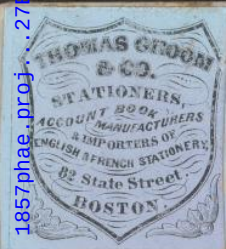


KG
11365
27

A.27

Transit Circle
Sept. 21st 1857.
to.
NOV. 3rd 1857.

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



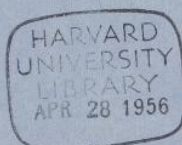
KG-11365.27

Moon Culminations to be observed
for War Department.
Lieut. Col. E. Johnson. Boundary of Kansas

Aug 28	to Sept 9 th	1857
Sept 27	" Oct 8	"
Oct. 26	" Nov 27	"

Stars to be taken from Am. Naut. Al.

KG 11365.27



1857 Sept 21st

Repeats at Montreal.

Telegraph to Quebec via Portland & Montpelier

Mr. Millikin - Operator.

NB. This comparison of 236 with EC was made by beat of second hand, not by circuit

EC 22 .. 02 .. 00.0

236 22 .. 03²⁷ .. 8.5Signals received
From QuebecSet $\frac{2}{1}$ [E]236: 2nd Set 22 .. 20 .. 35.746.4

5.7

45.6

22 .. 5.8

35.7

45.7

23 .. 5.8

35.7

45.8

5.6

45.7

25 .. 5.75

25 45.7

26 .. 5.7

26 45.8

27 45.8

28 .. 5.7

28 45.8

Signals sent
From Cambridge

Set 1/E

236 = 22 40

22 .. 42 .. 5

45

5

45

de

to 22 .. 44 ..

but signals not received at Quebec having been sent on closed circuit with break circuit key for which Quebec was not prepared.

236 fast 34⁵

Quebec Clock slow 53.57

22 .. 27 .. 00

53.57

22 51 .. 59.75

Quebec 22 52 53.30

Camb 22 52 31.0

E. East of Camb. 22.3

28 .. 45.8

34.00

28 .. 11.8

22 .. 53 .. 05.0

34.0

22 .. 52 31.0

From Letter of Lieut Asher Sept 22 1857

Anchor sent 1st signal at 22^h 18^m 00^s 0 until 22^h 27^m 00^s 0
" rec'd 1st land signal of 22^h 53^m 00^s 0 (5.0?) at 22^h 51^m 59^s 73
Anchor clock (Dial) slow 53^m 57 (imperfectly determined)

From Cambridge Set III

236 22^h 53^m 5 circuit made
beats every second till 35^s the

Commenced at 22 53 minutes

N.B. at 22 54 min 5 sec the key did not
mark till the 6th sec after 54 min

Commenced 22 53, 05, 0
beat sec^s till 35, 0

at 45 sec a single dot then commenced
beating, sec at 5 sec

The set which commenced at 22^h 53^m 5^s was
made with a make circuit key = & continued to
22^h 03^m 5^s

Set IV from Cambridge

Message sent

"Camb. will put Clock on time
 & send signals at each 5^s for 2^{mn}
 Commencing at ²³⁶ 23^h 35^{mn} 40^s Lucie will
 note times.

Set IV

First signal was at 23 35^{mn} 00 of 236
 Last signal was at 23 37^{mn} 00

Doty com. at 23^h 34^{mn} 45^s & went to 55^{mn}
 First Part of the signals were not taken
 on the sheet. but were sent regularly

Circuit broken at 23 35 00 of 236

5

10

15

&c

Set V. from Cambridge

Second set with Clock on from Cambridge

Commence at $23^h 51^m 00^s$ Dots at $23^h 50^m 45^s$

Set V.

Commence Dots at $23^h 50^m 45^s$

at 236 = 5-1, 05- dots

10, "

15, "

20, "

25, "

30, "

35, "

40, "

45, "

50, "

55, "

5-2, 00, "

5, "

10, "

15, "

20, "

25, "

30, "

35, "

40, "

45, "

50, "

55, "

5-3, 00,

Set VI. from Cambridge

Previous clock signals were not well received at Quebec.

Set VI.
New set begin at 0^h 17^m 00^s of 236
Dots at 16 45 26 55
1st signal to 236 = 17.. 00.
= 19.. 00.0

These were received at Quebec.

Set [VII]. from Quebec.
Quebec then returned signals by
breaking circuit. ~~by~~ but sent a tap
each ^{alternati} second.

Cambridge repeated message
for Quebec to send 1 signal every
5th for 2^m

~~107~~ Set [VIII] from Quebec.

The 5^s signals sent on open circuit
from Quebec fell precisely at 6^s, 11^s, 16^s
di of 236 Beginning at 0^h 36^m ??

Thought it beyond their ability
Quebec could not send back
signals with clock on line.

Set IX. from Cambridge.

Cambridge then put on Clock 2
sent 5^s signals for 2^m beginning at
236 1^h 2^m 5^s ? Dots at 1^h 0^m 1^s 4^s 5^s

Part of which was received at
Quebec. Record was kept on spring
governor.

Readings from Spring Geo. Sheet

Set IV

Readings of E.C. for Times of Signal.

236 = 23..35..00.0 EC = No record obtained

5	"
10	"
15	"
20	"
25	"
30	"
35	"
40	"
45	"
50	"
55	"

23..36..00.0 EC = 23..35..51.55

5	56.50
10	36..1.55
15	6.50
20	11.55
25	16.55
30	21.55
35	26.55
40	31.55
45	36.55
50	41.55
55	46.55

236 = 23..37..00.0 EC = 23 36..51.55

Set W. Readings of 2C

236 = 23.. 51.. 00. 0	2C = 23.. 50.. 51. 55
5. 0	56. 55
10. 0	51.. 1. 50
15. 0	6. 55
20. 0	11. 55
25. 0	16. 50
30.	21. 55
35	26. 50
40	31. 55
45	36. 55
50	41. 55
55	46. 50
52.. 00	51. 55
5	56. 55
10	1. 55
15	6. 50
20	11. 50
25	16. 50
30	21. 50
35	26. 47
40	31. 48
45	36. 50
50	41. 50
55	46. 50
23 53 00	23.. 52 51. 48

Set VI

$$236 = 0..17..00.0 \quad \Sigma C = 0..16..51.55$$

5.0	56.50
10.0	17 " 1.50
15.0	6.47
20.0	11.50
25.0	16.47
30.0	21.50
35.0	26.48
40.0	31.47
45.0	36.47
50.0	41.47
55.0	46.50

$$18..00.0 \quad 51.48$$

5	56.47
10	18 " 1.50
15	6.50
20	11.47
25	16.48
30	21.48
35	26.47
40	31.45
45	36.47
50	41.48
55	46.50

$$236 = 0..19..00 \quad \Sigma C. 0..18..51.48$$

This set [VII] is important as it furnishes a direct comparison of Quebec clock with Cambridge registered by Spring Governor. Signals from Quebec

Set [VII.]

Quebec Clock =

EC = 0.. 22.. 38.50

40.58

42.58

44.50

46.48

48.42

50.42

52.40

54.45

56.43

58.43

23.. 0.45

2.40

4.40

6.40

8.40

10.40

12.43

14.45

16.38

18.38

20.43

22.47

24.47

26.47

28.47

30.45

0.. 23.. 32.45

Set [VII] Continued.

Inch Clock =

EC = 0..23.. 34.45

36.40

38.45

40.45

42.47

44.47

46.43

48.43

50.47

52.47

54.45

56.45

58.43

24.. 0.45

2.43

4.43

6.43

8.45

10.45

12.43

14.45

16.43

18.43

20.40

22.47

24.45

26.47

28.45

30.43

32.45

34.47

36.40

EC. 0.. 24, 38.40

Set

Set IX - From Cambridge

236 = 1.. 5.. 00.0

 $\Sigma C = 1^h 4^m 51.45$

5

56.45

10

5.. 1.45

15

6.53

20

11.45

25

16.47

30

21.47

35

26.45

40

31.47

45

36.47

50

41.47

55

46.47

6.. 0

51.50

5

56.43

10

6 1.53

15

6.40

Signal not well given

[10.80]

25

16.47

30

21.45

35

26.40

40

31.40

45

36.35

50

41.40

55

46.43

7.. 00

1.. 6.. 51.40

1857

a - 0.21

b + 0.28

c + 0.11

Sept 21stSept ²¹/₂₂

A.H.

