

KG
11365
349

018

Chronograph record.

Aug. 13, 1869
to

July 7, 1870.

3651 349

13

L.C.
—
ed

14

August 13 1869

Started 9^h 56^m

F. 3451 9^h 52^m 30^s 40^s 50^s 60^s

H. 301 0^h 52^m F. 3424 0^h 34^m

E. Clock 0^h 33^m N. Clock 10^h 10^m

Stopped 10^h 2^m Therm. 75 69

August 14 1869

Started 9^h 40^m Therm. 75¹/₂ 71

H. 301 0^h 27^m F. 3451 9^h 36^m

F. 3424 0^h 13^m Watch 0^h 11^m

E. Clock 0^h 15^m N. Clock 9^h 58^m

Stopped 9^h 48^m

Started 18^h 27^m

51 Cephei

β Lyrae & following star

γ Aquilae

Clouded up: chronograph worked
very ill.

Stopped 19^h 20^m

August 15 1869

Started 9^h 50^m Therm. 74¹/₂ 70¹/₂

H. 301 0^h 33^m F. 3451 9^h 46^m 0^s 10^s 20^s 30^s

F. 3424 0^h 18^m Watch 0^h 17^m

E. Clock 0^h 19^m Stopped 9^h 57^m

RG 11365, 349

August 16 1869

started $9^h 44^m$ Therm. $72\frac{1}{2}$ 67
 E. clock $0^h 5^m$ H. 301 $0^h 23^m$
 F. 3451 $9^h 41^m$ F. 3424 $0^h 7^m$
 Watch $0^h 7^m$ stopped $9^h 49^m$

August 17 1869

started $9^h 48^m$ Therm. 68 65
 F. 3424 $0^h 4^m$ Watch $0^h 5^m$
 H. 301 $0^h 25^m$ E. clock $0^h 8^m$
 F. 3451 $9^h 47^m$ stopped $9^h 54^m$

August 18 1869

started $9^h 50^m$ Therm. $66\frac{1}{2}$ $64\frac{1}{2}$
 E. clock $0^h 8^m$ H. 301 $0^h 20^m$
 F. 3451 $9^h 46^m$ F. 3424 $0^h 4^m$
 Watch $0^h 5^m$ stopped $9^h 56^m$

August 19 1869

Falmouth stopwater, started at
 $22^h 18^m$ mean time by East clock.
 stopped at $22^h 56^m$ by East clock.
 Gain of stopwatch (in 38^m) 2^s
 Corresponding gain in 1^m $0^s 035$

Gain $\frac{2}{3}$ of 1^m

$0^s 035$



This agrees with rate for same
 stopwatch determined by G. M. Searle in New York.

August 20 1869.

Therm. $74\frac{1}{2}$ $74\frac{1}{2}$ started $10^h 10^m$
 E. Clock $0^h 14^m$ H. 301 $0^h 33^m$
 F. 3451 $10^h 6^m$ F. 3424 $0^h 15^m$
 Watch $0^h 17^m$ stopped $10^h 16^m$

August 21 1869

Therm. 80 74 started $10^h 59^m$
 E. Clock $1^h 1^m$ H. 301 $1^h 19^m$
 F. 3451 $10^h 57^m$ F. 3424 $1^h 0^m$
 Watch $1^h 3^m$ N. Clock $11^h 8^m$
 stopped $11^h 8^m$

August 21 1869 4^h M.T. Observation for collimation.

Illumination East. Middle wire east of centre
 square of N. Meridian mark.
 Wire Mark.

126.5

125.7

129.5

127.0

126.0

Mean 126.94

85.90

41.04

85.8

86.2

89.0

82.4

83.5

86.3

85.8

83.2

87.7

89.1

Mean 85.90

Reversed to Illumination West

Aug. 28. 1869. continued
Wire east of mark
Wire Mark

27.5

27.8

27.4

26.9

27.4

Mean

27.40

38.76

27.40

11.36

38.0

38.0

39.4

39.2

39.3

38.7

38.8

38.8

38.4

39.0

Mean. 38.76

Reversed to Illumination East
Wire east of mark
Wire Mark

126.6

127.8

126.9

125.8

127.6

Mean

126.94

83.77

43.17

84.7

82.2

81.8

84.1

85.7

85.1

83.0

82.4

82.7

83.77

August 21 1869 continued

Illumination East. Wire east of mark $\begin{cases} 0^{\text{h}}.4104 \\ 0^{\text{h}}.4317 \end{cases}$
Mean $0^{\text{h}}.4210$

Illumination West. Wire east of mark $0^{\text{h}}.4136$
Half Difference $0^{\text{h}}.1537$

$1.000 = 2^{\text{s}}.324$ as determined June 2 1869

$c = +.357$ Illumination East.

$c' = +.34$ Illumination E. $c' = -.37$ Ill. W.

Aug. 22 1869

Level reading (Circ 215° 34' Cross Level E.) E 41 W 65-
started $17^{\text{h}} 53^{\text{m}}$

γ Draconis

μ Sagittarii

δ Ursae Min. (mean of beginnings of two
breaks on wire (2))

Level reading (Circ 215° 32' Cross Level W.) E 42 W 65-
 α Lyrae

β Cephei

β Lyrae & following star
stopped $18^{\text{h}} 47^{\text{m}}$

started $18^{\text{h}} 50^{\text{m}}$

F. 3424 $8^{\text{h}} 41^{\text{m}}$ Watch $8^{\text{h}} 46^{\text{m}} 15$

E. Clock $8^{\text{h}} 50^{\text{m}}$ H. 301 $9^{\text{h}} 8^{\text{m}}$

F. 3451 $18^{\text{h}} 51^{\text{m}}$ Watch $\& 53 21$
stopped S. Clock 19 0 9

August 27th 1869
 Started 18^h 55^m
 d Sagittarii Ill East
 d Draconis
 d Aquilae
 r Aquilae faint through clouds
 d " "
 d Draconis.

Chronograph run down

August 29 1869
 started 18^h 26^m

d Lyrae wires 1, 2, 5, (key not closing after wire 2)
 F. 3424 (had run down; started
 (at about 8^h mean time) 6^h 46^m

Watch 8^h 7^m 15^s

β Lyrae & following stars

F. 3451 18^h 45^m

H. 301 8^h 37^m

E. clock 8^h 21^m

ζ Aquilae
 stopped 19^h 2^m

Aug. 30 1869

Therm. 72 $\frac{1}{2}$ 66 started 10^h 11^m stopped 10^h 20^m
 E. clock 23^h 33^m F. 3451 10^h 7^m H. 301 23^h 54^m
 F. 3424 22^h 15^m Watch 23^h 37^m 15^s N. Clock 10^h 20^m

Sept. 2 1869

Therm. $64\frac{1}{2}$ started $10^h 47^m$ stopped
 E. Clock $0^h 2^m$ F. 3424 $22^h 41^m$
 F. 3451 $10^h 48^m$ Watch $0^h 6^m 15$
 H. 301 $0^h 26^m$

started $18^h 28^m$

2 Lyrae

51 Cephei

3 Lyrae & following stars

5 Sagittarii

50 Draconis

5 Aquilae

1st min. after 5 Aquilae $19^h 1^m$

Sept. 3 1869.

Therm. $63\frac{1}{2}$ $59\frac{1}{2}$ started $10^h 50^m$ stopped $10^h 55^m$
 E. Clock $0^h 0^m$ N. Clock $10^h 52^m$
 Watch $0^h 0^m 1^s$ H. 301 $0^h 20^m$
 F. 3424 $22^h 39^m$ F. 3451 $10^h 48^m$

Level readings

Circle reading $215^\circ 30'$ Cross Level East $\left\{ \begin{array}{l} 0^h 15^m \text{ to } 0^h 30^m \\ 0^h 30^m \text{ to } 0^h 40^m \end{array} \right\}$ E 49 W 73" " West $\left\{ \begin{array}{l} 0^h 40^m \text{ to } 0^h 52^m \\ 0^h 52^m \text{ to } 1^h 02^m \end{array} \right\}$ E 49 W 71Circle reading $324^\circ 15'$ Cross Level East $\left\{ \begin{array}{l} 1^h 0^m \text{ to } 1^h 10^m \\ 1^h 10^m \text{ to } 1^h 20^m \end{array} \right\}$ E 47 W 68" " West $\left\{ \begin{array}{l} 1^h 20^m \text{ to } 1^h 30^m \\ 1^h 30^m \text{ to } 1^h 40^m \end{array} \right\}$ E 48 W 66

Sept. 3 1869 continued.

$$\text{Object glass north, } b = \frac{281 - 195\frac{1}{2}}{120} = +0.712$$

$$\text{" " south, } b = \frac{268\frac{1}{2} - 190\frac{1}{2}}{120} = +0.650$$

$$m = b \sec \varphi = 0.681 \times 1.353 = +0.92$$

Sept. 4 1869

Therm. $66\frac{1}{2}$ to 61 started $11^h 5^m$ stopped $11^h 6^m$

E. Clock $0^h 10^m$ H. 301 $0^h 28^m$

F. 34451 $10^h 59^m 30^s$

Sept. 6 1869

Therm. $75\frac{1}{2}$ to $67\frac{1}{2}$ started $11^h 11^m$ stopped $11^h 15^m$

E. Clock $0^h 8^m$ H. Clock $11^h 12^m$

F. 3424 $22^h 45^m$ Watch $0^h 8^m 15^s$

F. 3451 $11^h 7^m$ H. 301 $0^h 29^m$

Sept. 7 1869

Therm. 76 to $70\frac{1}{2}$ started $11^h 7^m$ stopped $11^h 14^m$

E. Clock $0^h 2^m$ H. Clock $11^h 10^m$

H. 301 $0^h 21^m$ F. 3451 $11^h 4^m$

F. 3424 $22^h 38^m$ Watch $0^h 3^m 15^s$

Sept. 8 1869

Therm. $75\frac{1}{2}$ to 73 started $11^h 14^m$ stopped $11^h 20^m$

E. Clock $0^h 3^m$ Watch $0^h 2^m 15^s$

F. 3424 $22^h 38^m$ H. 301 $0^h 24^m$

F. 3451 $11^h 12^m$ H. Clock $11^h 20^m$

Sept. 9 1869

Therm. $78\frac{1}{2}$ $73\frac{1}{2}$ started $11^h 43^m$ stopped $11^h 48^m$ E. Clock $0^h 28^m$ N. Clock $11^h 43^m$ H. 301 $0^h 47^m$ F. 3451 $11^h 38^m$ F. 3424 $23^h 3^m$ Watch $0^h 29^m 15$

Sept. 10 1869

Therm. $76\frac{1}{2}$ 70 . Started $11^h 11^m$ stopped $0^h 39^m$ E. Clock $0^h 7^m$ N. Clock $11^h 26^m$ F. 3451 $11^h 20^m$ F. 3424 $22^h 39^m$ Watch $0^h 11^m 15$ H. 301 $0^h 31^m 30^s$

Sept. 11 1869

Therm. 71 66 started $11^h 33^m$ stopped $11^h 38^m$ E. Clock $0^h 11^m$ N. Clock $11^h 34^m$ F. 3451 $11^h 24^m$ H. 301 $0^h 30^m$ Watch $0^h 11^m 15$ F. 3424 $22^h 44^m$ Started $20^h 30^m$

observation of planet

O. edia & star

* precedes.

pos circle 211.4

5? sets

pos circle 301.4

5 sets

WB

Star

30 Sept

Sept 12 1869

comparison of WB 1260
with Asia (6)Camp Star S. pr planet
Pas circle 31.4

5 comparisons

Pas circle 121.4

5 comparisons

0 of Pas 76.4
stopped 20 h 28^m(Level determined Sept. 11 $\bar{m} = +.91$)

Sept 13 1869

started 11^h 36^m Therm 71 $\frac{1}{2}$ 67 $\frac{1}{2}$ stopped 11^h 44^mE. Clock 0^h 6^m N. Clock 11^h 39^mH. 301 0^h 27^m F. 3451 11^h 34^mWatch 0^h 9^m 15 F. 3424 22^h 41^m

Sept 14 1869

started 11^h 43^m Therm 72 65 $\frac{1}{2}$ stopped 11^h 53^mH. 301 0^h 27^m E. Clock 0^h 8^mN. Clock 11^h 45^m F. 3424 22^h 43^m

Sept. 15 1869

S. Clock	11	44	46	Therm.
E. Clock	0	41	20	
S. Clock	11	47	26	71½ 65
F. 3424	22	36	29½	
S. Clock	11	51	45	S. Clock 11 48 39
H. 301	0	30	29½	
				Watch 0 7 1

Sept. 16 1869

S. Clock	11	49	43	Therm.
E. Clock	0	5	20	
S. Clock	12	00	2	72½ 66½
E. Clock	0	15	26	
S. Clock	12	7	2	H. 301 0 52 34
F. 3424	22	51	30	
S. Clock	12	8	43	F. 3451 12 10 26½
Watch	0	23	1	
S. Clock	12	12	50	
H. 301	0	47	24	

Sept. 16 1869

started 19^h 14^m

J Aquilae
 B 236, 5^s intervals ending 19^h 28^m
 K Aquilae
 γ Aquilae
 δ "

2 unknown

Sept. 17 1869

Therm. 73.67 started 11^h 57^mE. clock 0^h 9^mN. clock 11^h 58^mF. 3451 11^h 52^mE. clock 0^h 12^mH. 301 0^h 31^m 30^sWatch 0^h 12^mF. 3424 22^h 42^m stopped 12^h 4^m

Sept. 18 1869

Therm. 69.64¹/₂ started 12^h 24^m stopped 12^h 29^mN. clock 12^h 24^mF. 3451 12^h 17^m 30^sE. clock 0^h 33^m 30^sF. 3424 23^h 2^mWatch 0^h 34^m (mean of 2 breaks)H. 301 0^h 34^m 30^s

Sept. 19 1869

started 20^h 3^mChron. B. 236 20^h 11^m (mean of 3 breaks)

K. Cephei (11 wires: wires 4 & 5 perhaps a little soon)

π Capricorni 5 middle wires

G. 3241 (11 wires: wire 6 perhaps a little late)

α Cygni 5 middle wires.

Sheet changed to regulate

Chronograph: least minute 20^h 24^m

Ty C 1879 (10 wires: A lost: too early by 0.4)

σ² Urs. Major 20.6. wire 4 (last wire)circuit broken after 21^h 5^mB. 236 21^h 13^m to 21^h 14^m

Sept. 19 1869 continued
1 Drac. (S.C.) [11 wires.]

~~B Cephei (11 wires)~~ 1st sheet replaced
Last minute $21^h 24^m$; 1st min. $21^h 26^m$

B Cephei (11 wires.)

11 Cephei (11 wires.)

stopped $21^h 43^m$

Watch $10^h 49^m 0^s$ S. Clock $22^h 48^m 30^s$

Sept. 21 1869

started $12^h 7^m$ stopped $12^h 16^m$

N. Clock $12^h 7^m$ F. 3457 $12^h 1^m$

E. Clock $0^h 5^m 48^s$ H. 301 $0^h 26^m$

F. 3424 $22^h 34^m$ Watch $0^h 9^m$

E. Clock $0^h 11^m$

Sept. 24 1869

started $12^h 22^m$ Therm. 69 $63\frac{1}{2}$ stopped $12^h 31^m$

N. Clock $12^h 24^m$ F. 3451 $12^h 17^m$

E. Clock $0^h 10^m$ F. 3424 $22^h 36^m$

Watch $0^h 12^m$ H. 301 $0^h 33^m$

E. Clock $0^h 15^m$

Level readings

Circle reading	$215^{\circ} 57'$	$2^h 10^m$ to $2^h 20^m$	E	$40\frac{1}{2}$	W	66
Cross Level East	$2^h 20^m$ to $2^h 30^m$	E	44	W	$63\frac{1}{2}$	
" West	$2^h 30^m$ to $2^h 40^m$	E	41	W	65	
Circle reading	$324^{\circ} 3'$	$2^h 40^m$ to $2^h 50^m$	E	41	W	$64\frac{1}{2}$
Cross Level East	$2^h 50^m$ to $3^h 00^m$	E	43	W	$61\frac{1}{2}$	
" West	$3^h 00^m$ to $3^h 15^m$	E	43	W	$60\frac{1}{2}$	
" "	$3^h 15^m$ to $3^h 30^m$	E	$29\frac{1}{2}$	W	64	
" "	$3^h 30^m$ to $3^h 40^m$	E	29	W	65	

Sept. 24 1869 continued.

