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KG
11365
13

A.13

Transit Circle
from
June 28th to Dec 5/6th
1852.

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Observations with "Var. Transit" for May. Dec. in this Book - and also with "Fox Dip Circle" in this Book

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Power used on the Transit Circle changed
from 26 to 15 Aug. 5th 1852

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Data from C O Bonteler - U.S. Coast Survey

Linear coordinates and distances of certain points in the vicinity of Boston computed upon the meridian of the State House in Boston & referred to that point -

Cambridge Observatory (Ball on Dome)

	N^m	S^m	E^m	W^m	Dist from S H.
C.S. - mêtres	2590.56			5326.71	5923.2
Bunker Hill monument	2019.36		239.82		2033.5

Camb Obs to U.S. Arsenal Watertown Dist $3545^{m}.4$ Flagstaff -

Log. constant to change C.S. mêtres to Massachusetts Survey feet = 0.5159678 -

Nov. 30th 1852 -

See also Transit Book for March 1845 -

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June 29th 1852

Discussion of Level Errors (continued.)

Let r_1 be the reading of the scale at one extremity of the bubble of which one division has a value d_1

r_2 the reading of the other scale having one division $= d_2$

r_1' r_2' are the readings of the same scales when the level has been reversed

The scales being reckoned on each side from the centre of the bubble

Let z_1 be the reading of the 1st scale for $l = 0$, z_2 of the second

If we take the level error $= l$ positive when r_1 is greater than z_1 or r_1' less than z_1

$$l = (r_1 - z_1)\,d_1 \qquad l = (z_2 - r_2)\,d_2' \qquad (1)$$
$$= (z_1 - r_1')\,d_1 \qquad = (r_2' - z_2)\,d_2'$$

$$l = \tfrac{1}{2}(r_1 - r_1')\,d_1 \qquad l = \tfrac{1}{2}(r_2' - r_2)\,d_2' \qquad (2)$$

$$z_1 = \tfrac{1}{2}(r_1 + r_1') \qquad z_2 = \tfrac{1}{2}(r_2 + r_2') \qquad (3)$$

Let $d_0 = \frac{d_1 + d_2}{2}$ ~~than $\frac{1}{2}d_1 = d_0 - \frac{d_2}{2}$~~ $\frac{1}{2}d_2 = d_0 - \frac{d_1}{2}$

$$d_1 = d_0 - \frac{d_2 - d_1}{2} \qquad d_2 = d_0 + \frac{d_2 - d_1}{2}$$

if $\frac{d_2 - d_1}{2}$ is very small ~~and~~ $r_1 - r_1' = r_2' - r_2 = \frac{2l}{d}$ nearly

$$l = \tfrac{1}{2}(r_1 - r_1')\,d_0 - l\,\frac{d_2 - d_1}{2d_0} \qquad l = \tfrac{1}{2}(r_2' - r_2)\,d_0 + l\,\frac{d_2 - d_1}{2d_0} \qquad (4)$$

$$l = \tfrac{1}{4}\left[(r_1 - r_1') + (r_2' - r_2)\right] d_0 \qquad (5)$$

We have thus by reversal eliminated z and $d_2 - d_1$

z contains the effect of zero error of the readings of the scales, unequal length of supports of level & the error of adjustment of the cross level

$d_2 - d_1$ contains the correction for difference of curvature of the level tube ~~error of~~ or difference of value of the divisions of the two scales If the level error is small so that the readings of each scale in reversed positions occur in nearly the same part of the tube - which has been always the case

Putting ε_x for the probable error of a single days determination of l by $\frac{3}{2}$ readings of each scale in both positions $\times \varepsilon \times \sqrt{2}$

ε_1 ~~ε_1' ε_2'~~ ε_2 ε_0 those of r_1, r_1' &c

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We have found $d_0 = 1''.00 + 0''.0037(b-120)$ $\varepsilon_0 = 0''.036$ = prob. error of d_0

The prob. Er of a single reading for r is $0''.157$

" " mean of three " $0''.090 = \varepsilon_1 = \frac{\varepsilon'_1 = \varepsilon_2 - \varepsilon'_2}{}$

Prob. error of $\left[(r_1 - r'_1) + (r'_2 - r_2)\right] = 0''.090\sqrt{4} = 0''.180$ $\frac{1}{4}\left[(r_1 - r'_1) + (r'_2 - r_2)\right] = l$ nearly

" $l = \varepsilon = \frac{1}{4} l \sqrt{\left(\frac{0''.18}{4l}\right)^2 + \frac{(0''.036)^2}{d_0^2}}$ $d_0 = 1''.00$ nearly

$$\varepsilon = \sqrt{\left(\frac{0''.18}{4}\right)^2 + l^2 (0''.036)^2} = \sqrt{\left(\frac{0''.18}{4}\right)^2 + (0''.036\, l)^2}$$

$$\varepsilon = 0''.045\sqrt{1 + 0.640\, l^2} = 0''.\cancel{15}\left(1 + \cancel{0.0200}^2 - \cancel{0.0056}^4 - \cancel{0.0002\, l^4 + \&c}\right)$$

$$\varepsilon = \cancel{0''.18 + 0.0036\, l^2}$$

The level error of the Camb. Transit during the expeditions has never exceeded $3''.0$ If we take for the average value $l = 1''.5$

$\cancel{0''.0036\, l^2 = 0''.0081}$ $\varepsilon = \cancel{0''.\overline{781}} = \cancel{0''.012}$ $0''.07 = 0''.005$

We thus conclude that the probable error of an ordinary determination of the level error with the Camb. Transit by 3 readings in reversed positions is:—

$$\varepsilon = \cancel{0''.012}\ 0''.005 = 0''.07$$

I have supposed in the above only those *à priori* known sources of error mentioned to exist. viz constant errors changing sign with reversal. errors of reading off of the point of the bubble's coming to rest when its position on the axes is changed. & finally errors of division. A discussion of the figures of the pivots in the Book of N & S marks from 30th August to July 1 gives including them with the above $\varepsilon = 0''.16 = 0''.\cancel{12}\ 0''.011$

Is it not better to include this deviation of the path of the mean axis of collimation in the form of an error additional to those of az col & level $\varepsilon', \varepsilon''$ &c so that ε^{IV} being the probable amt of this error of deviation from a great circle $\varepsilon'\ \varepsilon''$ &c being the prob. errors of the assigned values of az col & level from their mean value in all positions of the telescope the probable error of a predicted pointing of the instrument will be

$$= \sqrt{\varepsilon'^2 + \varepsilon''^2 + \varepsilon'''^2 + \varepsilon^{IV\,2}}$$

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June 29/30 1852. Ill. East

α Persei 1st Second = EC 3.10.00 Lat 3.15.59

Dec. +49°

EC	3.. 12.. 31.7		$\omega x = +0.^{s}19$
	52.4		$\omega w = +0.09$
	13.5		$\omega l = -0.18$
	34.8		
	55.9		
	16.8	29/30	-11.60
	3.. 14 38.1	27/28	-10.43
	2432		117
	3.. 13.. 34.74		0.58
ωx	− 0.03		
ωw	+ 0.14		
ωl	− 0.27		
T-Bar	± 0.04		
Σ ω	− 0.12		
	3.. 13.. 34.62		
	3.. 13.. 46.22		
	EC −11.60		

EC. Run down July 3rd 3/4h

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July 5th Phil 1852 Ill Trent

194 – 6 PB steady – good definition –

EC 12.42.00
194 12.42.40.35
40.25
25.15
EC −15.10

+39° 39.8
57.8 wz +0.19
15.1 tw +0.08
33.0 cot +0.21
50.5
08.2
12 Corr. Derivate
12.50.26.0
29.04
32.94
12.49.30.91
tw +.10
wz +.02
col +.26
Pr. Eq +.04
12.49.31.33
12.49.6.18
194 +25.15

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July 7th 1852

12.. 50.. 22.9
-38.7
12.. 49.. 44.2

12.. 50.. 26.0
-40.3
12.. 50 45 7
44.2
1.5

EC 12.. 41.. 00
194 12.. 41.. 38.7

last wire of
12 Cam. Venat.
12.. 50.. 22.9

ax +0.19
lw +0.08
wl +0.21

July 7th 11h West -
Spica S.G.

EC - 13.. 16.. 25.35
dec -10° 16.. 39.55
16 - 53.35
17 .. 07.20
17 .. 21.60
17 .. 35.20
17 .. 49.25
7)51.30
13 .. 17 .. 07.33

ax + .15
lw + 05
wl + .21
13.. 17 .. 7 .74
R 13.. 17 .. 25.72
EC 37° - 18 .88
30 11. 8
7)5.18
EC loses daily. -0.74

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July 8/9th. Ill West

EC – 4.56.. 0 –
194 – 4.56.. 38.0

Transit of Capella on Spn. Gov. Sheet 1st beat $5^h.00^m..00^s$
last 5.. 7.. 00

Capella Spn. Gov.

EC – 5.. 4..27.35
47.00
06.35
26.35
46.00
05.80
25.37
7/38..04..22
5 .. 05 .. 26.32
In + 11
az – .03
col + 30
5 .. 05 .. 26 .70
5 .. 05 .. 44.94
– 18.24

EC – 5..48.. 0
194 – 5..48..38.0
38.0
18.2
8/5 194 + 19.8
4/5 + 25.5
4/5.7
1.45

20.15

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12 Cam. Dem. July 8th 1852
3 last wires

		Ee	12. 52. 00
154	46.0	194	12. 52. 38.2
	38		
12. 50. 21.0			

8.5

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Ill West July 14th/15th Thursday-

194	8.5
	23.1
−16°	37.1
	57.3
Sirius	5.8
	20.3
6h 39m	34.3
	1804
	180
	3604
6h 38m	51.49
	2
6h 38m	49.49
ax	+.17
lw	+.04
col	+.21
T-B	+.04
6h 38m	49.95
6h 38m	36.81
194	+13.14

Ec	6h 42m 00.
194	6h 42m 37.8
	37.8
	13.14
14/15 Ec	− 24.66
8/9	− 18.2
	6)6.46
Ec	−1.08 lower daily

It has been very hot since the 8th Bar Ext 90° in the day time

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Monday July 18/19 1852 Ill Twist.

α Can. Majoris

EC 6.. 37.. 26.3
40.7
54.9
9.3
23.6
38.2
6.. 38 .. 52.2
2452
180
65.2
6 .. 38 .. 9.31
6 .. 38 .. 36.86
~~E.C.~~ - 27.55
E corr + 46
- 27.09
14/15 - 24.66
4) 2.43
Rate of E.C. - 0.61

Since the 14/15th the weather has been cool

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1852 - July $\frac{19^d}{20}$

α Cam. maj.

194 — 59.9 − 4.6
14.5
28.8
43.2
57.5
11.7
6 .. 39 .. 26.0
7 | 301.6
43.09
2
6 .. 38 .. 41.09
6 .. 38 .. 36.90
4.19

6 .. 38 .. 41.09

ℰ C. − 6 .. 41 .. 0
194 − 6 .. 41 .. 32.5
6 .. 41 .. 32.50
−4.19
ℰ C slow. 28.31

6 .. 38 .. 41.09
ℰ corr. +46
6 .. 38 .. 41.55
6 .. 38 .. 36.90
194 +4.65

7 .. 49 .. 43.43
46.74
7 .. 50 .. 30.17

ℳ C − 11 .. 5 .. 0 − 1
194 − 7 .. 0 .. 12.5
7 .. 0 .. 12.50
4.19
31 .. 0 .. 08.31
7 .. 50 .. 30.17
23 09 .. 38 .. 14
22 .. 56 .. 13.92
8 .. 56.52
37.90
14
23 .. 05 .. 50.58
5 .. 00 .. 0
50.58
56
ℳ C slow 1 .. 06.58 mean.

July $\frac{20}{21}$

α Cam. Maj
ℱ C. B

194 59.0
13.3
27.5
42.0
56.0
10.5
6 .. 39 .. 25.0
233.3
60
7 | 2933
41.90
6 .. 38 .. 39.90
ℰ corr. +46
6 .. 38 .. 40.36
6 .. 38 .. 36.90
+3.46

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Saturday July 24th P.M. Ste. W

az + 0.19
lu + .08
col + .21

	α Bootis		α Bootis	
EC	14.. 7 39.5	+20°	39.5	
	57.2		54.2	
	8.7		8.7	
	23.2		23.2	
	~~38.0~~		38.0	
	14.. 8.. 52.6		52.6	
	~~262~~		14.. 9 7.2	
	120		223 4	
	V 962		60	
			163.4	
			14.. 8 .. 23.34	
		lu	+ .08	
		az	+ .08	
		col	+ .23	
		T - B'	+ .04	
			14.. 8 .. 23.77	
			14.. 8 .. 55.34	
		24 - 14h sid	EC -31.57	
		14 6 ..	-27.09	
			5.33) 4.48 (0.84	
			4264	
			216	

EC 14.. 17.. 00.0
194 14.. 17.. 31.5 Exact

EC - 14.. 28 -
194 - 14.. 28.. 31.4

EC loses daily from 19h

July 27 - ~~γ Ophi.~~

α Herc.	-33°81
α Ophi.	-34.11
μ' Sagittarii	-34.04

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$t_0 = 17^h$

a = +0.148
b = +0.074
c = +0.078

Rate of ξ (413) − 0.s65

July 27th, P.M. 1852 − T.H.S. − E.C.

2

1st

η Ophiuchi −

17h	0m	39s2	− 1″
		54,2	
	1	8,0	
		21,8	
		36,6	
		50,8	
17	2	4,9	
		215,3	
		60	
		7)155,3	
17	1	22,19	− 1″
17	1	21,19	

S 15° 32′

col = +.08

ar = +.07
lev = +.07

17 01 21.33
+.00
$\bar{R}^u$ 17 1 33.37 33.37

α Herculis

17h	6m	39s9	38.9
		53,3	53.3
	7	8,4	7.4
		22,4	21.4
		36,0	36.0
		49,9	49.9
	8	4,0	4.0
		210,9	210.9
		60	
		7)150,9	
17	7	21,56	

N 14° 24′

17 7 21.56

col = +.05

ar = +.07
lev = +.07

17 07 21.78
+.00
17 07 21.78
17 7 33.59

* Decl − 12° 40′

17h	9	53.7	
	10	7.5	
		22.3	
		36.0	
		49.0	
	11	2.6	
		16.1	
		3)185.2	
		60	
		7)245.2	
17	10	35.03	

17 10 35.03

col = +.08

ar = +.13

lev = +.04

17 10 35.28
+.00
17 10 35.28

α Ophiuchi

17	26	49.0	
	27	3.2	
		17.3	
		31.2	
		45.4	
		59.4	
	28	13.2	
		3)218.7	
		0	
		7)218.7	
17	27	31.24	

N 12° 40′

17 27 31.24

col = +.08

ar = +.08
lev = +.07

17 27 31.47
+.01
17 27 31.48
17 28 33.37 33.37

(1st 1st Limb

μ' Sagittarii

		38.27	
		53.10	
		07.79	
		22.45	
18	4	37.1	− 14.68
		52.0	− 29.38
	5	6.8	− 44.08
18	4	23.42	
		23.62	
		23.72	
		23.59	

S 21° 06′

λ Sagittarii

18	17	32.5	
		47.8	
18	3	3.0	
		18.2	
		33.5	
		48.8	
19		3.8	
		196.6	187.6
		60	60.
		7)136.6	127.6
18	18	19.23	18.23

S 25° 30′

Calculation of factor for wire-intervals for moon.