A.H.

A.H.

G.P.B.

G.P.B.

 α Cor. Bor. α Serpenti. δ Opuschi. β Arietis. α Arietis.

15..28..56.6

15..38..33.5

16..07..11.4

1..47..05.4

1..59..28.0

0.8

36.8

15.1

09.45

4 wires lost

4.5

40.5

18.4

13.00

by clouds.

8.4

44.0

22.0

16.80

12.4

47.4

25.5

20.70

82.7

202.2

92.4

65.45

16.34

40.44

18.48

130.90

15..29..4.54

15..38..40.44

16..07..18.48

1..47..13.09

-.03

-.06

-.07

-.09

+.03

+.03

+.02

+.28

-.02

-.02

-.02

+.12

15..29..4.52

15..38..40.39

16..07..18.41

1..47..13.40

15..28..39.27

15..38..15.07

16..06..52.97

1..46..48.25

E.C. +25.25

E.C. +25.32

E.C. +25.44

+25.15

15..29..4.54

15..37..40.44

16..07..18.48

-.06

-.12

-.15

+.31

+.23

+.20

+.12

+.11

+.11

15..29..04.91

15..37..40.66

16..07..18.64

15..28..39.27

15..37..15.07

16..06..52.97

E.C. +25.64

E.C. +25.59

E.C. +25.67

At

15^h 45^m E.C. + 25.64

wt = 3

25.47

25.15

2

Used for Error of E.C. for Long of distance

Sept 21st At 19^h 45^m 2nd. E.C. + 25.44
lower ~~just~~ daily - 0.50

1857

Ill. West.

Sept. 22/23.	Sept 23, ^{red}	$a = -0.18$	$b = +0.23$	$c = +0.08$
A.H.	A.H.	Sept 23 rd A.H.	" A.H.	A.H.
α Leonis.	Polaris.	Dis 1 st Limb.	δ Ophiuchi.	α Scorpii.
10 .. 01 .. 03.75	1 st wire lost.	15 .. 59 .. 17.80	15 .. 07 .. 10.55	16 .. 21 .. 57.5
7.55	2 nd wire lost.	22.50	14.10	1.5
11.00	13 .. 08 .. 21.1	26.25	17.45	5.5
14.50	4 th wire lost.	30.05	20.80	lost —
18.15	13 .. 12 .. 55.2	34.10	24.30	lost —
54.95		130.70	87.20	
109.90		15 .. 59 .. 26.14	15 .. 07 .. 17.44	
10 .. 01 .. 10.99			-13	
-0.9			+16	
+21			+08	
+08			16 07 .. 17.55	
10 .. 01 .. 11.19			16.06 .. 52.93	
10 .. 00 .. 56.53			86 +24.62	
86 +24.66				

Approx. red.

5 th wire	13 .. 12 .. 55.2
red to mid.	-4 34 4
	13 8 20.8
mid. obsd	13 8 .. 21.1
mid wire	13 .. 8 .. 20.95
wz	-5.23
tw	-5.79
col	-3.08
	13 .. 8 06.85
12 ^h + R	13 7 43.38
2c.	+23.47

1857.

Sept^r 23.
A.H.

A.H.

Procyon.

Ill. East.
A.H.

β Geminorum

Sept 24th
A.H.

Polaris, S.P.

β Geminorum.	Procyon.	β Geminorum	Polaris, S.P.	
7..25..47.00	7..32..8.7	7..36..52.8	13..03..39.45	
51.10	12.1	56.7	6..01.75	$a = -0.18$
53.20	13.7	0.6	8..10.73	$b = +0.23$
59.45	19.0	4.5	10..29.95	$c = +0.08$
3.45	22.7	8.65	12..49.80	
216.20	78.2	123.25	41..11.70	
43.24	15.64	24.650	8..14.34	
7..25..55.24	7..32..15.64	7..36..00.65	13..8..14.34	
-0.04	-0.11	-0.05	-5.23	
+0.27	+0.19	+0.25	+5.79	
+0.09	+0.08	+0.09	+3.08	
7..25..55.56	7..32..15.80	7..37..00.94	13..8..17.98	
7..25..30.73	7..31..30.71	7..36..35.93	13..7..43.84	
El +24.83	El +25.09	El +25.01	34.14	

1857.

Sept. 25.

A.H.

Ill. East. Sept 26th

A.H.

 a - .09
 b + .31
 c - .06

α Geminorum	α Can. Min.	β Geminorum	Polaris. S.P.
7. 25. 47.45	7. 32. 09.25	7. 36. 53.30	13. 03. 43.10
51.55	12.70	57.55	6. 06.05
55.90	16.30	1.30	8. 20.10
0.05	19.55	5.15	10. 35.30
4.25	23.00	9.40	12. 56.35
159.20	80.80	126.70	41. 40.90
31.84	16.16	25.34	8. 20.18
7. 25. 55.84	7. 32. 16.16	7. 37. 01.34	13. 8. 20.18
-.02	-.06	-.02	-. 2.62
+ .36	+ .25	+ .34	+ 7.80
-.07	-.06	-.07	- 2.31
7. 25. 56.11	7. 32. 16.29	7. 37. 01.57	13. 8. 23.05
7. 25. 50.80	7. 31. 50.77	7. 36. 35.99	13. 7. 44.41
66 + 25.31	66 + 25.52	66 + 25.58	66 + 38.64

1857

Sept. 26th

A.H.

Ill. East.

$a = -.09$

$b = +.31$

$c = -.06$

μ Herulis.	γ Draconis.	μ Sagittarii.	α Lyrae.
17.41.11.0	17.53.32.05	18.05.33.50	18.32.23.60
14.9	37.70	37.05	28.20
18.8	43.25	40.90	32.70
22.65	48.65	44.40	36.90
28.80	54.40	48.35	41.50
96.15	216.05	204.20	162.90
19.230	43.210	40.84	32.58
17.41.19.23	17.53.43.21	18.05.40.84	18.32.32.58
- .02	- .02	- .09	- .01
+ .50	+ .50	+ .14	+ .39
- 10	- 10	- .06	- .08
17.53.43.59	17.53.43.59	18.05.40.83	18.32.32.88
17.53.18.02	17.53.18.02	18.05.15.22	18.32.07.29
66 + 25.57	66 + 25.57	66 + 25.61	66 + 25.59

1857.

S. C. Sept. 27th "

Antares.

S. C.

Ill. East.

S. C.

S. C.

$a = -.09$

$b = +.31$

$c = -.06$

 α Scorpii. δ Sagittarii. ϵ Sagittarii.

Moon's I. Limb.

16 " 20 " 58.55

18 " 53 " 51.50

18 " 58 " 21.55

19 " 43 " 18.45

2.50

58.55

25.45

22.65

6.50

59.65

29.30

26.45

10.25

03.65

33.20

30.15

14.20

07.50

37.35

34.40

92.00

177.85

146.85

132.10

18.40

35.57

29.37

26.42

16 " 21 " 6.40

18 " 53 " 59.57

18 " 58 " 29.37

19 " 43 " 26.42

-.09

+.12

-.07

16 " 21 " 06.36

40.64

66 + 25.72

1857

Sept 27th "

Ill East.

"

Sept 27/28
A.H.

S.C.	S.C.	S.C.	S.C.	
Spot 1.	Spot 2	A Sagittarii.	μ Sagittarii.	α Leonis.
19 " 44 " 44.55	19 " 44 " 43.45	19 " 50 " 35.50	19 " 56 " 54.48	10 " 01 " 05.45
48.70	49.45	39.45	58.40	8.90
52.55	53.25	43.40	2.30	12.50
56.65	57.20	47.10	5.70	15.95
0.55	1.30	51.20	9.30	19.80
203.00	206.65	216.65	130.18	62.60
40.60	41.33	43.33	26.64	12.52
19 " 44 " 52.60	19 " 44 " 53.33	19 " 50 " 43.33	19 " 56 " 02.04	10 " 01 " 12.52
				- .05
				+ .28
				- .06
				10 " 01 " 12.69
				10 " 01 " 46.63
				86 + 26 " 06

1857.

M. East. $a = -.09$
 $b = +.31$
 $c = -.06$ Sept 28th $\frac{28}{29}$ 29th

A.H.

A.H.

A.H.

A.H.

W.C. B.

