } 1.162.$$

$$\underline{.122}$$

$$1.040 = \text{distance from line of}$$

Collimation to S. mark

Then adjusted Wires for Collimation

Mid line

S mark

987

1.031

1.003

.031

994

.018

1.009

018

9950365 249885 5134

0.998 or 1.000

1.027

S mark

.120

.133

.150

.139

.1325 674

.135

S mark Mid line E of S mark 1.027

" " " " S mark .135

|                          |                 |
|--------------------------|-----------------|
| Mid. Wire E of Smk       | $\tau$<br>1.027 |
| S. mk West of true South | <u>.919</u>     |
| Mid Wire E of true S -   | $\tau$ .108     |

|                           |             |
|---------------------------|-------------|
| Mid Wire E of Nmk         | .135        |
| N. m. West of True N.     | <u>.306</u> |
| Mid. Wire West of true N. | .171        |

Hence  $a + c = 171$

$a - c = 108$

$2a = 279$

$a = .139$

$c = -.031$

Hence  $1.027 + 0.031 = 1.058$   
 distance from line of Coll to Smk -  
 found previously 1.040  
 mean 1.049  
 Then adjusted wires again for coll.

Aug. 4. Ell. West. S.P.H.

Obs. for  $\alpha$  &  $\epsilon$

Middle Wire. N. Mark

. 009 . 210

. 000 . 208

. 004 . 209

. 003 . 209

. 000 . 203

5 . 016 10 39

. 003 . 208

Hence middle wire is . 205 East of N. Mark

Middle Wire S. Mark

. 000 1. 032

- 002 1. 050

- 010 1. 031

- 010 1. 026

+ . 003 1. 030

5 / - 019 5. 169

- 004 1. 034

Hence middle wire is 1. 038 East of S. Mark.

Mid. Wire E of N. mark  $\tau .208$   
 N. mark. West. of true N.  $\underline{.306}$   
 Mid. Wire W. of " "  $\tau .098$

Mid. Wire E. of S. mark  $\tau 1.038$   
 S. mark West " true South  $\underline{.919}$   
 Mid. Wire E. of true South  $\tau .119$

Hence.  $a + c = 119$

"  $a - c = \underline{098}$

$2a = 217$

$a = \tau .108$

$c = +\tau .011$  (Ill. W.)

Hence. the distance from line  
 of Collimation to S. mark is  $1.027$

Then adjusted wires again for Collimation.  
 Reading Smt - Mid Wire  $1.025$  ( $c = .004$ )  
 Reversed

2ll. E. (seeing not as good)

South mark Mid wire

.938 2.021

.970 2.020

.959 2.020

.982 2.044

.968 2.029

5/4.817 10.104

963 2.021

963

Mid. W, E of n. mt. 1.058

N. Mark Mid wire

.800 1.009

.801 1.020

.791 1.009

.806 1.019

.814 1.004

5/4012 5/5.051

802 1.010

802

Mid wire E of S mt. 1.208

Mid l. E of n mt. 208

N mt. W. of n 306

Mid line W of true N. 098

Mid w. E of S. mt. 1.058

S mt. W of S. .919

Mid W. E. of S. .139

$$a + c = .139$$

$$a - c = \underline{.098}$$

$$2a = 237$$

$$a = +^{\tau} .118$$

$$c = +^{\tau} .021 \text{ all E.}$$

Aug 7 Tuesday 3<sup>h</sup> 40<sup>m</sup>

5 Mark W of middle wire N mark W of middle wire

1.01 I.M. E. 0.25

1.01 0.25

1.04 0.23

3<sup>h</sup> 45<sup>m</sup> Level put on.

Cross level E.

| Time | E           | W           |
|------|-------------|-------------|
| 4 42 | 39.8        | 54.3        |
| 5 0  | <u>40.1</u> | <u>54.4</u> |
|      | 79.9        | 108.7       |

5 5 Level reversed

Cross level W.

|      |             |             |
|------|-------------|-------------|
| 5 40 | 55.8        | 39.0        |
| 7 0  | <u>56.7</u> | <u>40.0</u> |
|      | 112.5       | 79.0        |
|      | 192.4       | 187.7       |

$$b = -0.59 = -0.039$$

7<sup>h</sup> 10<sup>m</sup> S Mark W of middle wire N Mark W of middle wire

1.04 0.27

1.02 0.28

Reversed to I.M. W.

S Mark W of middle wire

N Mark W of middle wire

0.98

0.14

0.99

0.18

0.99

0.17

0.97

0.26

m

0.24

S Mark W

0.98

I.M. W

N Mark W

0.20

1.02

I.M. E

0.26

c = +0.02

I.M. E

+ 0.03

Mean c = +0.025 = +0.057 I.M. E.

Aug 9 Thursday. I.M. W.

2<sup>h</sup> 45<sup>m</sup> Level put on.

Cross level W.

3 33

62.4

45.0

4 0

62.8

44.8

125.2

89.8

4 5

Reversed to

Cross level. E.

4 40

43.9

63.6

4 55

44.0

64.0

87.9

127.6

b = +0.054

213.1

217.4

= +0.036

Aug 11. Saturday.

M. w.

2<sup>h</sup> 30<sup>m</sup> Level put on and adjusted  
(not that of axis.)  
~~Cross level adjusted~~  
Cross level E.

|    |                        |                   |                   |       |                   |
|----|------------------------|-------------------|-------------------|-------|-------------------|
| 3  | 17                     | <sup>E</sup> 49.1 | <sup>W</sup> 47.8 |       |                   |
|    | 43                     | <u>48.8</u>       | <u>47.0</u>       |       |                   |
|    |                        | 97.9              | 87.8              |       |                   |
| 45 | Rev. to Cross level W. |                   |                   | 189.7 | 186.8             |
|    |                        |                   |                   | b = - | <sup>d</sup> 0.36 |
| 4  | 5                      | 46.0              | 49.5              |       |                   |
|    | 12                     | <u>45.8</u>       | <u>49.5</u>       |       |                   |
|    |                        | 91.8              | 99.0              |       |                   |
|    |                        |                   |                   |       | = -0.024          |

Level further adjusted.

Aug 13 Monday 2 15 P.M.

S Mark W of middle wire

$$0.95 \ 0.98 \ 1.00 \ 0.98 \ 0.95 \ \left. \begin{array}{c} \text{Mean} \\ 0.97 \end{array} \right\} = 2^{\text{s}} 20$$

N Mark W of middle wire

$$0.16 \ 0.21 \ 0.18 \ 0.18 \ 0.19 \ \left. \right\} 0.18 = 0^{\text{s}} 41$$

Assuming the azimuths of the marks  
as on July 25 these results give

$$a = +0^{\text{s}} 20$$

$$c = -0^{\text{s}} 10 \text{ M. w.}$$

The following measurements were  
made of the diameter of the black <sup>square</sup>~~spot~~  
on the N Mark

0.22 0.21 0.19 0.23 0.19 } Mean 0.21

Aug. 13.<sup>th</sup> 46. S.P.H. 2M. W.

Mid. Wire South Mark

0.000 0.978

.969

.974

3/2921

Mid. Wire E of S.M. = .974

N. mark. Mid. W.

0.215. 0.000

.216

.224

3/655

.218 Mid. W. E of n m.

Reversed.

2ll.E.

S. mark.

Mid. line.

0.009

S. 000

.012

.008.003

.992

3/024

.008 Mid. W. E. of S. m. 992

N. Mark.

Mid line

.772

1.000

.761

.764.758

.236

3/2.291 Mid W. E. of N. m. 236

.764

$$(992 - 974) \div 2 = .009$$

$$(236 - 218) \div 2 = \underline{009}$$

mean value of  $\underline{c} = .009$ Hence  $\underline{c} = + .021$  2ll.E

2<sup>nd</sup> E. obs. for a.r.c.