$\frac{360 + I}{360}$	log ~~0.0166~~
sin Capc. 2.0	9.9969
sin Cph. 2.0	
sec. 0° decl	0.0345
Factor	0.0740
sec Dpc. μ' Sagittarii	0.0301
41.12	1.6141
27.42	1.4381
13.70	1.1367

S 22° 23′

17 49 21.7 − ~~32.52~~
doubtful very = 37.2 − ~~48.76~~ 36.2?
17 ~~48 49.18~~
~~48.44~~
17 ~~48 48.81~~ =

$\frac{B+A}{2}$ = 17 49 29.45
$\frac{P_2+P_1}{2}$ passed − 38.45
Mean = 17 48 51.00
col = +.08
ar = +.15
lev = +.09 +.04
rate 17 48 51.27 +.02
− u 17 48 51.29 + 38.97
17 49 25.26

= 18 4 23.59
cor = 88.39
3)28.51
9.50
20.50
25.50
18 04 23.50
col = +.08
ar = +.14
lev = +.04
18 04 23.76
18 4 56.83

18 18 19.23
col = +.08
ar = +.15
lev = +.09 +.03
18 18 18.49
+ 33.97
18 18 52.42

η Ophiuchi − 33.96 (5.92)
ξ Herculi − 33.84 (5.70)
ε Ophiuchi − 34.14 (5.00)
μ' Sagittarii − 34.04 (3.95)
− 33.99 (4.89)

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1852

Ill. Heat (4414)

July 28 Rm. Observer J. H. S.

a = + 0.130
b = + 0.076
c = + 0.085

Rate of E C = − 0.64

E.C. a Herculis	E.C. ν Serpentis	E.C. ε Ophiuchi	E.C. μ Sagittarii	E.C. λ Sagittarii	E.C. α Lyrae
N 14° 31′	S 12° 41′	S 16° 17′	S 21° 06′	S 25° 30′	N 38° 39′
38.35	14.85	48.30	37.60	31.65	30 48.40
52.45	28.90	2.60	52.15	47.40	31 5.80
6.90	42.95	16.60	7.30	2.40	31 23.35
20.95	57.10	30.60	22.00	17.80	31 41.00
34.85	11.20	44.90	36.95	33.00	31 59.30
49.10	25.65	58.95	51.50	48.50	
17 08 03.20	17 12 39.50	17 28 13.00	18 05 05.95	18 19 03.10	18 32 17.00 : 4
205.60	220.15	+ 214.95	213.25	+ 183.85	177.85
60	180	0	60	60	60
7) 145.60	400.15	7) 214.95	7) 153.25	7) 123.85	5) 117.85
17 07 20.80	17 11 57.16	17 27 30.71	18 04 21.89	18 18 17.69	18 31 23.57
33.58	12 32.18	5.59	18 4 56.80	18 18 52.42	57.64
34.98	35.02	34.88	34.91	34.73	34.07
17 07 20.80	17 11 57.16	17 27 30.71	18 04 21.89	18 18 17.69	Σ 194.85
col = +.08	col = +.08	col = +.08	col = +.08	col = +.08	Cor − 52.84
ar = +.06	ar = +.11	ar = +.11	ar = +.12	ar = +.13	6) 142.01
lev = +.16 +.17	lev = +.12 +.05	lev = +.18 +.04	lev = +.10 +.04	lev = +.09 +.02	18 31 23.67
17 07 21.01	17 11 57.40	17 27 30.94	18 04 22.13	18 18 17.93	col = +.10
r +.00	+.00	+.01	+.03	+.03	ar = +.01
− u + 34.40	+ 34.40	+ 34.40	+ 34.40	+ 34.40	lev = +.26 +.10
17 7 55.41	17 12 31.80	17 28 5.35	18 4 56.56	18 18 52.36	18 31 23.85
R 17 7 55.58		17 28 5.59	18 4 56.80	18 18 52.42	r + .04
					− u + 34.40
					18 31 58.32
					R 18 31 57.64

a Herculis	− 34.57 46
a Ophiuchi	34.85 51
μ Sagittarii	34.67 61
a Lyrae	33.76 80
β Lyrae	33.77 82
δ Aquilae	34.39 24
	21
	− 34.40

201
99

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28 Pm. Continued

E.C. β Lyrae	E.C. ☾ I limb	E.C. σ Sagittarii	E.C. ζ Aquilae	E.C. π Sagittarii
			21.00	
14.85	34.80	31.75	35.50	40.80
31.80	50.40	46.60	49.80	55.50
48.60	6.00	1.30	3.80	10.50
4.10	21.60	16.20	18.00	25.00
21.85	37.00	31.00	32.00	39.40
37.80	52.35	45.80		54.40
18..44.. 54.00	18..51.. 7.70	18..56.00.70	18..58..46.95	19..01..09.10
213.00	209.85	173.35	206.05	234.70
180	60	60	180	60
7)33.00	7)149.85	7)113.35	7)26.05	7)174.70
18 44 4.71	18 50 21.41	18 55 16.19	18 58 3.72	19 0 24.96
38.92		50.74	38.38	59.70
34.21		34.55	34.68	34.74
18..44..04.71	18..50..21.41	18..55..16.19	18..57..03.72	19..00..24.96
c + .09	col = +.08	col = +.08	col = +.08	col = .08
a +.03	ar = +13	ar = +.13	ar = +.06	ar = .12
b ~~+.23 +.08~~	lev = ~~+.07 +.03~~	lev = ~~+.10 +.04~~	lev = ~~+.18 +.05~~	lev = ~~+.10 .04~~
r + .04	18..50..21.64	18..55..16.24	18..57..03.94	19..00..25.20
~~+34.40~~	r +.05	+ .05	+ .05	+ .05
~~+34.40~~ +34.40	+ 34.40	+ 34.40	+ 34.40	+ 34.40
18 44 39.35	18 50 56.04	18 55 50.89	18 58 38.39	19 0 59.65
18..44..35.92 R	...	18..55..50.74	18 58 38.38	19 0 59.70

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1852phae.proj. . . 13T

July 28/29 Am. C.M.T.

E.C. β Tauri		E.C. δ Orionis	E.C. ε Orionis		E.C. β Tauri	E.C. α Tauri
+28°	~~50.40~~	—	26.00		33.05	6.. 6.60
	50.40	0° 3.. 24.40	−1° 40.10		49.10	+16 6.. 20.30
	25.85	3.. 38.10	7.. 53.70		4.65	6.. 34.50
	16.. 27.60	3.. 52.00	8.. 7.50		20.25	6.. 48.82
	16 37.10	4.. 5.75	8.. 21.00		36.00	7.. 3.30
	16 52.90	4.. 19.50	8.. 35.00		51.40	7.. 17.50
t = 5h	5.. 17.. 08.40	5.. 24.. 33.00	5.. 28.. 48.45		5.. 17.. 07.10	4.. 27.. 31.60
	167.65	139.75	231.75		201.55	181.62
	60	120	180		60	180
	107.65	259.75	51.75		7)141.55	7)361.62
	5.. 16.. 21.53	5.. 23.. 51.95	5.. 28.. 07.39		20.22	4.. 26.. 48.80
	cul. + .05	cul. + .05	cul. + .05		5.. 16.. 20.22	cul. — .01
	ax. + .06	ax. + .12	ax. + .12			ax. + .08
	lev. + .24	lev. + .16	lev. + .16			lev. + .18
	5.. 16.. 21.88	5.. 23.. 52.23	5.. 28.. 07.72			4.. 26.. 49.05
	5.. 16.. 56.25	5.. 24.. 26.67	5.. 28.. 42.06			4.. 27.. 26.20
	34.37	34.39	34.34			37.26

5.. 16.. 21.53 | 5.. 23.. 51.95 | 5.. 28.. 07.39 | 4.. 26.. 48.80

β Tauri

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1852phae.proj ..13T

Aug. 1/2 Am

E.C. α Aurigia		E.C. β Tauri		E.C. ε Orionis	
	9.10		31.75		23.40 3.9
+46°	29.00	+28	47.83	−1°	37.30 3.85
	48.67	6	3.45		51.15 3.95
5	8.38	6	18.95	8	5.10 3.62
5	28.15	6	34.65	8	18.72 3.68
5	47.75	6	50.25	8	32.40 3.60
5.06	2.52	5.17	05.80	5.28	46.00
	196.57		192.68		214.07
	120		60		180
7)	56.57	7)	132.68	7)	34.07
5.05	08.36	5.16	18.95	5.28	04.87
cal.	−.02	cal.	−.01	cal.	−.01
ax.	−.01	ax.	+.06	ax.	+.00
lev.	+.28	lev.	+.27	lev.	+.14
5.05	08.61	5.16	19.25	5.28	05.00
5.05	45.78	5.16	56.40	5.28	42.17
	37.17		37.15		37.17

34.37
4) 2.7 (0.69 EC Lossing

5.05.08.36

5.16.18.95

5.28.04.87 ?

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1852phae.proj...13T

Aug. 2/3 Am.

E.C. ζ Tauri	E.C. δ Orionis	E.C. ε Orionis
31.7	7.8	23.1
47.6	21.6	37.0
3.1	35.3	50.9
18.7	49.1	4.6
34.1	2.9	18.2
50.0	16.5	32.0
5 17 05.7	5 24 30.1	5 28 45.8
191.2	163.3	211.6
+6.0	180	180
7)131.2	7)343.3	7)31.6
18.75	49.04	4.51
5 16 18.75	5 23 49.04	5 28 04.51

Aug. 3/4 Am

E.C. ε Orionis	E.C. ε Orionis
22.8	49.75
36.8	3.85
50.2	17.50
4.3	4 6 31.40
17.8	6 45.00
31.5	6 59.00
5 28 45.8	5 47 12.80
208.7	218.32
28.7	5 46 32.64
5 28 04.10	
5 28 42.22	
38.12	

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1852phae.proj...13T

N. B.

Aug. 3rd 1852 P.M. This afternoon the power of 56 hitherto used on the transit Circle, (since it was mounted,) was changed for one of 153.

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1852phae.proj. . .13T

1852

Ill West (420)

Aug. 7 Pm.

E.6.
α Lyrae

42.80
0.60
17.55
35.60
53.15
18.30.16.60
= 160.70
cor = - 52.83
6) 107.87
17.98

18.29.17.98

E.6.
β Lyrae

10.20
26.80
43.00
59.40
15.80
32.40
18.44.48.80
236.30
180
7) 416.30
59.47

18.43.59.47

Aug. 8/9 Am.

194
α Lyrae

25.6
40.2
54.5
7 59.0
7 23.0
7 37.3
4.27.51.4
241.0
180
7) 61.0
8.71
−2
4.27.06.71
cor. −.11
ax. +.08
lev. +.19
4.27.06.87
4.27.26.41
19.54
4.27.06.71

E.6.
β Lyrae

15.28.70
7 15.60
7 31.40
7 46.90
5.17.02.40
= 125.00
cor = - 46.83
5) 78.17
15.63

5.17.15.63

E.6.
α Orionis

47.10
1.10
14.90
6 28.80
6 42.40
6 56.50
5.47.10.30
201.10
00
7) 201.10
5.46.28.73
cor −.05
ax. +.11
lev. +.12
5.46.28.91
5.47.9.64
40.73
5.46.28.73

Aug. 8/9 Am
M.S.T. 19.29.10
194 4.42.24.5
19.54

G.08.34.56
46.89
G.09.21.25

4.42.44.04
G.9.21.25
16.33.22.75
3.12.23
19.30.10.52
19.29.10.
1.00.52
16
1.16.52

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1852phae.proj . . 13T

1852 (421)

Aug. 11 Am } Aug. 11/12 Am. Aug. 13/14 Am

E.C. Spica	E.C. Sirius	E.C. Procyon	194 Sirius
00.5	12.25	9.60	29.2
14.6	26.70	23.50	43.7
28.4	−17° 7 41.00	+6° 37.10	58.0
42.8	7 55.50	0 50.90	12.3
56.6	8 9.90	1 4.60	26.6
10.4	4 24.10	1 18.50	41.0
13 17 24.3	6 38 38.20	7 31 32.40	6 38 55.4
177.6	207.65	276.80	266.2
120	100	180	180
7)297.6	2)387.65	1)356.80	7)86.2
42.51	6 37 55.38	7 30 50.97	12.31
13 16 42.51 ?	cal −.05	cal −.05	6 38 12.31
	ax +.16	ax +.11	
	lw +.08	lw +.12	
	6 37 55.57	7 30 51.15	
	6 38 38.34	7 31 32.76	
	41.77	41.61	
	6.37.55.38	7.30.50.97	

Obs. M.G.B.

Aug. 11/12 Am.

M.C.	21 23 35
194	6 48 55.5
	23.56
h m s	
6.20.24.21	6 49 19.00
46.74	6 21 10.55
9.21.10.55	21 28 08.05
	3.31.03
	21 24 37.02
	21 23 35. av
	1.02.02
	16
	1 18 0.2

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1852phae.proj...13T

Aug. 15/16 Am.

E.C. β Tauri		E.C. δ Orionis		E.C. ε Orionis		Aug 16/17 Am E.C. ζ Orionis	17/18 Am E.C. ε Orionis
25.85				44.03		43.80	43.6
+24° 41.75		−00°	15.85	+7°	58.20	58.00	57.5
57.20			29.40		11.90	11.70	11.3
6.12.75		3	43.20	6"	25.90	25.50	25.2
28.40		3	56.80		39.80	39.40	39.0
44.10		4	10.45		53.40	53.10	53.0
5" 16" 56.60		5" 24" 24.20		5" 47" 7.30		5" 47" 07.10	5" 47" 06.8
269.65		155.70		242.53		238.60	236.4
180		60		60		60	60
7)89.65		5)215.70		7)182.53		7)176.60	7)176.4
5" 16" 12.80		5" 23" 43.12		5" 46" 26.07		25.51	25.2
cal. −.05		cal. −.05		cal. −.05		5" 46" 25.51	5" 46" 25.2
ar. +.07		ar. +.11		ar. +.10			
lu. +.16		lu. +.12		lu. +.12			
5" 16" 12.98		5" 23" 43.30		5" 46" 26.84			
5" 16" 56.81		5" 24" 27.15		5" 47" 09.82			
43.83		43.85		43.58			
5" 16" 12.80		5" 23" 43.12		5" 46" 26.07			

1226 [.75

Aug. 15/16 Am.

M.T.C. 19" 49" 20
194 5" 30" 9.0
28.85
5" 30" 37.85
9" 36" 57.17
19" 53" 40.68
3. 13. 56
19" 50" 25.12
19" 49" 20
M.T.C.—Camb 1" 05.12
16
M.T.C.—B — 1" 21.12

E.C. 5" 32" 00
1945" 32" 14.9
9" 36" 10.43
46.74
5" 36" 57.17

5" 32" 00
43.75
5" 32" 43.75
5" 32" 14.9
28.85

1176.
Aug 20 Am E.C. slow of Boston 1" 23.8 ms

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1852phae.proj ..13T

1852.

August 18/19 Am.
Sirius

194. 22.9
37.5
51.7
6.0
20.4
34.7
6 .. 38 .. 48.9

222.1
-180
7) 42.1

6 .. 38 .. 66.01
-2.2

6 .. 38 .. 03.81
6 .. 38 .. 37.49

194 Slow of Cam 33.69
15/16 Cam 28.85
3) 4.74 (1.58 Rate 1 194.

24) 158 (0.066
144
14

6 .. 38 .. 03.80

E.C. 6 .. 42 .. 0
194 - 6 .. 42 .. 11.8
6 .. 42 .. 11.8
33.69
E.C. Slow - 45.49
" 15/16 - 43.75
2) 1.74 (0.58 Rate E.C.