Polaris.	α Leonis.	α Cor Bor.	κ Serpente.	Antares.
13 .. 03 .. 36.15	10 .. 01 .. 05.90	15 .. 28 .. 57.80	15 .. 37 .. 34.25	16 .. 20 .. 59.25
5 .. 55.60	9.45	1.75	37.80	3.45
8 .. 12.60	13.00	5.50	41.45	7.10
10 .. 24.65	16.30	9.45	44.90	10.85
12 .. 47.80	20.20	13.45	48.50	15.00
40 .. 56.80	64.85	87.95	206.90	95.65
13 .. 08 .. 11.36	12.970	17.59	41.38	19.13
-2.62	10 .. 01 .. 12.97	15 .. 29 .. 05.59	15 .. 37 .. 41.38	16 .. 21 .. 7.13
+7.80	-.05	-.02	-.05	-.09
-2.31	+2.8	+3.4	+2.6	+1.2
13 .. 08 .. 14.23	-.06	-.07	-.06	-.07
13 .. 07 .. 44.93	10 .. 01 .. 13.14	15 .. 29 .. 05.84	15 .. 37 .. 41.53	16 .. 21 .. 7.09
66 +29.30	10 .. 00 .. 46.65	15 .. 28 .. 39.15	15 .. 37 .. 14.96	16 .. 20 .. 40.62
66 +26.49	66 +26.49	66 +26.69	66 +26.57	66 +26.47

1857 Sept 29th

Ill. " East.

S. C.	S. C.	S. C.	S. C.	S. C.
η Capricorni	χ Capricorni	ι Capricorni	δ Capricorni	ϵ Capricorni
20 .. 56 .. 38.00	21 .. 00 .. 44.30	21 .. 14 .. 39.40	21 .. 18 .. 52.35	21 .. 29 .. 27.00
41.95	48.20	43.05	56.15	30.65
45.70	51.85	46.50	0.05	34.35
49.25	55.45	50.30	3.65	41.55
53.15	59.20	54.20	7.60	~~48.00~~
228.05	259.00	233.45	119.80	171.55
45.61	51.80	46.69	23.96	34.31
20 .. 56 .. 45.61	21 .. 00 .. 51.80	21 .. 14 .. 46.69	21 .. 19 .. -00.04	21 .. 29 .. 34.31
			21 .. 18 .. 59.96	

1857

Sept 29th " $\frac{28}{30}$

Ill. East. "

 $a = -09$ $b = +31$ $c = -06$

S. C.	S. C.	A.H.	A.H.	A.H.
Moris I. Limb.	Garrendi, center cone	α Can. Min.	β Geminorum	α Leonis.
21 .. 33 .. 43.9	21 .. 35 .. 33.95	7 .. 32 .. 10.8	7 .. 36 .. 54.85	10 .. 01 .. 6.00
48.0	37.95	14.2	58.90	9.65
51.6	41.60	17.8	2.70	13.20
55.3	45.45	21.05	6.40	16.65
59.3	48.95	24.60	10.45	20.25
258.1	207.90	88.45	133.30	65.75
51.62	41.58	17.69	26.66	13.15
21 .. 33 .. 51.62	21 .. 35 .. 41.58	7 .. 32 .. 17.69	7 .. 37 .. 2.66	10 .. 01 .. 13.15
		31 .. -06	-02	-05
		+25	+34	+28
		-06	-07	-06
		7 .. 32 .. 17.82	7 .. 37 .. 2.91	10 .. 01 .. 13.32
		7 .. 31 .. 60.89	7 .. 36 .. 36.13	10 .. 00 .. 46.67
		EG +26.93	EG +26.78	EG +26.65

1857

Sept. 30th

Ill. East.

A.H.	S.C.	S.C.	S.C.	S.C.
Polaris.	θ aquarii.	p aquarii	$\delta 3^2$ aquarii. 1	$\delta 3^2$ aquarii. 2
13.. 03.. 46.50	22.. 9.. 40.20	22.. 13.. 03.40	22.. 19.. 11.00	22.. 19.. 11.50
6.. 11.50	44.05	7.00	14.90	15.20
8.. 22.05	47.30	10.50	18.60	19.05
10.. 37.55	50.55	14.00	21.90	22.65
12.. 59.10	54.15	17.55	25.90	26.45
41.56.70	236.25	52.45	92.30	94.85
8.23.34	47.25	10.49	18.46	19.97
-2.62	22.. 09.. 47.25	22.. 13.. 10.49	22.. 19.. 18.46	22.. 19.. 19.97
+7.80				
-2.31				
13.. 8.. 26.21				
13.. 8.. 45.39				
90.82				

1857

October 3rd

Ill. East

S.C.	S.C.	S.C.	S.C.	
35 Rseium.	d Rseium.	^{45 of the log. N. st.} 44 Rseium.	δ Rseium.	ε Rseium
0..10..26.20	0..13..37.90	0..18..28.45	0..41..39.80	1 st wire lost
29.75	41.90	32.00	43.10	2 nd
33.45	45.45	35.45	46.85	3 rd
36.80	48.50	38.80	50.20	0..56..5.75
40.40	52.30	134.70	53.90	 9.35
166.60	226.05	42.90	233.85	
33.32	45.21	176.90	46.77	
0..10..33.32	0..13..45.21	35.38	0..41..46.77	

1857.

October 3rd

Ill. East.

S.C.	S.C.	S.C.	S.C.	S.C.
ϵ Piscium	Spot. A. Mepier.	Centre Cone, Gassendi	Moon's II Limb.	μ Piscium.
1 .. 01 .. 24.45	1 .. 6 .. 7.90	1 .. 07 .. 41.30	1 .. 08 .. 06.30	1 .. 23 .. 05.80
27.90	11.40	45.45	10.00	9.15
31.50	15.00	48.60	13.65	12.80
38.30	18.60	52.00	17.00	16.15
34.85	22.55	55.95	20.80	19.80
157.00	75.45	243.30	67.75	63.70
31.40	15.09	48.66	13.55	12.74
1 .. 01 .. 31.40	1 .. 6 .. 15.09	1 .. 07 .. 48.66	1 .. 08 .. 13.55	1 .. 23 .. 12.74

1857

October, 3rd.

Ill. East.

SC.	S.C.	S.C.	SC.	S.C.
π Piscium.	ν Piscium.	σ Piscium.	β arietis.	γ arietis.
1 .. 29 .. 55.10	1 .. 34 .. 23.50	1 .. 38 .. 14.60	1 .. 47 .. 8.30	1 .. 49 .. 56.25
58.50	27.10	18.20	12.10	0.05
2.05	30.55	21.70	15.80	3.50
5.55	33.85	25.10	19.40	7.10
9.40	37.75	29.00	23.45	11.00
130.60	152.75	108.60	79.05	77.90
26.12	30.55	21.72	15.81	15.58
1 .. 29 .. 2.12	1 .. 34 .. 30.55	1 .. 38 .. 21.72	1 .. 47 .. 15.81	1 .. 50 .. 3.58

1857.

October, 4th

Ill. Coast.

S.C.	S.C.	S.C.	S.C.	S.C.
δ Piscium	ϵ Piscium	ζ Piscium 1 st	ζ Piscium 2 nd	η Piscium
0 .. 41 .. 40.45	1 .. 01 .. 25.05	1 .. 06 .. 40.30	1 .. 06 .. 41.80	1 .. 24 .. 14.20
43.60	28.40	43.90	45.45	17.95
47.50	32.00	47.55	49.00	21.95
50.80	35.20	50.85	52.30	24.95
54.50	39.30	54.55	56.15	28.80
236.85	159.95	239.15	244.70	107.85
47.37	31.99	47.83	48.94	21.57
0 .. 41 .. 47.37	1 .. 01 .. 31.99	1 .. 06 .. 47.83	1 .. 06 .. 48.94	1 .. 24 .. 21.57

1857

October 4th

M. East.

S.C.	S.C.	S.C.	S.C.	S.C.
11 Piscium	✓ Piscium	o Piscium	i Arietis	α Arietis
1.. 29 .. 55.90	1.. 34 .. 29.80	1.. 38 .. 15.40	1.. 49 .. 56.95	1.. 59 .. 31.70
59.35	27.65	18.95	0.70	35.00
3.00	31.15	22.30	4.15	38.80
6.40	34.45	25.95	7.80	42.25
9.90	38.00	29.45	11.65	46.65
134.55	155.05	112.05	81.25	194.40
26.91	31.01	22.41	16.25	38.88
1.. 29 .. 2.91	1.. 34 .. 31.01	1.. 38 .. 22.41	1.. 50 .. 4.25	1.. 59 .. 38.88

1857

October 4th

Ill. East.