Object glass north, $b = \frac{259 - 169\frac{1}{2}}{120} = +0.746$

" " south, $b = \frac{249\frac{1}{2} - 165}{120} = +0.704$

$\bar{m} = b \sec \delta = 0.725 \times 1.353 = +0.98$

started 19^h 56^m

Chron. B. 236 20^h 2^m (mean of 3 breaks)

~~20^h 10^m 10^s D Aquilae~~

K Cephei

Ti Capricorni

2 Delphini

yr. 3241

2 Cygnus

μ Aquarii

Chron. B. 236 20^h 55^m (mean of 3 breaks)

stopped 20^h 51^m

Sept. 25 1869

started 12^h 20^m Therm. 70 64¹/₂ stopped 12^h 27^m

N. clock 12^h 19^m E. clock 0^h 0^m

F. 34151 12^h 15^m F. 34221 22^h 29^m

Watch 0^h 5^m 13 H. 301 0^h 24^m

Sept. 27 1869

started 20^h 19^m stopped 21^h 4^m

B 236 49^m 0^s 5^s 10^s 8^m

Sept. 27 1869 continued
Level readings

Circle reading $215^{\circ}49'$

Cross Level East 8^h50^m to 9^h0^m E 53 W 72

" " West 9^h0^m " 9^h15^m E 52 W 74

Circle reading $324^{\circ}13'$

Cross Level East 9^h15^m to 9^h25^m E 60 W 65

" " West 9^h25^m to 9^h35^m E 45 W 80

Object glass north ~~Sept. 27 1869~~ $b = \frac{146 - 105}{60} = +0.683$

" " south $b = \frac{145 - 105}{60} = +0.667$

$m = k \sec \varphi = 1.353 \times .675 = +0.91$

Sept. 28 1869

started 12^h38^m Therm. $67\frac{1}{2}$ $57\frac{1}{2}$ stopped 12^h57^m

N. Clock 12^h40^m F. 3451 12^h35^m

E. Clock. 0^h11^m F. 3424 22^h37^m

Watches 0^h14^m H. 301 0^h34^m

E. Clock 0^h17^m

Sept 29 1869
started 23^h 8^m

Searching for asteroids

Started 1^h 30^m

Nothing observed

Sept. 30 1869

started 12^h 52^m Therm. 65-60

N. clock 12^h 55^m F. 2151 12^h 48^m

E. Clock 0^h 18^m F. 3424 22^h 44^m

H. 301 0^h 39^m Watch 0^h 20^m

E. clock 0^h 23^m stopped 13^h 4^m

Oct. 1 1869

started 12^h 50^m Therm. 68 61¹/₂

N. clock 12^h 51^m F. 3451 12^h 45^m

H. 30.1 0^h 30^m F. 3424 22^h 35^m

Watch 0^h 11^m E. clock 0^h 18^m

stopped 13^h 2^m

started 21^h 14^m

1 Drac (2-5); ϵ Sagittarii; Chron. 13.236 21^h 40^m; ϵ Pegasi;

stopped 21^h 43^m

Oct. 2 1869

started 13^h 29^m Therm. 70¹/₂ 63

N. Clock 13^h 30^m F. 3451 13^h 23^m

E. Clock 0^h 46^m H. 301 1^h 6^m

F. 3424 23^h 11^m Watch 0^h 47^m

E. Clock 0^h 50^m stopped 13^h 39^m

Oct. 4 1869

started 12^h 59^m Therm. 70 66

N. Clock 12^h 59^m F. 3451 12^h 53^m

E. Clock 0^h 8^m H. 301 0^h 28^m

Watch 0^h 9^m F. 3424 22^h 32^m

E. Clock 0^h 13^m stopped 13^h 9^m

started 16^h 33^m

Anemometer

Oct. 5 1869 (astro.)

started 9^h 21^m

Oct. 5 1869

started 21^h 48^m

Chron. B. 236 21^h 54^m (mean)

79 Drac.

α Aurigae

32 Uls. Major

π Aquarii (lost)

Chron. B. 236 22^h 52^m

started 22^h 49^m

Oct. 6 1869

started 13^h 13^m Therm. 65 58N. Clock 13^h 14^m Fr 34.51 13^h 17^mE. Clock 0^h 14^m H. 301 0^h 36^mWatch 0^h 17^m Fr. 3424 20^h 40^mE. Clock 0^h 20^m stopped 13^h 26^m~~Started~~ 20^h 43^m

μ squarii

γ Cygni

T. J. C. 1879 3-5

2nd Ur. Major6th Cygni both stars

5 Cygni

Chron. B. 236 21^h 16^mstopped 21^h 11^m

Level readings

Circle reading 215° 38'

Cross Level East 8¹/₄ to 8⁵/₁₂ E 62 W 72¹/₂" " West 8⁵/₁₂ to 8⁷/₁₂ E 56 W 82

Circle reading 324° 22'

Cross Level East 8⁷/₁₂ to 8³/₄ E 63 W 76¹/₂" " West 8³/₄ to 8¹¹/₁₂ 59 82Object glass north, $b = \frac{154\frac{1}{2} - 118}{60} = +.608$ Object glass south, $b = \frac{158\frac{1}{2} - 60122}{60} = +.608$ $m = b \sec \phi = 1.353 \times .608 = +.82$

Oct. 8 1869

started $13^h 20^m$ Therm. $61\frac{1}{2}$ 56
 N. Clock $13^h 20^m$ F. 3451 $13^h 14^m$
 E. Clock $0^h 13^m$ H. 301 $0^h 34^m$
 Watch $0^h 15^m$ F. 3424 $22^h 59^m$
 E. Clock $0^h 20^m$ stopped $13^h 31^m$

Oct. 9 1869

Therm. 63 57 started $13^h 20^m$
 N. Clock $13^h 20^m$ F. 3457 $13^h 12^m$
 E. Clock $0^h 7^m$ Watch $0^h 7^m$
 H. 301 $0^h 27^m$ F. 3424 $22^h 32^m$
 E. Clock $0^h 10^m$ stopped $13^h 26^m$
 started $20^h 38^m$
 Chron. B. 236 $20^h 47^m$

M. Aquarii
 V. Cygni

T. y. C. 1879 3-5

σ^2 Urs. May's

61' Cygni

5 Cygni

Chron. B. 236 $21^h 17^m$
 stopped $21^h 15^m$

Oct. 12 1869

Therm. 66 60 started 13^h 46^m
 N. clock 13^h 46^m F. 3457 13^h 38^m
 E. clock 0^h 22^m H. 301 0^h 41^m
 Watch 0^h 22^m F. 3424 22^h 47^m
 E. clock 0^h 26^m stopped 13^h 53^m

Oct. 13 1869

Therm. 63½ 60½ started 13^h 43^m
 N. clock 13^h 43^m F. 3457 13^h 35^m
 E. clock 0^h 46^m H. 301 0^h 35^m
 Watch 0^h 16^m F. 3424 22^h 41^m
 E. clock 0^h 19^m stopped 13^h 51^m

Oct. 16 1869

Therm. 65½ 60½ started 13^h 44^m
 N. clock 13^h 44^m F. 3457 13^h 37^m
 E. clock 0^h 5^m F. 3424 22^h 30^m
 Watch 0^h 5^m H. 301 0^h 25^m
 E. clock 0^h 9^m stopped 13^h 52^m

Oct. 17 1869

started 20^h 59^m

611 Cygni B. Cygni 485
 5 Cygni 11 Cygni
 2 Cephei Chron. B. 236 21^h 53^m
 3 Aquarii stopped 21^h 48^m

Oct. 17 1869 Level-readings.

Circle reading $215^{\circ} 56'$

Cross Level East $8^h 00^m$ to $9^h 5^m$ E 76 W 71

" " West $9^h 5^m$ to $9^h 10^m$ E 52 W 75

Circle reading $324^{\circ} 4'$

Cross Level East $9^h 10^m$ to $9^h 20^m$ E 54 W 72

" " West $9^h 20^m$ to $9^h 45^m$ E 52 W 76

$$\text{Object glass north } b = \frac{146 - 108}{60} = +0.633$$

$$\text{" " south } b = \frac{148 - 106}{60} = +0.700$$

$$m = b \sec \phi = 1.353 \times 0.666 = +0.90$$

Oct. 18 1869

started $11^h 36^m$

Watch $9^h 46^m 20^s$

Oct. 19 1869

Therm. $66\frac{1}{2} 59$

started $14^h 20^m$

N. clock $14^h 5^m$

F. 3451 $13^h 57^m$

E. clock $0^h 13^m$

Watch $0^h 14^m$

F. 3424 $22^h 40^m$

H. 301 $0^h 35^m$

E. clock $0^h 18^m$

stopped $14^h 13^m$

Oct. 21

1869

Therm. 66.58

started $14^h 10^m$

N. clock $14^h 11^m$

F. 3451 $14^h 3^m$

E. clock $0^h 13^m$

F. 3424 $22^h 40^m$

Watch $0^h 14^m$

H. 301 $0^h 36^m$

E. clock $0^h 19^m$

stopped $14^h 23^m$

Oct. 22 1869.

Therm. $66\frac{1}{2}$ $58\frac{1}{2}$ started $14^h 35^m$
 N. clock $14^h 35^m$ F. 3451 $14^h 27^m$
 E. Clock $0^h 31^m$ H. 301 $0^h 51^m$
 F. 3424 $22^h 58^m$ Watch $0^h 32^m$
 E. clock $0^h 35^m$ stopped $14^h 42^m$

Oct. 23 1869

Therm. $67\frac{1}{2}$ $60\frac{1}{2}$ started $14^h 11^m$
 N. clock $14^h 11^m$ F. 3451 $14^h 3^m$
 E. clock $0^h 3^m$ F. 3424 $22^h 28^m$
 Watch $0^h 2^m$ H. 301 $0^h 23^m$
 E. Clock $0^h 5^m$ stopped $14^h 16^m$

Oct 25 1869

E 6 Started $22^h 6^m$

A Aquarii

γ

π

9 Draconis 26

γ Aquarii

stopped $22^h 32^m$

Oct. 26 1869

Therm. $68\frac{1}{2}$ 59 started $14^h 34^m$
 N. clock $14^h 34^m$ F. 3451 $14^h 26^m$
 E. Clock $0^h 15^m$ H. 301 $0^h 34^m$
 F. 3424 $22^h 41^m$ Watch $0^h 16^m$
 E. clock $0^h 19^m$ stopped $14^h 42^m$

Oct. 27 1869.

started 14^h 27^m Therm. 65 61
 F. 3451 14^h 17^m N. Clock 14^h 27^m
 E. Clock 0^h 3^m H. 301 0^h 22^m
 Watch 0^h 3^m F. 3424 22^h 29^m
 E. Clock 0^h 7^m stopped 14^h 34^m

Oct. 29 1869

Therm. 62 56½ started 14^h 10^m
 N. Clock 14^h 40^m F. 3451 14^h 32^m
 E. Clock 0^h 9^m H. 301 0^h 30^m
 Watch 0^h 10^m F. 3424 22^h 37^m
 E. Clock 0^h 14^m stopped 14^h 48^m

Nov. 1 1869

Therm. 65½ 57½ started 14^h 55^m
 N. Clock 14^h 56^m F. 3451 14^h 47^m
 E. Clock 0^h 12^m H. 301 0^h 31^m
 F. 3424 22^h 39^m Watch 0^h 12^m
 E. Clock 0^h 16^m stopped 15^h 3^m

Nov. 4 1869

Therm. 64 61½ started 15^h 3^m
 N. Clock 15^h 3^m F. 3451 14^h 55^m
 E. Clock 0^h 9^m H. 301 0^h 28^m
 Watch 0^h 8^m F. 3424 22^h 37^m
 E. Clock 0^h 13^m stopped 15^h 11^m

Nov. 6 1869

Therm. 69 to $3\frac{1}{2}$ started 15^h 11^mN. block 15^h 13^m F. 3451 15^h 4^mE. block 0^h 11^m Watch 0^h 9^mN. 301 0^h 30^m F. 3424 22^h 37^mE. block 0^h 14^m stopped 15^h 21^m

Nov. 7 1869 Level readings

Circle reading $210^{\circ} 46'$ Cross Level East 7^h 10^m to 7^h 30^m E 68 W 79" " West 7^h 30^m to 7^h 45^m E 64 W 83Circle reading $324^{\circ} 27'$ Cross Level East 7^h 45^m to 8^h 0^m E 68 W 79" " West 8^h 0^m to 8^h 10^m E 64 $\frac{1}{2}$ W 82Object glass North, $b = \frac{162 - 132}{60} = +0.500$ " " South, $b = \frac{164 - 132\frac{1}{2}}{60} = +0.275$ $m = b \sec \phi = 1.353 \times 0.488 = +0.66$ started 23^h 27^m

c Piscium

γ Cephei 3, 4, 5

Gr. 4163 mean of breaks

w Piscium

d Androm.

4 Drac. 1, 2, 3 2^d of two breaks

γ Pegasi

stopped 0^h 10^m

Nov. 9 1869

Therm. $64\frac{1}{2}$ 56 started 15^h 25^m
 N. Clock 15^h 25^m F. 3451 15^h 18^m
 E. Clock 0^h 11^m F. 3424 22^h 39^m
 Watch 0^h 11^m 15 H. 301 0^h 32^m
 E. Clock 0^h 16^m stopped 15^h 34^m

Nov. 11 1869

Therm. $66\frac{1}{2}$ 57¹/₂ started 15^h 33^m
 N. Clock 15^h 34^m E. Clock 0^h 10^m
 H. 301 0^h 29^m F. 3424 22^h 37^m
 Watch 0^h 9^m E. Clock 0^h 14^m
 stopped 15^h 40^m

Nov. 12 1869

Started 0^h 8^m

Level readings

Circle reading 215° 46'

Cross Level East 8^h 40^m to 8^h 47^m E 74 71/82°West 8^h 47^m to 8^h 55^m E 70 71/89°

K Drac. 11 wires

α Cass. 14 "

β Ceti

32 Cam. both stars

Stopped 0^h 53^mStarted E Piscium stopped 0^h 58^m

Nov. 12 1869 continued
started 1^h 6^m

Polaris
stopped 1^h 20^m

Level readings

Circle reading $324^{\circ} 5'$

Cross Level East 9^h 55^m to 10^h 0^m E 75^W 82¹/₂

" " West 10^h 0^m to 10^h 10^m E 72^W 88¹/₂

Object glass north, $t = \frac{171\frac{1}{2} - 144}{60} = +0.458$

" " south, $t = \frac{172\frac{1}{2} - 147}{60} = +0.425$

$m = t \sec \phi = 1.353 \times 0.441^{60} = +0.60$

Nov. 13 1869

Therm. $64\frac{1}{2}$ 59 started 15^h 38^m

N. clock 15^h 39^m E. clock 0^h 7^m

H. 301 0^h 26^m Watch 0^h 15^m

F. 3424 22^h 35^m E. clock 0^h 11^m

stopped 15^h 46^m

Nov. 14 1869

I started for McLeans
at 3^h 40^m

2d sheet 5^h 55^m stop 8^h 3^m

3 " 8^h 10^m

2 meters in interval

Chronograph run down
and started again
which run up bet
9^h 35^m & 9^h 38^m
stopped 9^h 41^m

Nov. 14 1869 astron.
Started 10^h 48^m Watch 10^h 5^m
stopped 10^h 49^m

Nov. 15 1869
Therm. 65 $\frac{1}{2}$ 55 started 16^h 2^m
N. Clock 16^h 3^m E. Clock 0^h 22^m
H. 301 0^h 41^m F. 3424 22^h 50^m
Watch 0^h 20^m E. Clock 0^h 26^m stopped 15^h 13^m

Nov. 17 1869
Therm. 65 57 at 2

Nov. 18 1869 at 2

Therm. 64 57

Nov. 19 2 Therm. 63 53

Nov. 20 1869

Started 16^h 10^m Therm. 65 60 $\frac{1}{2}$ stopped 16^h 21^m
N. Clock 16^h 10^m E. Clock 0^h 15^m
H. 301 0^h 34^m F. 3424 22^h 45^m
Watch 0^h 13^m E. Clock 0^h 19^m

Nov. 20 1869 Level readings.

Circle reading $215^{\circ}37'$

cross Level East $8^{\frac{1}{4}}$ to $8^{\frac{1}{2}}$ E 69 W 79

" " West $8^{\frac{1}{4}}$ to $8^{\frac{1}{2}}$ E 65 W 183

Circle reading $324^{\circ}10'$

cross Level East $8^{\frac{1}{2}}$ to 9^h E 68 $\frac{1}{2}$ W 79 $\frac{1}{2}$

" " West 9^h to $9^{\frac{1}{2}}$ E 66 W 83

Object glass north, $b = \frac{162 - 134}{60} = +0.467$

" " south, $b = \frac{162\frac{1}{2} - 134\frac{1}{2}}{60} = +0.467$

$Qm = b \sec \phi = 1.353 \times 0.467 = +0.63$

started $2^h 59^m$

Nov. 21 1869 2^h Therm. 67 $60\frac{1}{2}$

started $2^h 54^m$

β Urs. Min.

α Ceti

48 Lacphai

δ Arietis

α Persei

stopped $3^h 20^m$

Nov. 22 1869

Therm. 66 $57\frac{1}{2}$ started $17^h 0^m$

N. Clock $16^h 59^m$ E. Clock $0^h 54^m$

Watch $0^h 51^m$ H. 301 $0^h 13^m$

F. 3624 $23^h 24^m$ I. Clock $0^h 56^m$

stopped $17^h 5^m$

Nov. 24 1869

Therm. $64\frac{1}{2}$ 60 started $16^h 29^m$
 N. Clock $16^h 27^m$ E. Clock $0^h 16^m$
 F. 34124 $22^h 47^m$ Watch $0^h 14^m$
 H. 301 $0^h 36^m$ E. Clock $0^h 20^m$
 stopped $16^h 37^m$

Nov. 25 1869

Therm. 64 58 started $16^h 22^m$
 N. Clock $16^h 20^m$ E. Clock $0^h 3^m$
 Watch $0^h 0^m$ H. 301 $0^h 22^m$
 F. 34124 $22^h 34^m$ E. Clock $0^h 16^m$ stopped $16^h 27^m$

Nov. 26 1869

Therm. 2 64 57

Nov. 27 1869

Therm. 63 59 started $16^h 40^m$
 N. Clock $16^h 38^m$ E. Clock $0^h 13^m$
 Watch $0^h 10^m$ H. 301 $0^h 32^m$
 F. 34124 $22^h 35^m$ E. Clock $0^h 17^m$
 stopped $16^h 45^m$

Nov. 28 1869

Therm. at $2\frac{1}{6}$ 60 $\frac{1}{2}$ 55

Nov. 29 1869

Therm. at 2 66 58

Nov. 29 1869 (astr.)