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1852phae.proj . . . 13T

Ill West (424)

Aug. 21

Arcturus E.C.

24.70
39.50
53.85
8.60
23.10
37.90
14 08 52.25
239.90
180
7)59.90
8.56

14 08 08.56

α Serpentis E.C.

Last
45.85
59.40
13.40
27.20
36 41.00
15 36 54.80
∠ = 241.65
cor = − 41.52
6)200.09
33.35
20
13.35

15 36 13.35

Aug. 22/23 Am.

E.C.
Procyon

05.00
+5° 18.50
32.50
46.40 −
00.10
7 31 14.00
last
116.80
120
231.80
7 30 46.36
col. −.05
az. +.11
lev. +.12
7 30 46.54
7 31 32.98
46.44
7 30 46.36

Aug. 23 Pm

$t_0 = 17^h$ E.C.
η Ophiuchi

S 15.32'
25.40
39.55
53.90
0/ 8.10
22.25
36.55
17 01 50.95
23670
180
7)56.70
17 1 8.10
17 01 08.10
col = −.07
az = +.08
lev = +.10
17 01 08.21
r = + .00
− w + 46.85
17 1 55.06
17 1 55.06

E.C.
α Herculis

N 14.34'
26.55
39.55
54.00
8.25
22.45
36.80
17 07 50.90
23790
180
7)57.90
17 7 8.27
17 07 08.27
col = −.07
az = +.05
lev = +.17
17 07 08.42
+ .00
+ 46.85
17 7 55.27
17 7 55.25

Aug. 22/23 Am.

M.T.G. 21 29 35
194 38 11.5
38.74
7 38 50.24
10.08.46.31
46.74
10.04.33.05
10.04.33.05
21.34.17.19
3 32.03
21 30.45.16
21 29 35
1 10.16
16
1 26.16

1 26.16
1 21.12
7)55.04
−0.72

1 26.16
1.18.02
11)8.14
.74
232

1 26.16
2.4
1 28.56

Aug 27/28 Am M.T.G. slow of B
1 29.66

M.T.G. slow of Bat 7 Pm
m s
1 28.5

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1852phae.proj...13T

$a = +0.095$
$b = +0.193$
$c = -0.071$

(42.5)

Aug 23 8m. Rate of E.C. $-0^s.42$

E.C. ☾ I limb	E.C. 4 Sagittarii	E.C. μ' Sagittarii	E.C. α Lyrae	E.C. β Lyrae
				2.10
41.60	15.20	25.35	17.20	18.95
57.00	30.30	40.15	35.10	35.30
29 12.25	45.35	54.95	52.80	51.70
27.65	50 00.90	4 9.50	10.25	8.15
43.00	15.35	24.23	27.60	24.65
58.25	30.35	39.10	44.95	40.80
17 30 13.75	17 50 45.35	18 04 53.90	18 32 3.00	18 44 40.80
252.50	19220	24748	19090	18165
7 193.50	7 2.20	7 67.48	7 70.90	7 360.65
17 29 27.64	17 50 0.32	18 4 9.64	18 31 0.13	18 43 51.52
17 29 27.64	17 50 00.32	18 04 09.80	18 31 10.13	18 43 51.52
col = −.07	col = −.07	col = −.08	col = −.09	col = −.08
ar = +.09	ar = +.09	ar = +09	ar = +.01	ar = +.02
lev = +.09	lev = +.08	lev = +09	lev = +24	lev = +.22
17 29 27.75	17 50 00.42	18 04 09.90	18 31 10.28	18 43 51.68
σ +.01	+.01	+.02	+.03	+.03
−n +46.85	+46.85	+46.85	+46.85	+46.85
17 30 14.61	17 50 47.28	18 4 56.77	18 31 57.16	18 44 38.56
17	17 50 47.18	18 4 56.58	18 31 57.28	18 44 38.64

α Herculis	$-46^s.83$
μ Sagittarii	46.75^{66}
α Lyrae	46.66^{97}
β Lyrae	46.93
	46.85

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1852phae.proj. . .13T

(426 Rate of E.C. − 0.ˢ40 per Hour West

a = +0.096
b = +0.200
c = −0.072

Aug. 23/24 Aug. Aug. 24 P.M.

194 α Lyrae	E.C. 4 Sagittarii	E.C. γ Draconis	E.C. μ' Sagittarii	E.C. Cl Limb
	$t_0 = 17^h 00'$			
24,0	S 23°.48' 14,55	N 51°.30'	S 21°.06' 25,05	16.80
48.3	30,08		40.00	S 23°.20' 32.25
02.5	45.00	2.05	54.60	47.85
16.9	50„ 00.00	24.40	4„ 9.25	30„ 3.00
4„ 27„ 31.0	15,00	46.20	24.00	19.00
	30,60	8.40	38.80	34.40
Σ = 132.7	17„ 50„ 45.60	17„ 53„ 30.20	18„ 04„ 53.50	18„ 30„ 49.80
cor = − .12	18 03	Σ = 111.25	24 5 20	20 3 10
5)132.58		cor = −110.35	1	23.10
26.51	17„ 50„ 00.00	57.90	9)65.20	18„ 30„ 3.30
24		.18	18„ 4„ 9.32	
02.51	17„ 50„ 00.00	24	18„ 4„ 9.15	
00.51	col = −.08	24.18	18„ 4„ 8.57	
4„ 27„ 02.51	ar = +.10	17„ 52„ 24.18	−47.42	
col = −.08	lev = +.09	col = −.11	18„ 04„ 09.32	18„ 30„ 03.30
az =	17„ 50„ 00.11	ar = +.02	col = −.08	col = −.08
lev =		lev = +.31	ar = +.10	ar = +.10
	r + .01	17„ 52„ 24.46	lev = +.10	lev = +.09
	−u + 47.17	+ .01	18„ 04„ 09.44	18„ 30„ 03.41
	17 50 47.29	+ 47.17	r + .02	+ .03
	17 50 47.1	17 53 11.64	−u + 47.17	+ 47.17
		17 53 11.64	18 4 56.63	18 30 50.61
			18 4 56.57	

Aug. 31 P.M.
M.S.C. 4 „ 48„ 50
194 15 „ 30„ 8.5

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1852phae.proj...13T

Aug. 21

E.C.
o Sagittarii
18.54.19.30
Clouds
"
"
"
"
"

S 21° 57'

E.C.
π Sagittarii
28.05
48.00
57.70
19.00..12.50
clouds
"

S 21° 15'

Σ = 19.30
cor = - 44.50
35 07
55 03.82
18..55..50.7
c - .05
a + .10
b + .09
r + .03
-u + 47.17
18 55 51.15
18 55 50.6

Σ = 141.25
cor = 88.38
4)229.63
57.41
48
19..00..12.41
- .08
+ .10
+ .09
+ .03
+47.17
19 0 59.72
19 0 59.89

Aug 31 Pm

E.C.
β Libræ
46.60
00.40
14,25
28,25
42.10
15.. 9.. 56.00
Σ = 187.60
cor = - 41.76
6)145.84
24.31
10
14.31
15.. 09.. 14.31

E.C.
α Cor. Borealis
50.10
5.75
21.00
36.55
52.00
9.40
15..28..22.80
195.60
60
7)2355.60
15..27..36.51
15..27..36.51

E.C.
α Serpentis
28.70
42.60
56.40
10.30
24.20
38.00
15.. 8 6..51.90
252.10
180
72.10
15..36..10.30
18
15.36.10.12
15.36.52.56
- 49.44
47.43
7)2.04
0.29
mate of E.C.
among

15..36..10.30

ν Draconis - 47.23
ν Sagittarii - 47.11
(- 47.17)

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1852phae.proj. . .13T

(428)

Ill West

Sept. 1 Bm.

194 α Serpentis

27.3
41.2
55.0
γ 9.0
22.9
36.6
15.36.56.4
242.4
180
62.4
8.91
-2
15.36.06.91

15.36.06.91

Sept. 1/2 Am.

194 α Aquarii

+32°
7.7
22.0
36.0
50.0
04.4
4.27.18.7
≥ = 138.8
corr = -42.97
6)95.83
15.97
20
35.97
2
33.97

4.26.33.97

194 α² Cam.

29.0
45.4
1.5
17.5
34.0
50.0
7.25.06.4
183.8
66
7)123.8
7.24.17.68
-2
7.24.15.68
col. -.13
az. +.03
lev. +.50
7.24.16.08
7.25.9.27
53.19

7.24.15.68

194 α Canis Min.

+6° 00.5
14.4
28.3
42.0
56.0
9.7
7.31.23.3
174.2
120
7)294.2
42.03
-2
7.30.40.03
col. -.11
az. +.07
lev. +.35
7.30.40.34
7.31.33.20
52.86

7.30.40.03

Sept. 1/3 Am.

194 β Orionis

52.0
6.0
19.9
34.0
48.1
1.9
5.07.15.6
1775
7)2375
33.93
-2
5.06.31.93
23
5.06.31.70
5.7.26.40
54.70

5.06.31.93

Sept. 1 Bm
11.36. 4.57.00
194 15.42.16.0

52.86
59 15
605
53.05

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1852phae.proj...13T

1852.

Sept. $\frac{2}{3}$ Am

194.

Swims

1.9
16.4
30.8
45.0
59.4
13.7

6 .. 38 .. 28.1

1953
+120
7)3153

37 .. 45.04
−2
6 .. 37 .. 43.04
−25
6 .. 37 .. 42.79
r.. 37.87
.55.08

6 . 37 . 43.04

EC − 6 . 46 . 0
194 − 6 .. 45 .. 55.5
4.9
EC 8 − 50.4

E.C.

Sept. $\frac{5}{6}$ Am

194

Swims

58.2
−17° 12.6
27.1
42.3
55.5
9.7

6 .. 38 .. 24.2

228.6
60
7)288.6

4.1.23
2.21

6 . 37 . 38.98 — 6 . 37 . 38.94

cal −.11
ast +.10
Lun +.22

6 . 37 . 39.19
6 . 38 . 37.95 1876

EC − 6 . 42 . 0
194 − 6 . 41 . 52.6
6 . 41 . 52.6
58.76
51.36

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1852phae.proj. . .13T

Sept. 5/6 Am.

E.C.
a^2 Gemin.

1.70
18.15
34.25
50.40
7.. 25.. 06.70
3)54.10
7.. 24.. 18.03
Incl. − .13
αz. + .03
lw. + .50
7.. 24.. 18.46
7.. 25.. 9.38
50.92

Σ = 111.20
cor = − 81.17
5)30.03
6.01
12
18.01

E.C.
Procyon

56.00
9.90
7.. 31.. 23.75
Σ = 89.65
cor = − 82.77
3)16.88
2.29
40
42.29

7.. 30.. 42.29

Sept. 6/7 Am

194
β Tauri
12.5
28.2
43.5
59.5
15.0
30.4
5.. 16.. 46.0
235.1
180
415.1
5.. 15.. 59.30

194
ε Orionis

31.2
45.0
58.9
12.5
5.. 28.. 26.4
Σ = 174.0
cor = − 68.71
5)105.29
21.06
24
45.06
2
43.06
5.. 27.. 43.06

5.. 15.. 59.30

Sept. 5/6 Am.
M.S.T. 19.. 47.. 00
194 6.. 50.. 28.5
58.2c
6.. 51.. 27.26
10.. 59.. 44.80
19.. 51.. 42.46
3.. 15.. 24
19.. 48.. 27.22
19.. 47
1.. 27.22
16
1.. 43.22

10.. 58.. 55.06
46.74
10.. 59.. 44.80

6 Pm
M.S.T. 00.. 28.. 20
194 11.. 32.. 34.5
59
11.. 33.. 33.5
11.. 3.. 41.36
0.. 29.. 52.14
4.90
0.. 29.. 47.24
28.. 20
1.. 27.24
16
1.. 43.24

11.. 02.. 54.62
46.74
11.. 03.. 41.36

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1852phae.proj...13T

Sept. 7/8 Gw.

194 β Orionis	194 β Tauri
45.4	11.0
59.2	26.5
13.0	42.3
27.0	58.0
40.9	13.4
54.8	29.2
5h 07m 08.6	5h 16m 45.0
248.9	225.4
60	180
7) 184.9	7) 405.4
5h 06m 26.98	57.91
−2	−2
5h 06m 24.98	5h 15m 55.91

5h 06m 24.98 5h 15m 55.91

Sept. 8/9 Gw.

194 β Orionis	194 ε Orionis	194 Lyrae
−8° 44.3	−1° 1.0	54.0
58.0	15.0	8.5
12.0	28.9	22.9
25.8	7m 42.5	37.0
39.8	56.0	51.5
53.6	9.8	5.8
5h 07m 07.5	5h 28m 23.5	6m 38m 20.0
241.0	176.5	199.7
60	120	60
7) 181.0	7) 296.5	7) 259.7
25.86	5h 27m 42.36	37.10
−2	−2	−2
5h 06m 23.86	5h 27m 40.36	6m 37m 35.10
cal. −.11	cal. −.11	
az. +.09	az. +.08	
lev. +.27	lev. +.31	6.37.35.10
5h 06m 24.01	5h 27m 40.64	
5h 7m 26.57	5h 28m 43.21	
1m 02.56	1m 02.57	

5.06.23.86 5.27.40.36

Sept. 7/8 Gw.
M.S.T. 18h 10m 25s
194 5h 21m 30.0

Sept. 8/9 Gw
M.S.T. 17h 58m 20s
194 5h 13 19.5
1m 2.56
5h 14m 22.06
11h 10m 47.72 11h 11m 34.46
46.74 18h 02m 47.60
11h 11m 34.46 2.57.39
17h 59m 50.21
17h 58m 20
1m 30.21
16
1m 46.21

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1852phae.proj. . .13T

Sept. 9/10 Ann.

194	194	194
+32° last	Procyon	β Gem.
α Gem.	34.9	+6° 50.0	+28° 26.4
	51.0	4.0	42.3
	7.1	17.7	58.0
	23.5	30„ 31.5	4„ 13.7
	39.9	45.3	29.0
7„ 24„ 56.0		59.0	44.8
156.4	7„ 31„ 12.9	7„ 35„ last
120	220.4	187.8
36.4	ω	120
7.28	7) 22.04	67.8
−2	31.48	7„ 34„ 13.56
7„ 24„ 05.26	−2	−2
cal −.13	7„ 30„ 29.48	7„ 34„ 11.56
ax +.03	cal. −.11	cal. −.12
lev +.56	ax. +.07	ax. +.03
7„ 24„ 05.68	lev. +.35	lev. +.45
7„ 25„ 9.50	7„ 30„ 29.79	7„ 34„ 11.92
1„ 03.82	7„ 31„ 33.39	7„ 36„ 15.61
z = 212.4	1„ 03.60	1„ 03.69
cor = −48.76		
6) 163.64		
27.27		
20		
7.27		
2		
6.27		

Sept. 12/13 Ann.

194
α Leonis
41.0
56.3
9.2
23.5
37.5
51.4
10„ 00„ 05.5
223.4
60
7) 163.4
23.34
−2
9„ 59„ 21.34
10„ 00„ 29.07
1„ 07.73

9„ 59„ 21.34

α Geminor 7„ 24„ 05.27

Procyon 7„ 30„ 29.48

β Geminor 7„ 34„ 11.56

Sept. 9/10 Ann.

