

KG
11365
34

A.34

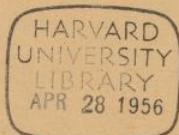
*Transit Instrument
June 23 1860 to Nov. 29 1860*

Sold by T. Groom & Co., Stationers, India Building, 82 State St., Boston.

KG 11365.34



KG 11365.34



1968phac.prc.11.344

1860phae.proj...34H

June 28
76. T. T.

Illumination East

$c = +0.14$
 $n = +0.16$

4700 BAB	4722 BAB	Moon I U	20 Librae	i Librae	
14 4 6.1	14 8 35.6	14 50 27.9	14 56 47.3	15 5 9.4	1
.9 .9	39.2	31.9	51.6	13.0	
-15 38 13.5	-17 33 42.8	-21 43 35.7	-24 44 55.2	-19 15 16.7	+
16.8	46.4	39.5	58.8	20.4	
20.7	50.2	43.4	57 2.9	24.1	
67 .0	214.2	178.4	215.8	83.6	
13.4 0	42.84	35.88	42.1 6	16.72	1
14 4 13.40	14 8 42.84	14 50 35.68	14 56 58.16	15 5 16.72	1
+ .14	+ .14	+ .14	+ .15	+ .14	
+ .05	+ .05	- .06	- .07	- .05	
14 4 13.49	14 8 42.93	14 50 35.77	14 56 58.24	15 5 16.81	14
14 3 14.93	14 7 44.91		14 55 56.61	15 4 18.47	14
+ 0 58.56	0 58.02		+ 58.63	58.34	
14 3 14.99	14 7 44.43	14 49 37.27	14 55 56.74	15 4 18.31	14

p Bootis

4	14	26	40.7
0			45.0
7	+30°	59	49.0
4			52.9
1			57.0
6			244.6
2	14	26	48.92
2	14	26	48.92
4			+ .17
5			+ .10
1	14	26	49.19
7	14	25	50.74
4			+ 58.45
1	14	25	50.69

1860 July 2nd

E.C. taken down to have new escapement applied
Another sidereal Clock B.S. was put up in the tran-
sit room to supply its place - and was set to coincidence
with it -

1860 July 2 H. P. T M. East Clock Box S

 α Virginis ζ Virginis

48.6

33.1

52.2

36.7

55.7

40.2

59.0

43.6

13 19 2.8

13 28 47.2

218.3

2008

43 66

40 16

13 18 55.66

13 28 40.16

 α_2 +.03

+.03

 L +.15

+.18

 e +.14

+.14

13 18 55.98

13 28 40.51

13 17 51.91

13 27 36.42

+1 04 08

+1 04 09

1860 July 4
H. P. T.

Illumination East

Bootis + 20°	♂ Bootis + 24°	ε Bootis + 28°	2 ² Libral + 15°	
14 ^h 10 ^m 28 ^s .5	14 26 51 .1	14 39 57 .0	14 ^h 44 14 .1	ar. +0.04
25 .4	56 .2	40 10 .9	17 .7	lv. +0.24
28 .9	27 0 .3	5 .0	21 .3	col. +0.14
32 .7	4 .2	8 .9	24 .9	
36 .4	8 .4	13 .1	28 .8	
144 9	121 .2	84 .9	106 .8	
14 ^h 10 ^m 28 ^s .98	14 ^h 27 ^m 0 ^s .24	14 40 4 .98	14 44 21 .36	
a. cor. +0.02	.02	.01	.04	
b. + .24	.25	.26	.13	
c. + .15	.16	.15	.15	
14 10 29 .39	14 27 0 ^s .66	14 40 5 .41	14 44 21 .68	
14 9 19 .37	14 25 50 67	14 38 55 26	14 43 11 .56	
1 10 .02	1 9 99	1 10 15	1 10 .12	

B.P.T. fast 1^m .02

1 4 9

5^s.93 = Gain of clock in 48^h. Hourly rate = +^s.124; daily = +^s.2976

1860 July 2

T 71.5

Moon I			Moon II			τ Sagittarii		* α Tauri	
	38.6			58.5			13.0		55.7
	42.6			2.7			17.0		59.5
-25	46.4			6.4	-28		21.0		3.1
	50.4			10.3			24.9		6.6
	54.7			14.5			29.0		10.5
18 51	46.54	18 54	6.48	18 59	20.98	4 29	3.08		
	93.08								
18 51	45.08								
	+1.15		+1.15				+1.16		
	-.07		-.07				-.09		
18 51	45.16	18 54	6.56	18 59	21.05				
1	4.67	1	4.67	18 58	16.38				
				+1	4.67				
18 50	40.49	18 53	1.89	18 58	16.38				

* July 3

1860 July 6

T. H. S.

α Virginis

13^h 19^m 3^s .1

6 .8

10 .3

13 .8

17 .4

51 .4

13 19 10 .28

az = + .03

L. = + .15

C. = + .14

13^h 19^m 10^s .6013 17 51^s .881 18^s .72 = B.V.G. fast1 4^s .0814^s .64 = gain of B.V.G. in 4 days

1860 July 7

H.P. 7.

ρ Bootis	ϵ Bootis	2^{nd} Librae
$14^{\text{h}} 27^{\text{m}} 5^{\text{s}} .3$	$14^{\text{h}} 40^{\text{m}} 10^{\text{s}} .3$	$14^{\text{h}} 44^{\text{m}} 27^{\text{s}} .5$
9 .5	14 .3	31 .1
13 .6	18 .1	34 .8
17 .6	22 .0	38 .1
22 .0	26 .2	41 .9
68 .0	90 .9	173 .4
$14 27 13 .60$	$14 40 18 .18$	$14 44 34 68$
$a = .01$	$a = .01$	$a = .04$
$b = .25$	$b = .26$	$b = .13$
$c = .16$	$c = .16$	$c = .15$
$14 27 14 .02$	$14 40 18 .61$	$14 44 35 .00$
$14 25 50 .63$	$14 38 55 .21$	$14 43 41 .53$
$1^{\text{m}} 23 .39$	$1^{\text{m}} 23 .40$	$1^{\text{m}} 23 .47$

B.P. fast $1^{\text{m}} 23^{\text{s}} .40$

$B.P. G = 15^{\text{h}} 46^{\text{m}} 0^{\text{s}}$
 $236 = 15 45 44.8$
 $236 \text{ slow of B.P.G. } 15.2$
 $1^{\text{m}} 23.4$
 $236 \text{ fast } 1^{\text{m}} 23.2$

1860 July 7

H. P. J.

Herculis & Ophiuchi

16	37	18.9	16	52	22	.3
		23.0			26	.1
		27.2			29	.6
		31.2			33	.1
		35.6			36.7	
		135.9			147.8	
16	37	27.18	16	52	29.56	
		$a = .01$			$a = .02$	
		$b = .28$			$b = .24$	
		$c = .17$			$c = .12$	
16	37	27.64	16	52	29.94	
16	36	3.75	16	51	6.09	
B.V.L.F.1	3	.89	B.V.L.F.1	23	.85	

1860 July 11.

1860 July 11.

1860 15 Ophiuchi

 α Ophiuchi.

34.2

58.0

38.0

1.8

41.5

5.3

44.9

8.7

48.6

12.5

16 52 41.44

17 30 5.26

- 0.01

- 0.01

+ 0.19

+ 0.20

+ 0.06

+ 0.06

16 52 41.68

17 30 5.51

16 51 6.08

28 29.69

1 35.60

1 35.82

860 June 12th

Polans (E. and E) α Virgin (E. and E)

13	4	51.5	58.3
	7	16.8	2.1
	9	29.0	5.4
+5 ^s ?	11	36.0 ³	9.2
	14	9.6	12.3

chr. 13 19 5.46
236.