Therm. 70 62 started 15^h 43^m
 E. Clock 23^h 5^m H. 301 23^h 24^m
 F. 3424 21^h 38^m Watch 23^h 2^m
 E. Clock 23^h 9^m stopped 15^h 49^m

Dec. 2 1869

Therm. 66 57 started 17^h 4^m
 N. Clock 17^h 13^m E. Clock 0^h 19^m
 H. 301 0^h 38^m Watch 0^h 16^m
 F. 3424 22^h 53^m E. Clock 0^h 23^m
 stopped 17^h 11^m

Dec. 6 1869

Therm. 58 51 $\frac{1}{2}$ started 17^h 0^m N. Clock 16^h 58^m
 E. Clock 23^h 58^m H. 301 0^h 17^m
 F. 3424 22^h 37^m Watch 23^h 56^m

E. Clock Commence here for

Dec 9th 1869. Duxbury Coal-
 Started 0^h 41^m Campaign
 Transit etc

Polaris bl w. 1st 3 wires
 of lost tel wry had
 abs of no account

Level Lh W	85	92
	94	83
	179	175

Dec 9th 1869 Therm

3 Arctis m 7

50 Cassiope m 7

2 Arctis m 7

reversed to 2 p 8

65 Beti m 7

1 Cassiope m 7

Level	Sp	E	W	E
			103	87
			<u>87</u>	<u>103</u>
			190	190

7 Beti m 7

stopped

2 45

Dec. 11 1869

Therm. 54.48¹ started 17^h 36^mN. Clock ^{not} working E. Clock 0^h 16^m~~W. 301 0^h 35^m Watch 0^h 12^m~~W. 301 0^h 35^m F. 3424 23^h 2^mWatch 0^h 18^m E. Clock 0^h 20^mStopped 17^h 43^m

Cambridge class
Dec 6 14 18 68

Dux clock
break before 1^h 53^m
~~Dux 5^m break at 1^h 55^m +~~
stopped at 1^h 58^m

be clock on 1^h 20^m

out 2^h 6^m
Dux clock on 2^h 14^m 20^s
5-6^m break 15^m +
off 2^h 20^m +
stopped 2^h 21^m

1st m break D. Cl
in 1st set 1^h 53^m
in 2^d sets 2 14

Sheet no 2 2^h 51^m

	W	E	
Level of W	74	91	at 3 ^h 43 ^m
	85	80.5	
	159	171.5	-12.5

d Persia W 3 m to

r! no Min LC W 16, 321 AB

Level of W	at 92	86½	at 3 30
	80	99	
	172	181.5	-13.5

d Persia of W D. F.

y Lunn D. F.

3 No Min LC W F 8543

reversed to E

3 No Min E D E

Level of E	W	E	
	85	98.5	at 3 36
	95	88	
	180	186.5	-6.5

y Lunn E 3 m to

E Lunn E 5 to

L y E 5 to

Level of E	W	E	At
	99	88	
	85	103	
	184	191	-7.0

reversed to of W

2 Camelopard UG Sp W 5-7s at 12 h
 V Canis W 5-7s

Level Sp W $\begin{array}{r} 102 \\ 84 \end{array}$ $\begin{array}{r} 87.5 \\ 106.5 \end{array}$ at 5-2
 $\begin{array}{r} 186 \\ 194.0 \end{array}$ 8.0

11 Canis 5-7s
 stopped 5-4 2^m

Dec. 15-

started 1 42

3 Arctis W E 2385 F

50 Cassiope W B 62 E

Level Sp W $\begin{array}{r} 85 \\ 74 \end{array}$ $\begin{array}{r} 79 \\ 90 \end{array}$ at 5-7
 $\begin{array}{r} 159 \\ 169 \end{array}$ - 10.

a Arct 3 m 7s

65 Ceti W 3 m 7s very fit clouds

new start 3 h 15-m

Dux clock in 3 h 17^m 30^s +

Dux sent arbitrary signals
 for several minutes
 stopped at 3 28 30

Dec 15- 1869
 Be Clock in 31^m
 at 3^h 36^m
 arbitrary signals
 for several minutes

Day Clock break
 3^h 18^m

Level Lp W $\begin{array}{r} W \\ 93 \\ 80.5 \\ \hline 174.5 \end{array}$ $\begin{array}{r} E \\ 86 \\ 99 \\ \hline 185 \end{array}$ at 3 37
 10.5

x Larr Lp W 3 m 40

E " " "

reversed to Lp E

x Larr Lp E

Level Lp E $\begin{array}{r} 100 \\ 85.5 \\ \hline 185.5 \end{array}$ $\begin{array}{r} 86.5 \\ 101.5 \\ \hline 188 \end{array}$ at 3 2
 -2.5

stopped " 3 5^m

new sheet " 3 8

x Camillof Lp E 5 1/2 1/2 lost

11 Orionis E 3 m 1/2

2 Auringae E F E D
 B Orion E 3 m $\frac{1}{2}$ S. last
 Level H. E $\begin{array}{r} W \\ 103 \\ 87 \\ \hline 190 \end{array}$ $\begin{array}{r} E \\ 88 \\ 103 \\ \hline 192 \end{array}$ at 13^m
 - 2.0

20 B Lunn 3 m $\frac{1}{2}$
 Orion E 61 B
 stopped 5-4 31^m

Dec 17 1869.
 Started 23^h 31^m
 1 Piscium W F
 2 Cephei 26 W E 345- F
 2^d break on E₃ mean of two
 on 85-
 Level Lp W $\begin{array}{r} W \\ 84 \\ 71 \\ \hline 155 \end{array}$ $\begin{array}{r} E \\ 69 \\ 82 \\ \hline 151 \end{array}$ at 23^h 41^m
 W Piscium $\frac{155}{151} + 4$.
 W Piscium W 3 all $\frac{1}{2}$
 d Androm W F 21 E 3 m $\frac{1}{2}$
 4 Draco H 16 W 3 all $\frac{1}{2}$ F 21 E
 1 Peg W 3 all $\frac{1}{2}$
 4 Draco H W 621 B
 Run up 0^h 13 new start 1^h 17^m

Dec 17 1869

4' Ceti Sp W 3 m 40

A Cassiope W 3 m 40

γ Piscium W 3 m 40

Level Sp W $\begin{matrix} W & E \\ 83.5 & 78.5 \end{matrix}$ at $1^h 29^m$ $\begin{matrix} 75. & 87. \\ \hline 158.5 & 165.5 \end{matrix}$ -7.5

reversed to Sp E

δ Piscium Sp E

Level Sp E $\begin{matrix} 85 & 77.5 \\ 76 & 87. \end{matrix}$ at $1^h 42^m$ $\begin{matrix} 161 & 164.5 \\ \hline \end{matrix}$ -3.5

β Ariete E 3 m 40

γ Cass E 5 40

δ Ariete E F E D

δ Drae LC E D, E, F.

65 Ceti Sp E 3 m 40

Level Sp E $\begin{matrix} W & E \\ 86 & 77.5 \end{matrix}$ at $2^h 10^m$ $\begin{matrix} 78.5 & 85. \\ \hline 154.5 & 162.5 \end{matrix}$ -8.0

1 Cassiope Sp E F E

river to W

E 3 45 F

Dec 17 1869
 Level th W ^W ^E
 $\begin{array}{r} 84 \\ 75 \\ \hline 159 \end{array}$ $\begin{array}{r} 80 \\ 85 \\ \hline 165 \end{array}$ - 6.0

5- the clin LC th W E E

reversed to th E

5- the clin LC E E F

E lost in clouds

faint

Level th E ^W ^E at 35^m
 $\begin{array}{r} 86 \\ 76 \end{array}$ $\begin{array}{r} 77.5 \\ 88 \end{array}$

arctic th E 3 m

faint through clouds
 stopped 2^h 44^m

Dec. 20 1869

started - 18^h 16^m N. Clock 18^h 16^m
 E. Clock 0^h 20^m H. 301 0^h 38^m
 Watch 0^h 15^m F. 3424 23^h 11^m
 E. Clock 0^h 23^m stopped 18^h 21^m

Dec 22 1869

Therm 62.56 started 18^h 12^m N. Clock 18^h 12^m
 E. Clock 0^h 8^m H. 301 0^h 26^m
 F. 3424 22^h 59^m Watch 0^h 3^m
 E. Clock 0^h 12^m stopped 18^h 19^m

Telegrams recd from
Mr Goodfellow

1869 Dec 15- 4 40 P.M.

weather promising can send
you arbitrary signals this
evening clock slow in
first series $13^{\text{S}}.8$ in
second series $13^{\text{S}}.9$

Dec 16 4 15 P.M. cloudy
no chance to night
clock slow. at compar-
ison last night $2^{\text{S}}.90$.

mean of last $^{\text{S}}$ nine signals
sent $28^{\text{m}} 58^{\text{S}}.4$ clock time
Same for last five
signals received $40^{\text{m}} 54^{\text{S}}.76$

Dec 17 will not try to night
4 30 P.M. cloudy and un-
certain will wait till
weather is more settled

Dec 18 3 15 P.M. will
wait till Monday night
or a rain storm this P.M.

Dec 20 430 P.M. Weather
quite hozy but will be
ready to night at 9^h

5-15 P.M. Too cloudy
to exchange to night

Dec 22 445 P.M. SE rain
storm no chance to night
too cloudy here for work
last night after 8 P.M.

Dec 23 1869

Ther 66.2 59.0 at 145 P.M.

Started 1^h 26^m

Level of W 183.5 72 at 1^h 39^m
70 85.5
153.5 157.5
- 4.0

o Piscium lost

B Arietis W 3 m 45

50 Cassiopeia W 3 m 45

2 Arietis W BGD lost circuit [brake]

Level of W W E at 2^h 4^m
 88.5 79
 78 90.
 166.5 169
 -2.5

Reversed to E

65 Beti Cl E E 321 B [brake] lost circuit
 Level of E W E at 14^m
 87 81.5
 78.5 90.5
 165.5 72.0
 -6.5

1 Cassiope E 3 m 7s 1st break
 on 2d wire

5. No. Min 26 Cl E 3 m 7s [brake] lost circuit

8 Beti 3 m 7s partly lost circuit [brake]

B. No. Min 26 of E B E D

2 Beti of E 3 m 7s

Level of E W E at 3 3
 91.5 83.5
 82 93.
 173.5 176.5

3 Antares E 3 m 3.0 s

2 Persei of E 3 m 7s

Dec 23 1869 2 0.7
 Dux clock on 3^h 19^m +
 Dux sent arbitrary signals
 for several minutes
 beginning at 28^m +

Be clock on 3^h 34^m
 out 3 39
 arbitrary signals sent
 for two minutes

1st min break of Dux clock
3^h 20^m

Stopped 3^h 53^m

new sheet 4^h 0^m
 level of 8 $\begin{array}{r} 92.8 \\ 82.5 \\ \hline 174.5 \end{array}$ at 4^h 3^m
 $\begin{array}{r} 83 \\ 93 \\ \hline 176 \\ -1.5 \end{array}$

2 Lamin of 8 B
 6 " " 3 m of
 reversed to 11 m

2 Lanius sp W 3 m 40

Senel sp W $\begin{array}{r} W \\ 92 \\ 81.5 \\ \hline 173.5 \end{array}$ $\begin{array}{r} E \\ 85 \\ 95 \\ \hline 180 \end{array}$ at 4 32
- 6.5

2 Camelopard W B C D E D, lost

1 Arigae sp W 6 34 - D E

11 Orionis sp W 3 m 40

2 Arigae sp W B C D

3 Orionis sp W 3 m 40

Senel sp W $\begin{array}{r} W \\ 95 \\ 83 \\ \hline 178 \end{array}$ $\begin{array}{r} E \\ 86 \\ 98 \\ \hline 184 \end{array}$ at 5 12
- 6.

3 Lanius W 3 m 40

Gr 966 sp W 3 m 40

stopped 5 32 m

Iranian E G Dec 23 4^h 20^m

All weather fine ready
at 9 h

Dec. 29 1869 ast.

started 16^h 47^m

N. Clock 16^h 47^m

E. Clock 22^h 12^m

H. 301 22^h 30^m

Watch 22^h 6^m

E. Clock 22^h 14^m

stopped 16^h 52^m

Messages to G. F. Milliken from
Duxbury.

Dec. 26. Southeasterly storm. No chance
tonight. Edw^d Goodfellow.

Dec. 27. Four forty-five P. M. Cloudy
no prospect of clearing off
yet. Edw^d Goodfellow.

Dec. 28. Four forty-five. Fog and
clouds: no chance yet for
longitude. Edw^d Goodfellow.

Dec. 29. Four forty P. M. Cloudy but
may clear: will send again
at 5 30. How is weather at
Boston? Edw^d Goodfellow.

Dec. 29. It is dubious. How long can
you wait for message from
me? Goodfellow.

Dec. 29. 5 30 P. M. Clearing off:
ready at nine (9). Edw^d Goodfellow.

Dec. 30. Four fifteen P. M. Weather clear:
ready at nine (9). If it clouds up
will send word at 7. Edw^d Goodfellow.

Dec. 30. 8 30 P. M. The evening has turned out
so unfavorable Mr. G. thinks will not
test: need not send man to Cambridge.
Answer quick: Duxbury office.

Dec. 31 1869

Therm. 66 60½ started 19^h 4^m
 N. Clock 19^h 4^m E. Clock 0^h 22^m
 N. 301 0^h 42^m Watch 0^h 18^m
 E. Clock 0^h 25^m Stopped 19^h 8^m

Started 1^h 3^m
 Polaris Sp E m 4
 4' Ceti Sp E 3 m 4s
 γ Piscium Sp E 3 m 4s
 Level Sp E $\begin{array}{r} W \\ 82.5 \\ 69.0 \\ \hline 151.5 \end{array}$ $\begin{array}{r} E \\ 70.0 \\ 83.0 \\ \hline 153.0 \end{array}$ at 28^m
 -1.5

new start 1^h 4^m 7^m
 β Arctis 3 m 4s
 50 Cassiopea Sp E D
 Level Sp E $\begin{array}{r} W \\ 82 \\ 72 \\ \hline 154 \end{array}$ $\begin{array}{r} E \\ 75 \\ 64 \\ \hline 139 \end{array}$ at 55^m
 -15.0

reversed to Sp W
 2 Arctis Sp W B G D
 2 Deneb 26 Sp W D G B D₃ lost
 2d mark on B₄'
 Level Sp W $\begin{array}{r} W \\ 80 \\ 71.5 \\ \hline 151.5 \end{array}$ $\begin{array}{r} E \\ 77.5 \\ 86 \\ \hline 163.5 \end{array}$ at 9^m
 -12

Dec 31 1869

C Cassiop Lf W B C

reversed to Lf E

C Cass Lf E 6 B

Level	Lf E	W	E	at	24 ^m
		82	76		
		72	86.5		
		154.	162.5	- 8.5	

5 Mrs Clin LG Lf E 6 3 4 5 D

reversed to Lf W

5 Mrs Clin Lf W 6 B.

V Beti Lf W 3 m Ts

Level	Lf W	W	E	at	40 ^m
		82	78		
		74	86		
		156	164	- 8.0	

2 Beti Lf W 3 m Ts

48 Cephei Lf W 3 m Ts

3 Arctis Lf W 3 m Ts

Level	Lf W	W	E	at	11 ^m
		84	78		
		74	82.5		
		158	165.5	- 7.5	

2 Persi Lf W 28 F

2 Mrs Clin LG Lf W D 43 21 G.

Rem up 3 h 24^m

Goodfellow to Meilliken

4.15 P.M. Weather fine & will be ready
 tonight at (9) nine for longitude
 if it holds up will telegraph at
 7. How is weather with you?

Dec 31 1869

new sheet 3^h 33^m

Duxbury clock 3^h 52^m +

5^m break at 3^h 55^m +

Duxbury clock out at 4^h 0^m

Message from Goodfellow

"I have my cable key in the main circuit and will make arbitrary signals with that to see if you get them distinctly".

Arbitrary signals begin at 4^h 4^m 58^s.

" " end at 4^h 8^m +

Cambridge clock in main circuit

1st min. break 4^h 11^m

Chronograph checked between 4^h 11^m & 4^h 12^m

Cambridge clock out 4^h 15^m

Arbitrary signals from Cambridge begin 4^h 16^m 55^s

stopped 4^h 19^m

Message from Goodfellow

"My first minute break was 3^h 55^m"

Sent to Duxbury clock correction for 23^d (1^m 59^s.06 fast). Mean of last set of arbitrary signals from Duxbury Dec. 20^d

3^h 30^m 50^s 71: of last set from
Cambridge 3^h 43^m 46^s 86.

2 Camelopard sp W F
 level sp W $\begin{array}{r} 86 \\ 76 \\ \hline 162 \end{array}$ $\begin{array}{r} 81 \\ 90 \\ \hline 171 \end{array}$ at 46^m - 9.

