

KG

11366

v.871

H. C. Observatory
Chronograph Record
1870
June 22 1870 to Nov 1st 1870

Sever, Francis, & Co., University Booksellers, Cambridge.

17
30

Sept. 26
Oct. ~~26~~ 4

α
 a α

June 22 1870 Ill E
 Started 14^h 17^m

B46 4797

4805-

8 Boatis

+ the min

+ Boatis 2-5-

E Boatis

Clouded up

Stopped 14^h 45^m

July 5 1870 All E

Started 15^h 15^m

γ² Uscellin 2-4

1 Draconis 3-5

B 46 510 9

37 Librae

2 Cor Bar

ψ¹ Lupi

ψ² "

1 Serpenti's

2 "

B "

m "

6 "

λ Librae

ξ Lupi

γ Serpenti's

ε Cor Bar

δ Scorpia 4-5

τ Herculis

β¹ Scorpia

July 5 1870 Jll E

♂ Draconis 2-5

K Herculis

γ² Scorpii 2-5

Gr 2320

♂ Ophiuchi

α Canoe M

ε Ophiuch

♂ Scorpii

γ Herculis

♂ Ophiuchi

ω Herculis 2-5

♂ Scorpii

γ Draconis 2-5

♀ Ophiuchi

♂ n Herculis

γ Scorpii

♂ Ophiuchi

B♂♂ 5568

" 5579

♂ Herculis

γ

July 5~~th~~ 1870 Jll 8

2 Comleap R

K Hercules

51 Hercules

C Ophiuchi 3-5

54 Hercules

K Ophiuchi

B+C 5718

E Hercules

d "

60

γ Ophiuchi

stopped 17 h 7 m

July 5 1870 astronomical mean time $23\frac{3}{4}$
 level obj. glass N. level E. E 34 W 67
 " " " N. " " W. E 43 W 56
 " " " S. " " E. E 33 W 64
 " " " S. " " W. E 41 W 54½

$$h \text{ obj. glass N.} = \frac{123 - 77}{60} = +0.767$$

$$h \text{ obj. glass S.} = \frac{118\frac{1}{2} - 74}{60} = +0.742$$

$$h \text{ sec } \phi = 0.754 \times 1.354 = +1.02$$

July 9 1870 Ill E

Started 15 23

2 Serpentes

B "

M " 4-3-

E "

λ Libiae

γ Lupi

ε Cor Bar

γ Herculis

B' Scorpii

δ Draconis 3-5-

κ Herculis

γ² Scorpii

δ Ophiuchi

σ Coronae

Level

E

W

b L E

41
41.5

62
61.5

39.

63.8

39.5

63.5

161.0

250.8

250.8
161.0

89.8

74.8
1.357

29.92

374.60

97.24

101.2792

Reversed to

89.8

11.2 25

.7 48

Ill W

July 9 1870

Jll W.

E Ophiuchi

E

W.

6 L E

41

61.5

$$\begin{array}{r} 257.3 \\ 158.2 \\ \hline 93.1 \end{array}$$

41

61.

93.1

38

64.8

11776

38.2

64

11354

158.2

2513

3104

3880

93.1

$$\begin{array}{r} 14998 \\ 1050704 \\ \hline 1050704 \end{array}$$

11.64

K Hercules

57

4

Ophiuchi

54 Hercules

K Ophiuchi

B46 5718.

E Hercules

d "

E Urs Major

7 Ophiuchi

B46 5795

580.4

2 Hercules

π

4

4-5

u

u

July 9

1870 Jle W

D. Aphinchi

w. Herculis

h. Aphinchi

r. "

V. Scorpii 3-5

λ. "

B. Draconis

d. Aphinchi

K. Scorpii

stopped 17^h 38^m

July 11 1870

~~Obs.~~ Immersion of ν^2 Sag.

observed with E. Equatorial

at 21^h 41^m 46.5^s by Chron. A. 424.sidereal time 21 41 32.54^s allowing for error of chronometer

Chron. compared with S. Clock, twice

started 21^h 51^mChron. A. 424 21^h 52^m 20^s 30^s 40^s 50^s 60^s.

(previous breaks to be neglected)

Chron. H. 301 2^h 35^m 0^s every 5^s for 1^mstopped 21^h 56^m { A 424 close ofChron. A. 424 started 22^h 19^m 0^s every 10^s after.stopped 22^h 20^mImmersion approximately at 21^h 37.83 mean time

July 13 1870

Local Obj: glass N. Crown level E, E 34 W 53

" " " N. " " W, E 30 W 57

" " " S. " " E, E 32 W 54½

" " " S. " " W, E 30½ W 56

Obj: glass N. b = $\frac{110 - 64}{60} = +0.767$ bsecp = .783 X 1.354" " S. b = $\frac{110½ - 62½}{60} = +0.800$ = + 1.06started 15^h 27^m

u Serpentes

e

λ Librae

ε Lupi

γ Serpentes

ε Coron

r Herculis

δ Scorpion

θ Draconis

κ Herculis

ν Scorpion

σ Ophiuchi

τ Car

ε Oph 2-5

σ Scorpion

τ Herculis

θ Oph

ω Herculis

δ Scorpion

July 13 1870 M W

γ Draconis

φ Ophiuchi

α Herulis

τ Scapri

ζ Ophiuch

B+C 55-68

55-79

ξ Herulis

η

ε Scapri

κ Herulis

57

B+C 57-18

δ Herulis

60

stopped 17 h 29^m

July 14 1870 started
for Astrakids

July 17th 1870
started 16^h 51^m

observations of
asteroids
stopped 19^h 22^m

Level reading July 17 1870 11^h m.t.
Obj: glass N. Cross Level E. E 30 W 53
" " N. " " W. E 28 W 56
 $b = \frac{109 - 58}{60} = +0.850$
 $b_{\text{sec } \phi} = .85 \times 1.054 = +.15$

2nd sheet
started 19^h 27^m

Ill East

July 20 1870

With the circle

B Leonis

stopped 11 58

new start 12 56

Polaris at Wire

α Virginis

γ the May

γ Bootis

stopped 13^h 51^m

July 20 1870.

Mer. Circle

B Libran 9 wires

Last min. 15^h 12^m

new sheet 15 15

μ Bootis 9 wires

2^d Urn. Min. middle wire

2^d Com Bar

End 15^h 45^m

July 21 1870.

Mer circle Ill &

on mark 25.79

Started 12^h 5-0^m

July 20 1875
Mass. Circle

last seen 12^h 12^m
seen about 12^h 21^m

Palanis on a wire B
at 22^h 00^m

21
20
19
18
17

at 25^h 92^m
Palanis C 1, 2, 4

clouds

d Virginis 13 miles

at 17^h

Palanis E 1

stopped 13^h 45^m

July 24, 1870

New start 15^h 25^m

L Caronae 13 miles

d Serpenti 13 miles

Changed to a higher power
& the ^{eye piece} other 13 miles

B Scapuli D - 4

* In Gr 2320. 13 miles
observed by mistake
T Herculis

stopped 16 21

new sheet 16 24

A Draconis 13 miles

η Herculis G - 61 mid
wire lost

L Camelopardalis D - 84

K Ophiuchi G - 61
middle wire had

July 21 1870 Ill E

B E Mrs Clin

13.

E 3-1

23

33

43

at 25.92

44 Ophirichi

d

stopped 17^h 33^m

July 22 1870

Ill W

Started 16^h 7^m

* Ophirichi B - E

d Hercules D - E₄

E Mrs Clin C₄ - E₂

2 Hercules

44 Ophirichi

B Draco C₁ - 4

July 22 1870

W Draconis

μ Herculis

γ Draconis

γ^2 Sagittarii

δ Urs Minor

10 Aquilae

51 Capricorn / C F 4-1

Stopped 18^h 40^m

July 23 1870 Ill W

Started ~~17^h 27^m~~ 16^h 44^m

K Ophiuchi

E Urs Minor

δ Herculis

δ Ophiuchi

W Draconis

μ Herculis

July 27 1870

E 2nd Ill M

started 16^h 25^m

α Draconis

ε Ophiuchi

γ Herculis

6 L M	ε ?	M
	35-	62
	35-	62
6 L E	35.5-	61.5
	36	61.5
	141.5	105.5 2470
		+13.19

K Ophiuchi very faint thro' clouds

δ Herculis faint

E. 2nd Ill

δ Herculis faint clouds

out 17^h 12^m

July 29 1870

astronomical

Walter Bickel

started 4 h 48^m

Micrometer head
reads 26⁷.16

α Aurigae

β Orionis 64 - 64

β Tauri

γ Orionis

ϵ Orionis

δ Orionis

γ Geminorum

δ Can May

Stopped 6 h 41^m

Level Ill	E	W
West at	41	39
	32	<u>47.5</u>
6 h 49 ^m	73	86.5

13.5
3.4

3.4
2.72

July 29 1870

	E	W
Lived again	43	36.5-
at 6 ^h 5-4 ^m	<u>31.5-</u>	<u>47.5-</u>
	74.5	84.0
		9.5-
		2.4