2<sup>nd</sup> W.

Mid W. E. of S.M.  $\tau$  .974

S.M. " of true S. .919

Mid. " E " " .055

Mid. W. E. of N.M.  $\tau$  .218

N.M. West of true N. .306

.088

Hence  $a + c = \tau$  .088

"  $a - c =$  .033

2/174

$a = \tau$  .060  $c = \tau$  .027 (2<sup>nd</sup> E)

and from obs 2<sup>nd</sup> E we have.

Mid W East of true S.  $\tau$  .073

" " " " " N. .070

$2a =$  143

$a =$  071  $c =$  .001

Hence mean values are  $a = \tau$  .066  $c = \tau$  .019

$\alpha$   $a =$   $\tau$  .155  $a =$   $\tau$  .043 2<sup>nd</sup> E

$$\begin{array}{rcl}
 \text{Cross level E in E.} & 51 & \text{W. } 52.1 \\
 & \text{E. } 52.7 & \text{W. } 51.5 \\
 & \underline{103.7} & \underline{103.6} \\
 & 103.6 & 
 \end{array}$$

$$b = \overset{5}{0.000}$$

Aug. 17. S.P.H. 211.E. Good Seeing -

N. mark Mid Wire

. 756. 1.000.

. 739

. 745

. 739

. 750

5/3729 . 746.

Mid Wire East of N. mark. <sup>r</sup>. 254

Smk Mid Wire

.027. 1.000.

.010

.018

.011

.028

.094

.019

Mid Wire E of Smk <sup>r</sup>. 981

Reversed

21115

at Mid line      Smk

.000      . 250

. 242

. 251

. 259

. 243

5 / 1 2 4 5      . 249

Mid line E. of N. mark. . 249

Smk .000 <sup>nu</sup> ~~.951~~

Mid line .000      Smk .951

.951

933

961

936

5 / 4732

Mid. line E of Smk . 946.

254

249

$$2 \overline{) 005}$$

(002.

981

946

$$2 \overline{) 035}$$

$$+ 017) \div 2 = \overset{\tau}{000}.0095.$$

Hence.  $c = -\overset{\tau}{.0095} = -\overset{s}{.02} \text{ m w.}$

21110.

Cron level East. E. 45. W. 64.2

E. 63.3

108.3

51

115.2

108.3

4/69

1.7

Sub 8

Cron level East. E. 33.9 W. 55.8

51.4

85.3

36.9

92.7

85.3

4/7.4

1.8

Aug 21 Tuesday.

Level put on at 3<sup>h</sup> 15<sup>m</sup>

Cross level E.

Telescope  
Reading of  
pointer about  
360°

|                                | E    | W    |
|--------------------------------|------|------|
| 3 <sup>h</sup> 50 <sup>m</sup> | 42.5 | 61.8 |
| 4 <sup>h</sup> 10 <sup>m</sup> | 42.6 | 61.4 |

4 15<sup>m</sup> Cross level W.

4<sup>h</sup> 50<sup>m</sup> 58.0 44.8

5 20 58.2 44.9

201.3 212.9

$$b = + 1^{\text{d}}.45 = + 0^{\text{s}}.10$$

Aug 22 Wednesday

Level put on at 3<sup>h</sup> 5<sup>m</sup>

Reading of pointer  
about 360°

Cross level E.

4 35 45 39.2 38.7 57 57.3

4 15 39.3 57.0  $b = + 1^{\text{d}}.38$

4 20 Cross level W.  $= + 0^{\text{s}}.092$

5 15 57.0 44.4

5 40 56.9 44.2

191.9 202.9

Aug 23 Thursday

Level put on at 2<sup>h</sup> 45<sup>m</sup> Reading of pointer  
Cross level E. 324° 18'

|      | E    | W    |
|------|------|------|
| 3 25 | 49.8 | 67.8 |
| 55   | 50.3 | 67.8 |

4 0 Cross level W.

|     |      |      |
|-----|------|------|
| 5 5 | 66.0 | 53.4 |
|-----|------|------|

|      |      |      |
|------|------|------|
| 5 30 | 66.9 | 53.2 |
|------|------|------|

233.0

242.2

$$b = +1.15^d = +0.5077^s$$

Aug 24 Friday I.M. W  
5<sup>h</sup> 0<sup>m</sup> P.M.

Middle wire E. of S. Mark Middle wire E. of N. Mark

|        |       |
|--------|-------|
| c 0.94 | 0.22  |
| 0.96   | 0.22  |
| 0.95   | 0.24  |
| 0.94   | 0.23  |
| 0.93   | 0.21  |
| 0.95   |       |
| 0.945  | 0.224 |

Coincidence 0.00

Reversed to I.M. E.

|              |       |
|--------------|-------|
| 1.01         | 0.74  |
| 1.01         | 0.72  |
| 0.98         | 0.75  |
| 1.02         | 0.71  |
| 1.03         | 0.71  |
| 1.02         | 0.71  |
| <u>1.012</u> | 0.723 |

2.000 Coincidence 1.000

0.988 0.277

c from obs. of S. Mark 0.022 = 0.<sup>s</sup>050

c " " " N " 0.026 = 0.<sup>s</sup>060

Mean c. I.M. E = + 0.<sup>s</sup>055

Aug 25 Saturday P.M. E.

11<sup>h</sup> 45<sup>m</sup> A M Cross level E.

Reading of  
pointer approx.  
360°

0<sup>h</sup> 40<sup>m</sup> E 45.8 W 64.5

0 49 45.6 63.3

0 50 Cross level W.

2 15 59.3 45.3

2 50 59.2 45.6

---

209.9 218.7

$$b = + 1^{\text{d}}.10 = + 0^{\text{h}}.073$$

Aug. 27<sup>th</sup> 2 M. E.

Cross level East. E. 43.      W 54.4

"      " West. E 55.2      W 46.1

98.2      100.5

98.2

4 2.3

66

$$b = +.04$$

Sept 2 Sunday I.M.E.

11<sup>h</sup> 0<sup>m</sup> A.M. Cross level East Pointer  
215° 30'

|                                | E                 | W            |
|--------------------------------|-------------------|--------------|
| 0 <sup>h</sup> 55 <sup>m</sup> | 36.3              | 51.3         |
| 1 25                           | 36.2              | 51.0         |
| 1 30                           | Cross level West. |              |
| 2 45                           | 46.8              | 39.6         |
| 3 5                            | 46.3              | 39.0         |
|                                | <u>165.6</u>      | <u>180.9</u> |
|                                | $b = +1.91$       | $= +0.13$    |

Sept. 2<sup>nd</sup> Monday 211: E.

Cross level. E. E 31.8 W 44.9

" " W E 47 W. 30.6

Pointer @ 360° 78.8 75.5

Time. 5<sup>h</sup>

$$\begin{array}{r} 75.5 \\ 4 \overline{) 3.3} \\ \underline{2} \\ .82 \end{array}$$

Result rejected.

Cross level E. E 27.8 W 51.9

W. E 50.1 W 34.0

77.9

86.5

77.9

4 8.6

2.15

Sept. 6. Thursday M E  
 S mark Midline

935 2.000

968

977

998

955

4833

966

Mid W. E. of S mark 1.034

A mark Mid line

781 1.000

772

739

734

752

3778

755

Mid E. of mark .245

Reversed

Sept? 6<sup>th</sup> Thursday Ill. W.

St Mark Mid Wine

95.6 000

961.