~~Page~~

J. H. S.

J. H. S.

1860 July 14.

a Leonis

~~4~~ 36.3

40.1

43.4

46.9

50.7

10 2 43.48

- 0.01

+ 0.20

+ 0.06

10 2 43.73

0 56.43

+ 1 47.30

J. H. S.

1860 July 16th T. H. G. & H. P. T.

Coronae	2 Serpentis	B Libral
38.2	16.1	15 11 22 .7
42.2	19.8	26 .0
46.1	23.2	29 .7
50.0	26.7	33 .0
54.0	30.3	36 .7
		15 11 14 8 .1
15 30 46.10	15 39 23.22	15 11 26 .62
- 0.01	- 0.01	a = - 02
+ 0.24	+ 0.18	b = + 14
+ 0.06	+ 0.06	c = + 06
15 30 46.39	15 39 23.45	15 11 29 .80
28 48.60	27 25.60	15 9 31 .84
+ 1 57.79	+ 1 57.85	1 57 . 56

1860 July 17 26. P. 2.

α Bootis	α Corona TMS	α Lupentis TMS
14 ^h 11 ^m 13 ^s .9	43.0	20.8
17.6	47.0	24.7
21.9	50.8	28.0
24.9	54.5	31.4
28.8	58.8	34.9
106.5		
14 11 21.30	15 30 50.82	15 39 27.96
a = -.01	-.01	-.01
b = +.06	+.24	+.18
c = +.22	+.06	+.06
14 11 21.57	30 51.11	28.19
14 9 19.23	15 28 48.58	15 37 25.59
1 6 2.34	2 2.53	2 2.60

 $\Sigma \epsilon = 0.0380$

1860 July 17-18

α Ceti	α Tauri	α Aurigae	β Orionis	δ Orionis	
56.5	51.7	17.9		35.0	20
0.2	55.6	23.2	51.7	38.6	14
3.5		28.0	55.1	42.2	
7.0	2.6	32.6	58.5	45.4	
10.6	6.4	38.3	2.2	49.2	
2 57 3.56	4 29 59.	5 8 28.00	5 9 ¹⁰ 55.	5 49 42.08	
- .01		.00		- .01	
+ .17		+ .32		+ .18	14
+ .06		+ .09		+ .06	
2 57 3.78		5 8 28.41		5 49 42.31	
2 55 0.00	4 27 55.36	5 6 23.22	5 7 49.99	5 47 37.13	1
2 3.78		2 5.19		2 5.18	

It is doubtful about the second on the sheet containing α Ceti and α Tauri.

I have therefore employed the error derived from α Ceti in reducing the obs. of solar eclipses and chro. comparisons upon this sheet; and the mean of the errors from α Aurigae and β Orionis in reducing the obs. of solar eclipses upon the sheet containing them.

1860 July 24 H. P. J. N.S.

α Bootis			α Ophiuchi			δ Ursa Minoris		
0	14 ^h 11 ^m	48 .0	18	59.6	18	18	7.6	
6		51 .7		3.0		19	9.7	
2		55 .4		6.7		20	7.1	
4		58 .9		10.0		21	3.3	
2	12	2 .8		13.7		22	4.7	
08		21 6.8						
01		43.36						
8	14 11	55.36	17 31	6.60	18	20	6.48	
6		-0.1		-0.1			+ 24	
		+22		+20			+2.66	
31		+06		+06			+1.01	
13	14 11	55.63	17 31	6.85	18	20	10.39	
18	9	19.13	28	29.66		17	33.33	
	+2	36.50	+2	37.19		-2	37.06	
			2	37				

July 28

H.P.T.

Librae

 α Cor. Bon β Arietis γ Arietis4^h 54^m 3.5

15 13 19 .3

1^h 31^m 30^s .8

1 43 53.0

7 .2

23 .4

34 .5

57.0

10 .6

27 .3

38 .4

44 0.8

14 .0

31 .0

41 .7

4.4

17 .8

35 .1

45 .6

8.4

14.54 10.62

15 13 27 .22

141 .0

123.6

1^h 31 38 .20

24.72

1^m 44 0.72

$$u = +0.16$$

$$C = +0.65$$

July 30th
1860 July 30th J. H. S.

5 Sijttarii			a. Aprilae			Q. I.			h ² Sijttarii			f. Sijttarii		
		12.1			35			18.3			48.3			18.8
-26	28	16.0			70	-23	6	22.4	-25	11	52.2	-20	6	52.7
		19.9			10.5			26.3			56.0			56.4
		23.6			13.8			30.1			59.7			0.0
		27.6			17.5			34.0			3.7			2.8
18	31	19.84	19	3	10.46	19	11	26.22	19	12	55.98	19	22	56.34
a		+0.05			+0.03			+0.05			+0.05			+0.05
b		-0.08			+0.19			+0.07			-0.08			-0.06
c					+0.05									
18	31	19.81	19	3	10.73	19	11	26.20	19	12	55.91	19	22	56.33
18	46	39.77		18	30.24		15	19.78	19	28	15.64	19	38	16.13
	15	19.96		-15	19.51					15	19.69		15	19.80
18	46	39.59				19	26	45.98	19	28	15.73	19	38	16.11

1860 July 30th T.H.S. γ Apilae α Apilae β Apilae

13.0

33.8

3.2

16.6

37.6

6.7

20.0

41.1

10.2

23.4

44.4

13.5

27.1

48.2

17.3

19 24 20.02

19 28 41.02

19 33 10.18

+ .02

.02

.03

+ .22

.21

.20

+ .05

.05

.05

19 24 20.31

19 28 41.30

19 33 10.46

- 39 39.98

- 44 0.97

- 48 30.01

- 15 19.67

- 15 19.67

- 15 19.55

δ Aquilae	L Sagitt	f Sagitt	γ Aquilae	L Aquilae
5.7	50.5	51.2	19.3	36.3
9.2	54.6	55.0	19.0	39.9
12.7	58.3	58.7	22.5	? 43.5
15.9	2.1	2.2	25.8	46.7
19.7	5.9	6.0	29.6	50.3

19 3 12.64 19 12 58.28 19 22 58.62 19 24 22.44 19 28 43.34

1860 July 31 I.H.T.

$$\kappa = +0.16$$

$$C = +0.05$$

<i>B. Aquilae</i>			<i>α Capricorni</i>			<i>α^2 Capricorni</i>			<i>α I</i>			<i>β Capricorni</i>		
		5.5			32.8			56.7			16.0			31.9
		9.0			36.4			0.4			17.9			35.7
+6	4	12.3			40.0	-12	58	3.8	-19	23	21.8	-18	16	39.4
		15.7			43.3			7.4			25.3			42.8
		19.4			47.3			11.1			29.3			46.8
		12.												
19	33	12.38	19	54	39.96	19	55	3.88	20	4	21.66	20	5	39.32
		+0.05			+0.05			+0.05			+0.05			+0.05
		+0.02			-0.04			-0.04			-0.06			-0.05
19	33	12.45	19	54	39.97	19	55	3.89	20	4	21.65	20	5	39.32
19	48	30.02				20	10	21.33				20	20	56.64
	15	17.57					15	17.44		15	17.46		15	17.32
19	48	29.91				20	10	21.35	20	19	39.11	20	20	56.78

15 17.46 at 19 58

1860 July 31. THH

 τ^2 Laplace

6.0

9.8

-13- 27 13.4

16.7

20.6

20 16 13.30

+ 0.05

- 0.04

20 16 13.31

20 31 30.82

15 17.51

20 31 30.77

$n = +0.16$
 $c = +0.05$

August 2
H.P.J.

Cor. Bor.	α Serpen.	β Cygni	γ Capricorn	δ Capricorn.	ϵ
5 13 24.0	15 22 2.1	20 51 38.12	20 59 7.8	21 17 0.9	2
28.1	5.8	42.2	11.5	4.8	
32.0	9.2	46.1	-17 26 15.4	-17 18 8.3	-1
35.9	12.6	50.0	18.8	11.8	
39.9	16.2	54.2	22.7	15.6	
159.9	46.9	230.7	76.2	41.4	
15 13 31.98	15 22 9 38	20 ⁿ 51 ^m 46.14	20 59 15.24	21 17 8.28	2
			+ .05	+ .05	
			- .05	- .05	
			20 59 15.24	21 17 8.28	21
			21 14 31.22	21 32 24.21	
			15 15.98	15 15.93	
			21 14 31.22	21 32 24.26	21

15 15.98 at $21^{\circ} 34'$

	D II 22.			θ Aquarii			σ Aquarii		
2	21	42	35.6	21	^h 54 ^m	7.4	22	7	55 .1
5			39.4			11 .2			58 .5
3	-10		43.0	-8	29	14 .8	-11	24	8 2 .1
8			46.5			18 .0			5 .5
6			50.0			21 .8			9 .3
4			214.5			73 .2			130 .8
8	21	42	42.90	21	54	14.64	22	8	2 .16
5			+0.05			+0.05			+0.05
-			-0.03			-0.02			-0.03
8	21	42	42.92	21	54	14.67	22	8	2.18
1				22	9	30.71	22	23	18.15
3		15	15.98		15	16.04		15	15.97
26	21	57	58.90	22	9	30.65	22	23	18.16

Aug. 15

76 P.T.

Ill. East

S' Scorpii				S Ophiuchi			
15	42	21	.6	15	52	4	.2
	25	.2			7	.7	
	28	.4			11	.3	
	32	.5			14	.8	
	36	.3			18	.4	
h m s 144 4				h m s 56 4			
15	42	28	.88	15	52	11	.28

Aug. 15. 1860

A.U. (Temporary Clock.)			Ill. East		
♂ ophiuchi			♂ Draconis		
			♂ ophiuchi		
		28.7		14.2	29.6
		32.6		24.1	33.1
		36.4		26.0	36.7
		40.0		31.4	40.2
16	58	44.1	17	12 37.2	17 13 44.0
16	58	36.36	17	12 25.78	17 13 36.72

Aug. 25 H.P.T.

Ophiuchi & Scorpii

52	38	.90	16	6	28.00
42	.90				31.90
46	.10				35.90
49	.40				39.90
53	.30				43.90
229.9			16	6	35.76
15 52 49.98			16	20	53.25
			14		17.98

Aug. 25. 1860.