July 30 1870

Started 12^h 55^m

Polaris E₂₋₁ 64-1

♂ Virginis

Pen up 13^h 30^m

~~new start 14 34~~

~~♂ Bootis~~

attempted to observe the
reflected images of the
wires but without success

July 30 1870

new start 14 34

E Boats

d² Lohræ

B Wodlin

B Boats

level at

15^h 2^m

385	335
275	45
<hr/>	
66.0	78.5
	12.5
	3.1

stopped 15^h 4^m

Aug 6 1870 E. Transit

Started 17 22

level Obj. glass N. Cross level E E 33 W 57
 " " " " " " W. E 32 W 58 $\frac{1}{2}$

14. 30.1

~~8 26 (mean)~~

8 31 (mean)

level Obj. glass S, Cross level E. E 31 W 58 $\frac{1}{2}$
 " " " " " " W. E 31 W 59

14 30.1 8 40 mean

stopped 17.42

Aug 1st 1870

Meridian circle
Ill West

N Mark E Polaris W of Rahu

26.03

06

1.15

08

1.35

1.35

06

05

10

10

26.0865

26.055

082

082

056

067

069

101

086

075

049

26.0722

Ill East

26.050

065

1.25

0.15

09

60

10

085

105

095

26.073

26.0865

26.099

096

141

072

090

074

050

041

059

090

26.0810

0720

Zero of coll

26.078

26.160

.082

Mean 26.080

26.0765

.078

Aug 6 1870 continued
see two pages back.

~~Immersion~~ Immersion

$8^h 49^m 17.4^s$

by chron. H. 301 observed by A. S.

$15^h 43^m 18.0^s$

by chron. B. 236 observed by S. M.

Started 18 20

B. 236 $16^h 17^m$ to $16^h 18^m$

E. Transit of Aquilar

2 Lyrae

51 Cephei

β Lyrae
stopped 18 47

Emergence $10^h 3^m 55.5^s$

Star seen within coloured border of
moon and observation cannot have
been much too late.

Started 19 35

Reversed to Ill. East.

Aug 6 1870 continued
 E. Transit
 of Aquilae
 2 Aquilae
 E Draconis

Chron. H. 301 10 50 (mean)

~~E~~ Aquilae

3 Urs. Major

Chron B. 1236 17 58^m (mean)

stopped 20 8

Level Obj. glass N. cross level E. E 34 W 59

" " " N " " W. E 34 W 61

" " " S " " E. E 34 W 61

" " " S " " W. E 34 W 61

August 15 1870

Started 17^h 20^m

With E & S transit

all East

the obj B x out of focus

focus improved

51 Cephei 16 E 2-5 H E

level H E

W E

20 72.5

level so much out that it could not be read level adjusted

New Start 19^h 38^m

1 Aquilae 63-1 B

2 " H E

level H E W E

60

40

45

55

105

95

6

2d break 2d mic

August 15-1870

Reversed to Lp W

T Aquilae Lp W + 3-5-

Level Lp W	W	E
	60	42
	<u>45</u>	<u>56</u>
	105	98

K Cephei Lp W all 2

W Capricorni L 2-5 E

Level Lp W	W	E
	58.5	45
	<u>46</u>	<u>57</u>
	104.5	102

E Delphini all 2

Stopped 20^h 31^m

or Clock in circuit

20^h 22^m - 23^m

Aug 16 1870

started 17 27
 over start 19^h 31^m

Level of W W 8
 63 44
 47 60
 110 104

✓ Aquilae Alt $\frac{1}{2}$ 0.6.0
 L " " "
 E & mean " "

reversed to of 8
 W 8
 65 42
 48 58.5
 113 100.5
 + 12.5

✓ Aquilae not seen
 II Capricorni ft clouds

stopped 20^h 22^m
 Level of 8

65 42
 48 60
 113 102

Aug 17 1870.

Started

16 ^h 54 ^m

E Lr M E

85 Transit M E

E us Min

44 Ophiuchi

Gr 966 LE

B Draconis E

2 Ophiuchi B

W E

52	31
<u>36.5</u>	<u>46.</u>
88.5	77

+ 11.5

W Draconis F E

reversed to W

W Draconis F

M Herculis

ψ¹ Draconis

52.5	31
36	47.

γ Draconis
 22 Sagittarii

Aug 17 1870
E Transit

7 Serpents

1 1/2 hrs Min East mic.

1 Aquilae

2 Lynce

51 Cephei

3 Lynce

6 Sagittarii

stopped 18^h 50^m

E Transit

E

W

Obgl R. CLE 36.
62 W 36

72

59. ~~11~~
59

118

1.6

11.5

August 18. 1870.

Obs with Mr. Curcle
started 18^h 50^m

γ Aquilae

δ Sagittae

ν Draconis 6₃ - 6₅

κ Aquilae

γ

ε Draconis

τ_B Aquilae

δ Ursae maj^{or} 4. 6₁ - 6₁

stopped 20^h 43^m

$b = -1.10$

$c = +0.03$

Aug 19 1870
Mer. Circle Collimation
N. Collimator S. Collimator

25.41
1.38
1.38

25.39
1.25

64

25.22
1.28
1.25

25.25

25-32 set wire to line of no collimation
started 20 46

7.4 C 1879 C D E
* pri. pr. Mrs. Moaj ED
5 2 Mrs. Moaj EDC
stopped 21 5

Aug 24 1870
Started 18^h 15^m

1 Aquilae @ 64 - 8 10^s past
micron 25.95 lost wire

A 96 45 + 4 53.4
B 8 25 1 37.6
D 278 0 0 56.1
188 15 0 49.7

Aug 24 1870

B Lyrae microm 26.25

A	35 ⁰ 15 ¹	2	55.3	on last
B	327 0	4	36.7	mic
D	35	3	55.0	
G	20	2	49.0	

3 Aquilae micr 26.448

A	4	20 ¹ - 1	+ 51.6
B		25 ¹ + 1	52.7
D		0 0	54.4
G		50 4	47.3

7 Aquilae micr 26.688 mic B

A	20	2	1.6
B	349 55	3	53.5
G	259 20	3	6.5
D	179 35	1	56.6

4 Cephei cloudy not seen

E	W	E	W
22	59	56	25
55	26	22	59
77	85	78	84

0.797

8

.6.

1.50

1.75
1.400

9.093

August 26 1870

Started : 17^h 28^m

✓ the thin G₁₋₄ E₁₋₄

micron 26.499 G₁₋₂

502

5-20

5-10

508

490

503

5-20 all m

5-20

596 E 3 $\frac{1}{2}$

315.0 40'

A

BD

BC

DC

3 2.8 2 52.7 2 47.0 2 57.5

clean 2.50.00

2 Lyne allc 25.491

3 85

3 45.5 3 41.7 3 33.2 3 50.3

clean 3.42.68

B Lyne allc 25.696

90.5

0 38.7 0 36.2 0 27.2 43.2

new start 19^h 43^m clean 0.36.32

2 Aquilae

1 star

new star

35 25

717
3611

20.695

675

1 14.2 1 14.1 1 03.5 1 24.3

clean 1 14.02

Aug 26 1870 B F
 2² Capricorn 20.628 573
 5-5 15- lost on chronograph
 2 6.8 2 4.8 2 1.2 2 19.9
 mean 2 8.18

stopped 20 19

new sheet 20 21

* 20^h 27^m - 14° 10' 26.493
 56° 25'

1 36.1 1 35.7 1 31.0 1 47.8
 mean 37.65

* 20 38 - 11° 35' 26.473

5-3 5-0

1 57.5 1 56.2 1 53.2 2 6.9
 1 58.45

* 20 50 - 10 12 26.441
 5-2 25- 3 30.92

3 30.2 3 28.0 3 25.5 3 40.0

61 Cygni 25.570

4 10

1 52.92

1 56.0 1 50.6 1 46.9 1 58.2

* 21 21^h 12^m - 13 9 ? 35^h 25.508
 5-5 20

2 50.2 2 47.6 2 46.0 2 59.5

2 50.82

stopped 21 5-3

Bar 30 252
 alt 67.5
 air 66.2
 Pier 70.0

Aug 27 1870
 started 18^h 46^m
 18 51

E Aquilae alt 23.200

28 35

4	26.1	5	01.5
4	27.5	3	46.9

* 19 9 $\frac{1}{2}$ - 21.18

25.160

63 35

-0	1.3	+0	46.2
+0	15.8	-0	23.3

Pl VII 6716 C₁₁-1 25.55-3

291 5

+0	11.1	+0	46.1
+0	10.0	-0	20.5

* 20 33+ - 2 40 faint 1st in last 22.174

55- 0

+0	12.6	+0	56.1
●	23.5	-0	13.8

W. W. W.

Aug 27 1870

* 20 44 - 10 48? 23.033
53 0

Wrong

- 0 10.9 + 0 36.8
+ 0 5.0 - 0 30.3

*

23.163

T Aquilae

25.205

35 20

+ 3 20.9 + 4 13.0

3 36.8 2.54.1

d¹ Capricorni

21.773

d²

25.405

55 10

4 3.5 4 52.3

4 20.9 3 41.5

x 20 27 - 1 4 10 27.977
56 25

+ 0 35.3 1 21.5

0 52.2 0 14.6

20 35 - 13 33 24.761

55 50

0 48.2 1 33.4

1 5.4 0 26.5

20 44 - 10 48

27.159

53 0

stopped

4 26.8

5 26.5

4 44.1

4 7.0

20 h 5-1^m

Aug 27 1870

new sheet 20 54

290 0 0² the May' 26.7 20

0 35.6 1 12.1

0 34.2 0 1.0

8 Legni

24070

12 35-

2 48.1 3 32.4

3 1.1 2 29.0

observations not recorded
on chronograph as it had
stopped.