959

941

960

5/4777

955 Mid W. E of Snrk

St Mark

163

226

199

218

202

5/1008

202

Mid Wine E of Snrk

(S. mk) 2ll. E. 1.034. (K. mk) 2ll E 245

(" " ) " W .955 (" " ) " W 202

2/.079

.043

coll. .039

coll. .021

mean. c 2ll. W.  $\tau$ .03 = 0685

Mid W. E. of S. mk 1.034 Mid W. E. of K. mk 245

S. mk W. of S 919 K. mk W. of K 306

Mid W. E. of true S 115 .061

$a + c = .115$ .  $a = \tau .088$

$a - c = .061$ .  $c = 0.27$  2ll. E.

Mid W. E. of S. mk 955 Mid W. E. of K. mk 202

S. mk W. of S. 919 K. mk W. of K 306

Mid W. E. of S .036 104

$a + c = 104$   $a = 0.70$

$a - c = \underline{0.36}$   $c = 0.34$ .

Hence finally mean value of  
azimuth is  $\tau .079 = +18$   
of collimation  $\tau .030 = +0.7$  2ll. W

Sept. 6. 3llw

Cross level E. E. 40.8 W. 62.3

" " W. E. 59.2 W. 43.5

100 0

105 8

$$\frac{105.8 - 100}{4} = \overset{d}{1.45} = + \overset{s}{.102}$$

Sept. 9 9ll w. Reading  $0^{\circ} 22'$ 0<sup>h</sup> 45<sup>m</sup> Cross level E.

|      |              |              |
|------|--------------|--------------|
|      | <sup>E</sup> | <sup>W</sup> |
| 1 45 | 44.1         | 64.7         |

|     |      |      |
|-----|------|------|
| 2 0 | 43.8 | 64.5 |
|-----|------|------|

2 5 Cross level w.

|      |      |      |
|------|------|------|
| 2 30 | 60.1 | 47.8 |
|------|------|------|

|      |      |      |
|------|------|------|
| 2 50 | 60.2 | 48.0 |
|------|------|------|

|       |       |
|-------|-------|
| 208.2 | 225.0 |
|-------|-------|

$$b = + \overset{d}{4.20} = + \overset{s}{0.28}$$

Sept 10 Ill. w. Reading  $324^{\circ} 18'$

3<sup>h</sup> 10<sup>m</sup> Cross level E.

3 55      43.7      63.4

4 0      Cross level W

5 0      60.5      46.1

104.2      109.5

$$6 + 2.65 = 0.518$$

Sep. 10. 66.

Fixed horizontal wire made to  
bissel  $\beta$  Lyrae at transit.

Reading of pointer  $379^{\circ} 01' 15''$

Micrometer<sup>(#)</sup> 323.52.30

(read v. 2) " E 54 06.46

" 2 " 306 05 34  $\frac{1}{2}$

Sept. 11. 66. 233W S.H. seeing good.  
South mark Mid wire 0

.973

.963

.953

.982

.975 r

5/4846 = .969 Mid W. East of S mark

N. mark

.191

.182

.199

.199

.201

5/972 r .194 Mid wire East of n. mark

233W Reversed.

2ll. East

Smrk

Mid Wme

.985

2.000

.984

.985

.983

1<sup>r</sup>.015

Mid. W. E of Smrk

.988

.984

4924

Smrk

736

741

741

740

751

3709

r

.742 MWE = .258

$$M.W. .969$$

$$+ E. \underline{1.015} \quad r .046$$

$$M.W. 194$$

$$+ E. \underline{258} \quad \underline{.064}$$

$$4 \overline{) 110}$$

$$c = + r .027 = + .06^s$$

$$\text{Cron level East } E \ 42.5 \ W \ 58.9$$

$$W. \underline{57.9} \quad \underline{42.7}$$

$$1004$$

$$\begin{array}{r} 1016 \\ 1004 \\ \hline 4 \overline{) 1.2} \\ \hline .3 \end{array}$$

$$b = + 0.2^s$$

1866. Sept. 14. 211<sup>n</sup> E. Sph.

Cron level East E. 45. W. 64.4

" " West E. 60.6 W. 49.1

105.6

113.5

105.64 7.9

1.97

.07

b = +.1379

Sept 16. Sunday M.E.

At 7<sup>h</sup> 30<sup>m</sup> Cross level E. Reading of  
pointer 324° 18'8<sup>h</sup> 30<sup>m</sup> E 55.2 W 70.7

8 35 Cross level W

9 5 70.0 55.8

125.2

126.5

b = +0.<sup>d</sup>32 = +0.<sup>s</sup>021

Sept 18 Tuesday Ill. E.

0<sup>h</sup> 0<sup>m</sup> Cross level E. Reading of  
pointer 215° 43'

1 0 <sup>E</sup> 47.8 <sup>W</sup> 63.2

1 5 Cross level W.

2 15 62.8 50.1

110.6 113.3

$$b = +1^{\text{d}}.35 = +0^{\text{s}}.09$$

5<sup>h</sup> 0<sup>m</sup> Observations on Marks.

Ill. E.

Ill. W.

| S. Mark | Conic. | N. Mark | Conic | N. Mark | Conic | S. Mark | Conic |
|---------|--------|---------|-------|---------|-------|---------|-------|
| 97      | 2.00   | 73      | 1.00  | 23      | 01    | 98      | 02    |
| 1.00    | 2.00   | 74      | 1.00  | 22      | 02    | 96      | -01   |
| 99      | 1.99   | 75      | 99    | 21      | 01    | 97      | 00    |
| 99      | 1.99   | 74      | 1.00  | 23      | -01   | 97      | -01   |
| 97      | 1.99   | 74      | 1.01  | 22      | 01    | 100     | 00    |
| 99      |        | 75      |       | 21      |       | 95      |       |
| 98      |        | 75      |       | 23      |       | 98      |       |
| 97      |        | 73      |       | 22      |       | 96      |       |
| 98      |        | 74      |       | 22      |       | 93      |       |
| 96      |        | 73      |       | 22      |       | 94      |       |

0.980 1.994 0.740 1.000 0.221 0.008 0.964 0.000

M E. S Mark W of middle wire 1.014

W " " " 0.964

$$\text{Coll.} = 0^{\circ}025' = 0^{\circ}057'$$

M E N Mark W of middle wire 0.260

W " " " 0.213

$$\text{Coll} = 0^{\circ}024' = 0^{\circ}055'$$

$$\text{Mean, c M.E.} = +0^{\circ}056'$$

$$\text{c' M E} = +0^{\circ}040'$$

$$\text{" " W} = -0^{\circ}072'$$

Sept. 19. Wed. M. W. Obsns. for Equat. Intervals.

d 5 4 3 2 1 c  
Contacts by driving the screw in direction d c

+6.38 +3.16 +1.58 0.00 -1.58 -3.15 -6.34

|    |    |    |     |    |    |    |
|----|----|----|-----|----|----|----|
| 36 | 17 | 58 | 00  | 58 | 17 | 33 |
| 36 | 17 | 57 | +02 | 58 | 15 | 32 |
| 35 | 18 | 58 | 00  | 57 | 15 | 31 |
| 36 | 17 | 58 | +02 | 59 | 15 | 33 |
| 36 | 16 | 59 | +01 | 57 | 14 | 33 |
| 36 | 16 | 56 | 00  | 57 | 12 | 32 |
| 37 | 18 | 56 | +01 | 58 | 16 | 33 |
| 37 | 16 | 57 | -01 | 59 | 14 | 33 |
| 36 | 17 | 58 | +02 | 58 | 14 | 33 |

+6.363 +3.168 +1.575 +0.007 -1.579 -3.147 -6.327

Contacts by driving the screw in the opposite direction.