	11. 6. 20„ 23„ 00
194	7„ 42„ 20.0
	1„ 3.7
11. 14. 44.28	7„ 43„ 23.7
46.74	11„ 15„ 31.02
11. 15 31.62	20„ 27„ 52.68
	3„ 21.16
	20„ 24„ 31.52
	20„ 23
	1„ 31.52
	16
	1„ 47.52

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1852phae.proj...13T

1852

Sept^r 13^th

	Gt
S. Simms West Transit West of Transit-circle ———	92.2
old meridian East of Transit Circle ———	22.5
Present meridian of 42 inch Transit west of its former meridian	94.7

Sept. 12/13 Am.

M.T.G.	22 82,,50
194	10,,04 20.5
	1,, 7.77
11,,26,,33.93	10,,05,,28.23
46.74	11,,27,,20.67
11,,27,,20.67	22,,38,,07.56
	3,,42.49
	22,,34,,25.07
	22,,32,,5[illegible]
	1,,35.07
	16
	1,,51.07

Sept. 15/16 Am.

M.T.G.	20,, 07,,45
194	7,, 50 ,,38.5
	1,, 13.46
11,,38,,23.54	7,, 51,,51.96
46.74	11,,39,,10.33
11,,39,,10.33	20,,12,,41.63
	3,,18.66
	20,,09,,22.97
	20,, 7,,45.[illegible]
	1,,37.97
	16
	1,,53,,97

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1852phae.proj. . .13T

(434)

Sept: 15/16 Ann
E.C.
a Geminorum

27.30
43.80
59.90
16.25
32.50
48.80
7 25 05.00
233.55
120
7)113.55
7 24 16.22
7 25 9.69
53,47

E.C.
a Canis Min.

59.00
12.55
26.60
40.50
54,30
8,00
7 31 21.60
225.15
60
285.15
7 30 40.45
7 31 33.55
53.10

Sept: 16/17 Ann.
194
Procyon

38.8
52.5
6.3
20.0
34.0
47.7
7 31 01.5
200.8
60
7)140.8
20,11
-2
7 30 18.11

Sept: 19/20 Ann.
194 W.C.B.
Geminorum

34.5
49,0
3,4
17.7
32,0
46.3
E 38 00.7
183.6
60
7)123.6
17,66
-2
6 37 15.66

7.24.16.22

7.30.40.45

7.30.18.11

6.37.15.66

Sept: 19/20 Ann.
N.C. 19 54 45
194 7 53 17.5
1 22.3
11.54.04.80 7 54 39.8
46.74 11 54 56.54
11,54,56.54 / 9 59 43.26
3 16.59
19 56 26.73
19 54 45
1 41.73
16
1 57.73

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1052phae.proj...13T

Sept. 19/20 Am

E.C. α Canis Min

	58.63
	12.50
	26.10
	40.00
	54.00
	7.75
7h	31m 21.45s
	220.43
	60
	7)280.43
7h	30m 40.06s
7h	31m 33.66s
	53.60
7h	30m 40.06s

E.C. β Gem.

	35.15
	50.90
	6.35
5h	22.00
	37.65
	53.25
7h	36m 08.80s
	214.00
	60
	7)154.10
7h	35m 22.01s
7h	36m 15.90s
	53.89
7h	35m 22.01s

Sept. 21 Pm

E.C. ν' Sagitt.

1	clouds	
2	52.10	
3	7.00	
4	18m 44m 21.90s	
5	clouds	
6		
7		

E.C. Anon.

	33.20
	48.30
	3.15
46	18.15
	46.00
	46m 02.80s
18h 46m	clouds

E.C. ξ² Sagitt.

	17.30
	32.40
	47.00
48	1.95
	16.50
	31.30
18h 48m	46.05s
	192.50
	180
	12.50
	1.79
	18.48.01.95

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1852phae.proj...13T

(436)
Ill West

Sept. 21 Pm

E.C.
ζ Aquilae
1.80
15.00
30.00
clouds
clouds
12.30
18.. 58.. 26.30

E.C.
Moon's I limb
19.. 11.. 20.0 double pull
clouds

A = 19.. 11.. 20.0
i, pres δ = +46.56
Mean 19.. 12.. 06.56

Sept. 21/22 Am.
194
α Leonis
23.3
37.3
51.4
5.5
19.5
33.8
9.. 59.. 47.6
218.4
180
38.4
9.. 59.. 05.48
−2
9.. 59.. 03.48
10.. 00.. 29.22
1.. 25.74
9.. 59.. 03.48

Sept. 21/22 Am
M.S.T. 21.. 57.. 00
194 10.. 03 45
1.. 25.74
12.. 02.. 02.51 10.. 05.. 10.74
46.74 12.. 02.. 49.65
2 49.65 22.. 02.. 21.09
3.86 64
21.. 58.. 44.45
21.. 57.. 00
1.. 44.45
16
2.. 00.. 45

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1052phae.proj...13T

(437)

$a = +0.047$
$b = +0.302$
$c = -0.080$

Rate of EC $+0^{s}.15$

Sept. 22 Pm

E.C. δ Aquilae	E.C. h^2 Sagitt.	E.C. e^2 Sagitt.	E.C. γ Aquilae	E.C. α Aquilae
$t_0 = 19^{h}00^{m}$				
N 2°.49'	S 25°.19'	S 16°.24	N 10°.15'	N 5°.29'
28.40	4.10	28.10	39.00	59.75
42.35	19.60	42.40	53.20	42 13.70
56.20	34.90	56.70	38, 7.15	27.40
10.00	26.50.00	33.11.00	21.00	41.45
23.70	5.00	25.40	34.95	55.30
37.40	20.20	39.65	48.90	9.15
19.17.51.10	19.27.35.30	19.33.54.00	19.39.02.85	19.43.23.00
49.15	14.10	25.25	20.705	22.975
69.15	180	180		60
19.17.9.88	8.5.10	77.25	19.38.21.01	19.42.41.39
	19.26.49.87	19.33.11.04		

19.17.09.88	19.26.49.87	19.33.11.04	19.38.21.01	19.42.41.39
col = −.08	col = −.09	col = −.08	col = −.08	col = −.08
az = +.03	az = +.05	az = +.05	az = +.03	az = +.03
lev = +.23	lev = +.12	lev = +.17	lev = +.26	lev = +.25
19.17.10.06	19.26.49.95	19.33.11.18	19.38.21.22	19.42.41.59
r +.00	+.00	+.00	+.00	+.00
−u +53.64	53.64	53.64	53.64	53.64
19 18 3.70	19 27 43.59	19 34 4.82	19 39 14.86	19 43 35.23
19 18 3.63	19 27 43.64	19 34 4.78	19 39 14.97	19 43 35.33

~~δ Aquilae~~
~~γ Aq~~

δ Aquilae	53.57
γ Aquilae	53.75
α Aquilae	53.74
β Aquilae	53.65
α Cygni	53.48
	−53.64

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1852phae.proj...13T

(438)

a = +0.047
b = +0.304
c = −0.080

Rate of Eb +0.15

19h 07m Sept. 22 Pm.

E.E. β Aquilae	E.E. Moon's I limb	E.E. βCapricorni	E.E. αCygni
28.95	50.40	49.55	32.95
42.80	5.70	19, 4.10	52.20
56.50	10 21.00	18.70	11.80
47 10.30	36.45	33.10	31.10
24.25	51.90	47.60	50.35
38.00	7.00	2.00	5.70
19, 47, 51.70	20, 11, 22.45	20, 20, 16.40	20, 36, 25.20
25250	19490	17145	21730
7250	80	60	
19, 47, 10.36	254	2345	20, 35, 31.04
	20, 10, 36.42	20, 19, 33.07	

19, 47, 10.36	20, 10, 36.42	20, 19, 33.07	20, 35, 31.04
col = −.08	col = −.09	col = −.09	col = +.11
az = +.03	az = +.05	az = +.05	az = +.00
lev = +25	lev = +.14	lev = +.16	lev = +42
19, 47, 10.56	20, 10, 36.52	20, 19, 33.19	20, 35, 31.35
r +.00	+.00	+.00	+.01
− n +53.64	+53.64	+53.64	+53.64
19 48 4.20	20 11 30.16	20 20 26.83	20 36 24.98
19 48 4.21		20 20 26.79	20 36 24.82

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1052phae.proj...13T

(439) a = + 0.041
b = + 0.300
c = − 0.078

Sept. 22/23 Am
194
a Leonis
21.5
36.0
49.8
4.0
18.0
32.0
9 59 46.3
207.6
180
7) 27.6
3.94
− 2
9 59 01.94
10 60 29.24
1 27.30
9 59 01.94

Sept. 23 Pm.

E.C.
γ Aquilae
$t_0 = 19^h 00^m$
N 10.5'
53.10
6.90
21.10
35.00
49.00
19 39 03.00
Σ = 168.10
Cor − 41.93
6) 126.17
21.28
19 38 21.28
col = −.08
ar = +.02
lw = +.26
19 38 21.46
r −.00
− u + 53.60
19 39 15.06
19 39 14.98

E.C.
a Aquilae
N 8.2'
59.90
13.85
27.80
41.60
55.50
9.30
19 43 23.10
23105
60
29105
19 42 41.58
col = −.08
ar = +.02
lw = +.25
19 42 41.77
−.00
+ 53.60
19 43 35.37
19 43 35.31

Rate of E.C. + 0.15

E.C.
β Aquilae
N 6.0'
28.80
43.00
56.90
10.60
24.40
38.20
19 47 52.00
25370
180
7570
19 47 10.53
col = −.08
ar = +.03
lw = +.20
19 47 10.68
−.00
+ 53.60
19 48 4.28
19 48 4.20

E.C.
ρ Capricorni
N 31.5'
49.70
19 4.20
18.80
33.25
47.70
2.20
20 20 16.50
17235
60
232.35
20 19 33.19
20 20 26.78
− 53.59
20 19 33.19
col = −.09
ar = +.04
lw = +.16
20 19 33.30
−.00
+ 53.60
20 20 26.90
20 20 26.79

Sept. 22/23 Am.
M.T.C. 21 35 00
194 9 45 37.5
1 27.3
12 05 55.46 9 47 04.8
46.24 12 6 46.20
12 06 46.20 21 40 18.60
3 33.02
21 36 45.58
21 35 00
1 45.58
16
2 01.58

γ Aquilae − 53.47
α Aquilae 53.54
β Aquilae 53.67
α Cygni 53.67
61 Cygni 53.67
β Aquarii 53.56
53.60

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1852phae.proj...13T

(440)

Sept. 23 Pm.

$a = +0.041$
$b = +0.300$
$c = -0.078$

Rate of Eb $+0^s.15$

E.C. a Cygni	E.C. 61 Cygni	E.C. Moon's I limb	E.C. β Aquarii	E.C. κ Capricorni
$\alpha = 19^h.58^m$				
$\delta = +44°.45'$	$\delta = +38°.01'$	$\delta = -19°.51'$	$\delta = -6°.13'$	$\delta = -19°.32'$
32.95	28.40	34.10	12.70	48.10
52.50	49.40	48.00	26.90	33 2.70
11.60	6.60	4.00	40.50	17.40
35 31.00	25.00	19.40	22„ 54.30	31.95
50.40	41.55	34.60	8.00	46.50
9.50	59.10	49.30	22.00	1.00
20„ 36„ 29.40	21„ 00„ 16.65	21„ 07„ 04.60	21„ 23„ 35.95	21„ 34„ 15.56
21 7 35	22520	194 00	200 15	16320
20„ 35„ 31.05	1/16 5.20	134„00	7|380.15	223.20
	23.60	21„ 06„ 19.14	21„ 22„ 54.31	21„ 33„ 31.89
20„ 35„ 31.05			21„ 22„ 54.31	21„ 33„ 31.89
col = -.11		21„ 06„ 19.14	col = -.08	col = -.09
ar = +.00		col = -.09	ar = +.03	ar = +.04
lev = +.42		ar = +.04	lev = +.20	lev = +.15
20„ 35„ 31.36		lev = +.15	21„ 22„ 54.46	21„ 33„ 31.99
r -.06		21„ 06„ 19.24	-.07	-.01
-m +53.60		r -.01	+53.60	+53.60
20 36 24.95		+53.60	21 23 48.05	21 34 25.58
20 36 25.02		21 7 12.83	21 23 48.01	21 34 25.54
		21 6		

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1052phae.proj...13T

Sept. 23 Bm.
E.C.
δ Capricorni

17.45
32.20
46.20
38. 0.70
14.95
29.20
21.. 38.. 43.60
18430

21.38.0.62
21..38.. 00.62
col = -.08
ar = +.04
lw = +16
21..38 .. 00.74
+ — .04

— a. + 5360
21 38 54.33
21 38 54.25

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1852phae.proj. . .13T

(442)

1852 Sept 26/27 Am
α Can. min.

RB – 194 –

19.0
32.7
46.9
60.5
14.4
28.0
7 .30 .. 41.7
183.2
180
3.2
00.46
– 2
7 „ 29 „ 58.46
7 „ 31 „ 33.73
1 „ 35.27

α Leonis
194 B 4 first wires lost
09.5
23.5
9 .. 59 .. 37.8

α Can Min
7 „ 29 .. 58.46

EC – 7 .. 34 .. 0
194 – 7 .. 32 .. 12.6
1 „ 85, 27
7 „ 33 „ 47.87
7 „ 34
12.13

EC + 0, 12, 02 M.T.C – 1.49.11 of B – 2.05.11

3 days 2.7
2.7.8

22/27 2.01.6
26/27 2.05.1
3.5 0.9

EC run down on 28th? It was set α afterwards the pallets & escapement wheel were cleaned

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1852phae.proj...13T

Sept 30th 1852 1 RL

194 29.4
44.8
59.5
14.2
28.7
43.5
14 7 .. 57.8
2779
1660
7)979
16.99
-2
+.35

14 .. 07 .. 12.35
14 .. 08 .. 54.57
194 -1 .. 42.16

14 .. 07 .. 12.00

E.C – 14.12 .. 00
194 – 14.10 .. 23.5
14 ..

Oct. 1st Am.
a Leonis
4.5
18.5
32.5
46.8
1.0
15.0
9 .. 59 .. 29.0
147.3
180
7)327.3
46.76
42.76

9 .. 58 .. 44.76

Oct. 1st Am.
M.S.C 21 .. 19 .. 00
194 10 .. 00 .. 56.7

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1852phae.proj...13T

Oct. 2 Pm.

194 α Serpentis

	lost
	45.5
	58.9
	13.0
	27.0
	40.9
15	35 54.6

$\angle = 239.9$

cor = − 41.56

6) 198.34

33.06

20

13.06

15 35 13.06

194 α Lyrae

	17.0
	35.0
	52.5
30	10.0
0	27.5
0	45.0
16 31	02.5
	189.5
	120
	69.5
	09.93
	−2
18 30	07.93
18 31	56.32
	1 48.39

18 30 07.93

October 4/5 Pm.

E.C.

α Aquilae

	32.80
	46.80
	00.80
20	14.60
	28.40
	42.45
9 20	56.20
	222.05
	120
	7) 102.05
9 20	14.58
9 20	19.22
	4.64

9 20 14.58

Oct. 2 Pm.

11 26	5 38 20
194 18	25 32.5
	1 48.39
	18 27 20.89
12 45 24.99	
46.74	
12 46 11.73	12 46 11.73
	5 41 09.16
	4 59 10.85
	40 53.28
	8.97
	5 40 13.10
	5 38 20
	1 53.10
	16
	7 09.10

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1852phae.proj...13T

October 5th 5h Pm

Troughton's "Variation Transit-" mounted on a stand in the Transit Circle room. Directed to south mark. Observer W. C. B. C. W. S. Records

Needle reversed at 2nd obs.