C = + 0.10
M = + 0.25

A.H.		clock B.S.		Ill. East					
u Sagittarii		Moon TO.		S. m. Min.		51 Hev. Cephei		β Lyrae	
		02.7		11.5	1	3.4	mid win only.		32.0
-21	6	06.6	25 54	18.7	2	4.0			36.2
		10.3		19.6	3	1.5	19 19 40.0		40.3
		18.8		23.5	3	58.9			44.4
18	51	17.8	18 58	27.7	19 4	59.7		19 30	48.8
18	51	10.24	18 58	19.60	19 3	1.50		19 30	40.34
		+ .10		+ .10					
		- .10		- .12					
17	51	10.24	17 58	19.58					
18	5	27.54							
	14	17.30	14	17.28					
18	5	27.53	18 12	36.86					

Subtract one hour from all observations of this page.

Aug. 25, 1860

A. U. clock. S. B. B.

Ill. Ear

ζ Aquilae			δ Draconis			τ Draconis			k^2 Sagittarii		
		37.5			56.8			33.0			50.9
+13	39	41.2			6.2			45.3	-25	11	54.9
		44.7			15.3			57.3			58.6
		48.2			24.2			8.7			2.3
18	44	52.0	18	58	33.6	19	4	21.4	19	14	6.3
18	44	44.72	18	58	15.22	19	3	57.14	19	13	58.60
		+10									+10
		+06									-12
18	44	44.88							19	13	58.58
18	58	61.93							19	28	15.58
	14	17.05								14	17.00
18	59	1.92							19	28	15.58

Sept. 3.

A.M.

clock. B. & P.

Ill. Jan

 α Aquilae δ Aquilae

42.3

54.3

46.0

57.8

49.5

1.3

52.8

4.8

19 57

56.619

5

8.4

126.6

19 57

49.4419

5

1.32

1860. Sept. 6.

A. H.

B. & S.

M. Ear

 β Lyrae" δ Aquilae

23.3

28.9

27.5

32.7

31.6

36.2

35.8

39.8

18 30 40.1 18 44 43.4

158.3

181.0

18 30 31.66 18 44 36.20

1860 Oct. 3.

J.H.S.

B. and S.

M. E.

ϵ Scorp		δ Ursae minoris		α Lyrae		η Perseus	
	45.0	15	59.0		4.6		58.2
	48.9	17	0.4		9.2		2.0
	52.7	12	59.3		13.5		5.5
	56.4	18	56.2		17.9		9.0
16 22	0.6	18 19	56.9	18 33	22.6	1 25	12.8
	203.6		231.8		67.8		87.5
	263.6		291.8				27.5
16 21	52.72	18 17	58.30	18 33	13.56	1 25	5.50
	- 0.16		+ 1.82		- 0.01		- 0.07
	+ 0.18		+ 5.18		+ 0.55		+ 0.39
	+ 0.10		+ 1.50		+ 0.12		+ 0.09
16 21	52.84	18 18	6.86	18 33	14.22	1 25	5.91
20	52.61	18 17	6.94	32	13.83	1 24	4.27
1	0.23		59.92	1	0.39	1	1.64

 $\Sigma \epsilon = 0.0225$

Partly Cloudy.

Oct. $\frac{23}{24}$. 1860
$$\begin{array}{r} 40 \\ 02 \\ \hline 8080 \end{array}$$

N. U. New Clock Ill. East

Ms Maj & Hydra

9.0 17.6

14.7 21.3

19.7 24.8

24.7 28.2

8 50 29.39 21 31.9

97.4 123.8

8 50 19.489 21 24.76

Oct. 24.

 $n = +0.40$
 $c = +0.12$

A.U.

Ill Ear

α Aquarii	β Aquarii	γ Aquarii	δ Aquarii	ϵ Aquarii	ζ Aquarii
58.3	49.5	—	37.1	32.6	
-1 0 1.8 -8 29	53.2	clouds	—	-11 24 40.7	-0° 50' 36.2
5.1	56.6	28.3	44.2	39.5	
8.6	0.0	32.0	47.7	43.0	
21 59 12.2 22 10 3.6	22 19 35.7	22 23 51.3	22 28 46.6		
86.0	162.9	221.0	197.9		
		44.20			
21 59 5.20 22 9 56.58		22 23 44.20	22 28 39.58		
+ 0.12	+ .12	+ .12	+ .12		
- 0.01	- .06	- .08	.00		
21 59 5.31 22 9 56.64		22 23 44.24	22 28 39.70		
21 58 39.39 22 9 30.72		22 23 17.43	22 28 13.72		
+ 25.92	+ 25.92	+ 26.81	25.98		
21 58 39.40 22 9 30.73		22 23 17.33	22 28 13.79		

Oct. 24, 1860

Ill. East

A. H.		Moon 10		♂ Aquarii		♂ Pis. Aus.		♂ Pegasi	
♂ Pegasi									
	51.3		24.0		36.1		17.0		9.1
+10 6	55.0	-4 35	27.6	-16 34	39.7	-30 22	21.2	+14 27	13.6
	58.5		31.2		43.3		25.2		17.1
	1.8		34.6		46.8		29.1		20.7
22 35	5.5	22 40	38.2	22 47	50.6	22 50	33.3	22 58	24.3
	172.1		155.6		216.5		125.8		84.8
	34.42								
22									
22 34	58.42	22 40	31.12	22 47	43.30	22 50	25.16	22 58	16.96
	+ .12		+ .12		+ .12		+ .13		+ .12
	+ .07		- .03		- .12		- .23		+ .10
22 34	58.61	22 40	31.21	22 47	43.30	22 50	25.06	22 58	17.18
22 34	32.69		25.91	22 47	17.46	22 49	59.08	22 57	51.35
	+ 25.92				25.84		+ 25.98		25.83
22 35	32.70	22 40	5.30	22 47	17.39	22 49	59.15	22 57	51.27

25.91 at 22 36

Oct. 24

A21.

Ill. East

p Aquarii

27.3

-6 48 31.0

34.4

37.8

23 7 41.4

171.9

96 23 7 34.38

12 +.12

10 -.05

18 23 7 34.45

35 23 7 8.59

83 25.86

27 23 7 8.54

Oct. 25. 1860 by Chron. 236. Eye and Ear.

♌ Aquarii		Moon I.		16 Piscium		Piscium		Johnson* 162	
	41.3		21.0		52.0		22.3	54	10.5
-6 48	45.1 +0 44	24.9	+1 20	55.7	+4 52	25.9		55	0.6
	48.8	28.2		59.1		29.3			49.4
	52.1	31.6		2.4		32.6		56	37.0
	55.5	35.6		6.0		36.2		57	28.5
2	242.8	141.3		175.2		146.3			126.0
	48.56	28.26		35.06		29.26			25.20
23 9	48.56	23 26 28.26	23 31 59.04	23 35 29.26	23 55 49.20				
	+ .12	+ .12	+ .12	+ .12					
	- .05	+ .01	+ .01	+ .03					
23 9	48.63	23 26 28.39	23 31 59.17	23 35 29.41					
23 7	8.58	23 2 40.07	23 29 19.08	23 32 49.33					
2	40.05		2 40.09	2 40.08					
23 7	8.56	23 23 48.32	23 29 19.10	23 32 49.34					

* Catalogue of
164 stars within 6°
of the North Pole.
Radclyffe Obs. for 1855
pp. 178-187

Oct. 25. 1860 by Chas. 236. E. and E.

α Andromedae		γ Pegasi		Johnson* 93 S.P.		α Cassiopeiae		2 Urs. min. = Joh* 12	
45.6		38.9		12	25.5	7.3		51	40.2
49.5		42.7		14	43.0	13.8		52	25.8
53.4		46.0		16	46.0	19.6		53	9.5
57.3		49.5		18	54.5	25.9		53	52.8
1.4		53.3		21	9.2	32.6		54	38.7
207.2		230.4			178.2	49.2			167.0
41.44		46.08			35.64	19.84			33.40
0 3 53.44	0 8 46.08	0 16 47.64	0 35 19.84	0 53 9.40					
1 12.80	6.15	+2 13 50.30							

Oct. 26. 1859

A. M. New Clock

Al. East

1860phae. p			N. H.			" "			" "			" "		
16 Piscium			2 Piscium			1 Sculptoris			20 Piscium			5 Andromedae		
		12.6			42.8			35.3			5.4			6.2
		16.0			46.3			39.4	+ 6	5	8.9			10.2
		19.5			49.8			43.3			12.2			14.1
		22.8			53.2			47.8			15.6			17.9
16	13	20.6	16	16	56.8	16	25	51.2	16	36	19.4	16	45	22.1
		93.5			248.9			217.0			61.5			70.5
16	13	19.50	16	16	49.78	16	25	43.40	16	36	12.30	16	45	14.10
		+0.12			+ .12						+ .12			
		+0.01			+ .03						+ .04			
16	13	19.63	16	16	49.93				16	36	12.46			
23	29	19.07	23	32	49.33				23	52	11.79			
7	15	59.44	7	15	59.40				7	15	59.33			
23	29	19.08	23	32	49.32				23	52	11.79			

New Electric Clock- Double Pendulum & Iso-
dynamic Escapement. Temperature compensation not fully
adjusted

Oct. 26, 1859

A.M.