11 40 P M

Bar 30.255-

Att. 67.5-

Air 65.0

E. Win 65.0

W " 65.2

August 29 1870

Started 20^h 30^m

2 Cygni 23.289

357 30

1 13.1

2 0.0

1 20.2

0 41.2

in Aquarii 23 50.5

31 45

2 3.6

3 4.5

2 19.4

1 39.8

7 7 6-1877 4 23.68.5

322 15

1 58.9

2 39.8

2 2.4

1 27.0

61 Cygni

23 14.0

4 10

3 30.11

4 17.7

3 41.0

3 0.9

* 21^h 21^m - 13° 9'

5-5 25 28.4 63 post F

- 0 6.9

+ 0 42.7

+ 0 9.5

- 0 32.3

Aug 29 1870
 * 21 33 - 11 25 22.60.5

53 40

2 34.1 3 33.7
 2 51.4 2 10.5

stopped 21ⁿ 37^m

W Pir 72.6

E " 72.7

August 30 1870
 started 19^h 11^m

B 26.0 22.0 2 ms clin

E₁ 30.5 27.5 every 0.5^d

π Capricorn 24.4 36
 60 5.5

0 57.1 1 47.2
 1 12.8 0 33.9

* 20 27 - 14 10 24.566

56 25

2 55.4 3 45.5
 3 12.2 2 31.5

20 33 - 12 40 21.250
 55-0

-0 12.4 + 0 37.8
 +0 2.4 - 0 35.0

* 8 m

* 20 44 - 10 46

23.234
 22 904

53 5-

2 17.9 3 8.0
 2 32.6 1 55.0

γ Cygni

24.075

1 35-

4 33.5

5 22.7

4 44.8

4 7.5

δ Cygni

21.640

12 35-

4 16.6

5 5.7

4 29.9

3 51.5

* 21 17 - 13.26

22.766

21 22 - 13.25-

24.022

5-5-45 not observed in 2 on 5

+0 9.1

+0 58.5

0 24.8

-0 13.0

11 $\frac{3}{4}$

Bar 29.976

Alt 70.8

Air 63.0

September 1st 1870
 started ~~1857~~
 19 1

d Sagitt 27.714

61 30

- 0 13.0 + 0 40.5
 + 0 3.0 - 0 37.8

+ Draconis 24.220
 329 10

+ 3 21.1 + 4 5.5
 + 3 23.9 2 42.2

K Aquilae 25.195
 49 35

1 44.7 2 37.3
 2 0.2 1 20.2

γ Aquilae 27.020
 31 55

4 21.0 5 12.4
 4 34.7 3 53.5

September 1st 1870

2 Aquilae 27.149
33 4.5-

0 30.4 1 23.5-
0 43.7 +0 2.5-

20^m 50^m 10° 12' 25.186
52 25-

4 23.1 5- 16.0
4 46.2 4 2.2

61 Cygni 22, 25-2
4 10

3 58.5 4 49.3
4 10.8 3 32.1

* 8^h day 25.710
21 17 - 13 26 25.700
21 22 13 25- 26.914

55-40

3 20.0 4 11.5-
3 37.8 2 56.7

stopped 21^h 28^m

Sept. 4 1870

Immersion of a star about 6 magn.
 observed at $8^h 54^m 28^{\frac{1}{2}}$ by chron.
 H. 301 with W. Equatorial
 Star entered about declination of crater Gassendi.
 started 20 18

E. Transit π CapricorniChron. H. 301 $9^h 27^m$ (mean)

E Delphini

Gr. 3241

Level Obj: glass N. Cross level E. E. 34 W. 59

" " " N. " " W. E 34 W. 59

Chron H. 301 $9^h 44^m$ (mean)

Stopped 20 42

Sept 5 1870

Started 18^h 32^mB. Lyrae 26.700
4 5-

+0 4.0 +0 5-2.0

+0 14.1 -0 21.4

19 7 -21 26 bisected on F 22.041
10 10 21 24 18.232

63.45-

+0 24.8 +1 12.8

0 43.1 0 3.9

19 13- -21 2 20.9 47

63 20

1 39.9 2 26.7

1 58.1 1 18.1

K Aquilae 21.980

49 35-

3 44.8 4 32.9

4 2.2 3 23.3

Sept 5 1870

20 34 - 13.58

20.302

56 15~

3 9.6

3 56.2

3 27.9

2 49.6

M. Agnani

23.078

57 45~

2 14.8

3 1.1

2 31.3

1 54.1

20 50 - 10 12

22.748

52 30

0 54.1

1 41.0

1 10.0

0 34.3

a² the clay 26

28.450

289 55~

4 19.8

4 52.9

4 19.5

3 51.0

Stopped 21^h 6^m

Sept 6 1870

Started 98 32

* 1833 $\frac{1}{2}$ - 23 57 31.071

66 15-

+0	44.5	+1	30.3
1	3.0	0	24.0

50 Draconis 30.646

327 0

-0	32.3	+0	6.2
-0	29.0	-0	50.5

J Aquilae

22.830

28 40

-0	24.2	+0	22.7
-0	10.3	-	59.2

Chron. H. 208 19 $\frac{1}{2}$ 3 $\frac{1}{2}$ m* 19 7 - 21 27 C₃ - E₄ F his 20 738* 19 7 - 21 26 D - E₄ F his 22.395

took extra breaks before 2 of 2d *

* 19 10 - 21 24			
63 45	+0 11.2	+0 57.1	F his 18.920
	+0 30.0	-0 7.9	

Sept 6 1870

Pi VII 67

B his 18.746

291 5-

+	4	12.4	+	4	45.4
	4	13.1		3	44.4

K Aquilae

26.579

49 35-

+	0	52.2	+	1	38.5
	1	8.4		0	31.2

r Aquilae

23.565

32 0

1	27.3	2	14.8
1	43.8	1	5.1

2 Aquilae

23.787

33 45-

2	35.5	3	21.5
2	51.6	2	11.2

7 Mis clin

all wine

23.787

313 25-

0	51.6	1	27.8
0	52.7	0	23.3

Sept 6 1870

20 32 - 15 - 24

24.298

57 40

2 34.7

3 18.7

2 51.2

2 14.5

* or hr

19.768

20 38 - 11 33

253 5-5-

1 12.8 1 5-6.5-

1 28.0 0 5-2.0

20 50 - 10 12

22.334

52 30

1 9.4 1 5-4.4

1 25.0 0 4 8.5-

2 2 hrs day

26.870

290° 0

+0 20.6 +0 52.6

+0 18.3 -0 7.7

H. 208 21^h 2^mstopped 21^h 5^m

Sept 7 1870
 Started 19^h 30^m

2 Aquilae

26.611

33 45-

0 51.8

1 34.8

1 41.2

0 26.2

7 Aquilae

22.873

35 25-

-0 11.8 +0 41.5-

+0 11.8 -0 26.8

22 Capricorni

22.515

5-51.15-

1 2.4

1 44.4

1 18.8

1 42.8

20 20 - 15 39

26.090

57 55-

1 22.2

2 51.3

1 40.2

1 3.5-

Sept 7 1870

20 32 - 15 24

25.540

57 50

1 47.1

2 29.8

2 4.0

1 27.2

23.506

20 38 - 11 35

50

3 54.1

4 36.5

4 8.5

3 34.1

20 45 - 10 48

25.194

53 5

0 51.7

1 35.5

1 5.6

0 32.0

28.004

July 6 1879

322 15

-0 41.6

-0 9.0

-0 39.7

-1 11.8

26.577

S. leggii

12 35

1 12.1

1 53.7

1 23.0

0 52.6

Sept 7 1870
 * 21 17 - 13 26 - 24.5-26

55- 45-
 -0 57.9 -0 14.0
 -0 44.6 -1 15.2

Stopped 21 h 25^m

A 5-6 30

2 23.7
 2 44.9
 343
 40.1
 745
 37.20

B 3 10.2
 2 10.0
 2 40 1

5-6 3 2 37

Sept 8 1870

Started 18 28

* 18.30 - 23.37
 miles & has an g 27.558

65-55-

3 38.0 4.27.0

3 56.5 3 1.7.9

o Sagittarii

26.901

68 40

2 57.2

3 39.2

Mean
 3' 4.12
 + .33

3 12.1

2 34.0

x

33.086

3520 20'