| c     | 1     | 2     | 3    | 4     | 5    | d    |
|-------|-------|-------|------|-------|------|------|
| -6.37 | -3.16 | -1.60 | 0.00 | +1.56 | 3.15 | 6.34 |
| 37    | 13    | 60    | -01  | 56    | 15   | 33   |
| 35    | 13    | 60    | +01  | 57    | 14   | 34   |
| 38    | 14    | 61    | 00   | 57    | 16   | 34   |
| 34    | 13    | 60    | +01  | 57    | 15   | 34   |
| 37    | 16    | 60    | 00   | 57    | 15   | 35   |
| 38    | 16    | 59    | 00   | 55    | 15   | 34   |
| 37    | 17    | 58    | 00   | 57    | 15   | 36   |
| 37    | 16    | 59    | 00   | 56    | 16   | 34   |
| 35    | 16    | 60    | 00   | 57    | 14   | 35   |

-6.365 -3.150 -1.597 +0.001 +1.565 +3.150 +6.343

Mean of first set +0.009

" " second -0.008

Differences from mean

|                     | d      | 5      | 4      | 3      | 2      | 1      | c      |
|---------------------|--------|--------|--------|--------|--------|--------|--------|
| 1 <sup>st</sup> set | +6.354 | +3.159 | +1.566 | -0.002 | -1.588 | -3.156 | -6.336 |
| 2 <sup>d</sup> set  | +6.351 | +3.158 | +1.573 | +0.009 | -1.589 | -3.142 | -6.357 |
| Mean                | +6.352 | +3.158 | +1.570 | +0.004 | -1.588 | -3.149 | -6.346 |

Middle wire before mean of 7, Ill. w 0.004

" " " " " 5, " 0.005

Backlash

0.020 0.018 0.010 0.006 0.018 0.003 0.038

The following measurements were made  
by S.P.L., 1866 Aug. 4.

| G.U. W. |        |        |        |        | Aug. 4.<br>Mean<br>S.P.L. | Sept 19<br>S.M.S. |
|---------|--------|--------|--------|--------|---------------------------|-------------------|
| c       | -6.364 | -6.362 | -6.359 | -6.362 | -6.362                    | -6.346            |
| 1       | -3.160 | -3.162 | -3.163 | -3.170 | -3.164                    | -3.149            |
| 2       | -1.585 | -1.582 | -1.599 | -1.591 | -1.589                    | -1.588            |
| 3       | +0.001 | -0.008 | +0.001 | +0.002 | -0.001                    | +0.004            |
| 4       | +1.579 | +1.594 | +1.572 | +1.577 | +1.580                    | +1.570            |
| 5       | +3.174 | +3.169 | +3.164 | +3.167 | +3.168                    | +3.158            |
| d       | +6.352 | +6.351 | +6.386 | +6.377 | +6.366                    | +6.352            |

(<sup>above</sup> c is the wire of the 7 ~~upper~~ which a star at upper  
culmination would first cross, G.U. W.)

The thermometer in the transit room read at

7 AM 61 1/2

12 M 63.

Observations on wire intervals were made at  
about 10 30.

On Aug 4. the therm. was probably about 75°  
from the record.

Sept 23 Sunday

IM. W.

Reading of pointer  $324^{\circ}18'$

3 40 Cross level E.

4 30 54.0 68.9

4 40 54.2 68.9

4 45 Cross level W

5 30 68.6 55.3

5 40 68.4 55.7

245.2 248.8

$$b = +0^d.45 = +0^s.03$$

Sept 27 Thursday

3 45 Cross level E. Pointer 215 50

4 25 47.2 70.6

" Cross level W.

5 15 62.9 54.9

110.1 125.5

$$b = +3^d.85 = +0^s.26$$

IX.14. Sept 28 Friday Ill. w  
4 5 Gross level E. Pointer 324 18

4 45 43.7 68.3

4 50 Cross level w.

5 15 61.1 50.2

104.8 118.5

$$b = +3.42^d = +0.23^s$$

IX.14. Sept 30 Sunday Ill. w  
5 30 Gross level E. Pointer 215 43

6 15 45.6 68.0

20 Cross level w

7 35 58.5 55.0

104.1 123.0

$$b = +4.72 + 0.31$$

sid. time Oct 1 Monday Ill w  
18 20 Gross level E. Pointer 324 18

19 45 53.7 76.3

19 50 Cross level w.

12 5 65.9 54.0

119.6 130.3

$$b = +2.68 = +0.18^s$$

Oct 2 Tuesday Ill W

sid. time 16 25 Cross level E. Pointer 324 18

17 5  $\overset{E}{45.8}$   $\overset{W}{66.9}$ 

17 6 Cross level W.

18 20 59.0 52.0 $b = +2^d.77$   $107.8$   $118.9$   $m = +0^s.25$ 

Oct 4 Thursday Ill. W.

sid. time

17 57 Cross level E ~~78.0~~

18 25 58.5 78.0

18 30 Cross level W

19 45 75.8 65.6

134.3

143.6

134.3

4 | 9.3

 $b = +2^d.3 = +.16$  $m = +.21$

Oct. 8<sup>h</sup> 1866

Cross level East. E. 45 W. 65.5

" " West E. 60.1 W. 48.2

105.1

113.7

105.1

4/8.6

2.15

Oct 15 Ill W Pointer  $324^{\circ}18'$   
sid. t.  
19<sup>h</sup> 0<sup>m</sup> Cross level E.

19 30 55.1 80.8

19 35 Cross level W

20 20 72.0 61.6

127.1 142.4

 $b = +3.82$   $\bar{m} = +0.34$ 

+0.26

Oct 18 Thursday Ill. w. Pointer 215° 42'

<sup>sid. b.</sup>  
22<sup>h</sup> 7<sup>m</sup> Cross level E.

23 0  $\begin{matrix} \text{E} \\ 54.2 \end{matrix}$   $\begin{matrix} \text{W} \\ 80.8 \end{matrix}$

23 5 Cross level W

0 20  $\begin{matrix} 73.3 \\ \hline 63.0 \end{matrix}$

$\begin{matrix} 127.5 \\ 143.8 \end{matrix}$

$$b = \cancel{+4.08} \quad \bar{m} = +0.37$$

$$+0.27$$

Oct 22 Monday Ill w Pointer 324 18

<sup>sid. b.</sup>

18 45 Cross level E.

21 15  $\begin{matrix} \text{E} \\ 44.6 \end{matrix}$   $\begin{matrix} \text{W} \\ 70.8 \end{matrix}$

21 20 Cross level W

22 0  $\begin{matrix} 61.8 \\ \hline 53.8 \end{matrix}$

$\begin{matrix} 106.4 \\ 124.6 \end{matrix}$

$$b = \cancel{+4.55} \quad \bar{m} = +0.41$$

$$+0.30$$

Oct 25 Thursday Ill. w.  
<sup>sid. t.</sup>  
 23 57 Cross level E. Pointer 324 33

0 25 62.5 83.8

0 27 Cross level w.

1 8 77.7 69.5

1 8 140.2 153.3

$b = +3.28$   $\bar{m} = +0.30$   
 $+0.22$

Oct 29 Monday Ill. w.  
<sup>sid. t.</sup>  
 17 50 Cross level E. Pointer 215° 36'

18 30 62.5 84.3

18 35 Cross level w.

19 20 76.8 69.8

139.3 154.1

$b = +3.70$   $\bar{m} = +0.33$

$+0.24$

sid. t. Oct 31 Wednesday Ill. w.  
 22 35 Cross level E. Telescope S; ie.  
 Pointer  $324^{\circ}30'$

23 47 63.0 80.2

23 50 Cross level w.

4 10  $\frac{78.0}{141.0}$   $\frac{69.0}{149.2}$

$b = +2.05$   
 $+0.14$

$\bar{m} = +0.18$

sid. t. Nov 2 Friday Ill w.  
 17 30 Cross level E. Telescope N.

18 25 58.7 76.0

18 30 Cross level w.

20 18  $\frac{76.0}{134.7}$   $\frac{59.5}{135.5}$

$b = +0.20$   
 $+0.01$

$\bar{m} = +0.02$

sid. t. Nov 4 Sunday Ill. w.  
 1 25 Cross level E. Telescope S.