M. Eas-

Reparis			Moon TO			
		59.4			33.3	Stopped observing
+ 14	24	3.0	+ 6	2	36.8	for Mr. Bond to
		6.6			40.4	regular clock.
		10.1			43.9	
16	50	14.0	16	51	47.6	
		93.1			202.0	
16	50	6.62	16	51	40.40	
		+ .12			+ .12	
		+ .10			+ .04	
16	50	6.84	16	51	40.56	
24	6	6.14	7	15	39.31	
7	15	59.30				
0	6	6.15	0	7	39.87	

Oct. 27, 1860.

A.H.

M. East

Cephei		S Sculptoris		162 Johnson		93 Johnson s.p.		12 Ceti			
	18.6		42.5	22	38.0	40	53.1		59.1		
	34.7		46.5	23	27.7	43	9.5	- 4	44	2.7	
	49.4		50.4	24	16.9	45	14.3			6.1	
	4.4		44.3	25	4.2	47	23.9			9.6	
16	5	20.4	16	12	58.4	16	25	55.2	16	49	36.2
	127.5									137.0	90.6
16	4	49.5	16	12	50.42	16	24	16.40	16	45	15.40
											54
											6.12
											+ 0.12
											- 0.03
										16	54
										24	22
										7	28
											58.18
											51.97
										0	22
											58.17

Oct. 27

A. H.

M. Ear

1860phae.p

α Cassiopeiæ	β Ceti	δ Piscium	Moon TV	ϵ Piscium
35.0	38.8	30.5	38.3	46.2
41.3 -18 45-	42.6 +6 49	34.2 +11 9	42.1 +7 8	49.7
47.6	46.2	37.6	45.6	53.2
53.5	49.8	41.0	48.9	56.6
17 3 39.9	17 7 53.7	17 12 44.8	17 23 52.7	17 27 60.2
237.3	231.1	188.1	227.6	185.9
17 3 47.46	17 7 46.22	17 12 37.62	17 23 45.52	17 26 53.19
	+13	+12	+12	+12
	-13	+05-	+08	+05-
	17 7 46.22	17 12 37.79	17 23 45.72	17 26 53.36
	24 36 38.15	24 41 29.88	7 28 51.96	24 55 45.23
	7 28 51.93	7 28 52.09		7 28 51.87
	0 36 38.18	0 41 29.75	0 52 37.68	0 55 45.32

Oct. 27. 1860.

A. H.

Polaris

"
 δ CetiIll. East
 "
 α Andromedae

35	9.9	-8 54	7.1			13.5
37	34.0	Minute	10.6			17.6
39	51.2	doubtful	14.1			21.4
42	3.4		17.6			25.3
17 44	31.3		21.2	16	32	29.4
	129.8		70.6			107.2

17	39	49.96	14.12	16	32	21.44
	9	9.50	+0.12	4	1	12.79

-0.06

14.18

6.09

7 28 51.91

1 17 6.14

Oct. 29.

A.H.

Ill. East

 α Cygni

32 Vulpecula

27.6 * very faint 26.7

32.7 on account 30.6

37.5 of clouds 34.7

42.2 38.2

20 36 42.3 20 48

187.3

20 36 37.46

Oct. 30th 1860.

T.H.S.

η Pscium			ν Pscium			β Arietis			α Arietis			67 ^{lets}		
		543			37			40.2			11.6			54.9
+14	38	580	+4	47	73	+20	8	53.2	+22	48	15.6	-7	4	58.6
		1.5			10.6			50.7			19.3			2.1
		5.1			14.2			0.2			23.1			5.6
1	24	8.8	1	34	17.8	1	47	4.1	1	59	26.9	2	10	9.1
		127.70			53.6			163.5			96.5			130.3
1	24	1.54	1	34	10.72	1	46	56.70	1	59	19.30	2	10	2.06
	24	4.47		34	13.54									
		+10			+10			+10			+10			+10
		+10			+03			+14			+16			-04
1	24	1.74	1	34	10.85	1	46	56.94	1	59	19.56	2	10	2.12
1	24	4.46	1	34	13.54	1	46	59.60	1	59	22.27	2	10	4.70
		-2.72			-2.69			-2.66		9	-2.71			-2.58
1	24	4.43	1	34	13.53	1	46	59.60	1	59	22.22	2	10	4.77

$\bar{E} - \text{Celi.}$

Moon II.

+7 50

+23

11

8.7

9.6

13.7

48.6

17.3

52.2

21.3

67.5

3 24

13.50

+1.10

+1.16

3 24

13.76

2.71

3 24

16.47

Oct. 31. 1859

A. H.

Ill. East

 α Andromedae γ Pegasi

3.6 Lamp went out: 56.8

7.7 obs within 1-20. 0.4

11.6 3.9

15.4 7.4

0 1 19.6 0 6 11.2

57.9 79.7

0 1 11.58 0 6 3.94

0 1 13.78

- 2.00

Nov. 1. 1860

TH

α Coronae	δ Ophiuchi	α Lyrae	ϵ Pegni	δ Pegni
38.1	20.0	2.9	14.2	36.3
42.0	23.6	7.6	17.8	40.2
45.7	27.3	12.0	21.3	44.0
49.6	30.8	16.2	24.9	47.8
53.7	34.5	20.8	28.4	51.8
229.1	186.2	59.5	106.6	220.1
15 28 45.82	17 28 27.24	18 32 11.90	21 37 21.32	21 46 44.02

 $\Sigma \epsilon^2 = 0.0580$

Nov. 1. 1860

H. S.

α Aquarii	γ Ceti	β Ceti	ϵ Piscium	Polaris
31.6	50.7	30.3	37.8	1 4 2.6
33.2	54.4	34.1	41.5	6 23.7
38.7	57.9	37.9	45.0	8 42.4
42.0	6.1	41.4	48.1	11 0.0
45.7	4.8	45.2	51.9	13 25.0
193.2	168.9	148.9	224.3	93.7

21 56 38.64 0 22 57.78 0 26 37.78 0 55 44.86 1 8 42.74
 65.39 59.81

The above are obs.
 in the usual way.
 The foll. are the
 mean of two
 contacts

1	4	4.7
6	26.0	
8	45.8	
11	0.7	
13	24.6	
	101.8	
1	8	44.56.

Nov. 1. 1860.

 $\frac{1}{2}$

J.H.S.

δ Ceti	η Perseus	ϵ Perseus	α Bootis
58.5	56.8	6.2	11.3
2.2	0.4	9.8	15.2
5.8	4.0	13.2	18.8
9.2	7.4	16.4	22.4
12.7	11.2	20.1	Clouds.
88.4	79.8		

1 17 5.68 1 24 3.96 1 34 13.14 14 9 18.78

No. 4/6

A. H.

M. East

 γ Cancri γ Cancri ϵ Hydræ

		37.7		11.9		22.9
+20° 55'		41.7	+21° 58'	15.9		26.4
		48.2		19.7		30.1
		48.9		23.1		33.7
8 24	8 35	52.8	8 39	27.1	8 39	37.1
		226.3		97.7		150.1
8 24	8 35	45.26	8 39	19.54	8 39	30.02
		-.12		-.11		-.17
		+.31		+.32		+.26
		+.03		+.03		+.03
8 24	8 35	45.48	8 39	19.78	8 39	30.14
8 24	8 35	40.65	8 39	14.93	8 39	25.34
		4.83		4.85		4.80
		4.95		4.96		4.97
8 24	8 35	40.60	8 39	14.89		

In reducing the observation of this date let the azimuth correction be assumed equal to zero, and the observed times minus the level error and the A.R. be

Nov. 6, 1860.

Ill. East

A.H.

L Aquilae

γ Aquilae

α Aquilae

β Aquilae

29.0

38.5

59.8

28.8

32.5

42.2

3.2

32.3

36.0

45.8

6.6

35.8

39.3

49.1

10.1

39.2

19 18

42.9

19

39

52.7

19

44

13.7

19

48

42.9

179.7

228.3

93.4

179.0

19 18

35.94

19

39

45.66

19

44

6.68

19

48

35.80

-,19

-,16

-,17

-,18

+,24

+,27

+,26

+,25

+,03

+,03

+,03

+,03

19 18

36.02

19

39

45.80

19

44

6.80

19

48

35.90

19 18

29.08

19

39

38.84

19

43

59.87

19

48

28.95

+6.94

+6.96

+6.93

+6.95

Nov. 6/7.

$$a = -0.30$$

$$b = +0.31$$

$$c = +0.03$$

isopnae-proj.