A 1 19.5

B 1 26.5

~~sun~~ start 20 38

21
 Y 24

5-
 6 - 14 14

23.775

22 180 *

7

22 775

A-

B-

36.30, 233 130.449

242

237

No.	Micron.	Finder.	A-	le-
13-	23.03.7	357.45	3,53.7	3.59.3
23	23.46.2	357.40	0.02.3	0.97.0
40	19.90.0	6.55	7.130	1.182
43	19.12.9	30	2.062	2.124
not in Cat. (2)	23.33.2	30	2.062	2.124
46	19.73.0	20	4.591	4.637
50	18.26.0	40	4.587	4.628
52	18.55.9	40	1.047	1.105
53	16.82.1	50	0.008	0.045
54	18.77.4	7.0	4.045	4.101
55	18.63.4	.55	2.019	2.088
not in Cat.	21.77.3	55.	2.019	2.088
not in Cat. (6)	14.86.6	55.	2.019	2.088
58-	19.48.8	7.0	.577	1.025
59-	22.54.0	.35	0.005	.050
60-	18.61.5	.35	.005	.050
61-	17.92.4	7.5	1.033	1.076
62	17.94.5	55	3.038	3.082
not in cat.	19.37.5	55	3.038	3.082
64,	18.54.5	7.5	2.032	2.070
not in Cat.	18.54.5	7.5	2.032	2.070

No.	microm	<u>Minute</u>	A.	le
66-	18,670	: 25 ¹	0.086	0.113

stopped

23 h 0^m

Sept 9 1870

Started 18^h 29^m

B Lyrae 24.846

9 25-

+1 14.3

C

1.249

D

1.596

B-

0.484

New sheet 19^h 30^m

x Aquilae

F 23.306

1.411

2 23.6

1 53.3

1 17.4

e Draconis

23.903

A

4.142

D

4 41.4

C
4.080B
4.406

I aquilae - 80.40

4.573

5.410

4.343 22.913

5.130

New sheet 20^h 43^m

Sept 9 187

r Cygni

25.5.23

1 35-

3 42.3

3 49.9

4 20.7

3 16.9

5 or 2 hrs away

30.7.22

289 55-

2604

2 57.4

2 55.9

3 27.2

2 30.5

22 18

29 24

7.06

x 24 h 6 m

x 7 m

29.237

32.710

56 35-

4 1.6

4 18.4

4 10.0

4 12.3

56 39 11 15

4 20

39 51

4 43.8

3 42.8

4 12.3

Stopped

22 h 4 m

Sept 12 1870

Check by breaking circuit
before 1855^mCheck before 19^h 46^m

* 21 6 - 14 14

56 35

14.108

12.478

13.107

A 3 32.4 31.7 D 4 19.7 10.9 3 41.15

C 3 17.3 45.8 B 3 12.7 11.4 3 38.75

2.40

* 21 32 41 - 35 7

14.942

3 41.20

* 33 11 35 5

14.037

3 39.85

1.35

on ~~last~~ ⁵ miles E. - 4

77 25

3 11.9

3 52.8

3 25.01

3 30.3

2 57.3

3 21.10

3.95

M Cupicornii

10 38.0

56 35

1 29.0

2 10.4

1 39.25

1 43.4

1 8.1

1 36.20

3.05

2 Aguarin

15.900

43 20

1 01.95

0 50.6

1 33.6

0 58.30

1 6.0

0 30.3

3.65

Stopped 22^h 4^m

new sheet 22^h 9^m

π Aquarii ? 25-47.0
41 40

1 55.9
2 10.8

2 35.4
1 33.7

2 04.55-
2 03.35-

1, 20

9 Draconis H
298 45-

17 61.3

3 41.2
3 37.4

4 8.5-
3 13.6

Stopped 23 11

Sept 13.

1870

50 Draconis

D E

327 10

9988

2 15.2

2 55.8

~~1 49.9~~~~2 18.2~~

2 18.2

1 49.9

3 Aquilae

12.038

28 45

1 17.6

2 6.1

1 29.7

0 52.9

19 7^m

2 83.4

16.178

63 45

4 22.4

5 7.9

4 40.7

4 1.0

63 25

~~1 23.8~~ ~~2 10.6~~~~1 39.6~~ ~~1 23~~

K Aquilae

12.913

49 45

-0 38.0 +0 11.5

-0 22.0 -0 57.7

Sept 13 1870

325 γ Aquilae

16.780

0	42.9	1	29.4
0	53.2	0	17.5

 δ Aquilae
 δ

11.906

-0	2.2	+0	44.8
+	8.9	-	25.8

18.366

 ϵ Draconis
 ϵ

3	32.25		
2	32.1	3	8.3
2	33.3	2	4.0

 η Capricorni

12.162

61	0	62-4	0	82.4	reject
					break preceding ϵ_2
3	33.7	4	18.7		
3	50.0	3	13.0		

20 27 -14 54

11.115

57 15

4	22.6	5	7.8
4	40.0	4	3.8

Sept 13 1870

20 33 - 12 40
 55 - 5 - 54
 614

9.396

2 7.2 2 52.4
 2 23.8 1 53.2

20 35 - 13 33

9.010

84 F 2 his only

56 0

0 47.2 1 33.7
 1 34 0 32.9

stopped 20 48

cream sheet 20 51

4 my 6 1879

17.294

322 20

0 52.2 1 28.1
 0 56.4 0 24.6

a² Mrs May

10.543

300 5

1 15.1 1 49.1
 1 13.3 0 47.9

* 21 6^m

his an F

11 4 27
 5 2 35
 5.843

3-6 40

2 56.8 3 43.1
 3 13.9 2 38.1

Sept 13 1870

21 33 - 35 7
35 517.146
16.163

77 25

1 54.9 2 38.4
2 12.5 1 39.4No - Ready A - le - Exp price min

7.0 - 1.12.7 1.20.2 11.85.7

55 - not obs. in R.A.

7.0' 1.12.7 1.20.2 8.1.6

another bright star not in catalogue

58 - 6.35 0.00.6 0.06.9 22.43.5not in cat 6.35 0.00.6 0.06.9 directed on 18.53.6
H-

61 - 7.0 2.00.7 2.06.8 - 16.32.0

64 - 7.5 2.08.0 2.09.6 18.51.5

66 - 6.25 0.09.2 0.14.8 18.55.7

67

Sift 18- 1870

started 19^h 71^m

K of quila 11 985

49 45 not observed bis on g
in a

-0 3.7 +0 46.6

+0 11.4 -0 24.7

2 of quila 15.027

33 50

3 1.6 - 3 50.0

8 14.2 2 35.1

2 the clin 27.0

25.5

25.0

15.845

825

804

788

792

-3' 30' 20.0

+0 36.8 +1 15.0

+0 35.9 +0 7.1 +0' 38.70

32 957

-3 20

930

930

-0 2.0 +0 34.6 -0 0.75

905

-0 3.6 -0 32.0

896

Sept 15 1870

New start $21^h 53^m$ α Aquarii θ Pegasi

32 Urs Maj S D

 γ Aquarii π " η Draconis S D

226 Cephei Bode

 ζ Pegasi ι Cephei δ Piscis AustrStopped $22^h 54^m$ Sept. 15 11^h sid. timeLevel $E 54\frac{1}{2}$ W 28 Spring W." $E 15$ W 67 " E. $E 69\frac{1}{2}$ W 95

E 18	W 64	Sp. E 4)	25.5
E 50	W 31	W.	6.375
68	95		

 $b = + 0^s.35$

68	95
68	
27	

5.4
.36

15)	5.0100
	.34

 $b \sec \phi = + 0^s.47$

1.354
.35
6770
4062

Sept. 18 1870

Immersion of δ Geminorum observed with
 W. Equatorial Chron. B. 236 at 9^h 32^m 7^s. Moon
 too bright for the star, and observation approx. only.
 started 0^h 5-1^m

Chron. B. 236 1^h 1^m (mean).