S.C.	S.C.	S.C.	S.C.	S.C.
Spro A. Messier	centre cone Bulliald?	Moon II. limb.	Parities.	ξ^2 beti.
2 .. 03 .. 09.90	2 .. 04 .. 37.30	2 .. 05 .. 11.80	—	2 .. 20 .. 58.00
13.85	41.10	15.65	—	01.90
17.45	45.00	19.15	—	05.25
21.15	48.40	22.90	2 .. 10 .. 45.80	8.70
25.00	52.25	26.60	49.70	12.15
87.35	224.05	96.10		86.00
17.47	44.81	19.22		17.20
2 .. 03 .. 17.47	2 .. 04 .. 44.81	2 .. 05 .. 19.22		2 .. 20 .. 05.20

1857.

October 4th

" Ill. East.

S.C.	S.C.	S.C.	S.C.	S.C.
μ Arietis.	38 Arietis.	π Arietis.	2 ^d Sat of Jupiter.	Jupiter ^I Limit.
2 .. 34 .. 42.80	2 .. 37 .. 34.75	2 .. 41 .. 43.35	2 .. 49 .. 53.70	2 ^h .. 50 ^m .. 1 ^s .70 1 st .
46.55	38.45	47.05	57.50	2 ^d wire lost, not by
50.25	42.05	50.85	—	9.00 3 rd
53.80	45.45	54.00	—	4 th wire lost,
57.80	49.00	57.85	—	16.60 5 th
251.20	209.70	253.10		
50.24	41.94	50.62		
2 .. 34 .. 50.24	2 .. 37 .. 41.94	2 .. 41 .. 50.62		

1857

October 4th

Ill. East.

S.C.	S.C.	S.C.	S.C.	S.C.
Jupiter II Limb.	1 Sat. of Jupiter	3 rd Sat. Jupiter	4 th Sat. Jupiter	α Ceti
2. 50. 5. 25. 1 ^h	—	—	2. 50. 33. 45	2. 55. 17. 70
—	—	—	37. 30	21. 60
12. 55. 30	—	—	40. 80	25. 00
—	—	2. 50. 22. 25	43. 90	28. 55
19. 60 5 ^m	2. 50. 21. 35	26. 05	47. 95	31. 85
			203. 40	124. 70
			40. 68	24. 94
			2. 50. 40. 68	2. 55. 24. 94

1857

October 4th
S.C.Oct. 5th
A.H." Ill. East.
A.H.a -.09
b +.31
c -.06

33 arietis.	Antares.	α Opiechi	μ Herculis.	γ Draconis
2 .. 59 .. 47.00	16 .. 21 .. 01.00	17 .. 28 .. 40.45	17 .. 41 .. 13.20	17 .. 53 .. 34.15
50.75	4.85	44.05	17.40	39.90
54.25	8.85	47.60	21.20	45.40
58.00	12.50	51.05	24.80	50.85
01.80	16.55	54.80	29.00	56.70
211.80	43.75	237.95	105.60	227.00
42.36	8.750	47.59	21.12	45.40
2 .. 59 .. 54.36	16 .. 21 .. 8.75	17 .. 28 .. 47.59	17 .. 41 .. 21.12	17 .. 53 .. 45.40
	- .09	- .05		- .13
	+ .12	+ .31		+ .34
	- .07	- .26		- .80
	16 .. 21 .. 8.71	17 .. 28 .. 47.59		17 .. 53 .. 45.51
	40.52	17 .. 28 .. 19.58		17 .. 53 .. 17.73
	86 + 28.19	86 + 27.91		86 + 27.58
	- .10			
	+ .14			
	- .28			
	16 .. 21 .. 8.51			
	16 .. 20 .. 40.52			
	86 + 27.99			

For Catalogue Stars Oct. 5th & Time Stars
near them See after Oct. 9th

1857

October 16.

M. East.

S.C.	S.C.	S.C.	S.C.	S.C.
Polaris.	θ arietis.	ζ^2 beta	without 9th lamp west end μ arietis	γ arietis.
0.. 3. 32. 05	2 " 10 " 35. 2	2 " 20 " 58. 30	2 " 34 " 42. 70	2 " 37 " 34. 75
5 " 47. 45 ^{15.40}	38. 8	1. 95	46. 70	38. 45
8 " 06. 30 ^{18.45}	42. 2	5. 25	50. 35	42. 00
10 " 23. 65 ^{16.35}	45. 6	8. 70	53. 95	45. 40
12 " 38. 55 ^{14.90}	49. 65	12. 30	57. 75	49. 05
40 " 28. 00	211. 45	86. 50	251. 45	209. 65
0 " 8 " 05. 60	42. 29	17. 30	50. 29	41. 93
	2 " 10 " 42. 29	2 " 21 " ~~17~~ . 30	2 " 34 " 50. 29	2 " 37 " 41. 93
		2 " 21 " 5. 30		

1857.

Oct 5/6.

Ill. East.

S.C.	S.C.	S.C.	S.C.	S.C.
π arietis.	p^3 arietis.	ϵ arietis.	α beti	δ^3 arietis.
2 " 41 " 43, 20	2 " 48 " 46, 40	2 " 51 " 26, 55	2 " 55 " 12, 75	2 " 59 " 47, 20
47, 00	50, 15	30, 50	16, 65	50, 95
50, 65	53, 85	34, 30	20, 25	54, 60
54, 25	57, 45	37, 80	23, 45	58, 30
58, 00	1, 00	41, 65	27, 00	1, 95
253, 10	208, 85	170, 80	100, 10	213, 00
50, 62	41, 77	34, 16	20, 02	42, 60
2 " 41 " 50, 62	2 " 48 " 53, 77	2 " 51 " 34, 16	2 " 55 " 20, 02	2 " 59 " 54, 60

1857

Oct 5/6

Ill East.

S.C.	S.C.	S.C.	S.C.	S.C.
Spot A mission	centre cone Hipparche?	centre cone Gassendi	Moon I I Limb	T arctis
3 " 03 " 58.80	3 " 05 " 08.35	3 " 05 " 40.30	3 " 06 " 04.55	3 " 13 " 22.75
2.70	12.30	44.15	08.70	26.35
6.55	16.20	48.10	12.65	30.30
10.35	19.65	51.75	16.40	33.85
14.35	23.95	55.45	20.45	37.80
92.75	80.45	239.75	62.75	151.05
18.55	16.09	47.95	12.55	30.21
3 " 04 " 6.55	3 " 05 " 16.09	3 " 05 " 47.95	3 " 06 " 12.55	3 " 13 " 30.21

1857

Oct 5/6

M. East.

S.C.	S.C.	S.C.	S.C.	S.C.
α Persei	η Tauri	η Tauri	η Tauri	η Tauri
3 .. 14 .. 29.30	3 .. 28 .. 57.85	3 .. 31 .. 38.20	3 .. 26 .. 47.25	3 .. 39 .. 23.45
34.55	1.80	42.20	51.45	27.35
40.20	5.50	45.80	55.05	31.00
45.05	9.10	49.70	58.85	34.60
50.70	13.10	53.75	2.60	38.80
199.80	87.35	229.65	215.20	155.20
39.96	17.47	45.93	43.04	31.04
3 .. 14 .. 39.96	3 .. 29 .. 5.47	3 .. 31 .. 45.93	3 .. 26 .. 53.04	3 .. 39 .. 31.04

1857

Oct 5 th	Oct 7 th	Ill. East	Oct 8 th	az - 0.24 lv + 0.33 coll - 0.10
3 rd	A.H.	2 Vers. Maj.	A.H.	
A Tauri	1/2 Leonis	10.55 5.65	Polaris S.P.	
3.56.38.95	10.12.26.75	13.40	13.3.48.80	
42.90	30.25	20.80	6.18.90.15.10	
46.30	34.30	28.10	8.24.60.11.30	
50.00	37.95	35.95	10.40.70.16.10	
53.95	41.65	103.90	13.1.10.20.40	
232.10	170.90	20.78	129.1	
46.42	34.18	A.H.	25.82	
3.56.46.42	10.12.34.18	10.55.20.78	13.8.25.82	
			- 7.00	
			- 8.30	
			+ 3.85	
			13 8 14.37	
			7 46.80	
			+ 27.57	

For Catalogue Start Oct. 7th & Lim. Stars
near them See after Oct 9th

1857.