	1 obs.	2 obs.
	166° 05' 20"	354° 59' 50"
	174 58 50	346 9 00
Dec. W	8 53 30	8 50 50
		8 53 30
		4.20
		8 52 10

Stand removed to north side of Transit-Circle and "Variation Transit-" brought to bear on north mark

355 33 00	175 35 00
355 34 00	167 25 20
347 17 20	8 09 40
8 16 40	
8 09 40	
26 2	
8 13 10	
8 52 10	
65 20	
8 32 40	Mean

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October 5/6 Am
9h Am "Troughton's" "Variation Transit" north side of Transit Circle

North	North
47..14..40	47..27..30
48..30..20	55..34..30
47..22..30	8..07..00
55..34..30	8..12..00
8..12..00	19
	8..09..30

"Variation Transit" south of Transit Circle

North	South	
234..27..40	225..32..30	234..?
225..41..30	225..48..40	
8..46..10	225..38..05	
	234..28..00	
	8..49..55	
	8..46..10	
	17..36..05	
	8..48..02	
	8.. 9..30	
	57..32	
	8..28..46	Mean by "Var. Transit"

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South Outside, on the Bank.

October 5/6 10 h Am.

Fox's "Dip Circle" on stand south of Transit Circle Att. Therm. Fah. 50

Merid. 00°..12	82..37	Face north	2nd observation Merid	00°..12	
~~82..37~~	~~79..58~~	Face south		~~Face south~~	
	162..35			80°..15	Face south
	81..17			82..20	" north
	00..12			2,35	
	81..05			81..17	
	90 .. 00			0..12	
	8..55			81..05	
				90..00	
				8..55	

"Dip Circle" removed to the north side of T. Circle

Merid. 00..34	82..42	Face north	Obs. for dip	74°..47	Face East
00..33	80..50	" south		74 15	
	1 92			62	
	81..46			74..31	Mean Dip
	0..33				
	81..13				
	8..47				
	8..55				
	102				

May. Dec W 8..51 Mean by Fox "Dip Circle"

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1852 (448)

October 6th 4h 3m Pm. on South Bank

By Troughton's "Variation Transit" placed on a stand ~~without~~ the building, and directed to the south mark Beautifully serene – Circum.4

		Needle Reversed	
357° 59' 30"	Merid. S. Mark	177° 58' 30"	Merid. South Mark
		167° 47' 10"	Magnetic Merid.
347° 41' 20"	Magnetic merid.	10° 11' 20"	
10° 18' 10"			
10° 11' 20"		168° 03' 30"	Mag. merid.
9° 55' 00"		177° 58' 30"	Merid. mark: south
30° 24' 30"		9° 55' 00"	
10° 08' 10"			

Oct. 6th 4h 40m Pm. In Transit Inside Circle room directed to south mark

		Needle reversed	
184° 24' 30"	Terest. Merid.	1° 24' 10"	Terestrial Merid.
172° 29' 10"	Mag. merid.	352° 32' 40"	Magnetic "
8° 55' 00"	Dec. West	8° 51' 30"	Dec. West

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October 6th 4h Pm Fox Dip Circle outside. South Bank

1° 13′ Merid. South Mark

82° 00′ Face north
80° 38′ " south
2° 33′
81° 16′
1° 13′
80° 03′
9° 57′ Dec. West

Oct. 7th 8h Am.
Dec. Var. Fox inside south of Circle.
South Mark – 360° 12′ 30″
Circle Needle 357° 25′ 40″
8° 46′ 50″
Mark, west of Mer. – 23″
8° 46′ 27″

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Ill. West (450)

October 6 8 pm.

E.C. a Lyrae	E.C. β Lyrae	E.C. ζ Aquilae
58.00	+33 43.95	+14 50.85
16.70	0.55	5.10
34.25	16.95	19.15
18 31 „ 52.00	33.40	33.40
—	49.95	47.45
—	6.10	1.50
—	18 „ 45 „ 22.40	18 „ 59 „ 15.80
Σ = 261.95	1730	173.25
cor = - 105.47	60	60
4)156.48	9)233.30	9)233.25
14.12	18 „ 44 „ 33.33	18 „ 58 „ 33.32
30	al — .14	al — .11
14.12	nx + .00	nx + .01
	lw + .26	lw + .20
	18 „ 44 „ 33.45	18 „ 58 „ 33.42
	18 „ 44 „ 37.70	18 „ 58 „ 37.51
	4.25	4.09

Oct. 6/7 hr

194 α Ursae Maj.
+63 6.50
37.00
52 „ 06.50
52 36.00 —
3 6.30
3 36.00
10 „ 54 „ 05.80
134.1
120
9)2541
8 36.30
— 2
10 „ 52 „ 34.30
cal — .23
ax — .01
lw + .46
10 „ 52 „ 34.52
10 „ 54 „ 32.52
1 „ 58.00

October 11 pm. Chronometer 194 set forward 2 minutes

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(457) U. West

October 10/11 tm.

E.C.
α Leonis

43.10 14.80
57.40 14.05
11.45 14.00
25.45 14.20
39.65 13.95
53.60 14.20
10..01..07.80
234.45
60
7)178.45
10..00..25.45
10..00..29.61
4.12

October 13 8pm.

E.C.
α Pegasi

39.00
53.00
7.40
21.70
35.80
50.10
22 58 04.10
241.10
60
7)151.10
22..57..21.58
22..57..25.73
4.15

Oct. 16 Pm.

194
α Aquarii

14.5
28.1
42.0
7.. 55.8
8.. 9.5
8.. 23.0
21..58..37.0
209.9
180
7)389.9
55.70
-2
21..57..53.70
21..58..12.75
19.05

Oct. 14 8m

194
α Andromeda

35.0
51.0
06.5
22.0
37.8
53.5
00..01..09.0
214.8
60
7)154.8
22.12
-2
00..00..20.12
00..00..17.32
27.20

10/11 Am.

M.J.C 20..41..40 E.C. 10..07..00
194 10..02..42 194 10..04..58.8
2..05.3 2..05.32
10..04..47.3
13..16..57.41 13..17..44.15
46.74
13 17 44.15
20..47..03.15
3..24.30
20..43..38.85
20..41..40
1..58.85
16
2..14.85 fast of B.
21
2..16.93 fast of B Oct. 14 Am
2.8
2..19.73 fast of B .. 16

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1852phae.proj...13T

October 18/19 hm { 19 Pm

E.G. α Leonis		194 α Pegasi	
9 45.45		6 16.5	
9 59.60	14.15	6 30.5	14.0
0 13.50	14.10	6 44.8	14.3
0 27.80	14.30	6 59.0	14.2
0 41.85	14.05	7 13.0	14.0
0 55.93	14.08	7 27.5	14.5
10.01.10.00		22.57.41.5	14.0
254.13		232.8	
60		180	
7) 194.13		7) 412.8	
10.00.27.73		58.97	
10.00.29.82		-2	
2.09		22.56.56.97	
		22.57.25.68	
		28.71	

Oct. 18/19 hm.

MS. 620.50.45

194 10.25.00.5

28.09

10.25.28.59 — 13.48.29.84

13.49.16.58 — 46.74

20.36.12.01 — 13 49 16.58

3.22.52

20.32.49.49

20.30.45

2.04.49

16

2.20.49

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1852phae.proj... 13T

a = − 0.120 (453)
b = + 0.175
c = − 0.035

October 21 P.m. Ill West Rate of E/C + 0.28

E.C. a Cygni	E.C. 61 Cygni	E.C. ζ Cygni	E.C. ι Capric	E.C. β Aquarii
t₀ = 20h 36' t₀ = 20h				
44.45				
lost − 24.38	23.30	50.50	lost 13.16.99	4.50
21 1.00	41.00	6.45	31.40	23 18.55
3.25	58.55	22.15	lost 13.46.86	32.10
22.55	16.00	38.05	14 00.40	46.00
20 36 41.60	33.35	53.80	14.60	59.95
lost 00.57	50.70	9.70	29.10	13.60
lost 20.41	21 01 8.10	21 07 25.45	21 14 43.40	21 24 27.50
	23100	20610		202.20
	111.00		Σ = 58.90	322.20
Σ = 51.40		21 6 38.02	cor = −57.65	21 23 46.03
cor = −38.51	21 00 15.86		s 1.25 / 0.25	
4) 12.89	21 00 15.86	21 06 38.02	21 14 00.25	21 23 46.03
3.22	col = −.04	col = −.03	col = −.03	col = −.03
20 36 03.22	az = −.01	az = −.03	az = −.10	az = −.09
Σ = 111.40	lev = +.21	lev = +.20	lev = +.09	lev = +.11
cor = 38.52	21 00 16.02	21 06 38.16	21 14 00.21	21 23 46.02
4) 149.92				
37.48				
15				
22.48				
20 36 22.48	r − .00	− .01	− .01	− .01
col = −.04	− " + 1.64	+ 1.64	+ 1.64	+ 1.64
az = +.01	21 0 17.64	21 0 39.79	21 14 1.84	21 23 47.65
lev = +.23	21 0 17.52	21 6 29.82	21 14 1.82	21 23 47.66
~~20 36 22.22~~				
20 36 22.66				
r − .00				
− " + 1.64				
20 36 24.32				
20 36 24.30				

a Cygni	−1.64
61 Cygni	1.50
ζ Cygni	1.67
β Aquarii	1.65
ε Pegasi	−1.72
	−1.64

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1852phae.proj...13T

$a = -0.120$ (4541)
$b = +0.175$
$c = -0.035$

October 21 Pm. Rate of Eq. $+0^s.28$

$t_0 = 20^h$

Eq. ε Pegasi

13.20
27,25
41.20
36,, 55.10
9,00
23,00
21,, 37,, 36.80
20555
38555
21,, 36,, 55.08

N 9°.12'

21,, 36,, 55.08
col = −.03
ar = −.07
lev = +.14
21,, 36,, 55.12
r −.01
−u +1.64
21 36 54.75
21 36 56.83

Eq. Moon's Limb

26.20
41.35
56,10
11.00
25.80
40.53
21,, 44,, 55.40
27638
96.38
21,, 44,, 10.91

S 17°.47'

21,, 44,, 10.91
col = −.03
ar = −.11
lev = +.09
21,, 44,, 10.86
−.01
+1.64
21 44 12.49

Eq. ν Aquarii

44.00
56.50
58 12.65
27.00
41.00
55.20
21,, 59,, 09.40
247.75
187.75
26,,82
−18
21 58 26.64
21 58 28.33
−1.69
58 −2.07
138 1.19
14

S 14°.35'

21,, 58,, 26.82 ?
col = −.03
ar = −.10
lev +.10
r −.02
−u +1.64
21 58 28.39
21 58 28.36

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1852phae.proj...13T

(453)

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1852phae.proj...13T

Experiments to ascertain how far a chronometer is affected in its rate - when carried by hand for short distances the gimbals not being clamped -

Oct 22nd 1852 -

Dist Chron 60

MSC	23 .. 54 .. 48.0	—	23 .. 57 .. 10
Hilton 236	14 .. 00 .. 45.0	194	14 .. 3 .. 45
	14 .. 5 .. 57.0		14 .. 06 .. 35
MSC	24 .. 3 .. 50	—	24 .. 6 .. 18.0
236	14 .. 9 .. 48.5	194	14 .. 12 .. 54.5
	14 .. 5 .. 58.5		14 .. 6 .. 36.5
MSC	0 .. 12 .. 57	—	0 .. 15 .. 18
236	14 .. 18 .. 57	194	14 .. 21 .. 56
	14 .. 6 .. 0.0		14 .. 6 .. 38
MSC	0 .. 22 .. 6.0	—	0 .. 24 .. 34
236	14 .. 28 .. 7.5	194	14 .. 31 .. 13.5
	14 .. 6 .. 1.5		14 .. 6 .. 39.5
MSC	0 .. 31 .. 9.0	—	0 .. 33 .. 42.0
236	14 .. 37 .. 12.0	194	14 .. 40 .. 23.0
	14 .. 6 .. 3.0		14 .. 6 .. 41.0
MSC	0 .. 40 .. 7.0	—	0 .. 42 .. 58.0
236	14 .. 46 .. 10.5	194	14 .. 49 .. 40.5
	14 .. 6 .. 3.5		14 .. 6 .. 42.5
MSC	0 .. 49 .. 14.0	—	0 .. 52 .. 9.0
236	14 .. 55 .. 20.0	194	14 .. 58 .. 53.0
	14 .. 6 .. 06.0		14 .. 6 .. 44.0
MSC	0 .. 58 .. 15.0	—	1 .. 01 .. 20.0
236	14 .. 4 .. 22.5	194	8 .. 5.5
	14 .. 6 .. 7.5		14 .. 6 .. 45.5

The Comparisons were made after removing the Chronometers a distance of some 50 feet & subjecting them to a similar motion & change of temperature to that to which they are ordinarily exposed in taking transits

After the comparisons at MSC 0 .. 58 .. 15.0 and 1 .. 01 .. 20.0 they remained in a fixed position & were then compared as follows -

MSC	3 .. 14 .. 07.0		
236	17 .. 20 .. 37.0		
MSC	3 .. 15 .. 50.		
194	17 .. 22 .. 57.5		

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1852phae.proj...13T

Effect of Motion on the rate of a Chronometer—

x = diff between clock & Chronometer at MTC $0^h..03^m..50^s$
y = their relative rate in one second of time by MTC

Equations for 236

$x + 0y = 14^h..05^m..57^s.0$
$x + 5423y =$ 58.5
$x +$

	Observed	Computed	e − o	
$x - 5423y =$	14..05..57.000	56.998	−0.002	4
$x + 0y =$	58.500	58.494	−0.006	36
$x + 5473y =$	60.000	60.001	+0.001	1
$x + 10963y =$	61.500	61.514	+0.014	196
$x + 16439y =$	63.000	63.011	+0.011	121
$x + 21773y =$	64.500	64.494	−0.006	36
$x + 27243y =$	66.000	66.001	+0.001	1
$x + 32653y =$	67.500	67.492	−0.008	64
				7)459

$0.008 \times 0.67 = 0.005$

$\varepsilon = 0.005$

$\sqrt{\frac{\Sigma()^2}{n-1}} = 0.008$ 66

For x $8x + 10906y = 8(14..05..62.0) + 2.0$
$x + 1363y = 14..05..62.0 + 0.25$

$2 + 1363y = 14..05..62.25$
$1363y = 3.756$
$x = 14..05..58.494$

$-x + 5423y = -14..05..57.0 = -m + 3.0$
$x + 5473y = 14..05..60.0 = m$
$2x + 21923y = 2(14..05..61.0 = 2m + 3.0$
$3x + 44173y = 3(63.0 = 3m + 9.0$
$4x + 87083y = 4(64.5) = 4m + 18.0$
$5x + 136203y = 5(66.0 = 5m + 30.0$
$6x + 197903y = 6(= 6m + 45.0$
$20x + 50116y = 20m + 108.0$
$x + 2506y = 14..05..60.0 + 5.40$
$x + 1363y = 14..05..62.0 + 0.25$
$1143y = +3.15$
$y = 0.002756$
$x = 14^h..05^m..58.494$

$0.002756 = 7.44028$
$= 2.55972$
0.5 0.17609
2.73581
544.26

236 gains on Clock 1.5 in 544.26 of MTC.