Polaris C₄ D

Collimation S. on N. Coll. 574

Telescope on N. Coll. 28

573 30	610
573	610
578	613
564	600
583	645
	78
	615

Set on coarse
 wire of collimators

S. Coll. 30	660	
	770	
	750	
	760	3127
	777	745

Min. at 30.64.5

δ & Dracon L. C. E. D. C

ξ Ceti (ink gave out)

B 236 2^h 14^m (mean)

Cass. C D E
 (star followed by a small companion)

stopped 2 23

(Immersion of δ Gem. escaped during
 collimation observations)

Sept. 18 1870 astr.

12^h 45^m sid. time

Collimation S. on N. coll. .590

Telescope on N. coll. 26.558

.523

.523

.508

.547

1519

Mean 26.532

S. coll. 26.841

.846

.838

.837

.853

Mean 26.843

Telescope wire D set at 26.687

For last observations of stars

$$c = + 3^{\text{h}}.958 = 3^{\text{h}}.958 \times 1.24 = + 4^{\text{h}}.91$$

3.958
x 1.24

4.90792

Sept 19 1870

Started 19^h 16^m

Check before 19 24^m

8 Aquilae 12.178
32 5- reject m

3 35.4 4 17.7

3 47.2 3 14.0

6 Draconis 16.620

332 25-

3 38.0 4 11.3

3 38.2 - 3 10.2

2 Aquilae 17.112

35 25-

3 33.8 4 17.2

3 48.3 3 9.0

21 Capricorni 12.050

22 15.713

55 20. reject c₂ on
false *

+0 16.0 +0 59.3

+0 32.4 -0 38

11 Capricorni

12.154

610 0'

3 33.0 4 15.8

3 49.6 3 13.3

Sept 19 1870

20 32 - 15 24
33

16.210
18 279

57 45

4 2 36.0 3 19.2
2 53.2 2 16.9

20 38 - 11.35

13.619

54 0

+0 3.8 +0 47.5

+0 16.9 -0 15.2

16.273

20 44 - 10 48

53 10

1 24.5 2 6.9

1 38.9 1 7.7

20 50 - 10 12

15.053

52 35

0 42.4 1 25.4

0 56.0 0 23.0

2² hrs delay

20.067

290 5

-0 25.7 +0 2.6

-0 29.7 -0 53.7

Sept 19 1870

21 10 - 1042

13.952
12 262

53 5-

1 17.5 1 59.0

1 30.3 0 57.0

21 21 - 13 9

55 30

14.210

3 38.9 4 18.5

3 54.2 3 19.1

21 28 - - 13 34

55 55

10.844

4 16.7 4 56.1

4 31.3 3 56.0

21 33 - 11 25

13.791

53 45

3 0.0 3 41.1

3 13.9 2 40.9

21 42 - 7 18

13.967

49⁰ 40¹

2 54.2 3 34.5

3 9.2 2 34.5

stopped
21^h 47^m

Sept 20 1870
Started

π Capricorni 12.899

61 0

3 7.2 4 0.3

3 23.1 2 45.8

20 27 - 14 54

12.876

57 15

3 18.5 4 10.6

3 34.7 2 57.6

20 3.3 - 12 40

14.58.9

55 0

3 56.0 4 49.2

4 12.1 8 34.9

20 38 - 11 35 540 0' 12.801

0 33.0 1 27.8

0 49.0 0 14.5

20 50 - 10 12

~~52 40~~

not observed in c

3 46.5 4 39.8

4 22 3 22.80

Sept 20 1870

or the clay 290 5- 14.760

2 49.1 3 28.7

2 47.2 2 20.8

d Cephei

340° 20' 16.754

2 27.8 3 12.3

2 33.7 1 59.7

B Aquarii

48° 30' 15.006

2 45.0 3 37.9

3 0.1 2 23.7

E 2-4 F his on F

g Aquarii

50 50

14.315

0 43.0 1 36.6

0 58.1 0 24.1

e Pegasi

33° 5'

14.808

2 59.9

3 53.0

3 13.1

2 35.9

M Capricorni

-6 30 13.773

4 25.0 5 15.6

4 40.5 4 4.6

79 Draconis

329° 15' 17.148

4 23.1 5 6.7

4 25.8 3 55.7

Stopped 22 h 0m

Sept 21 1870

Started 21^h 9^m1 Urs May 26 Bis on B 18.855-
274.45-4 29.1 5 8.4
4 30.0 4 2.4

21 34 - 11 22.

53 45- 15.434
0 53.9 1 46.7
1 8.8 0 33.3

11 Cephei 331 45- 12,296

-0 12.0 40 32.3

-0 10.8 -0 38.7

11 Capricorni 56 35- 12.126

+0 25.0 1 16.4

0 32.9 +0 3.2

2 Aquarii 43 20 15.415-

1 10.2 2 1.6

1 24.9 0 45.3

32 Urs May 288 10 18.245-

1 50.5 2 29.0

1 50.7 1 23.0

Sept 21 1870

22 15 - 257?

22 17 45-15 16.684

19.067

4 13.5 5 3.8

4 29.5 3 5-1.5

9 Draconis

Hutton cro 208

22^h 25^m 5^s - 30^s

B V S 236

23^h 3^m 35^s - 5-5^sStopped 23^h 8^m

Sept 22^d last end

7 Argemini 43.10 14.000

+2 12.7 3 6.4

2 29.6 1 51.0

Stopped 22^h 33^m

Sept 22^d 1870Started 20^h 13^m

Det Uls Maj 292 50 17.494

+0 9.6 +0 53.4

+0 7.9 -0 20.6

3 Aquarii 50 45- 17.000

4 4.0 4 59.0

4 20.9 3 43.1

21 41 - 7 18 49 40 14.310 on F

2 41.5 3 36.5

2 59.0 2 20.8

79 Draco 329 20 13 147

1 49.9 2 34.6

1 51.9 1 21.3

2 Aquarii 43 20 15.170

1 17.4 2 13.1

1 34.5 0 55.1

4 Aquarii 50 50 15.664

-0 29.8 +0 25.1

-0 14.0 -0 49.5

22 15 - 2 55 15.049

22 17 - 2 57 45 20 17.451

+0 12.4 +1 6.0

+0 28.6 -0 9.5

Sept 26 1870

Started 17^h 26^m

α Ophiuchi

μ Herculis

γ Draconis

γ² Sagittaeμ¹ " "

✓ Was still in

$$\begin{array}{r}
 4223 \\
 1052 \\
 \hline
 31.31 \\
 328.29
 \end{array}$$

26 120

124

120

130

26 124

27 331

26 727

27 347

324

319

330

334

- .0 27

0 27

$$\begin{array}{r}
 3-4 \\
 11 \\
 \hline
 -0.033
 \end{array}$$

Stopped

18.41

m



Sept 26 —
Level, circ W.

19.8

8.2 - 28.0

6.0

22.0

28.0 4.4

25.8

30.2

11

12.9

15.6

wrong 143

12.9

12.7

1.35

1.3

4.05

1.35

- 4 17 455 = 2.4

0.143

- 0.05

- 0.15

~~E. Cephei - circ W.~~

Mt minute 20.35

L Cygni + Circ W.

E Cygni.

W.

W. Cephei.

W. beginning

with 1st past middle, & wins -

in Aquarii - W - begin with

1st before middle win - lost last

124.6. 1879 - W - begin on

2nd win. To 2nd win past middle.

Level, W.

7.8

21.8 -

28.8

^{Sept 26 1870}
 α^2 Urs Maj - W. Commenced
 on 2nd wire. Ended with 3rd from
 End.

β Cygni. both stars. W.
~~Commenced~~ with over 4 last
 wires -

γ Egn — W begin on 4th wire -
 to 3rd past middle.

δ Cygni. W. begin with wt.
 last 2 —

Level, W.

$$\begin{array}{r} W \\ 7.0 \\ 20.3 \\ \hline 27.3 \\ 13.65 \end{array}$$

$$\begin{array}{r} S \\ 21.9 \\ 8.5 \\ \hline 30.4 \\ 15.2 \\ 13.65 \\ \hline 1.55 \\ .78 \\ .13 \\ \hline 2.34 \\ 78 \\ \hline .1014 \end{array}$$

$$\begin{array}{r} 27.3 \quad 30.4 \\ 28.9 \\ 28.8 \quad - 3.1 \\ \quad - 0.78 \end{array}$$

$$\begin{array}{r} S \\ - .101 \\ - .005 \\ \hline - 0.11 \end{array}$$

2 Cephei - E. Sept 26 1870
3rd to 9th inclusive -

1 Draconis, E.
6th to 10th.

Level. E.

$$\begin{array}{r} 6.8 \\ 20.4 \\ \hline 27.2 \\ 13.6 \end{array}$$

$$\begin{array}{r} 22.0 \\ 8.4 \\ \hline 30.4 \\ 15.2 \\ 13.6 \\ \hline 2 \overline{) 1.6} \\ 8 \\ 13 \\ \hline 104 \end{array}$$

$$\begin{array}{r} 27.2 \quad 30.4 \\ 3.2 \\ - 0.8 \\ - .104 \\ + 0.05 \\ \hline - 0.10 \end{array}$$

~~7 Aquarii - E.~~

Level - E.

$$\begin{array}{r} 20.4 \\ 6.7 \\ \hline 27.1 \\ 13.65 \end{array}$$

$$\begin{array}{r} 22.0 \\ 8.5 \\ \hline 30.5 \\ 15.25 \\ 13.55 \\ \hline 1.70 \\ 8.5 \\ 13 \\ \hline 255 \end{array}$$

$$\begin{array}{r} 27.1 \quad 30.5 \\ 3.4 \\ - .85 \\ - .110 \\ + 0.05 \\ \hline - 0.10 \end{array}$$

Sept 26 - 1870

1st minute break before reception
of Deane's Chro - 21. 50 by S.C.