1 Aurigae sp W 3 m 7s
 11 Orionis sp W 3 m 7s
 reversed to sp E
 2 Aurigae sp E F E D
 3 Orionis sp E 3 m 7s
 level sp E $\begin{array}{r} 88 \\ 76 \\ \hline 164 \end{array}$ $\begin{array}{r} 89 \\ 91 \\ \hline 170 \end{array}$ at 11^m - 6.0

3 Lurii sp E 3 m 7s
 Gr 966 sp E F E D
 V Orion sp E 3 m 7s
 2 Lep sp E C D
 stopped 5^h 36

Jan 2 1870
 started 18^h 12^m E. Clock 23^h 18^m
 H. 301 23^h 38^m Watch 23^h 14^m
 E. Clock 23^h 21^m stopped 18^h 16^m

Jan 3d 1870
 started 1^h 8^m
 new start 1 21
 y Prociurn sp W 3 m 70
 level sp W $\begin{array}{r} W \\ 82. \\ \hline 67.5 \end{array}$ $\begin{array}{r} E \\ 72. \\ \hline 87 \end{array}$ at 30^m 1ⁿ
 $149.5 \quad 157 - 9.5$

o Prociurn sp W 3 m 70
 B Anct's sp W 3 m 70
 50 Cassiop sp W B G D B₂ last
 1st break an B₃
 level sp W $\begin{array}{r} W \\ 82.5 \\ \hline 72.5 \end{array}$ $\begin{array}{r} E \\ 78.5 \\ \hline 86.5 \end{array}$ at 2^h 11^m
 $155 \quad 167.0 - 12.0$

1 Cassiop sp W B G.
 reversed to sp E

1 Cassiop sp E B G
 level sp E $\begin{array}{r} W \\ 83.5 \\ \hline 75 \end{array}$ $\begin{array}{r} E \\ 78.5 \\ \hline 86.5 \end{array}$ at
 $158.5 \quad 165 - 6.5$

5 Mrs Min 26 sp E 3 m 70
 x Cetr sp E 3 m 70

12.30 No Clin 16 h E P₅ 2 F
 1.60 h E D 6 B lost p_h
 3.40 h E 3 m_h mark
 4.00 h E 3 m_h
 12.30 No Clin 16 h E 3 m_h
 Level h E $\begin{matrix} W & E \\ 85.5 & 80.5 \\ 75 & 91.5 \end{matrix}$ at 3 25-
 $\begin{matrix} 159.8 & 172.0 & -12.5 \end{matrix}$

1.00 h E 3 m_h
 1.40 h E 3 m_h
 Level h E $\begin{matrix} W & E \\ 85 & 81.5 \\ 77 & 90 \end{matrix}$ at 43^m
 3.00 h E F.E.D. 3 h 5-4 m
 out

new sheet 3 h 5-7 m
 Dux clock in 5-7 m +
 Dux 5^m break at 4 h 0^m +
 off at 4 h 2 m +
 Dux clock signals for several minutes
 6.00 clock in 4 h 9 m
 out 4 h 14 m
 6.00 clock signals 2^m
 1st min Dux clock
 3 h 5-8 m

Dux clock slow

31st 5^h 34

mean of last 10 Dux sig

7^m 47.300

mean of last 6 Ge sig

18^m 36.579

Duxbury signals with
cable key.

Mr Dean will be ready
as soon as weather
permits

Level Lamp E. at 4^h 37^m

W { 86 E { 82 diff. - 14.
75 93

4 Camelop Lamp E E.D.C.

2 Aurigae " E E.D.C.

Reverend to Lamp West

11 Orionis W C D E

4 Aurigae W B C D 1st break on B₂

3 Orionis W E 2345 F.

Level Lamp W at 5^h 3^m

W { 87 E { 81 diff. - 10
76 92

β Tauri Lamp W C D E

gr. 966 W C D E

δ Orionis W C D E

α Leporis W C D E

ϵ Orionis W C D E

ω Draconis (L.C.) W F E D

Level Lamp W at 5^h 40^m

W $\left\{ \begin{array}{l} 88 \\ 77\frac{1}{2} \end{array} \right.$ E $\left\{ \begin{array}{l} 81 \\ 92 \end{array} \right.$ diff - 7.5
stopped 5^h 45^m

Jan 4th 1878
started 1^h 32^m
Level L & E

W	E
83	74.5
71	86.5
154	161

 at 1^h 42^m
- 7.

β Arctis L & E 3 m L S

50 Cass L & E 5^h 32^m E 5^h 32^m D₅

rest lost in clouds very faint

new start 4^h 32^m with

Dux clock on

Dux clock off in about a
minute

Clear at Duxbury.

6.73 Dux clock slow last
night 6.73.

Jan 4 1870

will send word to Boston
as early in the day as
possible when I get news
from Mr Dean that he
is ready to exchange
E Good fellow

stopped 4^h 49^m

Jan. 7 1870

started 2^h 33^m

γ Ceti Lp. E E.D.C. star unsteady

Level Lp. E W $\begin{cases} 81.5 \\ 77 \end{cases}$ E $\begin{cases} 81.5 \\ 92 \end{cases}$ diff - 9.5 at 2^h 42^m

β Urs. Min. L.C. Lp. E. C.D.E.

α Ceti E. E.C. faint: clouds.

δ Cephei Lp. E. E.D.C.

ξ Arietis Lp. E E.D.C. take $\frac{1}{4}$ of 2 breaks on wire
& add $\frac{1}{3}$ of the difference.

Level Lp. E W $\begin{cases} 92 \\ 82 \end{cases}$ E $\begin{cases} 85.5 \\ 95 \end{cases}$ diff. - 10.5 at 3^h 10^m

Reversed to Lp. West.

α Persi Lp. W. C D E

γ^2 Urs. Min. Lp. W. (L.C.) E D.C

Level Lp. W. W $\begin{cases} 94 \\ 80 \end{cases}$ E $\begin{cases} 86 \\ 99 \end{cases}$ diff. - 11 at 3^h 27^m

Jan. 7 1870 continued

δ Persei Lep. W. C D E

η Tauri Lep. W. C D E

ζ Persei Lep. W. C D E

Level Lep. W. W. $\begin{cases} 94.5 \\ 81.5 \end{cases}$ E $\begin{cases} 88.0 \\ 101.0 \end{cases}$ diff -13 at $3^h 49^m$

Jan. 10 1870

Therm. 62 54 started $19^h 32^m$

N. Clock $19^h 32^m$ E. Clock $0^h 12^m$

H. 301 $0^h 32^m$ Watch $0^h 8^m$

E. Clock $0^h 15^m$

Stopped $19^h 39^m$

Block put on main line at
 $3^h 29^m 10^s$. $1\frac{1}{4}$ minute space
 $3^h 30^m$

Again at $3^h 48^m$ } these minutes
spaces marked

Again at $3^h 49^m$ } X

Rattle ~~just~~ before $3^h 50^m$

Circuit after broken

Block on again $1\frac{1}{4}$ minute $5^h 34^m$

preceded by a rattle. Cambridge
chronograph not running.

Clock off - last minute $6^h \frac{1}{4}^m$ followed
by rattle.

Jan 11 1870
 Started 1^h 10^m

Palais Sp W D 3 45
 Level Sp W 87 80 at 16^m
 76 90.5 - 7.5
 163 170.5

0' Ceti Sp W D E F
 A Cassiope W 3 m 45
 7 Piscium W 3 m 45
 0 Piscium Sp W 3 m 45
 Level Sp W 87 82 at 1 42
 77.5 92
 164.5 174 - 9.5

3 Ceti Sp W 3 m 45
 50 Cassiope Sp W 3 m 45

Ren page 1^h 56^m

New start 3^h 55^m

Reversed to Sp E
 Level Sp E 93 85 at 3 57^m
 82 96
 175 181 - 6.0

Gr 232016 Sp E 3 m 45

8 Louri Sp E 3 m 45

6 " Sp E 3 m 45

15 Proc LG Sp E 13 6

2 Louri Sp E 3 m 45

Level Sp E W E at 3^m 2^m
 95 86
 83 98
 178 184 - 6.

An operator (C. H. Sewall) was expected from Boston, and waited for till midnight; but no one came. Some attempts were made without success to communicate with Boston by telegraph.

Jan 12 1879

Started 3^h 3^m

3 Arctis Sp E 3 m 45

Level Sp E W E at 3^h 27^m

 86 75
 76 85.5
 3 Persi Sp E 162 160.5 + 1.5

3 Persi Sp E 3 m 45

Level Sp E W E at 3^h 7^m

 86 74.5
 74 86.5
 160 161 - 1.0

3 Luvii Sp E 3 m 45

3 Persi Sp E F 5432 & other

scattering mines thro clouds

Operator came this evening. Conversation with Duxbury as follows:

Duxbury. Cloudy at Brest and will not exchange tonight. Cloudy here also.

Cambridge. Can we talk with Mr. Dean?

Duxbury. No, not now. Line occupied with business. I will send him

any message you like.

Cambridge. Cannot the time of exchanges be made as late as 9 P.M. to accommodate the telegraph company here?

Duxbury. Time between half past seven & nine has been fixed by cable company, but, if you wish, will ask Mr. Dean whether a change can be made to 9 P.M. It makes it very late at Brest to delay the exchange.

Jan 13 1870
Therm. 63 56 Started 19^h 43^m
E. Clock 0^h 11^m N. Clock 19^h 23^m
F. 3424 0^h 13^m Watch 0^h 7^m
H. 301 0^h 33^m E. Clock 0^h 16^m
Stopped 19^h 50^m

Jan 14 1870
Therm. 61 55¹/₂ Started 19^h 52^m
E. Clock 0^h 15^m
H. 301 0^h 35^m F. 3424 0^h 17^m
Watch 0^h 11^m E. Clock 0^h 19^m
Stopped 19^h 57^m

Jan 14 th/_u 1870

2 Black 3^h 39^m
 8 Black in class
 circuit 8^h 0^m 1st
 minute.

Operator at Observatory ?

Chronograph stopped
 by accident

2 Black 4 29

8 Black 8 50

check 8 clock 8^h 53

8 55

ant 8 Black ant
 8^h 5-6^m

stopped 5^h 7^m

Jan 15 1870

started 20^h 45^m Therm 61 50¹/₂

Ni Black stopped E. Clock 4^h 7^m

F. 0424 1^h 11^m H. 301 1^h 28^m

N. 903 1^h 3^m E. Clock 1^h 11^m

stopped 20^h 5-3^m

Jan 16 1870

Started 1^h 27^m

0 Piscium Lp E 3 m Ls

Level Lp E $\begin{array}{r} 84.5 \\ 73.5 \\ \hline 158 \end{array}$ $\begin{array}{r} 75.0 \\ 86 \\ \hline 161.0 \end{array}$ at 4^h 1^m - 3.

B Achetis Lp E 3 m Ls

50 Cassiope Lp E D E B

Level Lp E $\begin{array}{r} 86 \\ 72 \\ \hline 158 \end{array}$ $\begin{array}{r} 73 \\ 88.5 \\ \hline 161.5 \end{array}$ at 5^h 6^m - 4.5.

2 Achetis Lp E F E D

2 Draco Lp E D E F Direct ?

65 Ceti Lp E 3 m Ls

Crew start 2^h 58^m

reversed to Lp W

Level Lp W $\begin{array}{r} 84.5 \\ 73 \\ \hline 157.5 \end{array}$ $\begin{array}{r} 80.5 \\ 92 \\ \hline 172.5 \end{array}$ at 3^h 1^m - 15.0

18 Cephei Lp W D E F

22 Urs Min Lp W E B

1 Perse Lp W 3 m Ls

74 Lync Lp W 3 m Ls

Level Lp W $\begin{array}{r} 85 \\ 74.5 \\ \hline 159.5 \end{array}$ $\begin{array}{r} 82 \\ 92 \\ \hline 174 \end{array}$ at 4^h 2^m - 13.5

9 Perse Lp W 3 m Ls

Jan 16 1870 Sunday

new start 4 h 14 m

Level of W	W	E	
	86	83.5	at 17 m
	77	92	
	163	179.5	-12.5

E Hauri of W 3 m Hs

2 " of W 3 m Hs

2 Camelopard of W 3 m Hs

Level of W	W	E	
	87	82	at 44 m
	76	92	
	163	175	-12.0

1 Aurigae of W 3 m Hs

reversit to of E

Level of E	W	E	
	89	80	at 5-1 m
	77	92.5	

11 Orionis of E 3 m Hs

stopped 5-4 0 m

New sheet 5-4 3 m

2 Aurigae H & E D

3 Orionis E 3 m Hs

3 Hauri E 3 m Hs

In 966 3 m Hs

1 Orion 8 B

1 Sep E 321 26 B

E Orion 3 m Hs

Jan 16 1870 Sunday
 Level of E $\begin{array}{r} W \\ 88.5 \\ 80 \end{array}$ E at 33^m
 $\begin{array}{r} 91 \\ 1685 \end{array}$ 173.45

stopped 5^h 42^m

Jan 17 1870
 Therm. 65 $\frac{1}{2}$ 61 started 19^h 55^m
 E. clock 0^h 6^m N. 301 0^h 26^m
 F. 3424 0^h 10^m Watch 0^h 1^m
 E. Clock 0^h 9^m stopped 19^h 59^m

Word was received that
 Mr Dean was ready to
 work to night and
 the operator came out
 but after some time
 negat word from Mr
 Goodfellow that we
 would not try to night
 Paid by Prof. Winlock to
 operator \$10.00 & for despatches
 brought out from Boston \$2.50
 The operator is to have \$5.00
 every night he comes out.

Jan. 18 1870 (17th astro. mean time)
 started 18^h 11^m E. Clock 22^h 19^m
 F 3424 22^h 24^m Watch 22^h 15^m
 H. 301 22^h 42^m E. Clock 22^h 24^m
 stopped 18^h 18^m Therm.

Jan. 18 1870

New start 1^h 37^m
 B Anetis 1^h 8 7 8 16
 50 Cassiop lost in clouds
 stopped 1^h 56^m
 new start 3^h 3^m

New sheet 4^h 5^m
 V. Lurri 1^h 8 3 m 4s
 Level 1^h 8 86 80 at 1^h 15^m
 74 91
 160 171 -11.0

e Lurri 1^h 8 3 m 4s
 h u u 3 m 4s
 2 Cabulap 1^h 8 5 4s
 Level 1^h 8 86 81 at 43^m
 75 92

v Anizac 1^h 8 3 m 4s
 11 Anon's 1^h 8 3 m 4s
 1st break on 83

Jan 18 1870

Reversed to H W.

instrument did not
come down true in the $\frac{1}{2}$ S
level H W $\begin{array}{r} W \\ 87 \\ 75 \\ \hline 162 \end{array}$ $\begin{array}{r} E \\ 80.5 \\ 92 \\ \hline 172.5 \end{array}$ at $5^h 2^m$
-10.5

α Aurigae H W B C D

β Orionis H W 3 m Ls

γ 966 H W B 345 G D 2

δ Orion 3 m Ls

ϵ Rigel 3 m Ls

ζ Orionis 3 m Ls

Level H W $\begin{array}{r} W \\ 87 \\ 77 \\ \hline 164 \end{array}$ $\begin{array}{r} E \\ 81 \\ 92 \\ \hline 173 \end{array}$ at 33^m
~~Operator~~ -9.0

Operator came out but word
was recd. from E. Goodfellow
that he heard from Brewster
that it was cloudy. There
no exchange would be
made.

Prof Winlock paid 50 cts.
on telegrams.

The operator has now been
out four nights

Jan. 19 1870
 started 18^h 15^m E. Clock 22^h 19^m
 Watch 22^h 13^m 7.3424 22^h 23^m
 H. 301 22^h 39^m E. Clock 22^h 22^m
 stopped 18^h 21^m Therm. 67 $\frac{1}{2}$ 57 (at 22 $\frac{1}{2}$)

new start 2^h 42^m
 level sp w $\begin{matrix} w & E \\ 85 & 78.5 \\ 72.5 & 91.5 \\ 157.5 & 171.0 \end{matrix}$ at 2^h 45^m
 -13.5

B No. 11 in 26 sp w 3 m Ls
 2 Cent. sp w 3 m Ls
 48 Cephei sp w 321 B.
 2 Persi sp w 3 m Ls
 2nd No. 11 in 26 sp w 3 m Ls
 level sp w $\begin{matrix} w & E \\ 86 & 83.5 \\ 77 & 93 \\ 163 & 176.5 \end{matrix}$ at 2^h 4^m
 -13.5

1 Persi sp w 3 m Ls
 7 Zann sp w 3 m Ls
 3 Persi sp w 3 m Ls Persi at 48^m
 level sp w $\begin{matrix} w & E \\ 88.5 & 83.5 \\ 79 & 93.5 \\ 167.5 & 177.0 \end{matrix}$ at 50^m
 -9.5

Jan 19 1870
 Check by breaking
 circuit 5^h 11^m

♂ Orionis sp E Y A
 ♀ Orionis sp E at Y
 a Columba L E Y 1

Level lamp E

W 93 E 85 at 5^h 38^m

W 83 E 96

176

181

5^h 42^m

stopped

new sheet 5^h 48^m

18^h L E at Y

22 Camelopard sp E D C

20 sp E Y at

♂ μ Geminorum sp E

several of above stars lost
 by pen not marking

~~Chronograph checked some seconds~~

~~1st minute after check 8^h 12^m~~

a new sheet was put
 on and trials made
 to make the pen
 mark better

Jan 19 1870

Observations for personal
equation between Prof
Young and E & A

Lp W observers took
alternately B C & E F

B46 2366 A y * too faint

" 2382 y A

1 Geminorum at y two breaks
on one wire by y take 1st

B46 2433 y A A lost most

of wires owing to ill being
two bright

B46 2451 at y

" 2468 y A

2 Geminor at y

B46 2499 y A

2 Can den at y

B Geminor y A

q " at y

B46 2636 y A

" 2653 at y A lost 1st & 2d w

" 2668 y A

Jan 19 1870

2690 A 3
 2720 3 A faint far id
 2746 A 3 dup 1st *
 2791 y A
 2889 A y
 2901 y A
 2953 A y
 2971 y A
 2987 A y
 3011 y A
 3032 A y
 3055 y A
 3076 A y
 3106 y A

At 5 P.M. received word
 that we would work
 but when the operators
 came out and we had
 connected through got
 word from Mr. Good-
 fellow that it was
 cloudy in Bust and

Jan. 19 1870
 we would not exchange
 made arrangements to
 get word at a later
 hour so as to know
 certainly before the
 operator came out
 whether we were to
 work.

Jan 20 th 1870
 Received word at 5:30 ⁱⁿ
 that it was storming
 at Bust and we
 would not work.