2 40 70.0 85.7

2 45 Cross level w

3 15 82.3 73.0

$\frac{152.3}{158.7}$

$b = +1.60$

$\bar{m} = +0.14$

$+0.11$

sid. t. Nov 5 Monday Ill. w.

2<sup>h</sup> 5<sup>m</sup> cross level E. Telescope S.

2 40 69.5 84.7

2 45 Cross level W.

3 25 83.2 71.7

152.7 156.4

$b = +0.92$   $\bar{m} = +0.08$   
 $+0.06$

Nov. 6. Tuesday Ill. w.

22<sup>h</sup> 0<sup>m</sup> cross level E. Telescope S.

23 15 66.0 82.0

23 20 Cross level W.

0 20 80.0 70.0

146.0 152.0

$b = +1.50$   $\bar{m} = +0.14$   
 $+0.10$

Nov 7 Wednesday P.M. W.  
Obsns. on Meridian Marks

3 30 M J = 18 35 Sid J.

| S Mark       |              | N Mark       |              |
|--------------|--------------|--------------|--------------|
| 0.829        | 0.009        | 412          | 009          |
| 842          | 018          | 441          | 026          |
| 830          | 020          | 410          | 011          |
| 839          | 004          | 421          | 010          |
| 822          | 0.006        | 410          | 012          |
| 821          |              | 410          |              |
| 823          |              | 408          |              |
| 829          |              | 402          |              |
| 818          |              | 403          |              |
| 0.838        |              | 420          |              |
| <u>0.829</u> | <u>0.001</u> | <u>0.424</u> | <u>0.014</u> |

S Mark <sup>w</sup> of middle wire 0.819  
N Mark <sup>w</sup> " " " 0.404

Mean of 20 coincidences 0.010 used.

Reversed to P.M. E.

Mer

S Mark

N Mark

|              |     |  |              |      |
|--------------|-----|--|--------------|------|
| $-1^{rev} +$ |     |  | $-1^{rev} +$ |      |
| H 0.140      | 002 |  | 591          | 000  |
| 136          | 012 |  | 569          | 012  |
| 156          | 010 |  | 571          | +012 |
| 131          | 010 |  | 589          | -001 |
| 162          | 018 |  | 545          | +008 |
| 158          |     |  | 572          |      |
| 176          |     |  | 592          |      |
| 179          |     |  | 582          |      |
| 157          |     |  | 583          |      |
| 0.144        |     |  | 585          |      |

|             |       |             |       |
|-------------|-------|-------------|-------|
| $-0 + .154$ | 0.010 | $-0 + .581$ | 0.006 |
|-------------|-------|-------------|-------|

S Mark w of middle wire 0.856

N " w " " 0.429

Measurements all by neg. rotation of the screw.

Mean of 20 coincidences with the middle wire = 0.010 used.

Coll = 0.018 from S. Mark  
= 0.012 " N Mark.

Mean = +0.015 = +0.034 for G.U.E.  
c' = +0.018 G.U.E.  
= -0.050 " W.

Instrument  $\overset{E}{W}$  of S. Mark  $0.838 = 11.914$   
 "  $\overset{E}{W}$  of N Mark  $0.416 = 0.951$   
 Assuming  $\overset{S}{N}$  Mark  $W$  of S  $2.10$   
                   N "  $W$  of N  $0.70$   
 a from obsns. of S Mark  $= -0.19$   
 " " " " "  $= -0.25$

Nov 7 Wednesday P.M. E.  
 sid. time  $22^h 40^m$  Cross level E. Telescope S.  
 23 45  $65.3$   $76.1$   
 23 50 Cross level  $W$   
 0 40  $73.1$   $70.0$   
                   

---

                    $138.4$   $146.1$

$$\bar{m} = +0.17$$

3 30 Cross level E. Telescope N.  
 4 30  $68.2$   $78.8$   
 4 35 Cross level  $W$   
 5 10  $77.1$   $69.7$   
                   

---

                    $145.3$   $148.5$

$$\bar{m} = +0.07$$

Nov 88 Thursday J M E

19 50 Cross level E. Tel. M.

20 47 59.8 74.5

20 50 Cross level W

22 15 71.3 65.1

131.1 139.6

$$\bar{m} = +0.19$$

Nov 9 Friday J M E

20 40 Cross level E. Tel. S.

22 25 59.0 75.8

" Cross level W

23 40 72.9 63.8

131.9 139.6

$$\bar{m} = +0.17$$

Nov 10 Saturday 9M E

22 30 Cross level E. Tel. N.

0 5 61.0 76.3

" Cross level W.

1 0 71.3 66.5

132.3 142.8

$$\bar{m} = +0.23$$

Nov 12 Monday 9M E

20 40 Cross level E Tel. S.

22 25 60.0 78.2

" " Cross level W

0 50 75.3 65.0

135.3 143.2

$$\bar{m} = +0.18$$

19<sup>h</sup> 13<sup>m</sup> Nov 13 Tuesday

PM. E. <sup>h</sup> <sub>m</sub> Cross level E. Telescope N

20 10 60.1 78.9

Obsns. of stars for time.

20 40 Cross level W.

21 7 75.4 66.2  
135.5 145.1

$$\bar{m} = +0.22$$

Nov 14 Wednesday PM E

18 15 Cross level E. Telescope S.

19 10 61.0 77.3

⊕ " Cross level W

19 37 75.5 62.3  
136.5 139.6

$$\bar{m} = +0.06$$

Nov 16 Friday Ill. E.

18 35 Cross level E. Tel. S.

20 10 56.8 75.5

" Cross level W

22 35 75.2 63.1

132.0 138.6

$\bar{m} = +0.15$

Nov 17 Saturday Ill. E.

23 30 Cross level E. Tel. N.

1 0 64.8 81.7

" Cross level W

3 45 79.5 68.3

144.3 150.0

$\bar{m} = +0.13$

Nov 18 Sunday IM E.

2<sup>h</sup> 0<sup>m</sup> Cross level E. Tel. S.

2 50      67.0      81.7

"      Cross level W

3 45      80.1      67.3

|              |              |
|--------------|--------------|
| <u>147.1</u> | <u>149.0</u> |
|--------------|--------------|

$$\bar{m} = +0.04$$

Nov 21 Wednesday

19<sup>h</sup> 5<sup>m</sup> Cross level E. Tel. S.

19 55      58.7      78.8

•       $\alpha$  bygni observed

20 45 Cross level W Tel. N.

23 20      79.1      68.3

|              |              |
|--------------|--------------|
| <u>137.8</u> | <u>147.1</u> |
|--------------|--------------|

$$\bar{m} = +0.21$$

Nov 23 Friday I.M. E.

1 30 Cross level  $\checkmark$  E Tel. N. S.

• 2 15 72.9 85.8

" Cross level w

3 0 84.6 73.2

157.5 159.0

$\bar{m} = + 0.03$

Nov 25 Sunday I.M. E.

0<sup>h</sup> 15<sup>m</sup> Cross level E. Tel. N

1 2 78.0 87.5

" Cross level w

2 55 87.0 78.2

165.0 165.7

$\bar{m} = + 0.02$

Nov 26 Monday IM E.

20<sup>h</sup> 40<sup>m</sup> Cross level E. Tel. S.

21 12      71.3      83.9

" "      Cross level W

23 25      80.8      69.0

152.1      152.9

$\bar{m} = +0.02$

Nov 27 Tuesday IM. E

19<sup>h</sup> 52<sup>m</sup> Cross level E. Tel. S.

20 30      65.2      78.5

Obsns for time

21 20      Cross level W Tel. N

23 45      77.2      72.2

142.4      150.7

$\bar{m} = +0.19$

Nov 30 Friday PM. E.