Oct 7th 8.

Ill. East.

S.C.	S.C.	sc	sc	sc
η Tauri.	Spot. 1.	Spot. 2.	Mom II Limb.	X aurigae.
5 " 11 " 04.43	5 " 17 " 11.25	5 " 17 " 45.75	5 " 18 " 11.20	5 " 20 " 21.40
7.85	15.80	49.85	15.05	25.65
12.00	19.73	53.87	19.40	29.65
15.60	23.30	57.80	23.37	33.65
19.55	27.50	2.60	27.50	doubtful. 38.00
59.43	97.58	209.27	46.52	
11.886	19.516	41.854	19.304	
5 " 11 " 11.88	5 " 17 " 19.52	5 " 17 " 53.85	5 " 18 " 19.30	

1857

Oct 7.

Ill. East

SC	SC	SC	SC
136 Tauri	ϵ Geminorum	η Geminorum	μ Geminorum
5 " 44. 43. 45-	5 " 55. 48. 85-	6. 6 " 38. 78	6 " 14. 45. 45-
47. 35-	52. 80	42. 80	48. 18
51. 40	56. 47	46. 82	52. 85-
55. 20	58. 98	50. 55-	56. 78
59. 25-	4. 15	54. 65-	
256. 65	222. 25	233. 60	
513. 30	44. 45. 0	46. 72	
5 " 44. 51. 33	5 " 55. 56. 45-	6 " 6 " 46. 72	

For Catalogue Stars Oct 8th & Twin Stars
near them See after Oct. 9th.

1857

Oct 8th

S.C.

S.C.

S.C.

Ill. East.

α Aurigae	β Aurigae	γ Aurigae	δ Aurigae	ϵ Aurigae
5. 23. 47.82	5. 29. 49.65	5. 44. 43.05	5. 55. 48.50	6. 06. 37.40
52.00	54.00	47.10	52.40	41.20
56.30	57.82	51.00	56.00	45.00
0.15	1.80	54.86	59.72	48.85
4.30	6.00	58.75	3.75	52.75
160.57	169.27	254.70	220.37	225.20
321.14	338.54	50.94	44.074	45.04
5. 23. 56.11	5. 29. 57.85	5. 44. 50.94	5. 55. 56.07	6. 06. 45.04

1857

Oct 8th

Ill. East.

$$\begin{array}{r} a - .24 \\ b + .34 \\ c - .10 \end{array}$$

S.C.	S.C.	S.C.	S.C.	S.C.
μ Geminorum	ν Geminorum	center spot	center cone Gassendi	Moon I I Limit.
6 .. 14 .. 41.20	6 .. 20 .. 51.00	6 .. 24 .. 35.90	6 .. 25 .. 11.00	6 .. 25 .. 35.90
45.10	34.80	40.10	15.10	40.40 ⁴⁵⁰
48.80	58.50	44.35	15.20	44.20 ³⁸⁰
52.50	2.20	48.25	23.35	48.25 ⁴⁰⁵
56.40	5.90	52.35	27.45	52.55 ⁴²⁰
244.00	172.40	220.95	96.10	221.30
48.80	34.48	44.190	19.22	44.26
6 .. 14 .. 48.80	6 .. 20 .. 58.48	6 .. 24 .. 44.19	6 .. 25 .. 19.22	6 .. 25 .. 44.26
- .09				
+ .33				
- .11				
6 .. 14 .. 48.95				
6 .. 14 .. 21.65				
E.C. +27.28				

1857

Oct 8.

S.C.

S.C.

 ϵ Geminorum

37. Geminorum

6.. 35.. 30.35-

6.. 46.. 53.40

34.45-

57.10

38.20

1.15-

41.90

4.75-

45.928.90

190.82

125.30

38.164

25.06

6.. 35.. 38.16

6.. 47.. 1.06

-,08

+,36

-,10

6.. 35.. 38.34

6.. 35.. 11.17

td +27.27

Ill. East. Oct 9th

G.P.B.

az -0.23

lw +0.34

col. -0.10

 ϵ Piscium +7°

0.. 55.. 55.15-

38.70

1.98

5.45

9.00

130.28

26.056

0.. 56.. 02.06

-,13

+,28

-,10

0 56 02 11

0 55 35.10

Oct. 9th

EC +27.01

1857.

Oct 9th
G. P. B.

G. P. B.

Ill. East.

η Piscium +15°	γ Piscium.
1. 24. 13.7	1. 33. 23.45
17.3	—
21.0	doubtful. 30.00
24.3	35.55
doubtful. 28.0	37.20
104.3	
20.86	
1. 24. 20.86	
-.11	
+.31	
~~Minute Zeit?~~	
1. 24. 20.96	
1. 23. 53.78	
+ 27.18	

1857 Oct 9th Telegraph to Quebec
 Quebec Lieut Ashe

EC 22.35..00.0

236 22.35 54.4
 54.4

Set [I.] From Quebec

From Quebec Sent on open circuit

Not
will
get { 23.39 ~~12.8~~
 29.6

236	23	40	59.6	
		41	29.5	end
			39.5	intermediate
		41	59.5	
			29.6	
		42	39.5	
			59.5	
		43	29.5	
			39.5	
			59.5	
		44	29.4	
			39.4	
			59.5	
		45	29.6	
			39.4	
			59.6	
		46	29.5	
			39.5	
			59.5	
		47	29.5	
			39.5	

Quebec (continued) Set [I] (Continued)

23. 47.5-9.5
 48 29.5
 39.5
 59.5
 49 29.6
 39.5

Set [II] From Quebec New series from Quebec

23- 54 59.5
 57 29.5
 5 39.5
 59.5
 58 29.6
 39.6

Most of the above were recorded by the
 Spring Governor

By letter from Lieut. E. D. Ashe of Oct. 12th 1857 he
 states the results at Quebec as "very satisfactory"

Quebec sent 1st signal at 23^h 38^m 00^s.0 Clock slow 0^m 59^s.70
 " 10th " 23^h 47^m 00^s.0

N.B. Mr. Millikin found that he could communicate through
 to Quebec on one circuit. But Quebec operator found the
 signals too feeble & on that account a "repeater" i.e. a "relay"
 was put in at Portland. Through which all the signals were
 sent.

Set [III] From Lucbee

3rd Series from
Lucbee

Camb. clock on line

236 0^h 3^m 50 about

d continued 4^m

Stopped at 0^h 7^m 50.5

Lucbee beating each second

1st Set

Records

Set IV from Cambridge

Cambridge will send a signal
every 10^s for four minutes Lucbee

to note the times
from Cambridge

1st 0^h 13^m 0^s

10

20

30

to 17 0 last signal

20^m.00 **Set V** from Cambridge

Lucie wants a single dot at beginning of each minute for 4^m
from Camb

236 = 0 21^m.00.0
 22^m.00.0
 23^m.00.0
 24^m.00.0

~~Set VI~~ **Set VI** from Cambridge

Lucie next wants Clock on for 12^m

Clock was then put on.

Set V.

236^m
0^m 21^m.00.0
22^m.00.0
23^m.00.0
24^m.00.0

E.C. recorded by S.P. 172
12^m 21^m 0^m 20^m.05.70
21^m.05.70
22^m.05.80
23^m.05.65

Errors of E.C. on Sid. Time

Date	Time	E.C.	Observer	S.C.
1887 Oct 8/9	at 6 ^h .14 ^m	+ 27 ^s .28	Observer	S.C.
" 9	" 19.. 18	+ 27.07	"	A.H.
" 9	" 19.. 39	+ 26.91	"	A.H.
" 9	" 24.. 56	+ 27.01	"	G.P.B.
" 9/10	" 25.. 24	+ 27.18	"	G.P.B.

Mean of last four " 22.. 19 " + 27.04

E.C. gains daily + 0^s.10

} Sent to
Lieut. Ashu.
Lucie.

1857.