Jan 21st 1870

Received word that
there would be
no exchange to
night

check by opening
circuit before 3^h 4^m
48 Cephri Sp W E 45 F
level Sp W $\begin{matrix} W & E \\ 85.5 & 80.5 \\ 75.5 & 91. \end{matrix}$ at 3^h 12^m
 $161.0 \ 171.5 - 10.5$

d Persei Sp W 3 m Hs B, last

γ^2 Urs Minoris Sp W B 6 B

c Persei ~~Sp W~~ 3 m Hs

η Lumin Sp W 3 m Hs

3 Persei Sp W E 23 45 F

level Sp W $\begin{matrix} W & E \\ 86 & 84.5 \\ 76 & 95 \end{matrix}$ at
 $162.5 - 17.5$

Reversed to Lamp. Ed. 2nd
Personal Equation C. A. Young & E. P. Austin

BAC ~~1326~~ 1326 F E (A.) C. B (Y.)

1346 -- (Y.) -- (A.)

1370 " (A) -- (Y.)

Take 2nd break (A.)

Jan. 21 1870 cont.

B.A.C. 1403	FE (y.)	CB (A.)	
1421	" (A.)	- " (y.)	
1436	" (y.)	- " (A.)	
1500	" (A.)	" (y.)	
1519	" (y.)	" (A.)	
1538	" (A.)	" (y.)	
Arg. $+0^{\circ} 30'$	" (y.)	" (A.)	
$+0^{\circ} 57'$	" (A.)	" (y.)	
β Erid.	" (y.)	" (A.)	
Arg. $+0^{\circ} 50'$	" (A.)	" (y.)	obs. failed
B.A.C. 1678	" (A.)	" (y.)	
1717	" (y.)	" (A.)	
Arg. $-1^{\circ} 42'$	" (A.)	" (y.)	
ϵ Orionis	" (y.)	" (A.)	
Arg. $-1^{\circ} 12'$	" (A.)	" (y.)	
Arg. $+1^{\circ} 7'$	" (y.)	" (A.)	
B.A.C. 1869	" (A.)	" (y.)	
Arg. $+0^{\circ} 56'$	" (y.)	" (A.)	
Arg. $+0^{\circ} 32'$	" (A.)	" (y.)	
Arg. $+1^{\circ} 12'$	" (y.)	" (A.)	
Arg. $+2^{\circ} 20'$	" (A.)	" (y.)	
B.A.C. 2086	" (y.)	" (A.)	
Arg. $-1^{\circ} 6'$	" (A.)	" (y.)	

Jan. 21 1870 cont.
 Arg. +2°49' FE (y.) C.B. (A.)
 B.A.C. 2189 " (A.) - " (y.)

Time stars observed by E.P. A.

51 Ceph. Lep. E. D
 { Lowell Lep. E. $\begin{matrix} 93 \\ 84 \end{matrix}$ } W $\begin{matrix} 86 \\ 95 \end{matrix}$ } E
 at 6^h 45^m $\begin{matrix} 177 \\ 184 \end{matrix}$ - 4

50 Drac. (L.C.) E. B.C.D.

e Can. Maj. E.D.C.

♂ Can. Maj. E.D.C.

♂ Gemin. E.D.C.

{ Lowell Lep. E. $\begin{matrix} 95 \\ 88 \end{matrix}$ } W $\begin{matrix} 88.5 \\ 95 \end{matrix}$ } E
 at 7^h 16^m $\begin{matrix} 180 \\ 180.5 \end{matrix}$ - 0.5
 stopped 7^h 25^m

Jan. 22 1870
 started 21^h 1^m E. block 0^h 55^m
 N. block 21^h 2^m N. 301 1^h 15^m
 West. 0^h 50^m F. 3424 1^h 1^m
 E. block 0^h 58^m stopped 21^h 8^m

Jan 22d 1870

Received word that
it was clear at Brest
Operator came out. m
started @ 5-8

@ Black in chain
circuit at 7h 5-3^m
check by making two
extra breaks at 8h 0^m
and at intervals of
5^m or 10^m till 9h 5^m

signals from Brest
are denoted by
larger breaks than
those from Duxbury

Prof. Winlock paid
Operator check for \$20.

Mon 23rd 1870

Received word that it
was cloudy at Brest.

Tues. 24th 1870
received word that it
was clear at Brest

Operator came out.

started for signals
from Brest at 4^h 23^m
East clock in all of
8^h 5^m
pen up 5^h 44^m

circuit broke soon after
9^h and after waiting
about 20^m switched
battery off and put on
the west in order to
get however.
Got word from bellows
falls that however had

Jan 24 1870

gone home switched
Boston in again and
tried to get duxbury
finally got word that
Duxbury had said good
night

Jan 25 1870

received word from
Brest that it was
cloudy there

Jan. 26 1870

started	21 ^h 33 ^m	N. Clock	21 ^h 30 ^m
E. Clock	10 ^h 40 ^m	N. 301	1 ^h 30 ^m
F. 3424	1 ^h 16 ^m	Watch	1 ^h 4 ^m 1 ^s
E. Clock	1 ^h 14 ^m	stopped	21 ^h 40 ^m

Jan 26 1870
 received mail but
 it was clear
 at Brest

started H₂ 3 h 5^m
 & Persi H₂ 3 h 32^m B
 2nd Mrs. M^{rs} 26 H₂ 3 m 40
 Chron stopped
 new start
 Level H₂ W 8 3 h 27^m
 at 29^m

$$\begin{array}{r} 86 \\ 67.5 \\ \hline 153.5 \end{array} \quad \begin{array}{r} 8 \\ 68 \\ 87 \\ \hline 155 \end{array} - 1.5$$

J Persi H₂ 3 m 40
 Y Lami H₂ 3 m 40
 Z Persi H₂ 3 m 40
 Level H₂ W 8 at 3 h 51^m

$$\begin{array}{r} 86 \\ 70 \\ \hline 156 \end{array} \quad \begin{array}{r} 8 \\ 69 \\ 85 \\ \hline 154 \end{array} + 2.0$$

Pen up 3 h 57^m

Operator at Observatory
 new start 4^h 14^m
 East clock in chain
 circuit 1st 5^m break
 8^h 50^m
 last 9 15-
 Stopped 5^h 42^m

new sheet 5^h 59^m
 E clock in decirc
 to Hanover or H
 1st min break 9^h 38^m
 last break 9^h 42^m
 He got it all right
 connections of
 Hanover all 2 clock
 in 6^h 14^m +
 off before 6^h 20^m
 E clock on 6^h 25^m
 A sid clock in 6^h 23^m
 ant 6^h 28^m
 E direct ant 10^h 3^m
 E ch. in all 6 10^h 5^m
 ant 10 7^m

Jan 26 1870

Reversed to Lth W
 Level Lth W $\begin{array}{r} W \\ 83 \\ 72 \\ \hline 155 \end{array}$ $\begin{array}{r} E \\ 77 \\ 87 \\ \hline 164 \end{array}$ at 46^m

50 Proc 26 Lth W 3 mths
 e. Canthay Lth W 3 mths
 a a a 3 mths

d¹ Geminor Lth W 3 mths
 Level Lth W $\begin{array}{r} W \\ 84 \\ 75 \\ \hline 159 \end{array}$ $\begin{array}{r} E \\ 76.5 \\ 85 \\ \hline 161.5 \end{array}$ at 15^m

P¹ VII. 67 Lth W 3 mths

Reversed to Lth E
 Level Lth E $\begin{array}{r} W \\ 86 \\ 79 \\ \hline \end{array}$ $\begin{array}{r} E \\ 74.5 \\ 86 \\ \hline \end{array}$ at 23^m

d² Geminor Lth E 3 mths

2 Can Min Lth E 3 mths

B Geminor Lth E 3 mths

Level Lth E $\begin{array}{r} W \\ 84.5 \\ 76 \\ \hline \end{array}$ $\begin{array}{r} E \\ 76 \\ 84 \\ \hline \end{array}$ at 40^m

Q Geminor Lth E D³ E

e. Proc 26 E 3 mths

2nd No Min. D³ 45

stopped 8^h 2^m

Jan 27 1890

Started	21 ^h 46 ^m	N. Clock	21 ^h 46 ^m
E. Clock	1 ^h 19 ^m	F. 3424	1 ^h 25 ^m
H. 301	1 ^h 39 ^m	Watch	1 ^h 13 ^m
E. Clock	1 ^h 22 ^m	stopped	1 ^h 51 ^m

Received word from
Brest. that it was
clear. Operator came out.

started $\frac{3^h 30^m}{5-5-1}$

E clock in all Cir
9 22

for Hanover M. H.
ant 9 27

2nd clock in all ~~cl~~
6^h 0^m

Out 6^h 5^m

Han M. H. clock in
Main circuit 6^h 8^m +
ant 6 13 +

Han 2nd cl
E clock on 6. 16
9^h 46^m

Lon 27 1870

Lon sid clock off 6 21

East clock on before
9^h 53^m

off 9 57
Lon Sid Clock 6^h 29^m

Lon Clock 16^h 5^m just ~~am~~ 26^h and just
is about 27^h to night
~~date and is~~
1st minute of 28 Sid clock
last night 58^m

E Clock checked &
taken off 10^h 13^m
stopped 6 44^m

Jan 28 1870

Received word from
Brest that it was
clear these.

started 2^h 11^m
L Cassiopeiae sp 3 m 4s
level sp E ^W 80. 71. at
71 80

5 Ursaellin sp 3 m 4s

2 γ Beti sp 3 m 4s

41 Arctis sp 13

T Persei sp D C B

B My Min LG 3 m 4s

2 Beti sp 3 m 4s

level sp E ^W 84 76 at 5-9^m
75 84.5

Reversed to sp W

48 Cephei W D 3 4 E F

level sp W W E at 12^m
83 79.5
76 86

Jan 28 1870

2 Persi H W DEF
 22 Mo Min 16 W 3 m 4s
 Level H W 84 79. at 25
 75 88
 159 167. -8

2 Persi 3 m 4s
 22 Mo H W 3 m 4s
 3 Persi H W 3 m 4s
 Level H W 85 80.5 at 49
 77.5 88.

stopped 3 h 53 m
 new start 4 h 38 m
 2 black in all lei

Operator
 at Observatory

8 h 15 m
 30
 ant 9 15
 pen up 5 h 50 m
 new start 6 21

51 Cephrei H E 6 32 1 B 4 32
 Level H E 88 85 at 38
 81 92

e. e. v. c. b. y. s. p. e. 3 m 4s
 c. a. u. 3 m 4s

Highlands from
 Drilling & Post

Jan 28 1870

J Geminiorum. Lf E 3 m 4s

+ Draconis 16 H E 3 m 4s

Sinul H E ^W 90 ^E 83.5 - at 22^m
81.5 92.

stopped 7 h 29^m

Jan 29 1870

Therm 67 59 at 0 h 54^m

started 0 h 30^m N. Clock 0 h 30^m

E. Clock 3 h 55^m F. 3424 4 h 2^m

Watch 3 h 50^m H. 301 4 h 17^m

E. Clock 4 h 0^m stopped 0 h 39^m

Operator came out

Nothing done.

Prof Winlock paid operator
check for \$25.00

It was cloudy at Brest.

Attempts were made to
talk with Mr. Austin who
was at Duxbury, but the
operators on the cable line
would not accommodate.

Jan. 30. 1870

Prof. Winlock paid 50 cts. on a
telegram from Duxbury.

Jan. 31 1870
 started 20^h 54^m N. Clock 20^h 54^m
 E. block 0^h 12^m 10.30 0^h 31^m
 F. 3424, 0^h 20^m Watch 0^h 6^m
 E. block 0^h 15^m stopped 21^h 0^m

received word from
 Duxbury that there was
 to be no exchange

Feb. 1 1870

Prof W. paid 50 cts on a telegram

received word that it
 was cloudy at Brest

started 5^h 26^m

st w.

2 Columbae E 2345 - F
 level st w 102 86 at 41^m
 86 104

2 Orionis st w 3 m 45
 level st w 102 86 at 53
 86.103

Feb 1st 1870
 I Vis Min 46 H W F E. 4321
 reversed to 7h E

n Geminon 4h 3 m 4s

I Vis Min 4h 3 E F_s

Level 4h 3 ^W 102 ^E 87.5 at 48^m
 87 10.3

I Can May 4h 3 m 4s
 stopped 7ⁿ 12^m

observations May had
 stars moving violently
 and mines out of focus

Feb 2 1870
 received word that it
 was cloudy at Brest.

Feb 3 1870
 Therm. 65 56 started 21^h 38^m
 N. Clock 21^h 38^m E. Clock 0^h 43^m
 Watch 0^h 36^m H. 3h 20^m 0^h 53^m
 N. 301 1^h 5^m E. Clock 0^h 49^m
 stopped 21^h 46^m

Feb 3^d 1870

received word that it was
cloudy at Breit and there
would be no exchange

Feb 4th 1870

received word that
there was to be no
exchange

Feb. 5 1870

Therm 62.53 25.2 started 23 8
N. Clock 23^h 8^m E. Clock 2 6
H. 301 2 27 F. 3424 2^h 16 Watch 2 0

Feb 6 1870

received word that there
would be no exchange

Feb. 7 1870

Therm 62 56 $\frac{1}{2}$ started 21^h 15^m
N. Clock 21^h 15^m E. Clock 0^h 5^m
Watch 23 57 F. 3424 0 17
H. 301 0^h 25^m E. Clock 6^h 8^m
stopped 21^h 22^m

Feb 7 1870
received word from Homaner
that it was clear there
and made arrangements to
exchange. Cloudy at Best

started 4^h 3 m
Level Sp E 94.5 82 at 4^h 16
 84 92
 176.5 174 + 4.5

2 Taurus Sp E D G B

1 Deneb LG Sp E C very faint
who heard

2 Taurus Sp E D G B

2 Camelopard Sp E F E D

1 Aur Sp E 3 m 22

93 83.5 at 5^h 1 m
 86 93

Reversed to Sp W

11 Orionis Sp W 3 m 40

reject 1st break

Level Sp W 94.5 85 at 1^m
 84.5 95

2 Aurig B G D

3 Orion 3 m 40

Level Sp W 95 85.5 at 11^m
 85 95.5

Fish 7 1870

Outman 3 m 25 ?

stopped 5 33

new sheet 5 36

Hanover ready at 9^h 15^m

mean time. Operator at Observatory

E. clock in main circuit at 9^h 16^m 1
followed by break of 5^s. First
second after break 9^h 16^m 6^s.

More breaks one at each
minute in the same way.

last minute 9^h 21^m

Sidereal clock put in circuit.

6^h 40^m (not known if the
first minute got through)

last minute 6^h 45^m

Hanover 3 clock on

8 clock on before 9 36

clock after 9 37 by

breaking circuit

Hanover mean time clock

on just before

6^h 5-6^m off just before
7^h 0 1^m

High 7 1870
 Check after 7 14^m by
 opening circuit.
 level of W $\frac{W}{186} \frac{8}{86} \frac{100.5}{100.5}$ at 22^m

2^d Geminiar Lp W 3 m 40
 & can ellin Lp W 3 m 40
 3 Geminiar Lp W
 level of W $\frac{W}{100.5} \frac{8}{86} \frac{100.5}{100.5}$ at 40^m
 stopped 7^h 5-4^m

Feb. 8 1870

Therm. 67 57 started 21^h 20^m
 N. Clock 21^h 20^m E. Clock 0^h 7^m
 F. 3424 0^h 19^m Watch 25^h 59^m
 H. 301 0^h 27^m E. Clock 0^h 11^m
 stopped 21^h 27^m

Feb. 9 1870

Therm. 63 58 $\frac{1}{2}$ started 21^h 28^m
 N. Clock 21^h 28^m E. Clock 0^h 11^m
 Watch 0^h 3^m F. 3424 25^m
 H. 301 0^h 32^m E. Clock 0^h 15^m
 stopped 21^h 38^m

Feb 9 1870
 received word that it
 was clear at Brest

started 5^h 7^m

new start 5^h 24^m

& clock on chain circuit
 before 8^h 8^m

check after 8^h 10^m
 8 15

ant 8^h 18

& clock in chain circuit

9 25- out 9^h 30^m

Mr E reports ~~4-3~~

signals from Brest
 badly received and
 of no account for
 longitude

stopped 6^h 59^m

Feb 10 1870

Sat morn. that it was
 clear at Brewst. Cloudy
 at Hanover

Started 4^h 17^m
 Level Sp E $\begin{matrix} W & E \\ 95 & 85 \\ 85 & 95 \end{matrix}$ at 25^m

2 Larrin Sp E 3 m Ls
 11 Eridani Sp E C B
 2 Camelopard Sp E D C B
 1 Aurigae Sp E 3 m Ls
 3 Camelopard " " "
 11 Orionis 8 C B

6 Lepus 3 m Ls
 Level Sp E $\begin{matrix} W & E \\ 98.5 & 85 \\ 86 & 98 \end{matrix}$ at 2^m

reverted to Sp W

11 Aurigae Sp W
 3 Orionis Sp W D E F D, least
 Level Sp W $\begin{matrix} W & E \\ 98 & 86 \\ 85 & 99 \end{matrix}$ at 14^m

Feb 10 1870

E clock in Maine cir

7^h 56^m

check 8^h 0^m 5^m

out 8^h 6^m

signals from Duxbury

part on next sheet

stopped 6^h 48^m Operator at Observatory
new sheet 6 50^m

E clock in all cir 9 31+
out 9 40 check 9^h 35^m

Check 5 clock 7^h 25^m
level sp w $\begin{matrix} 103 \\ 86 \end{matrix}$ at 35^m
 $\begin{matrix} 87 \\ 104 \end{matrix}$

B Geminae sp w D E F

Q Geminae sp w 3 m²s

6 Drae 26 H w 6² B

6 Cancri " 3 m²s

3 (H) Uis May w 3 m²s

3 Cancri " "

B w " "

Feb 10 1880

* Cephei 46 sp W 3 m 7s
lost tally very hard
through clouds

send	sp W	W	E	at 17 ^m
		103	87	
		87	103.5-	

stopped 8^h 22^m

An attempt was made
to exchange signals of
Class IIII made by charging
the cable for 10^s and
then discharging both
signals noted after
an interval of 3^s the
same is repeated.

but owing to disturban-
ces of the current Mr
Goodfellow was not able
to get the signals from
Brest and only sent
signals to Brest.