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1852phae.proj...13T

(458)

Effect of Motion on the Rate of a Chronometer

Equations for 194

x = dif between Clock & Chrom at MSC $0^h.06^m.14^s$

z = Relative Rate of MSC and 194-

	Observed	computed	C − O	$n-1$ =	7)1003
$x - 548z$ =	$14^h.06^m.35^s.000$	$35^s.015$	$+0^s.015$	225	143
$x + 0z$ =	36.500	36.508	+0.008	64	.012 = $\sqrt{\frac{\Sigma()^2}{n-1}}$
$x + 540z$ =	38.000	37.980	−0.020	400	
$x + 1096z$ =	39.500	39.494	−0.006	36	$0^s.012 \times 0.67 = 0^s.008$
$x + 1644z$ =	41.000	40.988	−0.012	144	$\Sigma = 0^s.008$
$x + 2200z$ =	42.500	42.503	+0.003	9	
$x + 2758z$ =	44.000	44.005	+0.005	25	
$x + 3302z$ =	45.500	45.510	+0.010	100	

$8x + 10985z = 8(14^h.6^m.40^s.0) + 2^s.0$

$x + 1373z = 14^h.6^m.40^s.0 + 0^s.25$

$\Sigma()^2$ 1003

$x + 1373z = 14^h.6^m.40^s.25$

$1373z = 3^s.742$

$x = 14^h.6^m.36^s.508$

$-x + 548z = -14^h.06^m.40^s.0 + 5^s.0 = -m + 5.0$

$+x + 540z = +14^h.06^m.40^s.0 - 2^s.0 = +m - 2.0$

$2x + 1092z = \quad = 2m - 1.0$

$3x + 4932z = \quad = 3m + 3.0$

$4x + 8800z = \quad = 4m + 10.0$

$5x + 13755z = \quad = 5m + 20.0$

$6x + 19812z = \quad = 6m + 33.0$

$20x + 40579z = \quad = 20m + 68.0$

$x + 2529z = 14^h.06^m.43^s.4 \quad = m + 3.40$

$x + 1373z = 14^h.6^m.40^s.25$

$1156z = +3^s.15$

$z = 0^s.002725 = 7.43537$

2.56463

$1.5 \quad 0.17609$

$550^s.45 \quad 2.74072$

194 Gains on MSC $1^s.5$ in $550^s.45$ of MSC.

3/550.45

183.5

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1852phae.proj...13T

Effect of Motion on the rate of a Chronometer.

From the preceding it appears that in our ordinary manner of using a Chronometer for Observing Transits - with the gimbals unclamped its rate is not affected by its being moved for short distances of fifty feet or so

In comparing a sidereal Chronometer by coincidences with a mean solar clock - by ten & eight trials in each of which the chronometer was carried in our usual way some fifty feet & for about 5 minutes exposed to a temperature of 45° & then brought back & compared with the clock there resulted a probable discrepancy from exact uniformity in the relative rates of the clock & Chronometer of $0^s.005$ for 236 and of $0^s.008$ for 194 including the probable error of a comparison by coincidence & the deviations of the Clock rate from uniformity - the former of which must be the only sensible source of error

NB 236 is the Chronometer just made for the Observatory with R.R.B.s porcellain balance - appears to be a very good goer - 194 is a good Chronometer altho - like those we have always used -

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1852phae.proj. . . 13T

a −0.122
b +0.154
c −0.036

(460)

October 22 Pm.

Ill West Rate of Eb + 0.30

E.C. Nearest limb	E.C. α Aquarii	E.C. α Pis. Aus.	E.C. α Pegasi	E.C. φ Aquarii
$t_o = 22^h .04'$				
56.55	44. 12.40	41.00	41.70	06 .. 01.64
S 13°.49' 34. 11.30	S 8°.22' 26.50	S 30°.24' 57.15	N 14°.25' 55.90	S 6°.57' 15.54
23.70	40.20	49. 12.90	10.00	26 40
40.30	54.15	29.00	24.25	40.20
54.85	6.15	44.90	38.40	54.00
9.15	21.95	00.05	52.45	7.90
22 .. 35 .. 23.50	22 .. 45 .. 35.90	22 .. 50 .. 16.65	22 .. 58 .. 06.70	23 .. 07 21.80
92.35	199.25	201.68	229.40	
22 .. 34 .. 40.19	180.50	22 .. 49 .. 28.81	×60	
	379.25		9) 169.40	
	22 .. 44 .. 54.18		+ 2 57 .. 24.20	
22 .. 34 .. 40.19	22 .. 44 .. 54.18	22 .. 49 .. 28.81	22 .. 57 .. 25.65	
			1.45	
			22 .. 57 .. 24.20	23 .. 06 .. 43.19

58.56 12.49 15.54 26.4 40.20 40.2 54.00 54.0 7.90 7.9 7.65 21.80 21.8 11.75

Σ = 23 .. 06 .. 43.19
cor =
Σ = 165.05 221.35
cor = 6.
9) 281.35
40.19

α	− 0.04	− 0.04	− 0.04	− 0.04	− 0.04
la	− .11	− .09	− .14	− .06	− .09
b	+ .09	+ .10	+ .05	+ .14	+ .10
	− .06	− .03	− .13	+ .04	− .03
r	− .01	− .01	− .01	− .01	− .01
− n	+ 1.43	+ 1.43	+ 1.43	+ 1.43	+ 1.43
	22 34 41.56	22 44 55.57	22 49 30.10	22 57 25.66	23 6 41.58
		22 44 55.57	22 49 30.10	22 57 25.66	23 6 41.66

α Piscis Australis − 1.43
α Pegasi − 1.43
− 1.43

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1852phae.proj . . . 13T

(461)

October 22/23 Gtm | October 23 8m

Ill West

a = −0.124
δ = +0.140
c = −0.037

Rate of Eb +0.30

894

β Leonis

14.0
lost
42.5
56.8
11.0
lost
11 „ 41 „ 39.5
163.8
120.0
5) 283.8
56.76
−2
11 „ 40 „ 54.76
11 „ 41 „ 30.68
35.92

E.C. α Ophiuchi

$t_0 = 21^h$ 30.15
43.95
57.60
11.80
25.30
39.10
21 „ 58 „ 32.85
261.05
81.05
21 „ 58 „ 11.58

21 „ 58 „ 11.58
c −.04
a −.08
b +.10
r −.01
−a +1.08
21 58 12.73
21 58 12.70

E.C. ζ Pegasi

lost
37.96
51.95
05.75
19.80
33.90
22 „ 34 „ 47.80

Σ = 226.11
cor = −41.91
6) 184.20
30.70

Σ = 197.16
cor = −41.91
6) 155.25
25.88
20
05.88

22 „ 34 „ 05.88
c −.04
a +.07
22 34 05.91

E.C. λ Aquarii

12.80
26.96
40.95
54.60
8.40
22.30
22 „ 45 „ 36.20
202.01
38.01
22 „ 44 „ 54.57

22 „ 44 „ 54.57
−.04
−.09
+.09
−.02
−a +1.08
22 44 55.59
22 44 55.56

E.C. α Piscium Aust.

41.40
57.30
13.18
29.30
45.85
1.60
22 50 „ 16.95
204.48
22 „ 49 „ 29.21

22 „ 49 „ 29.21
−.04
−.13
+.05
−.02
+1.08
22 49 30.15
22 49 30.09

Oct 22/23
M. T. 21 „ 43 „ 10.0
194 11 „ 59 „ 18.5
35.92

11 „ 53 „ 54.42
14 „ 05 „ 02.80
21 „ 48 „ 57.62
3 „ 34.42
21 „ 45 „ 17.20
21 „ 43 „ 10.0
2 „ 7.2
16.
2 „ 23.2

14 „ 04 „ 16.06
46.74
14 05 02.80

Oct. 23 Pm. E.C. came near running down

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1852phae.proj...13T

(462)

October 23 Pm.

a −0.124
b +0.140
c −0.037

Rate of Eb + 0.s30

E.C.	E.C.	E.C.	E.C.	E.C.
t₀ = 2 h α Pegasi	ϕ Aquarii	Moon's I limb	ι Piscium	20 Piscium
	58.85	45.60	40.20	1 bot 40.19
N 14° 25′	13.10	22 „ 0.20	54.15	54.00
56.10	S 6° 51′	14.60	N 4° 49′	S 3° 35′
57 „ 10.40	26.80	59° 19′	32 „ 7.75	7.95
24.45	40.80	28.75	21.75	21.45
38.90	54.60	42.95	35.45	35.40
53.10	8.40	56.95	49.30	49.00
22 „ 58 „ 07.00	23 „ 07 „ 22.00	23 „ 23 „ 11.20	23 „ 33 „ 03.00	23 „ 41 „ 02.70
231.95	224.55	22025	21160	
171.95	284.55	23 „ 22 „ 28.61	15160	Σ = 170.50
22 „ 57 „ 24.56	23 „ 06 „ 40.65		23 „ 32 „ 21.66	cor = −41.34
	18			6 | 129.16
	23.06.40.47			21.53
	23.06.41.66			
	1.19			

22 „ 57 „ 24.56	23 „ 06 „ 40.65	23 „ 22 „ 28.61	23 „ 32 „ 21.66	23 „ 40 „ 21.53
c − .04	− .04	− .04	− .04	− .04
a − .06	− .09	− .09	− .07	− .09
b + .13	+ .09	+ .09	+ .11	+ .10
r − .02	− .03	− .03	− .03	− .03
− u + 1.08	+ 1.08	+ 1.08	+ 1.08	+ 1.08
22 57 25.65	23 b 41.66	23 22 29.62	23 32 22.71	23 40 22.55
22 57 25.64	23 b 41.66		23 32 22.71	23 40 22.30 ?

a Aquarii	− 1.15
f Pegasi	− 1.06
a Piscis Australis	− 1.02
a Pegasi	− 1.07
ι Piscium	− 1.08
a Andromeda	− 1.15
r Pegasi	− 1.06
	− 1.08

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1852phae.proj . . 13T

October 23 Bon.

E.C.
27 Piscium

25;65
39.50
53.50
7.26
21.00
34.90
23„ 51„ 48.40
230.21
500
23„ 51„ 7.17

23„ 51„ 07.17
c −.04
a −.09
b +.16
n −.04
−n +1.08
23 51 8.18

E.C.
α Andromeda

N 26°.16'
59.20
15.00
30.50
46.10
lost
17.20
00„ 01„ 32.90
Σ = 200.90
Cor = +15.62
6) 216.52
36.09
10
00„ 00„ 46.09
c −.04
a −.03
b +.17
r −.04
+1.08
0 0 47.23

E.C.
γ Pegasi

N 14°.22'
55.55
10.30
24.30
38.40
52.90
6.90
00„ 06„ 21.15
20990
0„ 05„ 38.58

0„ 05„ 38.56
−.04
−.06
+13
−.04
+1.08
0 5 39.63

October 24/25 hm

194
β Leonis
10.5
24.5
38.7
53.0
7.2
21.5
11„ 41„ 35.5
190.9
1m
2) 370.9
52.98
−2
11„ 40„ 50.98
11„ 41„ 30.92
39.74

Oct. 24/25 hm
M.S.t. 21„ 29„ 00
194 11„ 46„ 57.0
39.74
11„ 47„ 36.74
14„ 12„ 55.90
21„ 34„ 40.84
3„ 32.10
21„ 31„ 08.74
21„ 29„ 00.00
2„ 08.74
16
2„ 24.74

14„ 12„ 09.16
46.74
14„ 12„ 55.90
3„ 32.10
60

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1852phae.proj...13T

a = −0.127
b = +0.117
c = −0.039

(464)

October 25 Pm. Ill. Mist — Rate of Eb + 0.30

E.C. α Andromeda	E.C. γ Pegasi	E.C. 12 Ceti	E.C. 13 Ceti	E.C. α Cassiopeae	E.C. β Ceti
$t_0 = 00^h$					
59.80	56.25	49.75	58.55	57.50	27.85
N 28°16′ 15.75	N 14°22′ 10.75	S 2°46′ 3.60	S 4°24′ 12.45	N 55°43′ 22.25	S 16°48′ 42.80
31.15	25.00	17.40	26.20	46.50	57.20
0 „ 46.85	5 „ 39.05	22 „ 31.20	27 „ 39.90	32 „ 10.80	36 „ 11.80
2.20	53.13	46.00	53.80	35.45	26.25
18.00	7.60	58.50	7.40	59.75	40.75
00 „ 01 „ 33.40	00 „ 06 „ 21.60	00 „ 23 „ 12.45	00 „ 28 „ 21.20	00 „ 33 „ 24.05	00 „ 36 „ 55.20
207.15	213.28	217.90	219.50	256.30	261.85
120	60	60	60	180	180
7 | 327.15	7 | 273.28	22 „ 31.13	7 | 279.50	7 | 196.30	7 | 81.85
0 „ 0 „ 46.74	05 „ 39.04		39.93	32 „ 10.90	36 „ 11.69

0 „ 00 „ 46.74	0 „ 05 „ 39.04	0 „ 22 „ 31.13	0 „ 27 „ 39.93	0 „ 32 „ 10.90	0 „ 36 „ 11.69
c −.04	−.04	−.04	−.04	−.08	−.04
a −.03	−.06	−.10	−.09	+.06	−.12
b +.14	+.11	+.08	+.09	+.21	+.06
r −.00	−.00	−.00	−.01	−.01	−.01
− u +0.59	+0.59	+0.59	+0.59	+0.59	+0.59
0 0 47.40	0 5 39.64	0 22 31.78	0 27 40.47	0 32 11.67	0 36 12.17
0 „ 00 „ 47.29	0 „ 05 „ 39.61	0 22 31.73	0 27 40.35	0 „ 32 „ 11.78	0 „ 36 „ 11.97

α Andromeda − 0.48
γ Pegasi − 0.56
α Cassiopeae − 0.82
β Ceti − 0.39
− 0.59

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1952phae.proj...13T

October 25 Bm

c = .127
b = +.115
r = −.039

E.C. Moon's I limb	E.C. ε Piscium	E.C. ε Piscium
	36.35	5.60
N0°.30'.2	50.35	19.45
	4.25	33.25
53.18.90	55h 18.05	0, 47.15
33.00	32.00	1.00
47.00	45.80	14.70
00,, 54,, 00.55	00 55,, 59.55	1,, 01,, 28.55
14235	24635	14990
60	120	180
7)3235	7)12635	7)329.70
0h 53m 18.91	0h 55m 18.05	1,, 0,, 47.10
		46.93
		47.60
		0.67
0h 53m 18.91	0h 55m 18.05	
c −.05	−.04	1h 00m 47.10
a −.05	−.05	−.04
b +.09	+.09	−.05
r −.01	−.01	+.09
h +0.59	+0.59	−.01
0 53 19.45	0 55 18.60	+0.59
	0 55 18.60	1 00 47.65
		1 00 47.60

Nov. 3/4 Bm
16h 5m
γ Wrsa Majoris
lost

35.3	Copied
59.0	
4 22.5	
4 46.3	
10.0	
11,, 45,, 33.5	
11,, 45 173.1	
60	
5)113.1	
22.62	
−2	
11,, 44,, 20.62	
11,, 46,,	

E C. Oct. 21. Bm. 5h 1.69

22	−1.49	+0.20
23	−1.19	+0.30
25	−0.69	+0.27
26	−0.74	−0.07

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1852phae.proj . . 13T

(466)

October 26 P.m. Ill West a = −.129 b = +.116 c = −.040 Rate of E.C. + 0.30

Glass blurry and tremulous – very dead seeing

E.C. ε Piscium	E.C. e Piscium	E.C. θ Ceti	E.C. Climb	E.C. α Arietis	E.C. γ Ceti
$t_0 = 0^h$					
N 7° 36′	N 4° 52′	S 8° 57′	N 5° 21′	N 22° 46′	N 8° 09′
36.40	5.60	57.70	19.80	7.80	29.85
50.25	19.15	11.60	34.25	22.90	44.10
4.00	33.15	25.40	48.07	37.50	58.00
17.80	47.00	39.50	2.30	52.25	11.85
31.70	0.75	53.25	16.40	7.45	25.70
45.85	14.60	7.45	30.60	22.35	39.80
0 55 55.60	1 01 28.50	1 17 21.50	1 38 44.25	1 59 37.05	2 05 53.45
24560	14875	21640	2067	187.30	26275
120	180	60	180	180	180
7 | 125.60	7 | 328.75	7 | 27640	7 | 15.67	7 | 367.30	7 | 89.75
0 55 17.94	46.96	16 39.49	1 38 2.24	1 58 52.47	2 05 11.82
0 55 17.94	1 00 46.90	1 16 39.49	1 38 02.26	1 58 53.21	
c −.04	−.04	−.04	−.04	0.74	
a −.08	−.08	−.10	−.08	1 58 52.47	2 05 11.82
b +.08	+.08	+.07	+.08	c −.04	−.04
r −.01	−.01	−.02	−.02	a −.05	−.07
−u +0.74	+0.74			b +.11	+.09
0 55 18.63	1 0 47.59	− u +0.74	+0.74	r −.03	−.03
0 55 18.63	1 0 47.60	1 16 40.14	1 38 2.94	−u +0.74	+0.74
		1.16.40.16		1 58 53.20	2 05 12.51
				1 58 53.26	2 05 12.45

θ Ceti − 0.76
α Arietis − 0.73
−0.74

Oct. 31st E.C. run down

Nov. 1 M.T.C. put forward 2 min.