Oct 9th

Readings from Spring Governor sheets by
two Spr. Governors Not 172 and 216

Set I and II not recorded

Set III from Quebec. Quebec beating second
By No 172 By No 216

Σ C. =	By No 172	By No 216	
	0 .. 2 .. 55.20	0 .. 02 .. 55.25	+ 05
	56.20	56.20	00
	57.20	57.20	00
	58.20	58.20	00
	59.25	59.25	00
	3 .. 00.25	3 .. 0 .. 25	00
	01.25	1.27	+ 02
	2.25	2.27	2
	3.27	3.27	00
	4.25	4.25	00
	5.20	5.25	5
	6.20	6.25	5
	7.20	7.22	+ 2
	8.25	8.15	00
	9.15	9.10	- 05
	10.18	10.18	00
	11.18	11.18	00
	12.20	12.20	00
	13.20	13.20	00
	14.20	14.20	00
	15.20	15.20	00
	16.20	16.20	00
	17.20	17.20	00
	18.20	18.18	- 02
	19.20	19.18	- 02

E.C. - Continued - Lumber heating records

By No. 172		No. 216	
#		#	
0.. 03..	20.22	0.. 03..	20.20
	21.22		21.20
	22.20		22.18
	23.20		23.15
	24.20		24.20
	25.20		25.20
	26.20		26.28
	27.25		27.22
	28.22		28.22
	29.20		29.22
	30.20		30.20
	31.20		31.20
	32.22		32.22
	33.20		33.20
	34.20		34.20
	35.18		35.18
	36.15		36.15
	37.15		37.15
	38.18		38.15
	39.20		39.20
	40.25		40.30
	41.25		41.30
	42.25		42.30
	43.25		43.30
	44.25		44.30
	45.25		45.32
	46.25		46.25
	47.25		47.25
	48.25		48.25
	49.27		49.25
	50.25		50.22
	52.25		52.22
	53.25		53.22
0.. 03..	54.25	0.. 03..	54.22

- .02

0.2

0.2

- 0.5

0.0

0.0

+ 0.3

- 0.3

0.0

+ 2

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

- 0.3

0.0

+ 0.5

0.5

0.5

0.5

0.5

+ 0.7

0.0

0.0

- 0.2

- 0.3

0.3

0.3

- 0.3

Record by E.C. continued. Lumber beating seconds

S.G. No. 172

S.G. No. 216

EC = 0.. 3.. 55.25

H m s
0.. 03.. 55.22

- 0.3

56.22

56.20

0.2

57.22

57.20

0.2

58.25

58.20

- 0.5

59. lost

5 lost

4 00.25

4.. 00.25

0.0

1.27

1.30

+ 0.3

2.27

2.30

+ 0.3

3.27

3.25

- 0.2

4.27

4.25

- 0.2

5.25

5.25

0.0

6.25

6.25

0.0

7.27

7.27

0.0

8.25

8.25

0.0

9.25

9.25

0.0

10.25

10.25

0.1

11.27

11.27

0.0

12.27

12.27

0.1

13.27

13.25

- 0.2

14.27

14.30

+ 0.3

15.27

15.27

0.1

16.27

16.27

0.0

17.27

17.25

- 0.2

18.22

18.20

- 0.2

19.25

19.25

0.0

20.25

20.25

0.0

21.25

21.25

0.0

22.25

22.25

0.0

23.25

23.25

0.0

24.25

24.20

- 0.5

25.25

25.20

- 0.5

26.25

26.20

- 0.5

0 .. 4 .. 27.27

0 .. 04 .. 27.22

- 0.5

25

Record by E.C. continued, Quebec beating seconds

S.G. No. 172

S.G. No. 216

CC =	H m s	
0. 04. 28.27	0. 04. 28.22	-.05
29.27	29.22	.05
30.27	30.22	.05
31.25	31.20	-.05
33.20	33.20	.00
34.25	34.15	.00
35.15	35.15	.00
36.15	36.15	.00
37.20	37.20	.00
38.20	38.20	.00
39.20	39.20	.00
40.22	40.22	.00
41.25	41.20	-.05
42.25	42.22	-.03
43.25	43.22	-.03
44.25	44.22	-.03
45.22	45.22	.00
46.22	46.22	.00
47.27	47.30	+03
48.27	48.25	-.02
49.27	49.25	-.02
50.27	50.25	-.02
51.27	51.27	.00
52.22	52.22	.00
53.22	53.22	.00
54.22	54.22	.00
55.22	55.22	.00
56.22	56.22	.00
57.22	57.27	+05
58.22	58.20	-.02
59.22	59.20	-.02
00.22	00.20	-.02
0. 05. 01.20	0. 05. 01.15	-.05

Set. IIII

Cambridge sends a signal every 10 minutes to Zurich

Sg. No. 172

Sg. No. 216.

E.C. = ^h0 .. ^m12 .. ^s05.70

	15.70				
	25.80	0 .. 12	25.80		100
	35.80		35.70	-	.10
	45.80		45.80		.00
	55.80		55.75	-	.05
13	05.75		05.70	-	.03
	15.80		15.80		.00
	25.70		25.70		.00
	35.65		35.65		.00
	45.65		45.65		.00
	55.65		55.65		.00
14	05.70		05.70		.00
	15.75		15.75		.00
	25.70		25.70		.00
	35.70		35.65	-	.05
	45.80		45.75	-	.05
	55.80		55.75	-	.05
15	05.65		05.65		.00
	15.70		15.70		.00
	25.80		25.75	-	.05
	35.80		35.70	-	.10
	45.80		45.75	-	.05
	break		break		
0 .. 16	05.75	0 .. 16	05.65	-	.10

For Set V see a few pages back

Set VI

All the signals from Cambridge for Set VI were
 even seconds of the sidereal clock E.C.

1857

az - 0.23

lev + .34

coh - .10

Oct 9th Catalogue Stars.

M. East.

Reobservations.

Asaph Hall.

	♂ Aquilae			
19..12..19.75	19..18..39.65	19..21..00.80	19..22..09.75	19..24..13.85
23.25	43.30	4.45	13.15	17.55
26.75	46.55	7.97	16.70	21.00
30.10	50.00	11.65	20.00	24.45
33.70	53.80	15.30	23.80	28.10
133.55	233.30	40.17	83.40	104.95
26.71	46.66	8.034	16.68	20.99
19..12..26.71	19..18..46.66	19..21..08.03	19..22..16.68	19..24..20.99
	- .15			
	+ .27			
	- 10			
	19 18 46.68			
	18 19.61			
	+ 27.07			

1857

Oct 9th Catalogue Stars.

M. East.

Reservations.

A Hall

19 .. 25 .. 37.75	19 .. 31 .. 00.35	19 .. 33 .. 58.75	19 .. 35 .. 35.60	19 .. 38 .. 32.00
41.60	4.00	2.70	39.20	35.20
45.05	7.80	5.90	42.60	39.00
48.10	11.00	9.50	45.90	42.25
52.15	14.30	12.83	49.77	46.10
224.65	37.45	89.68	213.07	194.55
44.93	7.49	17.936	42.614	38.91
19 .. 25 .. 44.93	19 .. 31 .. 7.49	19 .. 33 .. 05.94	19 .. 35 .. 42.61	19 .. 38 .. 38.91

1857

Oct 9th Catalogue Stars.
A. Hall.

Ill. East.

Observations.

19.39.48.65			
53.45	19.45.08.05	19.51.51.75	19.53.29.55
56.85	11.45	55.45	33.30
0.10	14.90	58.73	36.75
3.85	18.40	1.90	40.10
163.90	22.00	5.57	43.75
z Aquarii	74.80	173.40	183.45
32.78	14.96	34.68	36.69
19.39.56.78	19.45.14.96	19.51.58.68	19.53.36.69
- .13			
+ 29			
- 10			
19 39 56 84			
19.39.29.93			
- 26.91			

1857

Oct 8th Catalogue Stars.
A Hall.

M. East.

Reobservations.

			α^1 Capricorni	α^2 Capricorni
19.58.18.90	20.05.20.7	20.08.15.85	20.10.06.25	20.10.30.25
22.55	24.3	19.45	09.90	34.15
25.95	27.7	22.85	13.55	37.40
29.30	31.0	26.10	16.90	41.00
32.95	34.8	30.00	20.90	44.55
129.65	138.5	114.25	67.50	187.35
25.93	27.70	22.85	13.50	37.47
19.58.25.93	20.05.27.70	20.08.22.85	20.10.13.50	20.10.37.47

1857

Oct 8th catalogue Stars.
— A Hall.