$c = +0.03$

A. H.		"		Ill. East		"		Moon T10		γ' Leonis			
ε Leonis		π Leonis		α Leonis									
	57.6		52.8		58.8		41.1				18.7		
	1.4 + 8	43	56.5		2.4 + 8°	54=8	44.8	+20°	33		22.5		
	5.2		0.0		6.0 + 8	21=8'	48.3				26.2		
	9.1		3.5		9.4 59'	13"=17	52.0				29.6		
	13.2		7.1		13.0		55.6				33.5		
	86.5		119.9		89.6		241.8				130.5		
						6° 44'=42					26.10		
9	38	5.309	52	59.98	10	1	5.92	10	3	48.36	10	12	26.10
		-.10		-.17			-.15			-.17			-.12
		+.32		+.20			+.28			+.26			+.31
		+.03		+.03			+.03			+.03			+.03
9	38	5.559	52	0.10	10	1	6.08	10	3	48.48	10	12	26.32
9	37	57.699	52	52.14	10	0	58.14			7.91	10	12	18.43
		+7.86		17.96			+7.94						+7.89
9	37	57.649	52	52.19	10	0	58.17	10	3	40.57	10	12	11.54

For the Moon, $\log \{ \rho \sin \pi \cos(\phi - \delta) \} = 8.1576$

$$\begin{aligned} \log A &= 9.9937 & f'I &= +7.221 \\ B &0.0165 & f''I &= +3.555 \\ \cos \delta &0.0053 & \phi'I &= -0.032 \\ F &0.0155 & \phi''I &= -3.508 \\ & & \phi'''I &= -7.236 \end{aligned}$$

$$48.321$$

$$48.355$$

$$48.268$$

$$48.492$$

$$48.364$$

$$1.800$$

$$48.360$$

$$\Sigma \epsilon^2 = 0.0274$$

Prob. Error of one Wier

$$= 0.056$$

Mean of Five

$$= 0.025$$

Nov. 7. 1860.

α Virginis

γ Bootis

52.7	3.9
56.4	7.4
0.0	11.2
3.4	14.6
7.2	18.6
119.7	55.7

13 17 59.94 13 48 11.14

faint

faint

$a = -21$
 $b = +31$
 $e = +.03$
Nov. 7. 1860
T.H.S.

Nov. 7/6

α Perseus	α Andromedae	γ Pegasi	α Virginis	η Bootis
135	14.4	17.9	55.1	6.0
174	18.7	11.6	58.7	9.7
20.8	22.5	15.1	2.4	13.4
24.1	26.3	18.6	5.6	17.0
27.8	30.6	22.3	9.2	20.8
103.6	112.5	73.5	131.0	66.9
23 52 20.72	0 1 22.50	0 6 19.10	13 18 2.20	13 48 13.38
	-08	-15		
	+34	+28		
	+03	+03		
0 1 22.79	0 6 15.26			
0 1 13.72	6 6.08			
+ 9.07	+ 9.18			

Nov. 7/8 cont.

2 Book's

21.2

25.1

28.9

32.2

36.4

143.8

14 9 28.76

 Σ_{92} 0.1044

Nov. 8
J.H.S.
d. coronae

θ Ceti

η Piscium

γ Paj.

8/9

α Bootis

19.7

10.6

8.7

8.1

53.6

14.2

12.2

12.0

57.5

17.7

15.9

15.7

1.3

21.1

19.4

19.0

6.5

24.7

23.0

23.0

167.6

88.3

79.2

77.8

15 28 57.52

1

17

1766

1

24

15.84

13 14

15.56

$\Sigma \approx 0.0260$

Mr. 8/9 cont.

2 Bouts

Blutau min.

285

22

275

rept.

(2.2)

30.9

15.0

26.5

28.3

38.5

42.2

154.9 14

14 9 3094 14 51 1467

- 0.12

- 0.01

+ 0.13

+ 0.09

+ 0.21

+ 1.03

21.16

15.18

18.45

29² 11.1244

Nov 9

HU

all Ear
J.H.S.

β Cephei

ϵ Pegasi

γ Draconis

41.7	27.9	22.5
52.2	31.4	18.2
2.7	34.8	33.9
12.2	38.3	39.0
22.9	42.0	45.1
131.7	174.4	168.7

21 27 2.34 21 37 34.88 17 5.3 33.74

- 0.42
- 0.04
+ 0.21
24.51
24.20

h m
14 42
A. 68.4
B. 63.4
C. 59.1

Dec. 12/13.

 β Urae min

Thermometers in the clock.

A above - B on the back of the machinery

C near pendulum spring

At 14.43

Ther. A 68.4

B 63.4

C 59.1

Floor

67.1

64.0

60.3

Sawd put on at

15^h. 0^m

Nov. 13 1860. J.H.S.

Nov. 14 J.H.S.

<i>L. Pici australis</i>			<i>K. Picius</i>			<i>a. Pizani</i>			<i>γ Ursae maj</i>			<i>α Bootis</i>		
		10.4						3.4			11.3			31.4
		14.6						7.0			17.1			35.3
		18.1						10.6			22.4			38.9
		22.1						14.0			27.7			42.5
22	50	26.7				22	58	17.7			33.2			46.3
		2.7						2.7			111.7			194.4
22	50	18.54				22	58	10.54	B	42	22.34	14	9	38.88
		-0.33						-0.14			+0.06			-0.13
		+0.11						+0.29			+0.49			+0.31
		+0.03						+0.02			+0.04			+0.03
22	50	18.35				22	58	10.71	13	42	22.93	14	9	39.09
	49	58.79					57	51.15		42	2.43		9	18.52
		19.56						19.56			20.50			20.57
											2.48			18.58
										42	2.48			18.57
		19.47						19.49			28.45			10.52

Z_{9v}At 23^h 5^m

See also Mer. Cir. Book

0.0104

A 66.6
B 63.1
C 61.0

At 14^h 27^m
A 56.0
B 53.4
C 52.0

8/12 Nov. 13/14 continued
 & Berlin

6.4
 10.6
 14.4
 18.2
 22.3

14 39 14.38
 -0.09
 +0.05
 +0.03
 14 39 14.67
 38 54.00
 20.67

16.7

A 60.7
 B 56.1
 C 56.2

~~16.7~~ 50.0

J.H.P. 1860 Nov. 14th

α Cygnae	ϵ Andromedae	γ Pegasi	ϵ Perseus
24.5	26.7	20.1	
29.1	30.8	23.7	3.1
33.6	34.8	27.3	6.6
37.8	38.5	30.7	10.0
42.5	42.6	34.5	13.7
167.5	173.4	136.3	8.75
			-1.75
18 32 33.50	0 1 34.68	0 6 27.26	0 56 6.60
-0.02	-0.02	-0.15	-9.17
+0.41	+0.35	+0.29	+0.27
+0.03	+0.03	+0.02	+0.02
18 32 33.92	0 1 34.98	0 6 27.42	0 56 6.72
18 32 12.86	1 13.66	6 6.03	55 45.37
+21.06	+21.32	+21.39	+21.35
13.01	13.70	4.15	
20.91	21.28	21.27	

 $\Sigma \alpha = 0.0153$

Alt 18^h 30^m
 A 65.0
 B 60.1
 C 58.0

Alt. 0 55^m
 62.5
 61.0
 59.9

Alt. 6^h 10^m
 61.0
 59.5
 58.

Nov 14/15
 Alt 14 35
 47.3
 53.3
 52.2

(Nov 15)
 Alt. 16.24
 A 56.8
 m 58.6
 C 56.0

1860 Nov. 15 THS.

15/16

15

 α Lyrae α Persei α Virginis η Ursae majoris α Bootis

		39.7	8.8	15.0	35.3
		45.1	12.6	20.5	39.1
35.46	35.2	50.4	16.1	26.1	42.7
35.06	39.4	55.3	19.4	31.5	46.2
35.16	44.2	1.0	23.0	36.9	50.1
		191.5	79.9	130.0	213.4

18	32	35.16	3	14	50.30	13	16	15.98	13	42	26.00	14	9	42.68
		- 0.02			+ .06			- 0.24			+ .06			- .12
		+ 0.41			+ .49			+ 0.20			+ .50			+ .31
		+ 0.03			+ .04			+ 0.02			+ .04			+ .03
18	32	35.58	3	14	50.89	13	18	15.96	13	42	26.60	14	9	42.90
		12.91			27.45		17	51.77			2.47		9	18.55
		+ 22.67			+ 23.44			24.19			24.13			24.35

 Σ 0.0700 (2) Σ 0.0724

M 3 10

M 13 55

A. 63

A. 58

B. 62

B. 53

C. 60

C. 54

1860
Nov 15/16 TH

e Bochi

10.0

14.1

18.0

21.7

26.0

89.8

14 39 17.96

- .09

+ .35

+ .03

14 39 18.25

38 56.02

24.23

Nov. 16 eve.

A 3^d above C.