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1852phae.proj...13T

(46) Alg. West

Nov. 2 Pm.

16h 5m	16h 15m	
ε^2 Capricorni	3 Pegasi	
23.5s	clouds	
37.9	clouds	
7m 51.9	clouds	
8m 5.8	ε 21.8	
20h 08m 20.0	35.5s	
clouds	2 49.5s	
clouds	22h 33m 03.5s	
77.7		
60		
3) 17.7		
5.90		
−2		
20h 08m 03.90	22h 32.19.8	
20h 9m 51.54	22h 34m 6,81	
1m 47.64	1m 47.01	

Nov. 2/3 Am

	E. G.	
	β Leonis	
lev + 0.16	50.15s	
az − 0.10	4.70	
col − 0.05	18.75s	
	39.00	
41m	47.20	
	01.40	
11h 42m	15.60	
	170.80	
	60	
2)	230.80	
11h 41m	32.97	
11h 41m	30.92	
	2.05s	
11h 41m	32.97	
az	− .05	
lev	+ 15	
col	− 05	
11h 41m	33.02	
11h 41m	30.93	
EC	+ 2.09	

Nov. 3/4

16h 15m	
γ Ursa Maj.	
last	
35.3	
59.0	
22.5s	
46.3	
10.0	
11h 45m 33.5s	
173.1	
60	
5) 113.1	
22.62	
−2	
11h 44m 20.62	
11h 46m 1.44	
1m 40.82	

Nov. 2 Pm.

11h 26 5m 25m 45s	
16h 15 20m 13m 80.5s	
1m 47.68	
20m 15m 18.18	14h 47m 58.15s
14h 48m 24.89	46.74
5h 26m 53.29	14h 48m 24.89
53.54	
5h 25m 59.75s	
5h 25m 45s	
14.75s	

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1852phae.proj. . .13T

Nov. 5 Pm. | Ill. East | Nov. 5/6 Am.

E.C. B.A.C. 8374	E.C. α Andromeda	E.C. γ Pegasi	E.C. β Leonis	
14.70	3.00	59.85	51.40	Lb + 0.16
30.45	18.80	14.00	5.60	az − 0.14
46.10	34.40	28.13	19.80	Col + 0.03
1.50	49.90	42.40	34.00	
17.25	5.55	56.85	48.40	
32.75	21.20	10.65	2.55	
23h 59m 48.40	00h 01m 36.80	00h 06m 25.05	11h 42m 17.00	
	169.65		178.75	
	186		60	
	7/34965		7/23875	
	0m 00 49.95		11m 41 34.11	
	az − .04		− .07	
	Col + .03		+ .03	
	Lb + 18		+ .15	
	0m 00m 50.12		11m 41m 34.22	
	0m 00m 47.21		11m 41m 31.00	
	EC + 2.91		EC + 3.22	

Sid day

2nd 11h 7	EC + 2.09
5. 0.0	2.91
5 - 11.7	3.22.

EC 2nd to 5th Rate + $\frac{1.13}{3}$ = +0.38

5th to 5 5/6th = +0.62

N. B. Transit Circle reversed to Ill. East Nov. 4th at 4h Pm. (See Book of Markings Level read.)

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1932phae.proj...13T

469

a −.178
b +.153
c −.020

Nov. 7/8 Am. East

Rate of Eb +0.s80

	1615	Eb. δ Leonis	Eb. β Leonis	Eb. γ Ursae Maj.	Eb. α II limb
		36.10	54.00	44..56.26	11.15
	29.5	50.95	8.20	49.80	25.20
	43.6	5.70	22.50	43.40	39.25
	57.5	20.30	36.80	37.10	17.. 53.45
9.. 59..	11.8	35.10	51.00	30.80	7.50
	26.2	49.85	5.30	54.40	21.53
	40.1	11.. 07.. 4.60	11.. 42.. 19.60	11 47.. 18.20	12.. 18.. 35.80
	54.0	202.60	197.40		493.80
	212.7	60	60	Σ = 173.70	180
	180	7)142.60	7)257.40	cor = −70.55	7)313.99
	32.7	11.. 06.. 20.37	11.. 41.. 36.77	6)102.82	53.41
9.. 59..	11.82	11.. 06.. 14.74	11.. 41.. 31.05	17.14	
	2	5.63	5.72	15	
9.. 59..	09.82		3.22	7.14	12.. 17.. 53.41
or	50.41		2)2.50 / 1.25		c −.02
1..	20.59				a −.11
					b +.11
					r −.11
					−u −5.64
9.. 59..	09.82	11.. 06.. 20.37	11.. 41.. 36.77	11.. 46.. 07.14	12 17 47.64
c	−.02	−.02	−.02	−.03	
a	−.09	−.08	−.09	+.06	
b	+.14	+.15	+.14	+.25	
r	−.03	−.07	−.09	−.09	
−u	−5.64	−5.64	−5.64	−5.64	
		11 b 14.71	11 41 31.07	11 46 1.69	
9		11..06..14.74		01.57	
10.. 00..	30.39	11..06..16.57	11..41..31.05	11..46..04.13	

α Leonis № 1615	− 20.57
δ Leonis Eb	+ 5.61
β Leonis	+ 5.66
γ Ursae Maj	+ 5.64
	+ 5.64

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Ild. East (470)

Nov. 8 Pm.

EC
θ Ceti
4,60
18,80
32.30
46.35
0.35
14.25
1,, 17,, 28.45
145.10
180
7)325.10
1,, 16,, 46.44
1,, 16,, 40.16
6.28

Nov. 8/9 Am.

1615
Y Ursa Majoris
—
—
—
12.0
35,5
11,, 45,, 55,5

avg. final Clocks

E.C.
α Virginis
49.15
3.00
16.90
30.80
45.00
58.80
13,, 18,, 12.90
2165
ae
7)216.55
13,, 17,, 30.93
13,, 17,, 24,43
6.50

10 Pm

E.C.
α Pegasi
50.50
4.70
18.85
33,10
47.20
1.30
22,, 58,, 15.60

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1032phae.proj...13T

Nov 10/11 Am Ill. East — 14/11 Am.

α Leonis – R.F.B. E.C.

1615–	45.4	−2	α Virginis
	59.4	−10°	50.80
	13.5		4.60
	27.5		18.70
	41.5		32.80
	55.8		46.60
10 :: 00 :: 09.9			0.30
253.0		13 „ 18 „	14.40
−60			168.20
7)193.0			60
10 .. 59 .. 27.57			7)228.20
2			13 „ 17 „ 32.60
9 .. 59 .. 25.57			cal. +.02
0 .. 0 .. 30.48			az. −.14
1 .. 24 .. 91			lev. +.10
			13 „ 17 „ 32.58
			13 „ 17 „ 24.47
			8.11

Nov. 12 Pm.

1615–	1615–
α Andromeda	γ Pegasi
last–	04.0
—	18.3
38.5–	32.5–
54.2	46.5–
10.0	00.8
25.5–	15.0
00 „ 00 „ 41.0	00 „ 05 „ 29.3

N. B. E.C. sometime after 9 Pm. on the night of the 11th run down –

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1852phae.proj...13T

November 11th 3h 30m Pm

"Variation Transit"

In Transit Circle room, south of Piers on tripod stand

Needle reversed

Merid	361° 51' 30"	181° 50' 20"	Merid.
	352° 40' 00"	172° 54' 30"	
	9° 11' 30"	8° 55' 50"	

on the southern edge of the Bank, south of the Transit Circle

Var - Transit 3h 30 to 4h 15

Reading for the	Far West	Far East
meridian mark	248° 36' 40"	68° 36' 45"
Coincidence of Needle	238° 22' 2"	58° 32' 20"
	10° 14' 20"	10° 04' 25"
		10 14 20
		18 40
		10° 09' 22" Mag. var.
meridian mark	248° 35' 40"	68° 36' 00"
Coincidence of Needle	238° 27' 30"	58° 31' 10"
	10° 08' 10"	10° 04' 50"
		+ 10
		13' 00"
		10° 06' 30" mag. var

10° 14' 20"
10° 08' 10"
10 4' 25"
10 4' 56"
31' 45"
10° 07' 31"

120
91
151
3

180
45
225

10° 07' 57"
8' 10"
1606
10 28 49

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1952phae.proj...13T

Ill East

Nov. 12/13 Am.

E.C. β Leonis	E.C. 12 Can. Venat.	E.C. α Virginis
58.95	lost	53.40
13.10	—	7.20
27.40	58.60	21.25
41.70	16.40	35.60
55.50	34.00	49.15
9.95	51.50	3.25
11.41. 24.40	12.49.09.90	13.17.17.20
231.40		186.55
60		60
7) 191.40		7) 246.55
11.40.41.63		13.16.35.22
11.41. 31.17		13.17.24.51
49.54		49.29

W.C.B.

Nov. 14/15 Am.

E.C. β Leonis		E.C. γ Ursae Majoris
1.20	4.10	3.20
15.30	4.40	26.85
29.70	4.00	50.20
40 43.70	4.70	5.14.00
58.40	4.00	37.85
12.40	4.50	1.30
11.41. 26.90		11.46. 25.50
187.6		158.90
120		60
7) 307.6		7) 98.90
11.40. 43.94		11.45. 14.13
11.41. 31.23		11.46. 01.84
47.29		47.71

Brennuland

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1852phae.proj. . .13T

(474) ω −.225
b +.20
c −.088

Rate of E6 + 0.8

$t_0 = 19^h$

Nov. 15. Pm.

E.6. Moon's L limb	E.6. γ Aquilae	E.6. α Aquilae	E.6. β Aquilae
	45.40	6.90	35.10
	59.80	19.90	48.95
	13.80	33.60	2.80
27 14.55	27.20	42 47.55	47 16.50
30.20	41.20	1.40	30.25
45.60	55.00	15.20	44.00
19 28 01.40	19 39 09.00	19 43 29.20	19 47 58.00
222.00	251.40	152.75	2355 60
120	60	+80	120
102.00	2)191.40	332.75	115.60
19 27 14.57	19 38 27.34	42 47 54	19 47 16.52
		−19	
		4247 44	
		43.34.47	
		0.47 03	

δ 23° 45′ Nov. altitudes Annulary

Λ 10° 15′ Λ 18° 29′ Λ 16° 02′

19 27 14.57	cl − .04 ?		
c −.10	az − .10		
a −.22	lev. + .10		
b +.05	19 38 27.30		
r −.02	19 39 14.09		
−ω +41.99	46.79		
19 28 6.47			

19 38 27.34	19 42 47.52	19 47 16.52
c −.09	−.09	−.09
a −.13	−.13	−.14
b +.10	+.10	+.09
r −.02	−.02	−.03
−ω +46.99	+46.99	+46.99
19 39 14.19	19 43 34.39	19 48 3.34
19 39 14.09	19 43 34.37	19 48 03.37

γ Aquilae	−~~48.64~~	−46.89
α Aquilae	−~~48.50~~	−47.07
β Aquilae	−~~46.73~~	−47.02
		−46.99

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(475)

a −.225
b +.110
c −.095

Rate of Eb +0.75

Nov. 16 Pm

Eb. γ Aquilae	Eb. α Aquilae	Eb. Moon's Limb	Eb. ν Capricornii
$t_0 = 19^h$ 46.20	6.70	15.20	9.00
N 10° 15′ 00.15	N 8° 29′ 20.70	S 23° 08′ 30.55	S 15° 39′ 23.45
13.95	34.45	45.85	38.00
28.00	42 48.35	1.05	52.30
41.95	2.25	16.40	6.90
56.00	16.20	31.60	21.60
19 39 14.00	19 43 30.20	20 28 47.10	20 31 36.00
296.25	150.85	197.75	187.45
60	120	1 7.75	180
5)156.25	5)389.85	20 28 1.11	5)367.45
19 38 28.03	19 42 48.55		20 30 52.49
cor. − 04	− 10		
cor. − 10	19 42 48.45		
cor. + 10	19 43 34.46	20 28 01.11	
19 38 27.99	Σ −46.01		
19 39 14.08			
46.09			

19 38 28.03	19 42 48.55	20 28 01.11	20 30 52.49
c −.09	−.09	−.10	−.10
a −.13	−.13	−.22	−.21
b +.09	+.09	+.05	+.06
r −.02	−.02	−.04	−.04
− u +46.13	+46.13	+46.17	+46.13
19 39 14.01	19 43 34.53	20 28 46.93	20 31 38.33
19 39 14.06	19 43 34.46		20 31 38.33

γ Aquilae −~~46.94~~ −46.20
α Aquilae −~~47.80~~ −46.06
−46.13

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Rate of E/C +0.70 Ill. East

Nov. 17 P.M.