1<sup>h</sup> 30<sup>m</sup> Cross level E. Tel. S.

2 10 65.1 78.1

" Cross level W

3 0 77.1 66.9

142.2 145.0

$$\bar{m} = +0.06$$

Dec. 2, Sunday PM E.

2<sup>h</sup> 5<sup>m</sup> C. L. E. Tel. S.

3 50 76.3 84.7

" C. L. W.

5 30 85.8 75.4

162.1 160.1

$$\bar{m} = -0.05$$

Dec. 3. Monday Ill E.

19 50 C. L. E. Tel. South.

20 30 69.1 81.7 12.6

Transits.

21 5 C L W. Tel. N.

21 35 83.3 70.0 13.3

152.4 151.7 25.9

$$\bar{m} = -0.02$$

Dec. 4. Tuesday Ill E

3 20 C L E. ~ Tel. S.

4 10 67.7 80.5 12.8

" C L W

4 55 80.7 67.1 13.6

148.4 147.6 26.4

$$\bar{m} = -0.02$$

Dec 5 Wednesday IM. E.

|                   |    |        |       |      |
|-------------------|----|--------|-------|------|
| 21                | 20 | 6 L E. | 78.8  | 18.0 |
| 23                | 53 | 60.8   | 78.8  | 18.0 |
| "                 |    | C L w  | 78.8  | 18.0 |
| 0                 | 35 | 77.0   | 63.4  | 13.6 |
|                   |    | 137.8  | 142.2 | 31.6 |
| $\bar{m} = +0.10$ |    |        |       |      |

Dec. 9. Sunday IM E.

|                   |    |       |       |      |
|-------------------|----|-------|-------|------|
| 22                | 15 | C L E | 80.5  | 17.5 |
| 23                | 0  | 63.0  | 80.5  | 17.5 |
| "                 | "  | C L w | 80.5  | 17.5 |
| 0                 | 0  | 79.7  | 63.9  | 15.8 |
|                   |    | 142.7 | 144.4 | 33.3 |
| $\bar{m} = +0.04$ |    |       |       |      |

Dec. 10 Monday M.E.

20 15 C. L. E. Tel. N.

20 50 66.3 81.9 15.6

Obsns. of stars.

21 15 C L W Tel S

21 55 83.8 69.5 14.3

150.1 151.4 29.9

$$\bar{m} = +0.03$$

Dec 11 Tuesday M E

3 30 C L E Tel. S.

4 15 78.1 88.8 10.7

' Transits

4 50 C L W Tel N.

5 35 91.1 80.3 10.8

169.2 169.1 21.5

$$\bar{m} = 0.00$$

Dec 13 Thursday IM E

20 50 C L E Tel. S.

21 30 73.3 86.7 13.4

22 " C L W

22 30 86.9 74.9 12.0

160.2 161.6 25.4

$$m = +0.03$$

Dec 15 Saturday IM E

0 40 C L E Tel. S.

2 0 84.1 91.9 7.8

" " C L W Tel. W. S.

4 20 95.2 81.5 13.7

179.3 173.4 21.5

$$m = -0.13$$

Dec 18 Tuesday M E.

22<sup>h</sup> 0<sup>m</sup> C L E Tel. S.

22 40 82.0 90.6 +8.6

Transits

23 0 C L W Tel. N.

23 30 92.1 78.5

0 40 92.0 78.5 -13.5

174.0 169.1 -4.9

 $\bar{m} = -0.11$  +22.1

Dec 20 Thursday M E.

6 20 C L E Tel. N.

108.6 110.7 +2.1

Transits

7 50 C L W Tel. S.

8 30 110.3 98.2 -12.1

218.9 208.9 -10.0

 $\bar{m} = -0.23$  14.2

Dec 26 ~~Wednesday~~ Saturday

G. M. E.

S Mer Mark

N Mer Mark

|       |                                   |       |                          |
|-------|-----------------------------------|-------|--------------------------|
| 0.175 | 161                               | 0.571 | 552                      |
| [138] | 158                               | 592   | 572                      |
| 161   | 144                               | 570   | 598                      |
| [119] | 142                               | 601   | 0.580 mean<br>of 20 obs. |
| 179   | 163                               | 607   |                          |
| 203   | 0.169 mean of<br>22 obs.<br>conc. | 597   | conc.                    |
| 188   | 1.048                             | 588   | 1.039                    |
| 171   | 029                               | 611   | 032                      |
| 151   | 039                               | 544   | 032                      |
| 184   | 034                               | 580   | 028                      |
| 188   | 038                               | 555   | 034                      |
| 187   | 1.038 mean                        | 602   | 1.033 mean               |
| 198   | 0.87                              | 608   |                          |
| 193   | 0.79                              | 591   |                          |
| 169   |                                   | 574   |                          |
| 191   |                                   | 550   |                          |
| 153   |                                   | 545   |                          |

## S Mer. Mark.

180

Result.

192

M E. S M. west of middle wire 0.858

203

W " " " " 0.773

197

collimation = 0.043

199

170

M E. N. M. west of middle wire 0.454

168

W " " " " " 0.368

187

collimation = 0.043

206

c = -0.098 for M. W.

180

c' = +0.11

0.188 mean of 10

0.176 mean of all 32 on S. mark

corr.

1.040

020

030

030

032

1.030 mean

Reversed to Ill. W.

| S.M.M.           | coinc.     | N.M.M.     | coinc.     |
|------------------|------------|------------|------------|
| 1.820            | 1.030      | 1.400      | 1.032      |
| 791              | 032        | 380        | 030        |
| 806              | 041        | 410        | 040        |
| 793              | 021        | 409        | 039        |
| 810              | <u>032</u> | 393        | <u>040</u> |
| 809              | 1.031 mean | 413        | 1.036 mean |
| 799              |            | 392        |            |
| 800              |            | 413        |            |
| 822              |            | 390        |            |
| 822              |            | 400        |            |
| 827              |            | 410        |            |
| 812              |            | 398        |            |
| 803              |            | 407        |            |
| 799              |            | 413        |            |
| 792              |            | <u>399</u> |            |
| 1.807 mean of 15 |            | 1.402      |            |

mean of 25 coincidences 1.034

Measurements all by positive rotation  
of the screw (in the direction of the  
hand of a watch)

Dec 26 Wednesday Ill w  
23<sup>h</sup> 10<sup>m</sup> S. L. E. Tel. S.

45 78.2 88.2

+ 10.

1 5 90.3 - 13. 81.8

168.5 - 13 170.0

$\bar{m} = + 0.03$

Dec 28 Friday Ill w

0 10 S. L. E Tel. S.

1 30 86.8 91.3

" C L W

2 20 93.5 84.0

180.3 175.3

$\bar{m} = - 0.11$

Dec 30 Sunday M. W

0 5 C 6 E Tel. S.

1 45 84.2 91.5

" C 6 W

2 30 90.2 83.3

174.6 174.8

$$\overline{m} = +0.01$$

1867 Jan 1. Tuesday

3h 30<sup>m</sup> mean Time. Att. Therm.

to barom. in transit room. 29° 7' PM W.

Wire 1. Upper bulb.