Feb. 11 1870

Prof. Winlock paid 60cts.

for a telegram.

Collected from Steward &
 paid Prof. Winlock \$59. $\frac{60}{100}$
 total amount paid by him
 for longitude work up to date.

Therm. 62 55 started 22^h 36^m
 N. clock 22^h 35^m E. clock 1^h 9^m
 W. 301 4^h 29^m 7.3424 1^h 24^m
 E. clock 1^h 12^m stopped 27^h 40^m

received word that it
 was clear at Hanover.
 started 3^h 58^m

γ Linné sp W 3 m 40
 level sp W 24 8 3.5-at 15
 82 93.

ε Linné sp W D E F
 15 D W C F 8
 α Linné D E F
 η 7 Eridani D E F
 γ Linné 3 m 40
 α Camelopard 3 m 40

Level of W. $\begin{matrix} W \\ 95 \\ 86 \end{matrix}$ $\begin{matrix} E \\ 85.5 \\ 95 \end{matrix}$ at 44

reversed to level E

1. Arrive at E DGB G_s - last
very faint cloudy

Level of E $\begin{matrix} W \\ 99 \\ 86 \end{matrix}$ $\begin{matrix} E \\ 85 \\ 98 \end{matrix}$ at 5-8

Connection with
Hanover

8 clock in main circuit

8 h 19

interrupted by break
on the line in again
at 8 h 25-

ant 8 30

Hanover Clock in all
circuit 6 h 3 m +

ant after 5 m

stopped 6 h 26 m

Cloudy at Hanover
and no good determination
of time there

Exchanges with
 Braest are terminated
 and arrangements
 made with Hammer
 to exchange only on
 decidedly clear nights
 in future.

Feb. 14 1870

Therm. 64 54 started 23 10
 N. Clock 23 9 E. Clock 1 32
 F. 3424 1 48 H. 301 1 52
 Watch 1 35 E. Clock 1 35 stopped 23 15

Feb. 15 1870

Therm. 65 60 started 23^h 57^m
 E. Clock 2^h 22^m
 H. 301 2 40 Watch 2 26 F. 3424 2 41
 E. Clock 2 28 30 stopped 0 14

Feb. 16 1870

Therm. 68 60¹/₂ started 21 53
 N. Clock 0 2 E. Clock 0^h 7^m
 Watch 0 9 F. 3424 0 24 H. 301 0 28
 E. Clock 0 11 stopped 21 58

Feb 16 1870

Received word that it
was clear at Hanover
and prepared to observe

started 4^h 29^m

2 Camelopard H E C B
Level H E $\begin{matrix} W & E \\ 71 & 76.5 \\ 77.5 & 90 \end{matrix}$ at 47^m

1 Aurigae H E D₂₁ C B

11 Orionis H E B m Ls

2 Aurigae H E F E D

3 Orionis H E D C B

Level H E $\begin{matrix} W & E \\ 91 & 80 \\ 83 & 88 \end{matrix}$ at 14^m

3 Lurri H E F E D

Reversed to H W ^{just disturbed} in reversing

Level H W $\begin{matrix} W & E \\ 93 & 80 \\ 84 & 91 \end{matrix}$ at 20

Gr 966 H W m L ft

1 Orionis W E F

2 Lurri W D E F

6 Orion 3 m Ls

Level α W $\begin{matrix} W & E \\ 92 & 83 \\ 83 & 92 \end{matrix}$ at 32^m

α Columbae α W B.C.D

w Drac α α W 3 m 40

ψ Dracon α α W 3 m 40

α Orionis α W 3 m 40

Level α W $\begin{matrix} W & E \\ 93 & 83 \\ 85 & 92 \end{matrix}$ at 52^m

α Ursa Min α α W F.O.

Level α W $\begin{matrix} W & E \\ 93 & 85 \\ 85 & 93 \end{matrix}$ at 7^m

Reversed to α E

α Ursa Min α α E E F 23.45

Level α E $\begin{matrix} W & E \\ 95 & 85 \\ 86 & 95.5 \end{matrix}$ at 24^m

γ Geminorum α E 3 m 40

α α Ceph α E m 4

Level α E $\begin{matrix} W & E \\ 96 & 86 \\ 86 & 96 \end{matrix}$ at 46^m

Stopped 6 h 49^m

Operator at Observatory

Feb 16 1870
 new sheet 6 5-6^m
 East clock in
 chain circuit 9^h 8^m
 off 9^h 13^m

How did clock in
 chain circuit
 East clock on chron
 agraphy at same time
 off 9^m

Did clock in
 chain circuit 7^h 12^m
 in again 7^h 14^m
 off 7 19

However mean time
 Clock in chain circuit 7 21
 off 7 25-
 stopped 7 29

Feb. 18 1870
 Therm. 66 56 started 22 21
 N. Clock 22 20 E. Clock 0^h 28^m
 H 301 0^h 47 7.3424 0 45 Watch 30
 E. Clock 0 31 stopped 22 26^m

Feb 19 1870

Therm 63 59 started 23 13
 N. Clock 23 11 E. Clock 4h 15m
 Watch 1 18 7. 34 24 1 34
 W. 301 136 E Clock 179 stopped 23 18

Received word that it
 was clear at glenower

started 4 27
 d barrel of sp W 5-70
 level sp W 86.5 78.5 at 4 5m
 72.5 87.5

1 Aurigae sp W 3 m 40
 11 Orionis 3 m 40 d. last
 level sp W 87 82.5 at 5 6m
 78 91.5

d Aurig 6 45-3 E
 B Orionis 8 E F
 reversed to E
 level E 90 82 at 12m
 82 91

B Janni 3 m 40
 Gr 966 9 45 in heap
 D₁₄ on - wire

Feb 19 1870

Albion's to B

6 Prime, 3 mfs

2 Columbae D C B

W Doc LC A E D E F

$\psi' \quad a \quad A \quad B \quad C \quad D$

2 Chromas of E 3 m 75

Level 118 $\begin{matrix} W & E \\ 93 & 83.5 \end{matrix}$ at 5-1^m
84.5 92

84.5 92

84 93.

22 Cornelap

UGL & BCD

Ms. Chin 16 W Feb E

n Geminorum 14 W & 3 m 7s

8 4

86 95-

stopped

6 h 36^m

new sheet

7^h 2^m

Mean time clock in

Main circuit check 4.3^m

h. 3 m

abd

94 75

Feb 19 1870
 Hanover clock on 7^h 10^m +
 off 7 16.

62 clock off 7 24

How did clock on
 7 26

62 on 2 clock check 9 27

" " 9 31

off 9 31⁺

started clock again 7 45-

stopped 7 46

End of longitude work
 Feb. 23 1870

Therm. 60 $\frac{1}{2}$ 54 $\frac{1}{2}$ started 22 57

N.C. E.C. 0 47

Watch 0 48.1 F. 34.24 1 7

H. 30.1 1 8 E.C. 0 51

stopped 23 6

Feb. 23 1870 Collimation

All. East.	87.5
Centro white	88.3
of square	87.8
of N. meridian	87.9
mark.	87.0
Seeing good	89.0
mark a little	89.3
tremulous.	88.7
Wire east of mark	88.1
	<u>90.1</u> 88.37

Coincidence

128.9
128.8
130.2
130.8
128.0
128.7
129.4
130.3
129.7
128.4
<u>129.32</u>

Feb. 23 1870 continued
Illum. West

Centre white
square of
N. meridian
mark

62.1
62.0
60.7
60.7
59.9

Wire East
of mark

61.0
60.3

60.7

59.9

61.7

60.90

Ill. East.

Square

89.8

89.0

87.0

88.7

91.1

89.0

91.3

87.2

91.5

89.3

89.69

Feb. 23 1870 contd

Coincidence

Coincidence
Sum of 10 measures 1293.2
 δ " 652.0
 $\hline 1945.2$
 Mean 129.68

Ill. E. 1st measure 88.37
 2 " 89.69
 $\hline 178.06$

Mean

89.03 wire east of mark 40.65

Ill. W.

60.90 " " " "

31.22

9.43

 $c = +0^s.1096$ Ill. E. $c' = +0^s.09$ Ill E. $-0^s.12$ Ill. W.

4.715

2.324

18.860

9.430

14.45

9.430

10.957660

Level by observations below

 $b = 0^s.1192$ Object glass N. } $b \text{ secp} = +0.26$ $b = 0^s.192$ " " S. }started 7^h 5^mLevel Ill. E. (circle reading $216^0 0'$)Cross Level East $E 86\frac{1}{2}^{\circ} W. 89$ West $E 83^{\circ} W. 92$ $169\frac{1}{2}$ 181

60 | 11.5

1.192

1.354

7.68

9.60

24.96

25.9968

Pi. 7 by wire 4, 5.

 α Geminae γ Can. Min. ρ Gem. ϵ Draconis

Feb. 23 1870 continued.

Level (circle reading $824^{\circ} 9'$)
 Cross Level East $E 85 W 88$
 " " West $E 88 W 91 \frac{1}{2}$
 $\underline{188 \quad 179 \frac{1}{2}}$

3 Mrs. May.

1 Argus $8^h 6^m$

stopped

Feb. 24 1870 (23° astr.)

Therm. 63 55 started 21 11

N. Clock $21^h 10$ E Clock 22 58

Watch 22 59 F. 3424 23 19 H. 30123 19

E Clock 23 2 stopped 21 20

started $6^h 15^m$

3 Gemini & Transit

51 Cephri 2d wire lost

take wires 1 3 & 5

50 Draconis 16

4 Gemini

4 Draconis

2 Mrs. Min 2-3 disengaged short

beats before wire 2

3 Mrs. May 2

15 Argus

Feb 24 1870
 Obs with W transit
 51 Capricorn sp W Lat E
 Level sp W $\frac{98}{86.5}$ $\frac{86}{89}$ at 45^m
 $\frac{184.5}{185} - 0.5$

40 Draconis LG 3m Feb F
 & Can Maj 3 m Feb
 Level sp W $\frac{1015}{87}$ $\frac{87}{102}$ at 57^m
 $\frac{188.5}{189} - 0.5$

✓ Can Maj sp W D.E
 ✓ Geminor sp W 3 m Feb

Reversed to sp E

P. VII 67 26 sp E m Feb

✓ Proc 26 " E
 Level sp E $\frac{104}{88}$ $\frac{88}{105}$ at 22
 $\frac{192}{193} - 1.0$

d² Geminor sp E 3 m Feb
 & Can dlin sp E 3 m Feb

3 Geminor sp E 2 6
 Level sp E $\frac{106}{89}$ $\frac{88}{106}$ at 39
 $\frac{195}{194} + 1.0$

Feb 24 1870
Observations with E Transit

20 Porphys

B. Cancri 1st head on last in to 1st

X " "

K Cephei 2-5

A Cancri

γ " "

Gr 3241

γ Cancri

δ " "

E Hydrae

δ S. Lynceis

α 2 Cancri

γ Hydrae 3-5

1st the Maj

stopped 8^h 53^m

Feb. 25 1870

Therm. 65.51

started 22 20

N. Clock

2. Clock 0^h 0

F. 3424 0.22

H. 301 0.20

E Clock 0.4

stopped 22 27

Feb. 28 1870

Therm. 64½ 61

started 23^h 7^m

E. Clock 0^h 24

F. 3424 0.57 Watch 35

H. 301 0.55 E Clock 0.38 stopped 23 12

Feb. 28 (astr.) 1870

Therm. 65 61½ started 21^h 35

N. Clock 21 33 E. Clock 22 58

H. 301 23 17 F 3424 23 22

Watch 23 0 E. Clock 23 2 stopped 21 41

March 2 1870

started 7^h 57^m

3 Ury. May's

15 Argus

K Cephei

2 Hydrae

i Ursa May's

12 Yon. Cat. 1879 1-4 clouds back Ury

stopped 8^h 58^m

March 4 1870

started 23 0 Therm. 65 55½

N. Clock E Clock 0 14

H. 301 0 33 Watch 0 15 F. 0 40

E C 0 17 stopped 23 7

March 7 1870

Therm. 64 56 started 23^h 10^m

N. Clock 23 8 E Clock 0 16

F. 3424 0 47 H. 301 0 41 Watch 0 22

E. Clock 0 24 stopped 23 20

March 8 1870

Therm. $66\frac{1}{2}$ 59 started 23 37

N. Clock 23 29 E. Clock 0 26

F. 3424 0 54 H. 301 0 48

E. Clock 0 29 Stopped 23 37

~~Started~~ 7 36

☿ Gemini.

☿ Draconis wire 5 .1 to 500

Level at 7^h 55^m

Object glass N. cross level East E 80° W 84

☿ Urs. Major.

15 Augus first of several beads
on wire 4

Level at 8^h 13^m

Object glass N. cross level West E 79° W 88

" " S. " " East E 81° W 87

" " S. " " West E 81° W 85

ly. 3241

" " S. " " East E 82° W 87

" " S. " " West E 81° W 88

☿ Hydrae

Stopped 8^h 45^m

March 10 1870

started 0^h 36^m N.C. 0 34
 E. Clock 1 25 H. 301 1 46
 F. 3424 1 54 E. Clock 6 28
 Therm. 66 57 $\frac{1}{2}$ stopped 0 44

March 11 1870

Therm. 64 57 started 23 23
 N. Clock 23 20 E. Clock 0 6
 F. 3424 0 35 H. 301 0 27
 E. Clock 0 9 stopped 23 29

March 12 1870

Therm. 61 54 started 23 34
 N. Clock 23 32 E. Clock 0 13
 F. 3424 0 43 H. 301 0 34
 E. Clock 0 16 stopped 23 39

March 14 1870

Therm. 63 $\frac{1}{2}$ 56 started 23 38
 N. Clock 23 35 E. Clock 0 9
 F. 3424 0 42 H. 301 0 32
 E. Clock 0 14 stopped 23 45
 started 8 18

E. Hydrometer

Level Obj. Glass N. Cross Level E. E 79 W 84
 " " " " W E 74 W 85

✓ Mrs. May.

T. Y. C. 1879

✓ Mrs. May.

κ Cancri

Level Obj. glass S. Cross level E. E 80 W 85

" " " " " " W. E 79 W 86

$$b(\text{Obj. glass N}) = \frac{169 - 158}{60} = +0.183$$

$$b(\text{Obj. glass S}) = \frac{171 - 159\frac{1}{2}}{60} = +0.192$$

$$\bar{m} = b \sec \varphi = 0.187 \times 1.354 = +0.26$$

α Hydrae

stopped 9 24

March 16 1870

started 0 34 Therm. 67½ 60

N. Clock 0 32 E. Clock 0 58

F. 3424 1 30 H. 30 1 19

E. Clock 1 0 stopped 0 40

March 19 1870

started 0 18 N. Clock

{ E. Clock 0 32 } H. 30 1 0 53

F. 3424 4 6 stopped 0 27 Therm. 65 58½

E. Clock 0 56 20 S. Clock 0 46 20

started 7 22 m

α Gem. (mean of stars)

α Can. Mein.

β Gem.
 φ Gem.

ϵ Draconis 3-5

3 hrs. May, Stopped 8^h 4^m

Level Obj. Glass N. Cross Level E. $E 74 W 81\frac{1}{2}$

" " " N. " " W. $E 74 W 81$

" " " S. " " E. $E 74\frac{1}{2} W 81$

" " " S. " " W. $E 74\frac{1}{2} W 81$

March 21 1870

Therm. $64\frac{1}{2}$ 60 started 0 10

N. Clock 0 8 E Clock 0 14

H. 301 0 35 F. 3424 0 19

E Clock 0 17 stopped 0 14

March 22 1870

Started 7^h 15^m

Pi 7 6

Level obj. glass N. Cross Level E. $E 70 W 80$

" β Gem. (mean)
 obj. glass N. Cross Level W. $E 72 W 78$

α Can. Min.