Nov. 17 at 21^h

A 67^h

B 63

C 64

Nov. 16. 1860

$$a = -0.45$$

$$b = +0.28$$

$$c = +0.06$$

A.U.		" "		" "		" "		" "		" "	
Lysai		β Lysai		Moon TO		δ Aquila		α Cygni			
	28.2		12.0		52.8		46.5		55.5		
	32.6		16.3	-23°	38=δ 56.8		50.1		0.6		
	37.0		20.3	-24	31=δ' 0.8		53.6		5.4		
	41.6		24.3	57'	9"=π 4.5		56.9		10.0		
18	32	18	45	28.6	19	1	8.6	19	19	20	37
	185.1		101.1		123.5		207.7		86.8		
				7°	20'=Δ						
18	32	18	45	20.30	19	1	0.70	19	18	20	37
	- .03		- .09		- .43		- .29		+ .03		
	+ .36		+ .33		+ .12		+ .22		+ .39		
	+ .08		+ .07		+ .06		+ .06		+ .08		
18	32	18	45	20.61	19	1	0.45	19	18	20	37
18	32	18	44	55.99				19	18	20	36
	+ 24.62		+ 24.62						+ 24.56		+ 24.69
n =	+ 0.46										
c =	+ 0.06										
n by δ	0.37		0.30		- 0.20		0.02		+ 0.46		
c by δ	0.08		0.07		+ 0.07		0.06		- 0.08		
	37.55		20.67	19	0.57		53.62		5.90		
	12.89		55.99				28.97		41.17		
Alt + m	24.66		24.68				24.65		24.73		
Rak	0.04		0.07				- 0.02		- 0.13		
	24.62		24.66				24.63		24.68		
Comp.	24.82		24.64		24.66		24.68		24.79		
Obs. R	12.93		56.03	19	0 35.91		28.94		41.11		

For the Moon $\log \{ p \sin \pi \cos(\psi - \delta) \} = 7.8324$

a by p by q

$$\log A = 9.9971$$

$$B = 0.0180$$

$$\sec \delta = 0.0380$$

$$\log F = 0.0531$$

$$f''F = +7.874$$

$$f''F = +3.876$$

$$\phi''F = -0.035$$

$$\phi''F = -3.826$$

$$\phi'''F = -7.890$$

$$0.674$$

$$0.676$$

$$0.765$$

$$0.674$$

$$0.710$$

$$3.499$$

$$0.700$$

$$\Sigma \epsilon^2 = 0.0063$$

Prob. Error of one Wire

$$= 0.027$$

Mean of Five

$$= 0.012$$

1860 Nov 17/18 - 18/19

Nov 17/18 $EC = 13^h 54^m$
 Lower Tm 54.0 in Stone Clock Case

Upper 58.0 in glass cover

Nov 18/19 - Lower Tm 52.5 at $12^h 58^m$

Upper 56.5

1860 Nov. 19.

 $\alpha - 0.64$
 $\beta + 0.29$
 $\gamma + 0.06$
 γ Praecium κ Praecium ϵ Praecium γ Cephei

21.8

12.7

12.4

25.4

16.2

15.9

28.9

19.7

19.5

32.2

23.0

22.8

25.0

35.9

26.6

26.4

41.8

144.2

98.2

97.0

23 10 28.84

23 29 19.64

23 33 19.40

23 34

-0.29

-0.30

-0.27

+0.22

+0.22

+0.23

+0.06

+0.06

+0.06

23 10 28.83

23 20 19.62

23 33 19.42

9 58.27

19 49.39

32 49.13

30.26

30.23

30.29

30.40

M 23^h 50^m
 A 63.5
 B 61.6
 C 60.3

1860 Nov 19/20		All		Ill. East		JHS	
2 Boobis		β Leonis		γ Ursae Maj		Polaris SP	η Ursae Maj.
42.6		22.2		48.6	13	5 55.6	22.7
46.5		25.8		54.8	7	29.3	28.4
50.2		29.4		0.9	9	45.4	33.7
53.7		32.9		6.7	12	4.5	38.9
57.6	"	36.6	"	12.9	14	28.9	44.5
250.6		146.9		123.9	#	113.7	168.2

14	9	50.12	"	42	29.38	"	47	0.78	13	9	46.74	13	42	33.64
----	---	-------	---	----	-------	---	----	------	----	---	-------	----	----	-------

$+13.76$
 -6.91
 $+2.28$
 $13 \ 9 \ 55.97$
 Let α' denote the
 first contact with the
 wire α' the bisection
 α'' the last contact.
 The time given above
 is

$$\frac{\alpha' + \frac{1}{2}(\alpha' + \alpha'')}{2}$$

See Redhill Catalogue.

J. H. S.

Should follow η
Ursae Maj.

JHS

$\Sigma \alpha' = 0.0184$

The effect of wrapping upper part of Clock in thick shawls has been to reduce the dif. between the upper & lower θ by 3° & it has varied only from Upper - Lower $= +3^\circ$ to Upper - Lower $= +6^\circ$

After the above obs. the clock may have been prevented from escaping one or two beats in trying on paper pattern for mat.

— Lost 2. ✓ —

11^h 41^m Sid 19/20

Lower θ 53.0 In Stone clock case
 Mid. 56.8 in Glass Case
 Upper 58.0

19^h

Lower 60
 Mid
 Upper 64

Took off Woolen cloth - They have been over the Clock constantly for a week past.

1860 Nov 20th

$$a = -0.44$$

$$b = +0.30$$

$$c = +0.06$$

1 Aquarii	4 Aquarii	5 Aquarii	C.I.	7 Aquarii
19.5	53.9	4.7	21.9	36.9
23.3	57.4	8.3	-6° 26' 8" 25.5	40.5
26.9	1.1	11.7	-7 7=8' 29.0	44.0
30.2	4.3	14.9	54' 29" = 11 32.4	47.5
34.2	8.0	18.5	36.2	51.0
134.1	124.8 6.44	58.1	145.0	219.9
			5° 36' = 42	
22 0 26.82	22 11 0.94	22 23 11.62	22 24 29.00	22 29 43.98
21 54 56.10	22 9 30.38	22 21 2 40.96		22 28 13.40

$$n = +0.45$$

$$c = +0.06$$

ntg d	-0.12	-0.07	-0.01	-0.06	-0.01
ctd	+0.06	+0.06	+0.06	+0.06	+0.06
	26.76	0.93	11.62	22 24 29.00	44.03
dt+m	+30.66	30.55	30.71		30.63
trap:	30.62	30.64	30.65	30.65	30.66

For the Moon $\log \{ \sin \pi \infty (\phi - \delta) \} = 8.0195$

$$\log A = 9.9954$$

$$B = 0.0137$$

$$\log D = 0.0028$$

$$\log F = 0.0119$$

$$fF = +7.162$$

$$f''F = +3.524$$

$$\phi F = -0.032$$

$$\phi'F = -3.479$$

$$\phi''F = -7.176$$

$$\Sigma s^2 = 0.0123$$

$$\text{Prob. Error of one way} = 0.037$$

$$\text{Mean of Five} = 0.017$$

At 3 P.M. removed wooden coverings from the clock case and put on at 5 P.M. a second glass cover outside of the one which had previously been used.

21^h 20^m Upper thr horizontal - The bulb 3 inches above the suspension springs of pendulum - Middle thr - 8 in below springs
Lower thr. at lower part of pendulum centre of mercury & inside of stone clock case

21 ^h 20 ^m	Upper	59.5	61.5	} Clock has been uncovered for two hours.
	Middle		60.8	
	Lower		59.5	

Nov. 20/21

α Piscis australis	α Pegasi	ϵ Bootis	β Ursae min:	α Coronae
21.6	14.3			
25.8	17.9			
29.9	21.5			
33.6	25.0			
37.8	28.6			
148.7	107.3			

22 51. 29.74 22 59 21.46

22 49 58.69	22 57 51.06
- 0.49	- 0.21
+ 0.10	+ 0.27
+ 0.07	+ 0.06
- 0.27	+ 0.12
+ 0.07	+ 0.06
29.54	21.64
30.55	30.58
30.68	30.70

At 1^h 30^m A 59
 B 56.5
 C 58.

About 9^h 30^m P.M., glass cover again removed and some change made in the escapement.

The clock lost 2^s between noon and 6 P.M. and gained 2^s between 6 and 10.

No shawls on 2 Glap covered

At 12^h 57^m A.M. Nov. 20/21 59.8 = A.
 52.8 = B.
 50.2 = C.

1860 Nov 21st

Nov 21/22

2 Glass covers without shawls

23^h 20^m

Lower

59 2

11^h 7^m

49.0

lateral

15^h 30^m

12" diff.

Mid.