(1st minute - 21. 50 by Deane's
Chro -)

22. 2 \pm by S. C. - Signal break

~~Signal break~~ by Deane's Chro

22. 3 -

I want 3 more nights

Sept 26 cont. from 2nd page
 back.
 γ Aquarii. E.
 Commence on 2nd wire ended on 9th
 π Aquarii. E. Commence on
 3rd wire. obs. 7 wires -
 9 Draco - 2nd wire to 9th;
 inclusive. E.
 226 Cephæi - E. 4th wire to
 9th.

ζ Pegasi. E. 7 middle wires.
 η Pegasi. E. 7 middle wires.
 λ Pegasi. E. 1st wire 2 sec. too
 soon. 7 wires.
 μ Pegasi. E. commence with 1st
 wire, to middle wire -

ε Cephæi. E. Commence
 with 5th wire - thru 9th.

2 Pis. Ans. E. 7 wires -

2 Urs. Maj. E. 7 wires -

Sept 26 1870
Level - S -

$$W - \Sigma$$

6.2
20.8

26 2

131

22,8

9, 10

31,8

15.9

13.1

28

1.4

13

42

14

2

- 182
+ 505

1st minute break 23.6.
cephci.

microm-wires - 9.00 -
used for transit.

outside, two micromeres,
+ next two -

Revised, & to W.

after reversal, commence with

1st wire past middle

Level. W.
2 3 4

250

12.5

205-

6 1 5

332

16,6

125

41

by the NASA

Sept. 26 1870
 Draco, 4 wires besides microm.
 wires.

Reverse W to E.

only 2 last wires after reversal.
Level - E, with microm wires.

W	E		
6.0	23.5	29.5	26.0 33.2
<u>20.0</u>	9.7	29.7	7.2
26.0	33.2		-1.8
13.	16.6		-.234
	13		+0.05
	3.6		
	1.8		-0.23
	13		
	5.4		
	1.8		
	<u>-.234</u>		

Level	Circle	W	lost page
W	E		
6.0	23.4	29.4	
<u>19.0</u>	9.8	28.8	-5.273
25.0	33.2		-0.05
	8.2		-0.26 ?
	2.1	76	
		1.9	-2.47
			-0.05
			-0.25 ?

Sept 27 1870
Started 19^h 44^m
Circle East

$$\begin{array}{r} W \\ 21.6 \\ 5.6 \\ \hline 27.2 \\ 26.4 \\ \hline 8 \end{array} \quad \begin{array}{r} E \\ 5.2 \\ 21.2 \\ \hline 26 \end{array} \quad \begin{array}{r} 4 \\ 2 \end{array}$$

N. O. Aquilae - 7 middle -

2² Capricornus.

II Capricorni. 7 wries.

.5 sec - later -

- 16 -

W Level Σ

5.8	21.5	273	2,45
19.0	8.2	27.2	1,23
			13
248	29.7		369
124	1,428.5		1239
			1599

Circle West

ε Cygni - 7 wires - 2 breaks on
2nd wire, take mean -

η Cygni - 1st wire past mid-
dle - 3 wires -

κ Aquarii - 7 wires -

12 H. C. - 1879 - do -
or 2 Ws. Maj - L. C. - begin with
middle - rest of wires -

β Cygni - begin with middle -
take rest - both stars -

W. Level.	E.	
6.0	21.5	27.5
19.0	8.7	27.7
<hr/>		
25 0	30 2	
	5 2	
	1.3	
	1 3	
	<hr/>	
	39	
	13	
	<hr/>	
	-.169	

δ Cygni 7 wires -

or do - do -

2 Cygni do.

$$\begin{array}{r}
 \text{Level} - \\
 19.6 \quad 8.2 \\
 6.0 \quad 22.0 \\
 \hline
 25.6 \quad 30.2 \\
 \quad 28.6 \\
 \hline
 \quad 4.6 \\
 \quad 1.15 \\
 \quad 13 \\
 \hline
 \quad 345 \\
 \quad 115 \\
 \hline
 \quad 1495
 \end{array}$$

d Mrs Maj - S. Co -

Reversed Circ. W to E.

4 Wires, ~~stop~~ commence with 2nd. with 2nd wire
 Commencing with 2nd. with 2nd wire
 beyond middle
 all after that.

Level

$$\begin{array}{r}
 19.6 \quad 8.2 \\
 6.8 \quad 21.2 \\
 26.4 \quad 29.4 \\
 \quad 26.4 \\
 \hline
 \quad 30.2 \\
 \quad 28.5 \\
 \quad 13 \\
 \hline
 \quad 22.5 \\
 \quad 25 \\
 \hline
 \quad 22.5
 \end{array}$$

- 098

stopped
 21^m 30^m

Sept 28 -

Lamp mist

Level - W.

$$\begin{array}{r}
 21.8 \quad 280 \quad 6.0 \quad 27.7 \\
 \quad \quad 14.0 \quad \quad \quad 13.85 \\
 6.2 \quad \quad 13.85 \quad 21.7 \quad \quad \quad .13 \\
 \quad \quad \quad .15 \quad \quad \quad \quad \quad .08 \\
 \quad \quad \quad \quad \quad \quad \quad \quad +.0104
 \end{array}$$

Commenced 19.59

4 Equidui - 7 wires -

3 Cygni -

"

8 Cygni -

"

2 Cephæi -

"

1 Draco - Commence on middle wire.

4 wires.

Level -

$$\begin{array}{r}
 22.3 \\
 3.8 \\
 \hline
 26.1
 \end{array}$$

$$\begin{array}{r}
 6.0 \\
 24.7 \\
 \hline
 30.7 \\
 26.1 \\
 \hline
 4.6
 \end{array}$$

$$\begin{array}{r}
 4.6 \\
 1.15 \\
 \hline
 1.13 \\
 3.45 \\
 1.15 \\
 \hline
 -1495
 \end{array}$$

Lamp East.

B Cephæi. 2nd past middle -
3 wires.

Y Capricornii.
Level -

$$\begin{array}{r}
 22.1 \\
 3.7 \\
 \hline
 25.8
 \end{array}
 \qquad
 \begin{array}{r}
 6.7 \\
 25.0 \\
 \hline
 31.7 \\
 25.8 \\
 \hline
 5.9 \\
 1.48 \\
 .13 \\
 \hline
 5.9 \\
 1.73 \\
 \hline
 7.63
 \end{array}
 \qquad
 \begin{array}{r}
 1.48 \\
 .13 \\
 \hline
 444 \\
 148 \\
 \hline
 1924
 \end{array}$$

11 Cephæi - 1st before middle -
5 wires.

θ Pegasi -

ζ Cephæi - lost 1st wire after middle -

γ Aquarii

π Aquarii

9 Draco - double break, mean to be
taken -

Level -

5.3
22.0

27.3

24.7
7.8

325
5.2
1.3
1.3

226 leaphi. no rattler. - .169
began on 3rd wire. took 3 wires.

Reversed Lamp E to W -
After reversal, took over last 3 wires.

Sept 28 —

Exchange of clock signals —
Last minute break of Dean's

Chis. 21 L 50 m —

Oct 2 1870

Started 21^h 32^m

to receive signals

Burlington Chronometer
in circuit

last minute 22^h 14^m

stopped 22^h 21^m

Oct 4 1870

Started 19^h 5-3^mLamp E -

♂ Aquilae

Level -

$$\begin{array}{r} 4.2 \\ 21.2 \\ - 25.4 \end{array}$$

$$24.7 - 125.$$

$$8.0$$

$$32.7$$

$$25.4$$

$$7.3$$

$$1.83$$

$$1.13$$

$$549$$

$$183$$

$$- .2379 = 0$$

$$1.83$$

$$1.13$$

$$549$$

$$183$$

$$- .2379 = 0$$

$$1.83$$

$$1.13$$

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$$- .2379 = 0$$

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$$- .2379 = 0$$

$$1.83$$

$$1.13$$

$$549$$

$$183$$

$$- .2379 = 0$$

$$1.83$$

$$1.13$$

$$549$$

$$183$$

E Daphni -
Groom - 3241 -

Revised -

Lamp W -

2 Cygni -

Level -

21.6	8.0	1.98
4.2	25.7	1.3
25.8	33.7	8.94
		1.98
		1.98
		25.74
		= 25.74

E Cygni - commence 1st wire after
middle. 4 wires.