" β Gem.
 obj. glass S. Cross Level E. $E 70 W 80$

ϵ Draconis

" obj. glass S. Cross Level W. $E 72 W 80$

Stopped 7^h 55^m

March 23 1870

Therm 70 63 started 0 22
 N. Clock 0 19 E. Clock 0 18
 H. 301 0 39 F. 3424 0.53
 E. Clock 0 21 stopped 0 27

March 24 1870

started 8^h 13^mB 236 - 8^h 36^m (mean)

♄ Cancri

η Cancri

new sheet 8^h 33^m

B 236 8 44½ (mean)

~~31.2~~ (31.2 44.0 56.7) ♄ 2 Cancri (396 43.5 56.3) (cannot last)

♄ Urs. Major

(15.5 44.7 13.0) ♄ 2 Urs. Major (29.5 58.6 26.9) 16

(53.8 6.3 17.5) ♄ Hydrae (45.5 57.6 8.5) 24^m

B 236 9 25 (mean)

stopped 9^h 15^m

March 25 1870

Level Obj. glass & cross level E. E. 79 W. 86

" " " " W. E. 79 W. 87

" " " " E. E. 80½ W. 87

" " " " W. E. 80 W. 86½

started 8^h 55^m

2² Uro. May

K Cancer

1 Draconis

2 Hydrae

2 Uro. May

3 Cephei

stopped 9^h 34^m

March 26 1870

Therm. 63 58 $\frac{1}{2}$ started 0 28

N. Clock 0 24 E. Clock 0 11

F. 3424 0 48 H 301 0 33

E. Clock 0 15 stopped 0 33

March 31 1870

started 9^h 12^m

1 Draconis

2 Hydrae

2 Uro. May

3 Cephei

Level Obj. glass & Cross Level E. E73 W78

" " " N. " " W. E78 W80 $\frac{1}{2}$

Level Obj. glass & Cross Level E. E71 W84

" " " S. " " W. E78 W78

March 31 1870 continued
 Level Obj: glass N. Cross Level E. E. 71 W. 84
 " " " N. " " W. E 79 W 79
 " " " S. " " E. E 70 W 87
 " " " S. " " W. E 79 W 78

L. Lequis
 stopped 10^h 3^m

April 1 1870

Therm. 65 57 $\frac{1}{2}$ Started 0 57
 N. Clock 0 54 E Clock 0 21
 F. 3424 0 59 H. 301 0 42
 E. Clock 0 24 stopped 1 5

April 2 1870

Therm. 61 69 Started 1 26
 N. Clock E. Clock 0 43
 H. 301 1 4 F. 3424 6 22
 E. Clock 0 46 stopped 1 33

April 5 1870

Therm. 65 61 Started 1 23
 N. Clock 1 20 E. Clock 0 24
 H. 301 0 49 F. 3424 1 7
 E. Clock 0 31 stopped 1 28

April 6 1870

Therm. 66 60½ started 1 3

N. Clock 0 59 E. Clock 0 4

H. 301 0 25 F. 3424 0 44

E Clock 0 7 ^{hump} stopped 1 8
_{after}

April 7 1870

Therm. 62½ 58 started 1 30

N Clock 1 25 E Clock 0 26

F. 3424 1 5 H 301 0 47

E Clock 0 28 after stopped 1 3/4

New sheet 8^h 18 m

April 8 1870

started 8^h 57^m

Level Obj. glass N. Cross Level E. E 66 W 77½

" " " N. " " W. E 70 W 74

1 Drac.

2 Hydrae

2 Ursa. Maj.

3 Cephei

preeding star

Level Obj. glass S. Cross Level E. E 65 W 79

" " " S. " " W. E 71 W 74

2 Lacrim

11 Lacrim

stopped 9^h 48 m

April 9 1870

Therm. 66 60 started 1 17

N. Clock 1 16 E. Clock 0 10

F. 3424 0 49 H. 301 0 30

E. Clock 0 12 stopped 1 25

April 11 1870

Therm. 72 62 started 1 37

N. Clock 1 34 E. Clock 0 19

H. 301 0 40 F. 3424 0 59

E. Clock 0 22 stopped 1 43

April 12 1870

Therm. 64 58 started 1 32

N. Clock 1 28 E. Clock 0 10

H. 301 0 30 F. 3424 0 49

E. Clock 0 12 stopped 1 36

started 9 19

2 Hydræ

of Urs. Major

Level Obj. glass N. cross Level E. E 65 W 79

" " " " " " W. E 71 W 73

E Leonis

11 Cephei

μ Leonis

79 Draconis

April 12 1870 continued
 Level Obj. glass S. Cross Level E. $E 65^{\circ} W 76\frac{1}{2}$
 " " " S. " " W. $E 68^{\circ} W 73$

stopped 9 57
 April 13 1870

Therm. 63 57 started 2 6
 N. Clock 22 E. Clock 0 40
 H. 301 1 0 F. 34 24 1 20
 E. Clock 0 42 stopped 2 10

April 14 1870

Therm. $62\frac{1}{2}$ $55\frac{1}{2}$ started 1.45
 N. Clock 1 41 E. Clock 0 15
 F. 34 24 0 56 H. 301 0 36
 E. Clock 0 17 stopped 0 49
 started 8 53

12 year Cent. 1879 2-5

2 Mrs. May

11 Capricorn 5

Level obj. glass N. Cross Level E. $E 57^{\circ} W 71\frac{1}{2}$
 " " " N. " " W. $E 61^{\circ} W 67$

1 Draconis
 2 Hydrae
 3 Mrs. May
 3 Cepheus

April 14 1870 continued
 Level Obj. glass S. cross Level E. E 56 W 70
 " " " S. " " W. E 61 W 65
 E Leonis

stopped 9 42
 April 15 1870

Therm. $65\frac{1}{2}$ $58\frac{1}{2}$ started 1 47
 N. Clock 1 42 E. Clock 0 13
 H. 301 0 33 F. 3424 0 54
 E. Clock 0 15 stopped 1 57

April 16 1870

Therm. 65 $54\frac{1}{2}$ started 2 18
 N. Clock 2 14 E. Clock 0 40
 H. 301 1 0 F. 3424 1 21
 E. Clock 0 42 stopped 2 22

April 18 1870

Therm. $64\frac{1}{2}$ 60 started 1 50
 N. Clock 1 46 E. Clock 0 5
 H. 301 0 25 F. 3424 0 47
 E. Clock 0 7 stopped 1 54

April 20 1870

Therm. 63 $58\frac{1}{2}$ started 2 2
 N. Clock 1 58 E. Clock 0 9
 H. 301 0 29 F. 3424 0 52
 E. Clock 0 11 stopped 2 7

April 22 1870

Therm. stuck started 2 7
 N. Clock 2 2 E. Clock 0 5
 F. 3424 0 49 H. 301 0 26
 E. Clock 0 7 F. 3451 2 10
 stopped 2 12

April 23 1870

started 2 7 N. Clock 2 2
 E. Clock 0 2 E. Clock 0 4
 F. 3424 0 47 H. 301 0 24.
 F. 3451 2 11 stopped 2 13

April 24 1870

started 9^h 42^m
 d Leonis
 32 Vrs May
 r Leonis
 q Drac.
 p Leonis
 226 Cephei
 stopped 10 31

April 25 1870

Therm. $67\frac{1}{2}$ $61\frac{1}{2}$ started 2 20

N. Clock 2 16 17 E. Clock 0 7

N. 301 0 29 F. 3422 0 53

F. 3451 2 25 E. Clock 0 13 stopped 2 27
started 10^h 0^m

α Leonis

β Urs. Maj.

γ Leonis

stopped 10 13

started 10 21

η Draconis

ρ Leonis

226 Cephei

stopped 10 31

Level obj. glass N. Cross Level E. E 65 W 75 $\frac{1}{2}$

" " " N. " " W. E 67 W 74

Started 10 42

ι Leonis

ν Cephei

stopped 10 48

Level obj. glass S. Cross Level E. E 64 W 77

" " " S. " " W. E 67 W 74 $\frac{1}{2}$

α Urs. Maj.

stopped 10 57

April 25 1870
22^h Ill 2

N mark all 2.40

.90		1.252	
872		1.28	
862		1.282	
862		1.28	392
872		1.28	340
852		1.298	
854	7 02	1.278	rej
925-	78	1.285	
903			

one round spot to off
left

2.100	215
2.125-	143
2.14	
2.17	
2.18	2.143

N mark	all W	round spot
.878	1288	2.160
.877	302	2.165-
.878	290	12
.872	275-	15-
.879	295-	.19
.878	290	.15-7
.877		

Mark violently agitated

reversed to Ill W

April 25 1870

22 1/2 h Jell W E 8 A obs

round. spot all W or Mark

26.5	1 ²	28.8	1.56.0
------	----------------	------	--------

26.0		29.0	53.0
------	--	------	------

26.4		30.0	52.5
------	--	------	------

24.0		28.9	59.0
------	--	------	------

20.2		29.0	54.5
------	--	------	------

30.0	373	29.0	53.0 350
------	-----	------	----------

24.2		1.29.7	57.0
------	--	--------	------

25.3	A 8 obs	1.55.0	87.8 772
------	---------	--------	----------

25.2		1.29.3	1.48.1
------	--	--------	--------

.176		.29.0	498
------	--	-------	-----

		29.0	478
--	--	------	-----

.18.6		29.1	491
-------	--	------	-----

.18.4		28.6	485
-------	--	------	-----

.19.3		27.0	494
-------	--	------	-----

		28.0	478
--	--	------	-----

.19.2		60.0	504
-------	--	------	-----

.20.0		28.6	500
-------	--	------	-----

21.5			4409
------	--	--	------

25.6			1.49.0
------	--	--	--------

21.8			
------	--	--	--

20.72			
-------	--	--	--

20.7			
------	--	--	--

--	--	--	--

--	--	--	--

--	--	--	--

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--	--	--	--

--	--	--	--

--	--	--	--

--	--	--	--

--	--	--	--

--	--	--	--

April 25 1870
 23^h unused to Ill East
 or all obs W W spot

.911	1.308	2.089
.853	290	.178
.839	312	.102
.840	289	.177
.820	284	.073
.841	278	133
.920	293	130
.883	654	113
507	1.293	.147
.863		.125
1490		1267
627		2.127

E. P. A. obs. Ill. E.

.903	.123
.852	.070
.878	.113
.864	.119
.882	.127
.877	.130
5256	88
.876	.114

Middle wire east of mean of the 5
 by circumpolars observed April 25
 0^s.021 Illum. East.

April 26 1870

Therm. 65 59 started 2 30 N. Clock 2 26

E. Clock 0 13 F. 3424 0 58

H. 301 0 34 F. 3451 2 33 34

E. Clock 0 15 stopped 2 34

April 27 1870

Therm. 65 60½ started 2 37

F. 3451 2 37 N. Clock 2 33

E. Clock 0 17 H. 301 0 38 F. 3424 1 3

E. Clock 0 19 stopped 2 42

started 10 46

of Urs. Maj.

δ Leonis

γ Cephei

Level obj. glass N. Lion Level E. E 56 11 71½

" " " " " " W. E 60 5 W 67

τ Leonis

116½ 176½

λ Draconis

6)22
3

91 Leonis γ Cephei

Level obj. glass S. Lion Level E. E 55 11 70½

" " " " " " W E 59 11 67

β Leonis

γ Urs. Maj.

stopped 11 28

May 4 1870

Therm 65 60 started 2 59 H. Clock 2
F. 3451 3 0 E. Clock 0 11

H. 301 0 32 F. 3424 0 58

E. Clock 0 13 stopped 3 4

May 5 1870

Therm. 66½ 59 started 3 31 H. Clock 3 29
F. 3451 3 34 E. Clock 0 41

F. 3424 1 29 H. 301 1 3

E. Clock 0 44 stopped 3 40

May 9 1870

Started 3^h 16^mEast Clock 0^h 8^mF 3424 0^h 57^m 55^s - 58^m 55^s3451 3 21 10^s - 20^s

H 301 0 38 15 - 25

Therm 58° - 64° yesterday

~~of to day~~
stopped 3 27^m

May 10 1870
 Started 3^h 41^m
 & clock on 0^h 28^m check 30^m
 F 3424 1 19 20 - 30
 3451 3 45 20 - 30
 H 301 0 53 15 - 25
 then 57 - 61

stopped 3^h 47^m

May 11 1870

Started 3^h 3^m
 & clock on 23^h 46^m
 F 3424 0 36 35 - 45
 F 3451 3 5 30 - 40
 H 301 0 9 35 - 45
 then 57 57.5
 & clock off circuit break
 at 23^h 52^m
 stopped 3^h 10^m

May 12 1870

Started 3^h 20^m

& clock on 23^h 59^m

F 3424 0 50 15-25

3451 3 22 20-30

H 301 0 22 40-50

Therm 54 57

& Clock out 0^h 5^m

stopped 3^h 27^m

May 12. Astron

Started 0^h 47

Polaris Wires c 2, 3, 5

stopped 1^h 20^m

~~Started~~ May 13

Started 3^h 39^m

& clock in 0^h 15^m circuit broken
after 0^h

F 3424 1 7 40-50

3451 3 42 30-40

H 301 0 36 40-50

Therm 55-0 60°

& cl out. 0^h 21^m stopped 3^h 47^m

May 14 1870
 Started 3^h 40^m

F 34 24 1 4 30 - 40

34 51 3 42 45 - 55

H 301 0 35 0 - 10

E Black ant 0^h 17^m
 stopped 3^h 46^m
 Ther 57.8 62.5

May 15 1870

Therm. 66 59 at 2^h 0^m

May 16 1870

Therm 70 66 at 3 40 N. Clock stopped

F. 34 51 3 44 E Clock 0 8

F. 34 24 1 7 H. 301 0 35

E Clock 0 16 stopped 3 53

May 17 1870

started 15 15

Level Obj. glass N. Cross Level E. E 58½ W 73

" " " N. " " W. E 59 W 74

" " " S. " " E. E 59 W 74½

" " " S. " " W. E 60 W 74½

γ² Urs. Min. & Cor. Bor. & Serpentes

E Serpentes & Urs. Min. & Scorpi

stopped 15 53

May 18 1870 Jll E

Therm. 64 58 started 3 46
 7.3451 3 47 E. Clock 0^h 4^m
 7.3424 0 57 H. 301 0 25
 E. Clock 0 6 stopped 3 51

May 19 1870

Therm. 64 59 started 3 50
 7.3451 3 52 E. Clock 0 5
 7.3424 0 58 H. 301 0 26
 E. Clock 0 7 stopped 3 56

New shut 11^h 55^m

0 Virginis

2 Corvi

e "

5 Comae

4 Draconis 4-5

1 Cor Ven

7 Virginis

12 Comae

13 "

7 "

5 Corvi

7 "

May 19 1870 Ill E
 4 Draconis
 4 Virginis
 2 "
 B. 287

31 Comae

4 Virginis

12 Coma Ven

36 Comae

14 Coma Ven

Clouded up
 stopped 13^h 10^m

May 19 Astronomical
 South clock 3^h 45 50
 B. 236 3 46 19.5

May 20 1870

Therm. 67 61 $\frac{1}{2}$ started 3 57

F. 3451 0 58 mean B. 236 4 0

F. 3424 1 1 H. 301 0 29

E. Clock 0 10 stopped 4 3

B. 236 29^h 44 fast of S. Clock

May 23 1870

started 4 6 Therm. 66 59

F. 3451 4 18

E. Clock 0 15

N. Clock 4 17

F. 3424 19 H. 301 0 37

E. Clock 0 18 B. 236 4 24 stopped 4 24

B. 236 fast of S. Clock 45^s 18

May 24 1870

Therm. 64¹/₂ 60¹/₂ started 4 54 N. Clock 4 52

F. 3451 4 56 B. 236 4 58 E. Clock 0 50

H. 301 1 11

F. 3424 1 44

E. Clock 0 53 stopped 5 2

B. 236 fast of S. Clock 50^s 63

May 25 1870

Therm. 63 58¹/₂ started 4 16 N. C. 4 17

F. 3457 4 18 B. 236 4 20 E. C. 0 8

F. 3424 1 2

H. 301 0 29 E. C. 0 10

stopped 4 24 B. 236 fast of S. C. 54^s 40

started 13 18

5 Tigris

Level Obj. of S. N. Clock Level E. 8 54 W 69

" " " B. " " W E 53 W 76

2^d Lohr's middle wire lost

B. Vis. Min 2 3 4

stopped 14 55

May 26 1870 Ill 8
 started 12^m 25^m
 Bet 6 4277
 4287

31 Comae
 4 Virginis
 32 Comelof 345 no rattle bed
 12 Can Ven lost W no rattle
 36 Comae
 48 Virginis faint
 14 Can Ven
 04 Hydorae
 0 Virginis
 B Comae
 Palanis @ W 3 5
 2 Virginis
 1 " "
 70 "
 1 " "
 8 " "
 25 Can Ven
 m Virginis
 63 "
 87 "

May 26 1870 Ill E

7 No May

7 Boatis

9 "

50 Cass LG

x Virginis

2 Draconis

B46 4699

x Virginis

14 Boatis

2 Boatis

2 Virginis

0 Boatis

climbed up

stopped 14^h 26^m

May 28 1870

Started 4 33 N. Clock 4 35 Alt 1 20

Therm 62 58 E. Clock 0 15 1

W. 301 0 36 7.3424 1 11

7.3451 4 42 E. Clock 0 19

B 236 4 45 stopped 4 44

B. 236 fast of S. Clock 68:32

May 29 1870 2^h

Therm 65 58

May 30 1870

Therm. 68 63½ started 4 39 N.B. 4 40
 F. 3457 4 43 B. 206 4 45 E.C. 0 12
 H. 301 0 33 F. 3424 1 8
 E. Clock 0 14 stopped 4 47

1° 21'
 B. 206
 Fast 45 sec
 135.01

New sheet

started 12^h 45^m

4 Virginis

12 Cor Ven bath stars

8 Virginis

B Comae

B 46 44 33

~~19 Cor Ven~~

61 Virginis

63 "

a "

c "

70 "

3 "

25 Cor Ven

83 Virginis

87 "

7 Mrs May

May 30 1870 Ill E
 y Boatis
 19 "

50 Cassiope

7 Virginis

2 Draconis

B46 4699

2 Virginis could not see
 2 Boatis faint clouds

clouded up

$13\frac{3}{4}$
 $10\frac{3}{4}$
 $\hline 30\frac{1}{2}$

stopped 14^h 18^m

Level Obj. glass N. level level E. E 52 W 66

" " " N. " " W. E 51 W 67 $\frac{1}{2}$

" " " S. " " E. E 51 W 66 $\frac{1}{2}$

" " " S. " " W. E 50 W 67

Obj. glass N. b = .508

" " S. b = .542

b sec ϕ = .530 X 1.354 = .72

May 31 1870

Therm. at 3 $\frac{1}{4}$ 68 $\frac{1}{2}$ 6.4

June 1 1870

Therm. 67 63 $\frac{1}{2}$ started 5^h 0^m N. Clock 5^h 0^m

Av. 1^o 22' E. Clock 0 23 H. 301 0 44 7.3424 119

E. Clock 20 25 B 236 5 10 7.3451 58 stopped 5 9

June 2 1870

Therm. 69 65 started 4 51 N.B. 4 51 Av. 1° 22'

E. Clock 0 11 H. 301 0 34 7.34 24 1 8

E Clock 0 14 B. 206 5 1 7.34 51 5 0 stopped 50

B. 206 fast of S. Clock 1^m 37^s 85

Ill E N Mark
round spot Coincidence

2. 100

158

135-

115-

188

1137

166

143

169

182

443

2. 149

1.294

.297

.298

.298

.295

.299

.296

.285

.290

.285

11

1.291

390

center square

9.890

.853

.871

.876

.928

.930

.888

.912

.926

.935

901

989

June 2 1870 Jll E

A Seale observer

round spot on W

298
70

2.187

.230

.173

.197

.158

.179

.201

.191

.184

.160

540

2.184

1.298

.297

.1295

.292

.285

.283

.276

.273

.281

.310

894

1.289

.887

.1965

.938

.993

.966

.952

.870

.927

.970

.956

424

.942

Illumination West
E. P. A. obs.