+ rotation

- rotation

0.870

880

880

888

870

877

852

880

855

890

869

884

864

879

888

854

868

870

880

880

0.870

0.878

Wire 2

2.452

2.431

423

446

439

440

2.441

462

442

452

450

457

448

mean 2.447

2.432

450

458

436

437

450

449

2.443

Wire 3

4.050

051

042

051

050

051

049

042

042

4.046

4.032

038

042

039

047

051

048

051

058

4.050

mean 4.047

4.046

Wire 4

5588

5600

580

606

582

589

587

591

580

600

581

591

576

588

580

596

582

596

581601

mean 5.582

5.596

Wire 5

7.200

198

201

181

190

191

186

198

183

189

mean

7.192

7.201

205

199

205

210

201

207

194

210

207

7.204

Alt. Therm 30.0

Time 3<sup>h</sup> 50<sup>m</sup>

## Result for thread intervals.

Mean of + rotation 4.028

" " - " 4.033

## Differences from mean

| wire | + rot  | - rot. | mean   |
|------|--------|--------|--------|
| 1    | -3.158 | -3.155 | -3.156 |
| 2    | -1.581 | -1.590 | -1.586 |
| 3    | +0.019 | +0.013 | +0.016 |
| 4    | +1.554 | +1.563 | +1.558 |
| 5    | +3.164 | +3.171 | +3.168 |
|      | <hr/>  | <hr/>  |        |
|      | -4.739 | -4.745 | -4.742 |
|      | +4.737 | +4.747 | +4.742 |

From which it would appear that  
the mean of the 5. is  $0^{\circ}.016 = 0^{\circ}.037$   
E. of the middle wire, for Ill. W. U.C.

For the mean of the wires, then we  
have  $c = \pm 0.061$  Ill. W. E.

or

 $c' = -0.077$  Ill. W.

Thursday

Jan 3 ~~Wednesday~~ IM. W.22<sup>h</sup> 25<sup>m</sup> C L E. Tel. S.

23 5 80.2 87.5

" C L W

23 45 89.5 78.2

169.7 165.7

 $\bar{m} = -0.09$ 

Jan 4 Friday IM W

22 30 C L E Tel N.

23 20 84.2 87.8

" C L W

23 55 91.3 80.0

175.5 167.8

 $\bar{m} = -0.17$

Jan. 7 Monday Ill. w.

~~23 0<sup>m</sup> C. L. E. Tel. S.~~~~23 35~~

23 35 C L W Tel S

1 30 93.3 83.3

Transits

2 0 C L E. Tel. S.

2 40 86.3 91.3

179.6 174.6

 $\bar{m} = -0.11$ 

Jan 14 Monday Ill. w.

23 5 C L E Tel. S.

23 45 84.8 88.8

"

Transit

0 15

10 15

C L W

94.9 81.9

179.7 170.7

 $\bar{m} = -0.20$

Jan 15 Tuesday.

Examination of North Meridian mark.

Sides of squares, from  $10^{\text{in}} 26$  to  $10^{\text{in}} 40$

Diameter of left hand circle  $4^{\text{in}} 35$

" " centre "  $3^{\text{in}} 17$

" " right hand "  $4^{\text{in}} 64$ .

Thickness of stone in middle, about 6 in.

Jan 22 Tuesday

$23^{\text{h}} 40^{\text{m}}$  C L. E. Tel. S.

0 40 85.7 88.3

" 6 L W Tel S

1 40 95.8 81.5

181.5 169.8

$\bar{m} = \cancel{0.35} - 0.26$

Jan 28 Monday M W.

23 30 C L E Tel. N.

0 15 79.8 87.8

" " b L W Tel S.

1 0 89.7 77.7

---

 169.5 165.5
 $\bar{m} = -0.09$ 

Feb 4 Monday M W

0 55 b L E Tel. S.

1 35 72.8 83.2

Transits

2 35 b L W Tel N.

3 10 86.8 74.2

---

 159.6 157.4
 $\bar{m} = -0.05$

Feb 11 Monday IM w

0<sup>h</sup> 20<sup>m</sup> b b E Tel. S.2<sup>h</sup> 0<sup>m</sup> 78.8 85.8

Transits

3 20 b b w Tel N.

3 55 92.2 81.2

171.0 167.0

$$\bar{m} = -0.09$$

Feb 17 Sunday Ill w

7 25 b b E Tel N

8 25 78.9 85.8

" b b w

9 30 87.9 76.7

156.8 162.5

$$\bar{m} = -0.10$$

Feb 18 Monday M w

2<sup>h</sup> 0<sup>m</sup> C L E Tel N.3<sup>h</sup> 0<sup>m</sup> 75.9 83.0.

Feb 25 Monday M.w.

1<sup>h</sup> 25<sup>m</sup> C L E Tel ~~A~~ S.2<sup>h</sup> 5<sup>m</sup> 75.8 84.8

" C L W Tel N.

|   |    |       |       |
|---|----|-------|-------|
| 2 | 45 | 92.8  | 79.8  |
|   |    | <hr/> | <hr/> |
|   |    | 168.6 | 164.6 |

 $\overline{m} = -0.09$ 

Mar 8 Friday M w.

1 15 C L E Tel S,

2 30 75.8 82.7

Transits.

3 45 C L W Tel N

|   |    |       |       |
|---|----|-------|-------|
| 4 | 35 | 89.1  | 72.8  |
|   |    | <hr/> | <hr/> |
|   |    | 164.9 | 155.5 |

 $\overline{m} = -0.21$

Friday  
Mar 15 ~~Mar~~ Ill. w.

3<sup>h</sup> 50<sup>m</sup> b l e Tel. N.

4 25 78.6 86.7

Transits

5 10 b l w Tel. S.

7 15 92.7 78.0

171.3 164.7

$\bar{m} = -0.15$

Mar 19 Tuesday

13<sup>h</sup> 50<sup>m</sup> b l e Tel. S.

15 0 84.2 90.0

15 5 b l w Tel. S

15 45 94.5 80.2

178.7 170.2

$m = -0.19$

Mar 22 Friday Ill w.

11<sup>h</sup> 15<sup>m</sup> C L E Tel S.

11 50 79.9 87.1

" C L W

12 35 89.8 75.8

---

169.7 162.9

$\bar{m} = -0.15$

Mar 29 Friday Ill w.

3 25 C L E Tel N.

5 55 " S

7 20 78.2 84.2

Transits

7 45 C L W Tel N.

8 30 88.0 76.3

---

166.2 160.5

$\bar{m} = -0.13$

Apr 6 Saturday IM W.

12 0 6 6 E Tel N.

12 55 68.2 77.9

" 6 6 W "

13 30 80.7 67.3

148.9 145.2

$\bar{m} = -0.08$

Apr 9 Tuesday IM W

12 0 6 6 E Tel. S.

13 30 72.2 84.3

" 6 6 W

14 5 87.0 68.7

159.2 153.0

$\bar{m} = -0.14$

Apr 12 Friday

9 45 C L E Tel. S.

10 20 61.8 85.9

" C L W Tel S

11 10 87.2 59.9

149.00 145.8

$$\bar{m} = -0.07$$

Apr 19 Friday

11<sup>h</sup> 5<sup>m</sup> C L E Tel. S.

11 55 67.8 81.5

" " C L W

13 0 84.5 68.5

152.3 150.0

$$\bar{m} = -0.05$$

Apr 21 Sunday

15 35 C L E Tel. S.