61 8

49.5

Upper

62 9

51.0

Shawl put on.

$$a = -0.44$$

$$b = +0.30$$

$$c = +0.06$$

A.H. Nov 22 1960

OA East-

α Ursae S.P.	α Regni	γ Pictum	κ Pictum	158 Johnson
30.4	20.5	26.3	19.3	23 26 26.0
38.3	26.2	32.0	22.8	27 26.0
45.7	27.8	35.4	26.2	28 21.2
52.6	31.1	38.7	29.7	29 17.3
0.5	34.9	42.4	33.2	30 18.0
167.5	138.5	176.8	131.3	108.5
22 55 45.50	22 56 27.70	23 10 35.36	23 20 26.24	23 28 21.70
-.92	-.22			
-.17	+.27			
-.13	+.06			
22 55 44.28	22 58. 27.81			
22 55 7.85	22 57 51.03	58.44	49.35	
+36.37	36.78			

$n = 0.33 \pi$				
$c = 0.06$				
atm - 0.63	+0.09	+0.01	0.00	23 27 49.79
rad - 0.13	+0.06	+0.06	0.06	+9.94
44.74	27.85	35.43	+26.30	-2.76
at+m +36.89	+36.82	36.99	36.95	-0.02
comp. 36.96	36.96	36.98	36.99	-4.07
				23 27 52.88

2 Glap cases - without Clotus -

Lower str rose gradually all day but the upper was at one time 12° higher than the lower.

At noon (15^h 30 Sid) put on shawl to top only of outer glap.

Nov 22 20 ^h 35 ^m	upper	65.8	At 2 ^h 0 ^m	58.0 upper.
	mid	64.2		
	lower	59.5		54.5 lower.

Nov 22 1860

μ Picum	γ Aphae	δ Sculptoris	ζ I.	ω Picum
18.9		11.5	20.7	41.3
22.6		15.6	24.3	45.0
26.0		19.5	+ 4° 5' = δ 27.8	48.4
29.4	+ 0.3	23.3	+ 3 32 = δ 31.2	51.9
33.1		27.5	54' 9" = π 35.1	55.6
130.0		97.4	139.1	242.2
			5° 30' = Δ	
23 33 26.10	23 34	23 42 19.48	23 51 27.82	23 52 48.44
				+ 26
				+ 25
				+ 06
				23 52 48.49
				23 52 11.60
				36.89
49.10		42.10		
+ 0.03	-	-0.18	+0.02	+ 0.03
+ 0.06		+ 0.07	+ 0.06	+ 0.06
26.09		19.37	27.90	48.53
st + m 36.99		37.27		36.93
Comp. 36.98		36.99	37.00	36.93

For the Moon by $\{p \sin \pi \cos(\phi - \delta)\} = 8.0925$

$$\log A = 9.9946$$

$$B = 0.0134$$

$$\text{Red } 0.0011$$

$$H' = 0.0091$$

$$f.F = +7.115$$

$$+3.503$$

$$-0.032$$

$$-3.457$$

$$-7.130$$

$$27.815$$

$$27.803$$

$$27.768$$

$$27.743$$

$$27.970$$

$$4.099$$

$$27.820$$

$$\Sigma \epsilon^2 = 0.0314$$

$$\text{Prob Error of one wire} = 0.060$$

$$\text{Mean of Five} = 0.027$$

Nov 22

Nov 22/13

α Andromedae

93 Johnson L.P.

42.4

10 38.0

46.5

12 51.6

50.3

14 56.2

54.1

17 5.3

58.4

0 19 20.2

51.7

171.3

93 Johnson Vol. XVI.

1860.0 $AR = 12^h 14^m 20.96$ Dec + 88° 28' 33.5" $\log a = 0.39824n$ $\log a' = 8.86976$ $" b = 9.19546n$ $" b' = 9.99900n$ $" c = 8.85994n$ $" c' = 1.30139n$ $" d = 0.39808n$ $" d' = 8.79637$

158 Johnson

1860.0 $AR = 23 27 49.79$ Dec + 86 32 5.2 $\log a = 0.03828$ $\log a' = 9.21977$ $" b = 9.18839n$ $" b' = 9.99491$ $" c = 8.23502n$ $" c' = 1.29795$ $" d = 0.03749$ $" d' = 9.14582$

+ 0.14

12 14 20.96

+ 0.07

- 22.76 + 0.6

50.59

- 2.80 - 17.8

37.01

- 0.09 - 23.2

36.97

+ 9.33 - 0.4

12 14 10.42

+ 1.5

+ 17.7

+ 23.4

- 0.5

For Nov 22 93 Johnson

 $\log A$ 0.9580 - 22.71

B 1.2525 - 2.80

C 0.0706 - 0.09

D 0.5713n + 9.32

- 16.28

Other case only

14 16 30 $\log A$

59 C.

Other case removed.
Inner restored.

Nov. 23/24 1860 ME.
~~27~~ Corona

17.4
 23.4
 27.4
 31.0
 35.1
 136.3

15 29 27.26
 28 47.22

4 d
 20 d

$\Sigma \alpha$ 0.0180

A 15^h 10^m 12. A 13
 C 57

-0.43
+0.26
+0.05

Nov. 24. 1869

Nov. 24

Nov 24/25

Nov 25th

2 Lyrae

γ Aquilae

42.2	12.2
47.7	15.8
53.7	19.4
58.5	22.7
64.0	26.6
205.6	96.7

18 32 53.12	19.34
-0.03	-0.28
+0.03	+0.07
+0.06	+0.05
18 32 53.68	19.53
12.79	38.64
40.69	40.89

28
19
32
16
30

Σv 0.0072 Not very good. 0.50390

Sid. = 3 ^h 45 ^m	Upper Tr	51	24/25	Getting colder through night -	25 th	0 ^h 27 ^m	Sid.
	Mid	50	13 10	39.5			38.5
	Lower	48		37.8			36.0
				37.0			37.2

Nov 25/26

Nov 26/27

A

Comparison of EC & MC.

Nov 26,

EC = 18 38 25.8
 236 = 18 41 10.0

MC 2 19 0
 236 18 45 39.2

EC 17^h 15^m

Upper

58.6

Mid

50.0

Lower

52.0

Was at 39° through night all the Yrs nearly-

Nov 26/27 20^h 50 Sid. Up

Warm through night

13

Mid

59

Lower

54

Nov. 24. 1860

$$a = -0.43 \quad \text{ref } +3m \quad \phi$$

$$b = +0.26$$

$$c = +0.05$$

A.U.

Ill. East

ϵ Piscium	Polaris	Moon TO	η Piscium	BAC 477
19.2	4 40.8	1 0.3	1 38.3	59.3
$+7^{\circ} 9$ 23.0	—	1 4.0	$+14^{\circ} 38$ 42.2	3.0
26.6	9 19.4	$+14^{\circ} 9 = 8$ 7.4	45.8	6.4
29.8	—	$+13^{\circ} 24 = 8$ 10.9	49.2	10.2
0 55 33.4	1 14 2.8	1 22 14.8	1 24 52.9	1 29 14.0
132.0	63.0	$54' 28'' = \pi$ 37.4	228.4	92.9
		$5^{\circ} 55' = 112$		
0 55 26.40	1 9 21.00	1 22 7.48	1 24 45.68	1 29 6.58
45.32			4.46	25.42
- .26			- .20	
+ .21			+ .23	
+ .05			+ .03	
26.40			45.76	
41.08			41.30	

$$a = +0.24$$

$$c = +0.05$$

+0.03	+0.06	+0.06	+0.07
+0.05	+0.05	+0.05	+0.05
2648	1 22 7.59	45.79	6.70
41.16		41.33	41.28
Comp. 41.27	41.31	41.31	41.32

For the Moon $\log \{ p \sin (\pi \sin (\phi - \delta)) \} = 8.1450$

A 9.9939	$f'F = +7.325$
B 0.0144	+3.606
Less δ 0.0134	-0.033
F 0.0217	-3.559
	-7.340

7.625
7.606
7.367
7.341
7.460
7.480

$$\Sigma \epsilon^2 = 0.0694$$

Prob Error of one Wile = 0.089

Mean of Five = 0.040

Nov. 24. Clear instantly and had observing
A.U.

Nov 24

A.U.

Ill. Ear

v Picum

 β Triet α Triet

47.9

33.3

56.1

51.6

37.2

59.8

54.9

40.9

3.6

58.3

44.5

7.2

1 35

81.9

1

47

48.3

2

0

11.1

214.6

204.2

137.8

1 34

54.921

47

40.842

0

3.56

13.54

55.65

22.25

+ 0.02

0.09

+ 0.10

+ 0.05

0.05

+ 0.05

54.99

40.98

3.71

41.45

41.33

41.36

41.32

41.34

41.36

Nov. 25.

$$a = -0.43$$

$$b = +0.24$$

$$c = +0.05$$

Ill. Ear

A.U.		Polaris		γ Piscium		BAC 477		ν Piscium		β Hædæ	
4	35.8			41.4		2.2		50.9		36.2	
7	4.7			45.1		5.9		54.2		40.0	
9	18.2			48.6		9.5		57.6		43.7	
11	29.7			52.0		12.9		61.1		57.2	
1	13	57.3	1	24	55.7	1	29	16.8	1	34	04.8
		45.7			24 2.8			47.3			168.6
											228.2
1	9	21.14	1	24	48.56	1	29	9.46	1	34	57.72
					4.45		28	25.41			13.54
										47	43.64
											59.65

$$n = +0.20$$

$$c = +0.05$$

		+ 0.08		+ 0.09		+ 0.02		+ 0.11
		+ 0.05		+ 0.05		+ 0.05		+ 0.05
		48.69		9.60		57.79		43.80
at + m	+	44.26		44.19		44.25		44.15
		44.22		44.22		44.23		44.25

Nov. 25. very good observis after two or three fine stars

A.H.