Spot

Square

Coincidence

.170

.198

.222

.215

.182

.219

.186

.200

.208

.215

.09

201

1094

858

236

.118

12288

229

173

.2690

2286

229

69

.2586

264

.448

.1420

.453

.455

.455

.490

.450

.488

.460

.460

.579

1.458

292

.164

390

226

.275

.298

.285

.302

.290

.315

.300

.290

.290

.299

.944

1.294

113

June 2 1870 Herm. West
A.S. obs.

Spot.	Coincidence mid. wire	Square
.133	310 290	.452
.141	315 285	.462
.176	316 284	.458
.140	308 292	.440
.132	309 291	.444
.198	306 294	.464
.160	304 296	.410
.187	293 307	.447
.172	299 301	.428
.180	305 295	.445
<u>.1619</u>	<u>.2935</u>	<u>.4455</u>

started 12^h 57^m

4 Virginis

3 Comae

BAB 4433

19 Can Ven

61 Virginis

63 4

2 4

at Cassiopeae

3 Virginis

June 2d 1870 Ill W
 Level Sp. W. at ~~at~~
 C L E W E

$$\begin{array}{r} 70 \\ 58 \\ \hline 128 \end{array}$$

$$\begin{array}{r} 35 \\ 49 \\ \hline 84 \end{array}$$

very poor

in the clay

in Boats

Level Ill W Oh glass ~~at~~ S

C L E E 38. W 68.5

$$\begin{array}{r} 48 \\ \hline 86 \end{array}$$

$$\begin{array}{r} 58 \\ \hline 126.5 \end{array}$$

 40.5

d Draconis

Revised to Ill E

d Boatis

Level Ill E Oh glass S

C L E E 37.0 W 69.

$$\begin{array}{r} 48.5 \\ \hline 85.5 \end{array}$$

$$\begin{array}{r} 58.5 \\ \hline 127.5 \end{array}$$

 42.

BAC 4776

o Boatis

4797

4805

June 2^d 1890. M E

g Bootis

5 Urs Min

o Bootis 4-5

Bt 6. 48 38

π Bootis dup 1st x

μ Virginis

34 Bootis

e "

μ Librae 4 5

λ^1 " 1-3

λ^2 "

ξ Bootis dup 2nd x

ξ Librae

ξ^2 "

β Urs Min

Bt 6 49 37 3-5

δ Librae

β Bootis

ψ " 2-5

e "

48 Cephei

24 Librae 4-5

June 28. 1870 Ill E

1 Lupi

BAB 5023

B. Librae

1 Lupi

e Librae

u' Bootis

γ' Mus Clim

stopped 15^h 22^m

Level Obj. glass N. Cross Level E, E 40 W 68

" " " N. " " TV. E 49 W 59½

June 3d 1870 Ill E

started 12^h 49^m

e Virginis

ψ Hydrae

α Virginis

β Comae

BAB 4433

19 Cor Ven

Polaris all Wire

~~BAB 4466~~

α Virginis from up 13^h 46^m

Jennings 12000
two whellmanJune 3^h 1870 Ill E22 $\frac{1}{2}$ mean timeDistance by micrometer between
extreme wires of the middle 5.
$$\begin{array}{r} 19869 \\ 2267 \\ \hline 2267 \\ \hline 269239 \end{array}$$

Western wire (ill. East) Eastern.

0.108

6.422

103

100

085

104

097

110

093

100

102

$$\begin{array}{r} 10012 \end{array}$$

$$\begin{array}{r} 6.338 \quad 14.37 \quad (2.267) \\ \underline{12676} \end{array}$$

1694

12676

4264

38028

46126

44366

$$1^2 = 2.267$$

1437

1436

1447

1433

1438

1440

1455

1448

1440

$$\begin{array}{r} 4396 \end{array}$$

Collimation as determined June 2
Middle wire west of mean of 5 Ill. E. 0.006 by ignis polaris.
E.P.A. obs. Middle wire west of spot

Ill. E. 2.149 - 1.291 = 0.858

Ill. W. 1.294 - .201 = 1.093

$$c = + 0.117 \text{ Ill. E.}$$

$$\begin{array}{r} 235 \end{array}$$

Middle wire east of square

Ill. E. 1.291 - 0.901 = 0.390

Ill. W. 1.458 - 1.294 = 0.164

$$c = + 0.2113 \text{ Ill. E.}$$

$$\begin{array}{r} 0.226 \end{array}$$

A.S. obs. Middle wire west of spot

Ill. E. 2.184 - 1.289 = 0.895

Ill. W. 1.294 - 0.162 = 1.132

$$c = + 0.118 \text{ Ill. E.}$$

$$\begin{array}{r} 1237 \end{array}$$

Middle wire east of square

Ill. E. 1.289 - 0.942 = 0.347

Ill. W. 1.444 - 1.294 = 0.150

$$c = + 0.098 \text{ Ill. E.}$$

$$\begin{array}{r} 197 \end{array}$$

June 4 1890

Therm. 71 67½ Started 5^h 6^m N.B. 5-6 to 12
 E. Clock 017^m break afterwards, H. 3010 49 7.2424 d 12
 E. Clock 020 7.3457 5^h 15^m B236 5-15-30
 stopped 5 14 B236 fast of S. Clock 1^m 49.17

New sheet

13^h 15^m

2 Virginis

A Cassiope

3 Virginis

B46 4541

25 Can Ven

m Virginis

83 "

y Mas Maj

h² Centauri

y Bootis

y "

48 Hydore

T Virginis

B46 4679

new start 14^h 2^m9^m

Observations of this
 night not very good

June 4 1870 All E

2 Virginis

2 Librae

~~B 46 4776~~

0 Boatis

stopped 14^h 22^m

June 6 1870

started 13^h 19^m

* pr 87 Virginis ~~at~~ 5' S

87 Virginis

γ Ursellae

γ Boatis

9 "

2 Draconis

B 46 4699

clouded up. stopped 14^h 8^m

June 7 1870

Therm. 76¹/₂ 73 started 5 4 N.C. 5 5 A. 12¹/₂

E.C. 0 3 F. 2424 0 54 H. 301 0 25

E.C. 0 5 F. 2451 5 11 B. 236 5 13

stopped 5 12 B. 236 east of South Clock 2^m 6.85

June 9 1870

Therm 71 68 started 5 34 N.C. 234 to 20
 E. Clock 0 26 7.3424 1 16 H. 301 0 48
 E. Clock 0 30 7.3451 5 43 B. 236 5 45
 stopped 5 44 B. 236 fast of S. Clock 2^m 19^s 30

June 10 1870

Therm 70 64½ started 5 21 N. Clock 5 21 to 120
 H. 301 0 24 7.3424 0 56 E. Clock 0 9
 B. 236 5 24 7.3451 5 26 stopped 5 27
 B. 236 fast of S. Clock 2^m 25^s 34

June 11 1870

Therm 65 61 started 5 27 N. Clock 5 28 to 117
 E. Clock 0 9 7.3424 0 59 H. 301 0 31
 E. Clock 0 11 B. 236 5 34 7.3451 5 32
 stopped 5 32 B. 236 fast of S. Clock 2^m 31^s 64

18 Chronograph sheets returned
 by Miss Bond.

1870 Jan. 14, 22, 24, 26 No. 1 & 2, 28 No. 1 & 2
 Feb. 1, 7, No. 1 & 2, 9, 10 No. 1 & 2, 14, 16 No. 1 & 2,
 19 No. 1 & 2.

June 12 1870 2^h Therm. 71 62

June 12 1870

started 13^h 13^m

d Virginis

~~51 Canis~~

BAC 4541

25 Gen Ven

m Virginis

63 "

87 "

γ Urs Maj

h² Centauri

γ Bootis

9 "

48 Olydae

τ Virginis

d Draconis 4 5

BAC 4699 #2-5

stopped 14^h 11^m

new sheet 14 7^m

d Bootis

λ Virginis

2 Librae

BAC 4776

June 12 1870 Ill 8

4 Boatis

Bab 4797 4-5

" 4805

9 Boatis

5 Visclin 1-4

2 Boatis

Bab 4838

7 Boatis 1st head m 1-2

u Virginis

34 Boatis

6 "

u Librae

2 " "

Stopped 14 h 46 m

Level Obj. glass S. Cross Level C. E 41 W 64

" " " S. " " W. E 50 $\frac{1}{2}$ W 54 $\frac{1}{2}$

" " " N. " " E. E 40 $\frac{1}{2}$ W 68

" " " N. " " W. E 50 $\frac{1}{2}$ W 58

$$\text{Obj. glass N. b} = \frac{126 - 91}{60} = +0.583$$

$$\text{" glass S. b} = \frac{128\frac{1}{2} - 91\frac{1}{2}}{60} = +0.617$$

$$\text{b sec } \phi = 0.600 \times 1.354 = +0.81$$

June 13 1870

Started 5 30 Therm. $73\frac{1}{2}$ $69\frac{1}{2}$ N.C. 5 31 Az. 118
E. Clock 0 6 H. 301 0 27 7.34240 55 E. Clock 0 9
B 206 5 40 7.3451 5 38 stopped 5 38

June 14 1870

Therm. 74 $71\frac{1}{2}$ started 5 41 N. Clock 5 41 Az. 119
E. Clock 0 10 H. 301 0 33 E. Clock 0 13
7.3424 1 0 B. 206 5 49 7.3451 5 47
stopped 5 48 B. 206 fact of S. Clock $13^h 24^m 46^s$ $14^h 2^m 50^s$

started 12^h 59^m

B. 6000

B. 4433

Polaris 2 - 5

2 Virginis

5

7 Ursae

7 Bootis

stopped 13^h 50

June 15 1870

Therm. 74 $70\frac{1}{2}$ started 6 15 N.C. 6 16 Az. 120
E. Clock 0 42 7.3424 1 29 H. 301 1 4
E. Clock 0 44 7.3451 6 23 stopped 6 23

June 15th 1870 J.W.C.
 started 13 3.4^m

8.7 Virginis

γ Urs Major

γ Bootis

9 "

48 Hydrae

τ Virginis

2 Draconis

Bbb 4699

k Virginis

14 Bootis 4-5

d Bootis

2 Virginis

Bbb 4757

2 Librae

Bbb 4776

θ Bootis

Bbb 4797

4805

g Bootis

5 Urs Minor 2-4

2 Bootis

June 15th 1870 Ill E

B46 4838

II Bootis

u Virginis

34 Bootis

E "

u Librae

d² "

30 Bootis

31¹ Librae

32 "

B Vis Min 1-4

B46 4937

v Librae

B Bootis

4 "

C "

24 Librae 4-5-

1 Lupi

new star 15^h 8^m

B46 5023

B Librae

v Lupi

d² "

June 18th 1870 J M E

Librae

N Boots

2nd Mo Altin 2-5-

1 Draconis 3-5-

Prob 6.5109

37 librae

2 Cor Bar

ψ¹ Libe

ψ² u. (2-5) d φ¹ m many 7

2 Serpenti

B u

g Lupi

✓ 5 corpiu

stopped 15th 5-4 m

Level Obj. glass N. Cross Level E. E 36 W 65

" " " N " " W. E 45¹/₂ W 55¹/₂

" " " S. " " E. E 35 W 64

" " " S. " " W. E 44¹/₂ W 55

$$\text{Obj. glass N. } b = \frac{120\frac{1}{2} - 81\frac{1}{2}}{60} = +0.650$$

$$\text{" " S. } b = \frac{119 - 79\frac{1}{2}}{60} = +0.658$$

$$b \text{ secp} = .654 \times 1.354 = +0.89$$

June 18 1870 Ill E
 Started 13 h 59 m

BAB 4699

K Virgins

14 Boatis

2 0 4

n Virgins

BAB 4757

2 Librae

BAB 4776

4 Boatis

BAB 4797

4805-

9 Boatis

5 no den 1-4 no rattle

0 Boatis

BAB 4838

11 Boatis

n Virgins

34 Boatis

E

n Librae

2 2 11

June 18 1870

3 Boat

4 Librae

32 "

B 3 Mrs Chen 2-5

B 4 49 37 3-5

1 Librae

B Boats

24 Librae

1 Lupi

B 6 50 23

B Librae

E "

W Boats

22 Mrs Chen 4-5

1 Draconis 3-5

B 6 51 09

37 Librae

2 Can Bar

4 Lupi

42 "

B Sirentis

W "

E

stopped 15^h 46^m

June 20th 1870

Started 6^h 6^m

E Clock 10^h 12^m

F 3424 0 54^m 10^s - 20^s

~~3451 6 10 10 - 20~~

F 3451 6 11 15 - 25

3424 0 57 35 - 45

H 301 0 38 50 - 60

E Clock ant 0^h 20^m

Stopped 6^h 15^m

thermometers 71.8 74.7 at 0^h 25^m

June 21 1870

Level Obj. glass N. level level E. E. 41 W. 70

" " " N. " " W. E 50 W 63

" " " S. " " E. E 42 W 72

" " " S. " " E. E 52 W 64

Obj. glass N. $b = \frac{133 - 91}{60} = +1.70$

" " S. $b = \frac{136 - 94}{60} = +1.70$

$b \sec \phi = 7 \times 1.354 = +1.95$

Started 14 50

A Libra 2-5

B Bootes

V Bootes

June 21 1870 cont.

⊙ c Bootis

48 Capher

1 Loupi

β Librae

δ Loupi faint, clouds

m. Bootis

ν Draconis

B46 5109

α Cor Bar

δ Serpentis 3-5 clouds

β ♂ u

u u.

ε u

λ Librae Librae

Stopped 15 h 47 m

June 22 1870

Therm. 48 65 started 6 17 E Clock 0 15

7.3424 0 55 H. 301 0 37 E. Clock 0 18

7.3451 6 24 Stopped 6 24

June 23 1870

Therm. 69 66 started 6 27 7.3451 6 28

E. Clock 0 23 7.3424 1 2 H 301 0 44 E Clock 0 25

Stopped 6 32

June 24 1870

Therm. 74 66½ started 6 31 N.C. 645
 No. 158 E. Clock 0 36 F. 3451 648 H. 301 0 38
 F. 3424 1 16 E. Clock 0 39 stopped 6 50

June 25 1870

Therm. 80 73½ started 6 17
 Chron. 26½ fast, mist 6 23 24
 Are 1° 54' N. Clock 6 28
 F. 3451 6 24 E. Clock 0 11
 F. 3424 0 48 H. 301 0 32
 E. Clock 0 13 stopped 6 31

June 28 1870

Therm. 78 71 started 6 47
 N. Clock does not break F. 3451 649
 E. Clock 0 24 H. 301 0 45 F. 3424 0 58
 E. Clock 0 26 stopped 6 55

June 29 1870

Therm. 83 78 started 6 47 F. 3451 648
 E. Clock 0 18 2 H. 301 0 40 F. 3424 0 51
 E. Clock 0 21 stopped 6 53

6.5⁹ transit No 5
value of 1 div of level scale
0.064

June 29 -

1st minute break 6.10.

Ther. in South C. case 75.5 79.

F 3451 6.13 - end. 6.14 ~~end~~

East clock. 23.42. 2 ~~1st~~ after break.
23.44. 1st sec. end of ~~minute~~

Hutton 301. 0.6. end of break.
0.7 end of break.

F 3424. 0.18 end. 0.19 end

Last minute 6.27.

~~July~~ June 30

1st Minute break 6.27. 73 - 82.

East Clock. 23.57. 2 - 23.52.0

F 3451 - 6.32 6.33.

F 3424 - 0.25 0.26

H 301. 0.20

Last break 6.40

July 1st.

At minute break - 6.40 68.5-73 -

North Clock - 6.43 1.50

East " failure - 0.4.2 0.5 -

F 3451 - 6.48.30 6.49.0 6.50

F 3424 0.36 0.36.30

H 301. 0.30.30 hrs. 0.31

after last break. 0.12.2

July 3rd -

At minute 7.18-0 62. 69.5-

N.C. 7.20

F 3451 - 7.22 -

Σ.C. - 0.33.

F 3424 - 1.0

H 301 0.55 -

Σ.C. last ^{run} 0.36 -

July 5 -

7.36 68 - 71.5

N.C. 7.37 - 1.55 -

F 3451 - 7.40 Σ.C. 0.47

F 3424, 1.14 H 301. 1.10

Σ.C. Last. 0.57

July 5 - 23.45

S.C. 6.39 73. 73.5

N.C. 6.40 1.55

F 3451. 6.43.

Σ.C. 23.46

F 3424 0.12

H. 301. 0.8 -

July 7. 0.0. 73. 74.

Minute break 7.3

N C 7.4 1.55

F 3451 7.7

Σ.C. 0.10 0.11 0.12

F 3424 0.35

H 301