	E.C. γ Capricorni	E.C. ζ Cygni	E.C. ε Cephei	E.C. β Aquarii	E.C. C Linb
$t_0 = 20^h$	50.05	6.70	49.50	21.00	55.20
S 25°.48'	5,40	22.40	18.70	36.00 lost	10.40
	20.60	38.25	48.00	—	25.40
36	35.85	5 54.00	17.20	—	24.40.35
	51.05	9.90	46.50	—	55.40
	6.40	25.60	15.90	—	10.40
	20 37 21.55	21 06 41.70	21 15 45.30	—	21 25 25.40
	190.90	198.55	241 1		222.55
	60	180	12		60
	7 1450.50	7 378.55	121 1		7 280 55
	20 36 35.84	21 05 54.08	21 14 17.30		21 24 40.08

20 36 35.84	21 05 54.08	lw	+ .32	21 24 40.08
c − .11	− 11	ax	+ .14	c − .11
a − .24	− .06	cot	− 17	a − .21
b + .04	+ .12	t	21 14 17.59	b + .05
r − .02	− .03	R	21 15 2.89	r − .04
−u + 45.29	+ 45.29		45.30	−u + 45.29
20 37 20.80	21 06 39.29 39.31			21 25 25.06
20 37 20.80	21 06 40.06		21 14 17.30	

	c − .20
	a + .16
	b + .19
	r − .03
	−u + 45.29
	21 14 02.71
	15 2
	21 15 02.71
	21 15 02.89

ζ Cygni −45.31
α Cephei −45.79
β Aquarii
ε Pegasi +45.29
−45.29

21 23 47.29

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1852phae.proj:...13T

(477) (4/4)

Nov 17th Cont-

E.C.		E6		E6.	
ε Pegasi		S Capricorni		μ Capricorni	
	29.70		39.80		47.40
	43.45		54.2		1.60
	57.45		8.5		15.70
	11.30		23.0		44m 30.00
	25.10		37.2		44.15
	39.20	21..	38.. 51.75		58.30
21..	36.. 53.10		Σ = 214.45	21..	45.. 12.70
	259 30		cor = -42.97		7)209.85
	240		6)171.48	21m	44m 29.98
	499 30		28.58		
21..	36.. 11.33	21..	38.. 08.58	21..	44.. 29.98
	w + .13		c - .10		- .10
	w - 11		a - .20		- .19
	cor - 8		b + .05		+ .06
+ 21..	36.. 11.. 27		r - .04		- .04
R 21	36.. 56.45		-u + 45.29		+ 45.29
	45.18	21	38 53.58	21	45 15.00
21..	36.. 11.33	R 21	38 53.54	21	45 14.93
	c - .10				
	a - .13				
	b + .08				
	r - .04				
	-u + 45.29				
	21.. 36.. 56.45				
	21 36 56.43				

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1852phae.proj...13T

(476)

Ill. East

$t_0 = 23^h$

a = −0.219
b = +0.102
c = −0.092 Rate of 66 + 0.6

November 20 Pm

E.C.
Moon's I limb
14.70
29.00
42.95
57.15
23 53 11.20
clouds
clouds

E.C.
α Andromeda
16.75
32.35
23 59 48.00
clouds 24.00.03.49
clouds 19.12
clouds 34.69
clouds 50.39

E.C.
γ Pegasi
13.60
27.80
42.00
55.95
10.40
24.45
00 05 38.60
218.00
180
2)398.00
00 04 56.14
cl. −.08
ar. −.10
lv. +.10
00 04 56.06
5 39 42
43.36
0 00 56.14
c −.09
a −.11
b +.09
r −.03
−ω +43.51
0 05 39.51
0 05 39.42

$\frac{G+H+E+D+C}{5}$ = 23 52 31.00
$\frac{i_4+i_5+i_6+i_3+i_2}{5}$ p sec δ = +14.10
23 52 45.10
12
Mean = 23 52 57.10

c −.09
a −.17
b +.07
r −.02
−ω +43.51
23 53 40.40

≡ = 97.10
cor = 93.53
3)190.63
63.54

24 00 03.54
c −.10
a −.07
b +.12
r −.03
−ω +43.51
0 0 46.97
0 00 47.06

α Andromeda −43.60
γ Pegasi −43.42
−43.51

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1852phae.proj - ...13T

(479)

Nov. 21/22 Ams.

1615

	β Leonis		η Ursae Majoris
+15°	43.5		47.60
	57.8	+50°	8.90
	11.9		30.45
	26.0	40"	57.80
	40.3		13.00
	54.5		34.45
11h	42m 08.5	13h	41m 56.20
	242.9		242.40
	60		120
	7)182.9		7)362.40
	26.13	13h	40m 51.77
	-2		col −.12
11h	41m 24.13		ax. +.04
	col. −.08		lev. +.17
	ax. −.09	13h	40m 51.86
	lev. +.10	13h	41m 41.76
11h	41m 24.06		49.90
11h	41m 31.44		
	7.38		

E.C.

~~E.C. α Arcturi~~

Nov. 21/22

M.S.C.	20h	28m	30
1615	12h	35m	30.0
			7.38
	12h	35m	37.38
	16h	03m	19.45
	28h	32m	17.93

16h 02m 32.71
46.94
16h 03m 19.45

M.S.C. 22h 18m 45s
1615 14h 26m 03.5
7.18
14h 26m 10.68
16h 03m 19.45
22h 22m 51.23
3.39.54
22h 19m 01.29
22h 18m 45
26.29
16
42.27

M.S.C. slow of Boston
rate of M.S.C. −0.5s

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1852phae.proj...13T

Ill. East

Nov. 23/24 Am.

E.C. α Virginis	E.C. η Ursae Majoris	E.C. Asterius
lost	48.70	22.50
lost	+50° 10.40	+20° 37.00
lost	31.70	51.60
16„ 36.30	52.70	6.15
lost	14.60	20.70
lost	35.55	35.45
13„ 17„ 18.15	13„ 41„ 57.30	14„ 08„ 56.10
	250.95	223.50
	180	180
	2) 370.95	2) 43.50
	13„ 40„ 52.99	14„ 08„ 06.21
	cul. − .12	cul. − .08
	az. + .04	az. − .08
	lev. + .17	lev. + .11
	13„ 40„ 53.08	14„ 08„ 06.16
	13„ 41„ 41.80	14„ 08„ 54.89
	48.72	48.73

49.94
2) 1.21 (0.60 RC

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1852phae.proj...13T

a = −0.203 (481)
b = +0.075
c = −0.081

Ill. East
Stars branchishing

Rate of Eb +0.ˢ50

Nov. 24 Sm

$t_0 = 0^h$

Eb. β Ceti	E.C. θ' Ceti	Eb α Arietis	Eb ξ² Ceti
S 18°.48'	S 8°.57'	N 22°.46	N 7°.28'
40.00	10.00	20.25	lost 18.50.71
54.60	23.95	85.10	lost 19.04.51
9.25	37.90	49.95	18.25
35.23.70	15.51.85	4.90	32.10
38.25	5.80	19.85	46.10
52.70	19.45	34.80	0.00
0.36.07.15	1.16.33.70	1.58.49.75	2.20.14.00
225.65	183 65	214 60	
60	180	180	≡ = 110.45
7)16565	7)3665	34.65	Cor = −9.26
0.35.29.66	1.15.51.95	5-8.4.95	5)41.19
			8.24
			24
			32.24
0.35.23.66	1.15.51.95	1.58.04.95	2.19.32.24
c −.09	−.08	−.09	c −.08
a −.19	−.16	−.07	a −.11
b +.03	+.04	+.07	b +.06
r −.01	−.02	−.04	r −.05
− ω +48.47	+48.47	+48.47	− ω +48.47
0 36 11.87	1 16 40.20	1 58 53.29	2 20 20.53
0.36.11.80	1.16.40.10	1.58.53.29	2 20 20.66

β Ceti −48.40
θ' Ceti −48.37
α Arietis −48.37
γ Ceti −48.43
ε Persei −48.79
−48.47

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1852phae.proj...13T

$t_0 = Q^h$

$a = -0.203$ (482)
$b = +0.075$
$c = -0.081$

Rate of E6 + 0.50

Nov. 24 Pm.

Stars branchishing

E.C. γ Ceti	E.C. 845 B.A.C.	E.C. Saturn's I limb	C, II Limb
11.75	lost 35.29.93	51.70	45.70
25.20	+9°.29' lost 43.79	5.70	0.30
38.90	57.40	19.80	14.00
34ᵐ 52.65	11.40	44, 33.95	53ᵐ 28.90
6.40	25.40	48.15	43.20
20.30	39.20	2.05	57.40
2. 35ᵐ 34.00	2. 36ᵐ 53.35	2. 45ᵐ 16.25	2. 54ᵐ 12.00
189.20		17760	201.50
18	Σ = 187.75	60	2. 53ᵐ 28.79
369.20	cor = -69.56	239.60	
2. 34ᵐ 52.74	5)118.19	2. 44ᵐ 33.94	
	23.64		
	12.		
	11.64		

2. 34ᵐ 52.74	2. 36ᵐ 11.64	2. 44ᵐ 33.94	2. 53ᵐ 28.79
~~-.08~~			
c -.08	-.08		-.08
a -.13	-.11		-.10
b +.06	+.06		+.06
r -.05	-.05		-.06
− ω +48.47	+48.47		+48.47
2 35 41.01	2 36 59.93		2 54 17.08
2. 35ᵐ 40.97	2 36 59.75		

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Nov 24 Continued

Obs. 6.W.J

	δ Aurigæ	α Persei	ζ Tauri
	41.50	59.10	15.35
N 19.10	56.10	20.20.	29.35
	10.60	41.05 N 49.19	43.20 N 12.26
2	25.25	13 2.40	21 57.10
	39.70	23.35	11.25
	54.25	44.45	25.30
3 3	8.90	3 14 5.95	3 22 39.50
	23630	19650	22105
	60	180	180
7	176.30	9 16.50	401.05
3 2	25.19	3 13 2.35	3 21 57.29

3	02 25.19	3 13 02.35	3 21 57.29
c	−.10	−.12	−.08
a	−.08	+.04	−.10
b	+.07	+.10	+.06
r	−.06	−.07	−.07
−w	+48.47	+48.47	+48.47
3 3	13.49	3 13 50.78	3 22 45.57
3 3	13.53	3 13 51.01	3 22 45.65

Nov. 27 Pm

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Nov 24/25 Ath Ill Cast

Wires F & G of 12 Can Dena-

to mean of 7 wires

F	27.45	1.43854
G	41.29	1.61584
39. 6 50 2u		0.11020
	35.38	= 1.54874
	53.22	= 1 72604

11.1
53.2

az − 0.20
lev + 0.12
col − 0.08

53.2
11.

EC
- last
- - -
- - -
- - -
- - -
53.2
12. 49. 11.1

12 Can Dec

12. 48. 53.2 − 35.38 = 12. 48. 17.82
12. 49. 11.1 − 53.22 = 12. 48. 17.88

F 12. 48. 17.82
G 17.88
12. 48. 17.85 red. to mean of wires
az −.01
lev +.16
col −.10
12. 48 17 .90
12. 49 6 23
EC − 48.33

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1852phae.proj...13T

Ill. East

Nov. 27 Pm	Nov. 29 Pm.		Nov. 29/30 Am	
E.C.	E.C.	E.C.	1615	1615
α Cygni	β Ceti	θ' Ceti	η Ursæ Maj.	η Boötis
38.7	42.00	12,15	——	53.4
57.9	56.50	26.15	——	10.0
17.2	11.10	39.90	20.5	24.5
36.4	25.50	54.00	42.0	39.0
55.8	40.15	7.90	3.5	53.4
15.2	54.70	21.80	25.0	8.0
20,,36,,34.6	00 36,,09.30	1,,16,,35.70	1342,,46.8	13,,48,,22.5

212,8
60
2)2722,8
36.99
-2
13,,47,,36,99
13,,47,,38,71
1.79

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1852phae.proj...13T

Nov. 29/80 dm

E.C.
+20° α Boötis
23.10
39.95
54.40
8.90
23.60
38.00
14 08 52.95
242.70
180
2)62.70
14.08.08.96
cal. − .08
az. + .08
lev. + .11
14.08.08.91
14.08.55.01
46.10

Dec 1st Pm

16h 5m
α Cygni
—
6.5
26.0
45.5
4.5
20.37.24.0

Dec. 1/2 dm

E.C.
η Ursæ Maj.
52.45
+50 13.80
85.10
56.60
18.00
39.40
13.42.00.80
216.15
180
2)396.15
13.40.56.59
cal − .08
az + 03
lev + 05
13.40.56.63
13.41.42.04
45.41

Ill. Eist

E.C.
η Boötis
9.80
+19° 24.40
38.85
63.50
8.00
22.45
13 47 37.20
194.20
180
2)374.20
13.46.53.96
cal − .05
az − 06
lev + 06
13.46.53.97
13.47.38.84
45.43

Nov. 29/80
M.T.G. 21.25.40
16h 5m 14.04.32.0
1.8
14.04.33.8
16.34.57.91
21.29.41.89
3.31.28
21.26.10.61
21.25.40
30.61
16
46.61

Dec. 1st Pm.
E.C. 20 40.00
16h 5m 20 46.46.2

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1852phae.proj ...13T

(487)

Ill East a −.12 b +.02 c −.05 Rate of Eq + 0.80

Dec. 1/2 Am.

Eq. α Bootis

25.75
+20 40.30
56.00
9.70
24.40
39.00
14 08 53.80
247.95
180
67.95
14 08 09.70
cor. − 05
ar. − 06
Lw. + 06
14 08 09.65
14 08 55.07
45 42

Dec. 5/6 Am.

E.C. ε Virginis

$t_0 = 12^h$ 12 11 26.95
40.65
N 14° 08′ 84.45
8.25
22.00
35.50
12 12 49.60

ε = 169.80
cor = − 68.79
5)101.01
20.20
12
8.20

12 12 08.20
c −.05
a −.07
b +.02
r −.01
−u +43.24
12 12 51.33
12 12 51.22

E.C. Moon's Ilimb

19.45
33.20
47.30
N0° 30′ 47 1,45
15.60
29.70
12 48 43.80
1950
180
5)1050
12 47 1,50

12 47 01.50
−.04
−.08
+.01
−.03
+43.24
12 47 44.60

E.C. α Virginis

00.15
−10° 14.00
28.10
42.00
56.05
10.00
13 17 24.20
174.50
120
7)294.50
13 16 42.07
cor. −.05
ar. −.12
Lw. +.03
13 16 41.93
13 17 25.08
43.15
45 42
2 27 / 0.5 ∫ EC rate gain

13 16 42.07
e −.05
c −.05
a −.09
b +.01
r −.04
−u +43.24
13 16 57.44.57
46.74
13 16 58 31.25
13 17 25.11
13 17 25.08

E.C. η Ursae Majoris

56.00
+50° 16.25
37.60
59.13
20.45
41.85
13 42 03.40
233.68
180
7)413.68
13 40 59.09
cor. −.08
ar. +.03
Lw. +.08
13 40 59.12
13 41 42.15
43.03

13 40 59.09
−.08
+.02
+.03
−.05
+43.24
13 41 42.25
13 41 42.25

Dec. 1/2 Am
M.Yr. 21 17 40
1615 14 4 29
2.0
14 04 27.0
16 42 45.02
21 21 41.58
3 29.97
21 18 12.01
21 17 40
32.01
16
48.01 Slow of Both.

16 41 58.28
46.74
16 42 45.02

21 19 15
20 19 49.67
34.67
16
50.67

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1852phae.proj. . .13T

(488)

a = − 0.120
b = + 0.018
c = − 0.051

Rate of Eb +0.80

Dec. 5/6 Am

$t_0 = 12^h$

Eb. η Bootis		Eb. α Bootis	
+19°	12.25	+20°	28.40
	26.70		42.80
	41.00		57.40
	56.00		11.80
	10.40		26.45
	24.90		41.20
13 47	39.50	14 08	56.00
	210.75		264.05
	180		180
	7)390.75		7)84.05
	13 46 55.82		14 08 12.00
	cal. −.05		cal. − .05
	ar. −.06		ar. − .06
	lev. +.06		lev. + .06
	13 46 55.77		14 08 11.95
	13 47 38.91		14 08 55.16
	43.14		43.21

	13 46 55.82	14 08 12.00
c	−.05	−.05
a	−.05	−.05
b	+.02	+.02
r	−.06	−.07
	+ 43.24	+ 43.24
	13 47 38.92	14 8 55.09
	13 47 38.91	14 08 55.16

ε Virginis	− 43.18
η Ursæ Maj	− 43.25
η Bootis	− 43.23
ε Bootis	− 43.31
	− 43.24

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