η Cephei - commence 1st wire
past middle - 2nd next - 2 wires.

α Aquarii - commence on
2nd wire of tally.

Oct 7 1870 Russian Transit

Started 20^h 47^m

W 8 Ill E

$$\begin{array}{r}
 60 \\
 20.7 \\
 \hline
 26.7
 \end{array}
 \quad
 \begin{array}{r}
 25.0 \\
 10.2 \\
 \hline
 35.2
 \end{array}
 \quad
 \begin{array}{r}
 -8.5 \\
 -2.02 \\
 \hline
 6.36
 \end{array}$$

LyC 1879 5 Miles -28
 on 2 no day 7-9

61 Cygni 8-11

3 Cygni

$$\begin{array}{r}
 W \quad 8 \\
 21.0 \\
 -8.0 \\
 \hline
 29.0
 \end{array}
 \quad
 \begin{array}{r}
 11.0 \\
 24.1 \\
 \hline
 35.1
 \end{array}$$

d Cephei 6.1 -1.52 -20
 4.6

Reversed to Ill W

$$\begin{array}{r}
 W \quad 8 \\
 22.0 \\
 8.2 \\
 \hline
 30.0
 \end{array}
 \quad
 \begin{array}{r}
 10.8 \\
 25.0 \\
 \hline
 35.8
 \end{array}$$

B Cephei 6-9 -5.8
 1.45
 4.3

γ Capric 6-9 -.19

ε Pegasi

11 Cephei

Oct 7 1870

n Copricarni

W	E
07.0	28.0
1.20	24.1
<u>24.1</u>	<u>12.0</u>
28.1	38.0
	- 9.9
	- 2.48
	<u>7.4</u>
	- .32

Stopped 21ⁿ 55^m

Oct 8 1870

Started 21^h 48^m

d Aquarii	43 ⁰ 20 ¹	11.854
-----------	---------------------------------	--------

3 23.3	3 25.2
--------	--------

3 34.5	3 28.2
--------	--------

γ Pegasi	19 25	19.936
----------	-------	--------

4 0.7

4 7.7

4 2.2

4.6

ι Cephei	-6 50	16.270
----------	-------	--------

3 58.5

3 56.2

3 52.2

4 2.0

d Pisc Austr	-2 40	12.993
--------------	-------	--------

2 10.3

2 23.2

2 11.0

2 20.6

d Uroclorj 3 minto	-4 55	17.025
--------------------	-------	--------

0 6.9

10 0.5

-0 3.1

1 6.8

β Aquarii	-4 15	14.885
-----------	-------	--------

1 3.0

1 14.5

1 4.4

1 9.1

γ Proclium	39 45	16.398
------------	-------	--------

4 18.0

4 29.3

4 18.7

4 22.1

θ Proclium	36.45	14.005
------------	-------	--------

0 14.7

0 27.8

0 20.0

0 20.5

Stopped	23 ^h 33 ^m
---------	---------------------------------

Oct 10 1870

Started 20 h 28 m

20 33	E F 8	57 50	13.542
- 15 24			his first
- 0 39.9	- 0 34.1		last voice
- 0 30.6	- 0 33.4		

New start 20 h 43 m

21 h 0 m	- 14 27	20.739
21 1	14 22	12.644
21 2	14 19	7 383
1 53.7	1 56.8	on 7 not ind
2 3.1	2 1.4	56° 45'

21 10	- 10.40	- 5 5	13.904
-------	---------	-------	--------

0 20.9	0 25.5	13.552
28.7	2 26.4	

2 Cephei	25'	13.552
----------	-----	--------

- 0 38.3	- 0 39.0
36.2	37.8

Did this day	- 2 45'	19.700
--------------	---------	--------

3 47.8	3 38.1
3 38.7	3 44.1

7 Corneum	35'	16.931
-----------	-----	--------

2 27.2	2 31.1
37.5	32.9

21 41	- 7 18	49 40	16.581
-------	--------	-------	--------

1 20.6	1 24.0
1 30.1	1 27.4

Oct 10 1870

μ Capricorni his on of 15.806
not observed in α
30'

3	10.1	3	15.1
	17.8		21.4

 α etgrain

15.491

43 20'

1	9.3	1	12.7
---	-----	---	------

17.6

14.0

 α etgrain

30 45

3	17.0	=	3	19.6
	27.8			26.1

22	15	-	25.5
	17		25.7

18.221
20.640

-5 15

3	22.9	3	22.3
	27.6		23.3

Oct 12 1870

Started 21 40

79 Draconis $-9^{\circ} 15'$ 20.708

2	6.7	2	0.0
2	1.3	2	4.0

d Aquarii $-3^{\circ} 20'$ 17.448

-0	2.0	+0	2.8
+0	7.5	+0	2.0

d Aquarii	$-0^{\circ} 50'$	14.2193
		190 F
		190 G

0	29.6	0	33.4
0	39.2		36.0

22	15	-	25.5	20'
22	17		2.57	

-0	12.0	-0	8.1	15.831
-	3.1	-0	8.5	18.263

22	20	-	1.57	20'	19.680
----	----	---	------	-----	--------

-0	15.9	-	0	11.1
-0	06.6	-0	0	11.2

Stopped 22 49

Oct 13 1870

Started 20 45

or 2nd day 290 5' 19.695-

-0 19.5 -0 29.0

-0 28.3 -0 22.0

21 10 -10.42 -3° 5'

1 28.6 1 33.9

38.7 35.0

12.722

Bison G

B. Aquari

30

15.865 D

810 F

808 G 45

2 44.5 2 20.6

26.4 21.9

21 33^m -11 25

21 34 11.22

40!

on 19

18.181

17.400

4 44.5

4 43.2

4 43.7

4 44.0

4 47.4

4 47.5

4 4

4 48.4

4 49.9

4 49.4

4 49.1

5-5-0

5-4.1

5-4.4

5-4.6

4 44.5

5-5.3

4 48.0

5-1.4

Oct. 14 — Gayult. obs —
Circuli E —

1st minute 21. 3 —

20.6

8.8

4.1

25.1

B. Cephri — last 5 wines

E Pegasi — 9 middle wines

11 Cephri. Commence with
middle wine. ~~Take rest 5 wines.~~

M Capricorni. Commence
on 4th — Take rest —

70 Draco. Commence on 4th —
5th doubtful — 6 wines —
poor, star very faint —

L Aquarii, 7 wines —

4.0

19.9

26.1

10.5

26.7

— 3.6 —

Circle 7R-

3.6	26.7
19.8	10.7

32 Uis Maj. L. 6-

Commence on middle -
next to last wire 7ad.II Aquarii. Commence on
middle -

9 Draco 7 wires -

7 Aquarii - 7 wires -

7 Pegasi. 7 wires

20.0 -

10.5

4.2

25.3

Last minute - 22.42

Coincidence H. 30.1 S. Clock

H. 30.1^h 17^m 10^s S.C. 23^h 51^m 15^sImmersion of γ Tauri. Not visible in opera glass.
A.C. Martin observed it with E. Equatorial
stopwatch started at immersion.stopwatch stopped 7^m 30^sInterval by S. Clock
by stopwatch 2^m 46^s 5

Oct 14 1870 continued
stopwatch started at $0^h 10^m 30^s$
by S. Clock

stopped at $0^h 13^m 15^s$
by S. Clock

Interval by stopwatch $2^m 45^s.2$

Interval of 5 seconds by stopwatch
found not to differ sensibly from
same interval by S. Clock.

∴ Interval between immersion of
J Tauri & stopping of watch, in time
by S. Clock was $2^m 46^s.5$ same as
by watch, which seems to keep
sidereal time, & immersion
occurred $0^h 4^m 43^s.5$ by S. Clock

(The watch starts about 0.2 after the
 60^s mark.) Comparison of stopwatch & S. Clock
repeated at $11^h 55^m$ mean time: stopwatch $2^m 46^s.5$
Clock $2^m 45^s.5$

Emergence of J Tauri

Observed by A. S. at $11^h 19^m 16^s$
by chron. H. 301 with opera glass.
Star distinct on its first appearance.
Observation may be 1^s late: probably
not more.