Ill. East.

Reservations.

20..12..09.75	20..14..43.85	20..18..30.03	20..19..49.35	20..21..20.75
13.20	47.40	33.70	52.93	24.40
16.55	50.85	37.00	56.25	27.75
19.95	54.20	40.45	59.53	31.15
<u>23.60</u>	<u>57.90</u>	<u>44.00</u>	<u>3.24</u>	<u>34.80</u>
83.05	254.20	185.18	221.30	138.85
16.61	50.84	37.036	44.26	27.77
20..12..16.61	20..14..50.84	20..18..37.04	20..19..56.26	20..21..27.77

1857

Oct 8th catalogue Stars
A Hall.

Ill. East.

Reservations

20 . 25 . 29 . 30	20 . 29 . 52 . 55	20 . 32 . 26 . 95	20 . 34 . 10 . 55	20 . 40 . 43 . 00
32 . 65	55 . 95	30 . 50	14 . 00	46 . 50
36 . 20	59 . 70	34 . 10	20 . 95	50 . 10
39 . 55	2 . 95	37 . 55	24 . 30	53 . 40
43 . 25	6 . 50	41 . 00	17 . 60	57 . 00
180 . 95	177 . 65	170 . 10	87 . 40	250 . 00
36 . 19	35 . 53	34 . 02	17 . 48	50 . 00
20 . 25 . 36 . 19	20 . 29 . 59 . 53	20 . 32 . 34 . 02	20 . 34 . 17 . 48	20 . 40 . 50 . 00

1857

Oct 8th Catalogue Stars.
A Hall

Ill. East.

Observations.

20 .. 41 .. 35.95-	20 .. 43 .. 08.15-	20 .. 46 .. 23.60	20 .. 48 .. 16.3	20 .. 49 .. 55.20
39.55-	11.90	27.45-	19.7	58.80
42.80	15.15-	30.90	23.0	2.20
46.35-	18.60	34.20	26.5-	5.60
49.70	22.00	37.95-	30.3	9.25-
214.35-	75.80	155.10	115.8	131.05-
42.87	15.16	32.02	23.16	26.21
20 .. 41 .. 42.87	20 .. 43 .. 15.16	20 .. 46 .. 32.02	20 .. 48 .. 23.16	20 .. 50 .. 2.21

1857

Oct 8th catalogue stars
A Hall.

Ill. East.

Reservations.

20 .. 52 .. 21.60	20 .. 53 .. 36.80	20 .. 53 .. 58.6	20 .. 57 .. 53.20	21 .. 01 .. 58.95
25.15	40.35	2.1	56.95	2.65
28.55	43.60	5.8	0.45	6.00
32.00	47.20	9.2	3.70	9.30
35.70	50.75	12.5	7.20	13.00
143.00	218.70	88.2	121.50	88.90
28.60	43.74	17.64	24.30	17.98
20 .. 52 .. 28.60	20 .. 53 .. 43.74	20 .. 53 .. 5.64	20 .. 58 .. 00.30	21 .. 02 .. 5.98

1857

Oct 8th catalogue stars
A Hall.

Ill. East.

Reobservations

B Aquarii

21..05..12.00	21..08..01.00	21..11..48.60	21..16..53.70	21..24..25.50
15.65	4.60	51.70	57.50	29.00
19.00	8.00	55.30	0.90	32.50
22.50	11.50	59.00	4.50	35.90
26.10	15.00	2.25	7.80	39.50
95.25	40.1	216.85	124.40	162.40
19.05	8.02	43.37	24.88	32.48
21..05..19.05	20..08..08.02	21..11..55.37	21..17..00.88	21..24..32.48

1857

Oct 7th Catalogue Stars.

A Hall.

P East.

21..32..41.95	21..40..22.90	21..44..03.85	21..48..46.30	21..53..49.60
45.25	26.30	7.90	49.70	53.10
48.80	29.85	11.50	53.30	56.70
52.15	33.00	15.00	56.6	59.90
55.75	36.60	18.90	0.1	3.30
243.90	148.65	57.15	206.0	222.6
48.78	29.73	11.43	41.20	44.52
21..32..48.78	21..40..29.73	21..44..11.43	21..48..53.20	21..53..44.52

1857.

Oct 7th catalogue star.
A Hall.

Ill. East.

 α Aquarii

21. 58. 50. 45	22. 02. 29. 20	22. 08. 41. 70	22. 19. 31. 30	22. 23. 27. 60
53. 90	32. 85	45. 35	38. 60	31. 40
57. 05	36. 30	49. 00	41. 90	34. 95
0. 55	39. 35	55. 97	45. 45	38. 10
4. 30	43. 00	52. 40	33. 20	41. 75
168. 25	180. 70	244. 42	192. 45	173. 80
33. 25	36. 14	48. 88	38. 49	34. 76
21. 58. 57. 25	22. 02. 36. 14	22. 08. 48. 88	22. 19. 38. 49	22. 23. 34. 76

21 58 29. 49

1857

Oct 7th catalogue stars.
A Hall.

Ill. East.

22				
22 " 28 " 18.55	22 " 30 " 23.40	22 " 34 " 43.6	22 " 39 " 52.97	22 " 44 " 48.2
22.00	26.92	47.0	56.70	51.9
25.80	30.60	50.9	59.90	54.2
28.95	33.80	54.2	3.45	58.45
32.55	37.25	57.9	7.00	2.2
127.85	151.97	253.6	180.02	215.95
25.57	30.344	50.72	36.004	43.19
22 " 28 " 25.57	22 " 30 " 30.39	22 " 34 " 50.72	22 " 39 " 60.00	22 " 44 " 53.19

1857

Oct 7.th catalogue stars.
A. Hall.

Ill. East

22..46..58.00	22..49..4.30	22..53..20.45	22..57..01.9	23..01..45.55
1.85	8.10	23.75	5.8	49.35
5.00	11.80	27.50	9.25	52.80
8.70	15.00	30.55	12.60	59.50
12.00	18.70	34.40	16.50	55.90
85.55	57.9	136.60	46.05	263.10
17.11	11.58	29.30	9.21	52.62
22..47..5.11	22..49..11.58	22..53..27.33	22..57..09.21	23..01..52.62

1857

over 7th catalogue stars.
A Hall.

M. East.

~~23.02.28.35~~	23.06.47.15
~~50.60~~	50.60
~~52.00~~	54.00
~~57.30~~	57.30
~~1.20~~	1.20
191.45	210.25
23.02.28.35	42.05
32.00	23.06.54.05
35.60	
38.80	
42.60	
177.35	
335.70	
23.02.35.57	

Oct $\frac{11}{12}$. 1857.

Ill. East.

A.H.	A.H.	A.H.	A.H.
α Hydras	Moon's II Limb	ϵ Leonis	α Leonis
9.. 20.. 55.45-	9.. 25.. 39.25-	9.. 38.. 05.20	90.. 01.. 06.85-
59.00	43.00	9.10	10.55-
2.50	47.10	13.00	17.55-
5.85-	50.70	16.75-	14.10
9.40	54.45-	20.30	21.25-
132.20	234.50	64.35-	70.30
26.44	46.90	12.87	14.06
9.. 21.. 2.44	9.. 25.. 46.90	9.. 38.. 12.87	10.. 01.. 14.06

1857.

Oct 12.

A.H.

a H.

Lamp West.

a H.

$a = -.24$

$b = +.34$

$c = .00$

α Leonis	moon II Limit.	α Urs May.
10 .. 01 .. 06.9	10 .. 16 .. 26.20	10 .. 55 .. 65.20
10.8	30.10	13.50
14.0	33.55	20.60
17.5	37.30	27.80
21.1	41.00	35.50
70.3	168.15	102.60
14.66	33.63	20.52
10 .. 01 .. 14.06	10 .. 16 .. 33.63	10 .. 55 .. 20.52
~~- .12~~		~~- .18~~
~~+ .31~~		~~+ .69~~
~~10 .. 01 .. 14.25~~		~~10 .. 55 .. 21.03~~
~~10 .. 00 .. 47.02~~		~~10 .. 54 .. 54.19~~
~~88 + 27.28~~		~~88 + 26.84~~
~~-.09~~		~~+ .14~~
~~+.29~~		~~+.65~~
~~+.08~~		~~+.17~~
10 .. 01 .. 14.34		10 55 21.48
10 .. 00 .. 47.02		10 54 54.19
88 + 27.32		88 + 27.29

New corrections were obtained to day, Oct 13th 1857.