Nov 25

$$a = -0.43$$

$$b = +0.24$$

$$c = +0.05$$

Ill. Part

AK
2 Ariels

Moon TO

27 Ariels

μ Ariels

		58.8		48.8		50.6		10.6
		2.6 + 18°		29' = 8 52.7		54.4		14.3
		6.3 + 18		3 = 8' 56.3		58.1		18.1
		10.0 54'		49" = π 0.0		1.6		21.7
2	0	14.0	2	11 3.9	2	24 5.3	2	35 25.6
		91.7		161.7		170.0		90.3
				6° 18' = Δ²				
2	0	6.34	2	10 56.34	2	23 58.00	2	35 18.06
		22.35				23 13.86		34 33.87
		-1.16						
		+1.24						
		+1.01						
		6.47						
		44.12						

$$\begin{array}{r}
 +0.13 \\
 +0.05 \\
 \hline
 6.52 \\
 +44.17 \\
 \hline
 44.26
 \end{array}$$

$$\begin{array}{r}
 +0.60 \\
 +0.05 \\
 \hline
 56.69 \\
 44.28 \\
 \hline
 44.28
 \end{array}$$

$$\begin{array}{r}
 +0.09 \\
 +0.05 \\
 \hline
 58.14 \\
 44.28 \\
 \hline
 44.28
 \end{array}$$

$$\begin{array}{r}
 +0.10 \\
 +0.05 \\
 \hline
 78.21 \\
 44.34 \\
 \hline
 44.34
 \end{array}$$

For the Moon by $\{ \sin \pi \cos(\theta - \delta) \} = 8.1637$

A 9.9936	+ 7.502	56.302
B 0.0155	+ 3.693	56.393
2C 0.0230	- 0.033	56.267
by E = 0.0321	- 3.645	56.355
	- 7.518	56.382
		1.699
		56.340

$$\Sigma \epsilon^2 = 0.0156$$

$$\text{Prob Error of one W in} = 0.036$$

$$\text{Mean of 7 in} = 0.016$$

Nov 28.

A.H.
γ Ceti

δ Ceti

		45.1			40.1
		48.6			43.7
		52.1			47.1
		55.5			50.4
2	36	59.1	2	55	54.1
		260.4			235.4

2	36	52.08	2	55	47.08
		7.79			2.73
					- .27
					+ .19
					+ .05
					47.05
					44.32

+ 0.01	+ 0.02
+ 0.05	+ 0.05
52.14	47.15
44.35	44.42
44.34	44.32

Nov. 26 M 2

Andromeda

51.3

55.7

59.4

3.6

7.7

177.5

O ϕ 59.50

13.54

45.96

Cloudy. observ. bad.

Nov 27 11 PM EC 3^h 30^m

Upper Arm = 68

Middle 67

Lower 63

Nov 27/28 7 AM EC 11 25

60.5

60

56.5

Nov 28 Noon EC 16^h 5^m

Upper 71.0

Mid 66.5

Lower 62.0

1860 Nov. 26. M. E.
J.H.S.

β Draconis

α Lyrae

52.4

19.5

58.3

24.5

4.0

29.4

9.3

34.1

15.4

39.3

139.4

146.8

17 28 2.88

20 37

29.36

+ 0.12

+ 0.02

+ 0.29

+ 0.24

+ 0.05

+ 0.04

17 28 4.34

20 37

29.66

27. 13.72

36

40.90

48.62

48.76

Σ

0.0134

Nov 28.

Ill. East

♂ Cygni		♂ Aquarii		♂ Cephei		♂ Pegasi		16 Pegasi	
	41.6		56.4		16.8		3.5		25.4
	45.7		0.0		27.2		7.0		29.4
	49.8		3.4		37.7		10.5		33.2
	53.6		6.8		47.2		13.9		36.9
21	7	21	25	21	27	21	38	21	47
	57.7		10.5		57.8		17.6		40.9
	248.4		77.1		186.7		52.5		165.8
21	7	21	25	21	27	21	38	21	47
	49.68		3.42		37.34		10.50		33.16
	-.11		-.31		+.55		-.23		+.14
	+.19		+.11		+.45		+.14		+.18
	+.03		+.03		+.09		+.03		+.03
21	7	21	25	21	27	21	38	21	47
	49.79		3.25		38.43		10.44		33.23
21	6	21	24	21	26	21	37	21	46
	1.06		14.52		49.68		21.74		44.47
	+ 48.73		+ 48.73		+ 48.75		+ 48.70		+ 48.76

Nov. 28. 62.7
 26. 1st 5th 61.5
 56.0

Nov. 26/19.

J. H. S.
α Bootis

1.1
5.0
8.8
12.4
16.3
43.6

14 10 8.72
-0.17
+0.17
+0.03

14 10 8.75
14 9 16.79

After α Bootis

Upper Tw = A 57°
Middle = B 56
Lower = C 51

Nov. 29.

T. 1

31

D.H.S.

 Σ Perium

29.4

33.0

36.4

39.8

43.6

182.2

0	56	36.44
		16

0	55	45.29
---	----	-------

41.25

After Σ Perium29th 11. Pdc

upper = 47.3

45

middle = 45.8

45

lower = 46.5

45

Nov. 28. 1860

$$a = -0.41$$

$$b = +0.17$$

$$c = +0.03$$

Ill. East

4th		2nd		2nd		2nd		2nd		Moon 110	
Tauri		Tauri		Tauri		Auriga		Auriga		Moon 110	
14.0		40.9		38.0		40.0		56.2			
17.8		44.6		41.7		44.1	+25°	58' 0.1			
21.5		48.1		45.6		48.4	+25°	33' 4.0			
25.0		51.6		49.4		52.3	56'	15" = 7.9			
28.7	4	55.4	4	53.3	4	56.6	4	59	12.0	5	
107.0		240.6		228.0		241.4		80.2			
								7° 25' = 12			
21	4	48.12	4	45.60	4	48.28	4	59	4.04	5	
20		58.92		56.50		59.10					
		-1.19									
		+1.16									
		+0.03									
	4	48.12									
		49.20									

$$n = +0.41$$

$$c = +0.04$$

+0.14	+0.12	+0.17	+0.26	0.20
+0.04	+0.04	+0.04	+0.04	0.04
21.58	48.28	45.77	48.59	4 59 4.28
49.31	49.36	49.27	49.49	
Computed 49.34	49.35	49.35	49.37	49.38

For the Moon $\log \{ \rho \sin \pi \cos(\phi - \delta) \} = 8.1952$

A 9.9932	f.I = +7.947	4.147
B 0.0182	+3.912	4.012
Dec 0.0457	-0.035	3.965
$\log F = 0.0571$	-3.861	4.039
	-7.963	4.037
		4.040

$$\Sigma \epsilon^2 = 0.0179$$

$$\text{Prob. Error of one Wire} = 0.045$$

$$\text{Mean of Five} = 0.020$$

29/30 8 A.M.

11 A.M.

Upper 43

45

Mid

Lower 42

45

On the 29th to 9 A.M. of 31st the
Upper & Lower thermometers differed only
1° and they varied only from 44° to 46°
Mean 45°

Dec 1st 9 A.M. to 3 P.M. average temp 47°

At 3 P.M. 47° 5' Noon 48°

1860phae.proj....34H

A.H.		M. Sair		M. Sair		M. Sair		M. Sair	
P. Tauri		P. Orionis		P. Leporis		P. Tauri		P. Aurigae	
2	14.0	38.6	20.0	4.1	7.1				
1	18.0	42.2	23.8	7.9	12.3				
0	21.9	45.8	27.3	11.7	17.3				
9	25.8	48.7	31.1	15.2	22.2				
0	5 18 29.9	5 25 52.6	34.8	19.2	27.3				
2	109.6	227.9	137.0	58.1	86.2				
4	5 18 21.92	5 25 45.58	5 27 27.40	5 30 11.62	5 7 17.24				
	32.65	56.23	37.96	22.57	28.29				
		reject.	- .37		+ .04				
			+ .09		+ .24				
			+ .03		+ .04				
			27.15		17.56				
			49.19		49.27				
	+0.22	0.00	- 0.12	0.16	0.42				
	+0.05	+ 0.06	+ 0.04	0.04	0.06				
	22.19	45.62	27.32	11.82	17.72				
	49.54	reject.	49.36	49.31	49.43				
	49.40		49.42	49.42	49.39				