16 25 64.2 79.7

Transits

16 40 C L W

17 35 80.2 65.1

144.4 144.8

$$\bar{m} = + 0.08$$

Apr 26 Friday

7<sup>h</sup> 15<sup>m</sup> C L E Tel. S.8<sup>h</sup> 35 63.7 76.8

Transits

9 40 C L W Tel N

11 20 79.9 62.5

143.6 139.3

$$\bar{m} = - 0.10$$

May 1 Wednesday

20 0 C L E Tel N

21 15 66.1 83.0

C L W

23 25 78.7 62.7

144.8 145.7

$$\bar{m} = + 0.02$$

May 10 Friday

7<sup>h</sup> 0<sup>m</sup> b l e Tel S

7 50 57.0 71.8

" c l w

9 30 72.0 56.8

---

129.0 128.6

 $\bar{m} = -0.01$ 

May 17 Friday

19 15 b l e Tel N

19 40 61.2 78.8

Transit

20 18 b l w Tel. S

20 48 78.6 60.8

---

139.8 139.6

 $\bar{m} = 0.00$ 

May 24 Friday

11 15 c l e Tel S

12 10 53.6 73.3

" b l w

13 20 71.3 54.2

---

124.9 127.5

 $\bar{m} = +0.08$ 

06

June 5 Wednesday

13 45 e L E Tel S

15 35 47.0 66.0

" C L W

16 25 63.0 50.5

---

 110.0 116.5

$$\bar{m} = +0.14$$

L. W.

E

W

Wheel

30.5-

61.3

45.3

43.5-

---

 75.8

104.8

M

28.5-

58.0

---

 42.5-

---

 43.0

71.0

101.0

July 8 1867

Aug 10 Saturday Lf. E.  
7 20 AM Seeing fair.

|         |       |      |
|---------|-------|------|
| N. Mer. | 0.78  | 0.99 |
| Mark.   |       |      |
| w of    | 81    | 99   |
| middle  | 79    | 99   |
| wire    | 80    | 100  |
|         | 79    | 98   |
| mean    | 0.794 |      |

|         |       |    |
|---------|-------|----|
| S. Mark | 08    | 99 |
| w of    | 09    | 98 |
| middle  | 07    | 99 |
| wire.   | 05    | 99 |
|         | 04    | 99 |
|         | 07    | 99 |
|         | 0.067 |    |

Rev. to Lf. w.

Seeing improved, and now  
remarkably fine.

S Mer mark N Mer mark corne

2.12 1.38 0.99

11 36 1.00

14 38 1.01

17 38 0.97

13 37 .99

13 39

10 38

10 38

12 40

13 38

2.125 1.380

Rev. to Lp. E.

0.11 0.84 99

11 83 1.00

09 82 99

12 83 98

0.11 83

0.108 0.830

0.990 mean of 20

Double weight to second set Lp E.

giving 0.094 0.818

coll from N Mark

Lf E. Middle wire <sup>east of mark</sup> ~~west~~ 0.172

w 0.390

$$\frac{1}{2} \text{ diff} = 0.109 =$$

S Mark

Lf E Middle wire <sup>east of mark</sup> ~~west~~ 0.896

1.135

$$\frac{1}{2} \text{ diff} = 0.119$$

Mean result  $0.114 = 0.260$

correcting  
Collimation of middle wire Lf E  
- 0.26

Aug 10 Lh. E.

Measurements of diaphragm.

Therm  $80^{\circ}$  Time  $12^h 30^m$

| western wire |     | eastern wire |     |      |     |      |     |
|--------------|-----|--------------|-----|------|-----|------|-----|
| Ret.         | + - |              |     |      |     |      |     |
| 0.83         | 84  | 2.42         | 43  | 4.01 | 01  | 5.56 | 59  |
| 81           | 85  | 41           | 43  | 3.99 | 02  | 56   | 60  |
| 83           | 85  | 40           | 43  | 99   | 02  | 56   | 60  |
| 82           | 87  | 41           | 44  | 99   | 02  | 56   | 60  |
| 81           | 86  | 42           | 43  | 99   | 02  | 57   | 60  |
| 0.820.854    |     | 2.412        | 432 | 994  | 018 | 562  | 598 |
| Backl. 034   |     | 020          |     | 024  |     | 036  | 048 |

|            |         |                                                                                             |
|------------|---------|---------------------------------------------------------------------------------------------|
| 0.837      | + 3.168 | From which the<br>reduction of the<br>middle wire to the<br>mean seems to be<br>insensible. |
| 2.422      | + 1.583 |                                                                                             |
| 4.006      | - 0.001 |                                                                                             |
| 5.580      | - 1.575 |                                                                                             |
| 7.180      | - 3.175 |                                                                                             |
| 20.025     |         |                                                                                             |
| mean 4.005 |         |                                                                                             |

Hence, coll. of mean of 5 wires. Lh E.  
 $= -0.28 \text{ sec } \delta$  (including diurn. aberr.)

Sept 16 3 P.M.

Seeing good

S. Mark 0.27 N. Mark 76

28 76

27 81

28 77

28 79

27 78

0.275 79

come 79

1 00 80

00 80

99 0.785

00

01

00

01

00

99

1.000

Middle wire E of S Mark  $0.725 = 1.66^s$

" " E " N Mark  $0.215 = 0.49^s$

Assuming azimuth of S Mark  $2.17^s$   ~~$0.70^s$  W~~

N Mark  $0.70^s$  W

Middle wire W of S  $0.51^s$

" " E of N  $0.21^s$

corr =  $0.12$

Reversed to W.

S Mark      corr      N Mark

2.02      1.01      1.52

03      02      52

04      99      51

05      02      52

05      01      52

05      01      51

03      00      53

04      01      52

04      01      52

2.05      1.00      1.53

2.040      1.008      1.520

mid. wire  $\epsilon$ 

$$S \text{ Mark of } S \text{ mark } 1.032 = 2^s.36$$

$$" \quad " \quad " N. " \quad 0.512 = 1^s.17$$

$$\text{Coll. from } S \text{ Mark } 0^s.35$$

$$N \text{ Mark } 0^s.34$$

$$\text{Side Axis } \epsilon \text{ of } S \text{ mark } 2^s.01$$

$$" \quad \epsilon \text{ of } N \text{ mark } 0^s.83$$

|                           |               |                 |
|---------------------------|---------------|-----------------|
| Coll. corr. Lp $\epsilon$ | $+ - 0^s.345$ | corr. for aberr |
| " " W                     | $+ 0.345$     |                 |
|                           |               | $- .36$         |
|                           |               | $+ .33$         |

$n$  being about  $= +.33$  from the obsns.

$$\text{Sept 16 and } \bar{m} = +.90 = b \sec \varphi$$

$$a = m \sin \varphi - n \cos \varphi = +.60 - .28$$

$$= +.32$$

$$a = b \tan \varphi - \bar{m} \sec \varphi = \bar{m} \sin \varphi - n \sec \varphi$$

$$= +.60 - .45 = +.15$$

|               |                     |              |
|---------------|---------------------|--------------|
| Whence S Mark | $\frac{1.86}{2.16}$ | July 10 1866 |
| N Mark        | $0.98$              | $2.18$       |
|               |                     | $0.72$       |

$$\begin{array}{r} 2 \ 0 \ 6 \ 4 \\ 2 \ 9 \ 6 \\ \hline 2 \ 0 \ 6 \\ 9 \ 0 \end{array}$$
2<sup>s</sup> 29

Sept 17  
Measures of diaphragm. 2 PM

+ rot

Therm 69

|      |      |      |      |      |
|------|------|------|------|------|
| 0.84 | 2.41 | 3.99 | 5.58 | 7.17 |
| 83   | 42   | 4 01 | 56   | 16   |
| 83   | 44   | 01   | 56   | 14   |
| 84   | 42   | 00   | 56   | 16   |
| 0.84 | 2.41 | 4.01 | 56   | 7.16 |

mean 0.836    2.420    4.004    5.564    7.158

Sum 19.982    mean 3.996

- rot.

|      |      |      |      |      |
|------|------|------|------|------|
| 0.85 | 2.43 | 3.99 | 5.57 | 7.19 |
| 85   | 42   | 4 02 | 57   | 17   |
| 84   | 41   | 01   | 59   | 17   |
| 84   | 42   | 00   | 57   | 17   |
| 0.84 | 2.43 | 4.01 | 5.56 | 7.18 |

0.844    2.422    4.006    5.572    7.176

Sum 20.020    mean 4.004    from which  
the reduction of mean to middle seems to  
be  $0.005 = 0.501$  which may be neglected.







190180

63360

Max.

301

206265 ) 196416 (

2931769

3194251

.9787518

1 in = 0''95225  
at N Mark  $3\frac{1}{3}$