Chron. H. 301 compared with S. Clock

65-58 Oct. 15 1870

Started 13^h 42^mE. Clock 0^h 5^m 7.3424 25^h 8^mE. Clock 0^h 6^m stopped 13^h 45^m

Started 21 35

79 Draconis 329° 20' 15.330

0 24.8 0 20.1

0 20.5 0 24.1

2 Aquarii 44 25

3 20.8 3 25.8

3 31.1 3 33.9

3 Regasi 32° 15'

12.644

12.630

at rather
post last
wire

15.816

+0 0.9 +0 4.7

0 7.8 0 5.1

n Regasi 18 25' 16.893

3 50.8 3 52.5

56.0 55.6

stopped 22^h 55^m

Oct 18 1870
 Started 20 47

21 0 - 14 27 22.578
 21 1 14 22 14.469
 21 2 14 19 56.45 9.202

00 42.9 0 46.8
 54.2 52.5

22 11 13 53 B 10.345
 14 1 - 13.1 F 23.792

1 3.7 1 7.6
 16.8 12.4

21 20 - 21 46 -4° 5' 14.873

4 31.7 4 36.0
 46.8 40.9

21 28 - 13 41 ?? -6 0' 5.465

2 41.3 2 45.6
 53.5 49.7

micrometer screws was run
 to the limit of field on
 this star so that it
 began to unscrew possibly
 changing its zero.

Oct 18 1870

u. Capricorni 56 35' 7.430

- 0 16.2 - 0 12.1
- 4.9 - 7.3

79 *Draconis* - 9 20 13.499

1 32.2 1 32.5
29.3 32.6

2 *Aquarii* - 3 20 15.106

1 19.7 1 24.6
31.7 25.7

32 *Ursae Majoris* 3 15 20.024

- 0 46.6 - 0 53.8
51.3 45.7

22 16 - 2 39 2 44 5.5 19.491
17 2 43 1 27.012

1 24.9 1 20.6
27.8 22.2

27.012

2 *Pegasi* ? - 8 0'

1 49.8 1 53.8
58.6 53.6

stopped 23^h 5^m

Oct 24 1870

Started 22^m 23^m

1/2 Aquarii lost not in circuit
 1/2 Pegasi

79 Draconis

1/2 Aquarii

1/2 Pegasi

1/2 Cephei

1/2 Aquarii

stopped 22 15

Oct 22 1870
 Started 21^h 7^m

2 Cephri 340 20 16.254 -

315-B

319 MM

266 g

227 -

A
 2 40.2 2 35.0
 40.3 = 2.95 39.6
 40.25 37.30
 21 33 - 11 24 7755
 21 34 21 3878

53 45-

18.520 d
 16 766

+0 10.4 +0 11.0
 0 17.4 0 16.2
 13.90 .30 13.60

u Capricorni 56 35-

12 348

+0 19.4 +0 18.1
 +0 30.0 0 27.6
 24.70 1.85 22.85

16 115-A

155 B

79 Draconis 329 20
 7.9

186 D

135 F

9.0 G

-0 13.0 -0 7.3
 -0 11.0 -0 7.9
 12.0 4.40 7.60
 17.45 1.70 9.15

2 Agnassii 43 20

15.750 D

15.751

in edge of
 field

0 48.4 1 1.4
 1 8.3 1 3.0
 1 3 35 1 2 20

1.35-

Oct 22 1870

4 Aquarii 50 50 12.953

1	14.7	1	15.9
	23.6		20.5
	19.15		18.20

22 1.6 - 2 38

2

22 17 2 42 on E₄ F₂

43-5-

10.867

11.612

on G

17.55-6

on G

0 55.2 0 56.3

1	4.5	0	59.9
0	59.85	1.75	58.10

Pen up 22^h 40^mCrew. start 23^h 16^m8^m 2 Draconis north obs in c.

23 32 + 1° 31 40° 50' 19.700

16.180

1 53.6 1 53.5

2 2.1 1 56.6

1 58.85 3.80 55.05

stopped 23^h 41^m

Oct 23 1870

Started 21^h 6^m

21	10	-	10	42	53° 5'	12 281
			10	41		11 573 F

2d x 1st wire middle

+	1	45.1	1	46.9
	1	53.5	1	51.7

13.713 A

21 20 - 21 46 - 4.10

695 D

ripest 1st wire 692 F

-	0	20.6	-	0	21.9
		12.0			15.7

21 27 - 13 30

5-5-5

14.305

14 160

20⁵ post

0	59.5	1	0.0
1	9.0		6.3

lost wire

21 34 - 11 21 - 3 45

14.045

2	47.1	2	53.1
3	1.9	2	58.8

E Regasi

33 5'

14.584 F

3	08.0	3	7.0
3	14.8	3	9.8
	11.4	30	8.4

M Capricorn

30'

14 584

3	53.9	3	54.2
4	3.9	4	1.6
3	18.9	5	7.8

79 Draconis

9 20

14 631

0	53.0	0	44.8
0	47.7	0	51.5

Oct 23 1870

δ Aquarii 43 20' 14.631

1 39.0 1 40.4
 1 49.0 43.8
 1 44.0 1.90 42.10

32 Mo May

γ Aquarii 44° 30' 5.772

2 36.5 2 36.9
 2 46.5 40.5
 2 41.5 2.80 39.7
 22 20 - 1 57 20' 17.225

1 13.3 1 15.3
 22.5 17.5

* Pr 6 50 17.169
 226 Cephei 18 425.84

0 27.9 0 18.7
 0 17.6 0 25.8

η Pegasi 12° 50' 16.914

1 22.9 1 20.6
 27.0 24.8

ι Cephei 6 50 13.2 A

4 37.0 4 29.0
 33.8 35.5

15-179 D

140 F

2 Mo May

284 5-5

104 G

-0 7.0 -0 12.9
 - 8.1 -0 8.2

17.506

430 G

435 F

435 D

435 B

435 A

Oct 23 1870

* Pr -

23 31 + 1 31 40° 50'

20.223
16 662

+1	32.4	1	30.5
	<u>41.2</u>		<u>36.0</u>
	36.90	3.65	33.25

stopped 23^h 37^m

Oct 24 1870

Started 21^h 29^mZone works obs. E. P. A.
min. read A.S.

Microscopes B & D

23	36	19	Div.	15	Moier	15.4	Moier	10.3
42	6	15		3	3.6	5.1	7	58.0
50	45	35		1	56.3	5.6	1	52.0
57	13	30		3	18.9	4.3	3	13.3
24.0 48 rev.								

Oct. 26

1870

a

Div.

B

D

started 22^h 49^m
experiments with
zone stars

stopped 0^h 37^m

Oct 28 1870

Started 21^h 42^m

2 Aquarii

32 no ellaj? 3 lost mires?

8 Aquarii

γ "

η "

9 Drae 26

stopped 22^h 28^m

Oct. 29 1870

Immersion of a star 1^m 21.^s7 ~~by~~
by stopwatch before 23^h 35^m by S. Clock.

Observation uncertain: immersion
if it actually occurred not
distinctly visible owing to the brightness
of the Moon's cusp, close to the
extremity of which the star
wanished (on the bright part of the
limb.)

Stopwatch, compared with S. Clock
loses 4^s in 2^m: hence it loses 2.^s7 in 1^m $\frac{1}{5}$.
But on another comparison, it ran fast 1^m 21.^s7
while the South Clock ran 1^m 23^s.

Oct. 29 1870

Third trial	S. Clock	1 ^m	23 ^s
	Stopwatch	1	19.9
Fourth "	S. Clock	1	23
	Stopwatch	1	19.8
Fifth "	S. Clock	1	23.
	Stopwatch	1	19.4
Sixth "	S. Clock	1	23.
	Stopwatch	1	20.2
Seventh "	S. Clock	1	23.
	Stopwatch	1	19.7

First two comparisons rejected because the South Clock was not made to tick on the chronograph till the third.

Mean of the last 5 makes the watch lose $3^s.2$ in $1^m 23^s$ by South Clock.

It would then lose $3^s.25$ while running $1^m 21^s.7$ and the immersion occurred at $23^h 33^m 35^s.05$ by South Clock, approximately.

E. P. Austin observed chron A 424 and recorded signal for immersion at $23^h 31^m 28.5$ Chron. comp. with S. Clock by stopwatch and found slow $2^m 5^s.3$ at $0^h 13^m$.
 ∴ Immersion at $23^h 33^m 33.8$ by S. Clock

Nov 1st 1870

5	35	4	46.3	8.2
			52.3	6.0
5	30	0	12.6	8.5
			17.8	5.2
5	5	3	25.6	7.8
			32.6	7.0
6	0	1	32.4	—
			35.8	3.4
X	5	45	3	9.1
				8.0
			14.9	5.8
5	50	3	47.8	7.8
			53.3	5.5
5	45	1	36.1	8.7
			42.2	6.1
5	40	1	51.3	8.9
			55.4	4.1
5	35	1	38.7	9.0
			43.1	4.4
5	40	0	25.1	8.4
			30.0	4.9
5	15	0	42.3	8.4
			48.0	5.7
5	10	2	2.3	9.0
			6.9	4.6
5	30			9.6
5	55			

✓ had

cont III