$a = -.18$

$b = +.32$

$c = +.08$

1857

Oct 13th catalogue stars.
NH.

Lamp West.

α Aquarii				
21 .. 58 .. 49.60	—	22 .. 02 .. 16.55	22 .. 07 .. 30.60	22 .. 08 .. 40.95
53.10	—	20.05	34.20	44.80
56.50	21 .. 59 .. 43.20	23.40	37.75	48.10
59.95	46.70	27.00	41.20	51.35
3.60	50.20	30.45	44.80	54.90
222.75		117.45	188.55	240.10
44.550		23.490	37.710	48.02
21 .. 58 .. 56.55		22 .. 02 .. 23.49	22 .. 07 .. 37.71	22 .. 08 .. 48.02

1857.

Oct. 16th Catalogue Stars.

Camp West.

A Hall.

² Capricorni				
20 .. 10 .. 34.7	20 .. 12 .. 10.1	20 .. 14 .. 44.3	20 .. 18 .. 29.9	20 .. 19 .. 49.2
34.4	13.6	47.9	33.6	52.4
37.8	17.1	51.3	37.0	56.3
41.4	20.5	54.9	40.2	59.7
45.1	24.0	58.3	43.9	33
189.4	85.3	256.7	184.6	221.4
37.88	17.06	51.34	36.92	44.28
20 .. 10 .. 37.88	20 .. 12 .. 17.06	20 .. 14 .. 51.34	20 .. 18 .. 36.92	20 .. 19 .. 56.28

1857

Oct 16th catalogue stars.

Lamp West.

A Hall.

20 " 21 " 20.6	20 " 25 " 29.2	20 " 27 " 53.6	20 " 32 " 26.9	20 " 34 " 10.3
24.2	32.9	57.5	30.6	13.9
27.4	34.4	0.8	33.9	17.4
30.8	39.6	4.4	37.5	20.7
34.5	43.2	7.8	41.0	24.5
137.5	181.3	124.1	169.9	86.8
17.50	36.26	24.82	33.98	17.36
20 " 21 " 27.50	20 " 25 " 36.26	20 " 28 " 00.82	20 " 32 " 33.98	20 " 34 " 17.36

1857

Oct 16th catalogue stars.
A Hall.

Lamp West.

20 " 40 " 42.8	20 " 43 " 08.2	20 " 45 " 12.5	20 " 48 " 16.1	20 " 49 " 55.2
46.6	11.8	15.8	19.8	58.8
50.0	15.3	19.4	23.1	2.1
53.4	18.7	22.8	26.5	5.7
<u>57.0</u>	<u>22.2</u>	<u>26.5</u>	<u>30.1</u>	<u>9.1</u>
2498	76.2	97.0	115.6	130.9
49.96	15.24	19.40	23.12	26.18
20 " 40 " 49.96	20 " 43 " 15.24	20 " 45 " 19.40	20 " 48 " 23.12	20 " 50 " 02.18

1857

Oct 16th catalogue stars.
A Hall.

Leamp. West.

20..58..58.2	20..53..40.5	20..56..11.8	20..57..53.4	21..01..59.1
2.1	44.0	15.3	57.0	2.7
5.4	47.4	18.7	0.4	6.3
8.9	50.8	22.2	3.8	9.6
<u>12.4</u>	<u>54.4</u>	<u>25.7</u>	<u>7.4</u>	<u>13.0</u>
87.0	237.1	93.7	122.0	90.7
17.40	47.42	18.74	24.40	18.14
20..54..05.40	20..53..47.42	20..56..18.74	20..58..00.40	21..01..06.14

1857.

Oct 16th catalogue stars
A Hall.

Lamp West.

21 " 05 " 12.2	21 " 07 " 47.5	21 " 11 " 48.5
15.6	50.9	52.4
19.3	54.4	—
22.7	58.0	58.9
26.3	1.6	—
96.1	212.4	
19.22	42.48	
21 " 05 " 19.22	21 " 07 " 54.48	

1857.

Oct ¹⁶/₁₇.

Lamp West.

$$a_2 = -.18$$

$$b = +.32$$

$$c = +.08$$

A.H.	A.H.	A.H.	A.H.	A.H.
α Hydrae	θ Usc Maj.	ϵ Leonis.	α Leonis.	γ' Leonis.
9 .. 20 .. 56.8	9 .. 23 .. 35.6	9 .. 38 .. 06.4	10 .. 01 .. 08.1	10 .. 12 .. 27.7
0.4	41.6	10.4	11.8	31.7
3.8	47.1	14.0	15.3	35.2
7.2	52.8	17.8	18.8	38.9
10.9	58.6	21.7	22.5	42.7
79.1	235.7	70.3	76.5	176.2
15.82	47.14	14.06	15.30	35.24
9 .. 21 .. 03.82	9 .. 23 .. 47.14	9 .. 38 .. 14.06	10 .. 01 .. 15.30	10 .. 12 .. 35.24
-.12	+.05	-.06	-.09	-.07
+.20	+.51	+.33	+.29	+.33
+.08	+.13	+.08	+.18	+.10
9 .. 21 .. 03.96	9 .. 23 .. 47.83	9 .. 38 .. 14.91	10 .. 01 .. 15.58	10 .. 12 .. 35.60
9 .. 20 .. 35.84	9 .. 23 .. 19.21	9 .. 37 .. 45.94	10 .. 00 .. 47.11	10 .. 12 .. 07.06
EC + 28.62	EC + 28.72	EC + 28.47	EC + 28.47	EC + 28.54

1857.

Oct 17th catalogue stars.
A Hall.

Ill. West.

		Bignani		Z
21 .. 16 .. 54.4	21 .. 18 .. 39.1	21 .. 24 .. 26.2	21 .. 27 .. 10.7	21 .. 27 .. 45.3
58.2	42.8	29.9	14.2	49.0
1.5	46.3	33.4	17.9	55.7
5.0	49.7	40.5	21.2	52.2
8.4	53.4	36.8	25.0	59.5
127.5	231.3	166.8	89.0	261.7
255.0	462.6	333.6	178.0	523.4
21 .. 17 .. 01.50	21 .. 18 .. 46.26	21 .. 24 .. 33.36	21 .. 27 .. 17.80	21 .. 27 .. 52.34

1857.

Oct 17th catalogue Stars.
A Hall.

Ill. West.

21 .. 32 .. 42.4	21 .. 33 .. 56.0	21 .. 35 .. 22.3	21 .. 40 .. 23.3	21 .. 44 .. 4.9
43.9	59.5	26.0	26.8	8.8
49.3	2.9	29.4	30.2	12.2
52.6	6.8	33.1	33.6	15.5
56.0	10.1	36.6	37.4	19.2
2462	135.3	1474	151.3	60.6
49.24	27.06	29.48	30.26	12.12
21 .. 32 .. 49.24	2 .. 34 .. 3.06	21 .. 35 .. 29.48	21 .. 40 .. 30.26	21 .. 44 .. 12.12

1857.

Oct 17th catalogue Stars
A Hall.

Lamp West.

	α Aquarii			
21 .. 48 .. 46.7	21 .. 53 .. 50.1	21 .. 58 .. 50.7	21 .. 59 .. —	22 .. 02 .. 17.8
50.6	53.5	54.3	—	21.4
53.9	56.9	57.9	44.4	24.8
57.2	0.4	1.2	47.8	28.2
1.0	4.0	4.8	51.4	32.0
209.4	164.9	168.9		124.2
418.8	329.8	337.8		24.84
21 .. 48 .. 53.88	21 .. 53 .. 56.98	21 .. 58 .. 57.78		22 .. 02 .. 24.84

1857.

Oct 17th
A. Hell.

catalogue Stars.

Lamp West.

22 .. 08 .. 42.2	22 .. 09 .. 59.6	22 .. 19 .. 32.1	22 .. 23 .. 28.2	22 .. 27 .. 19.3
46.0	3.2	35.7	32.0	22.6
49.4	6.7	39.2	35.4	26.2
52.8	10.2	42.5	38.9	29.6
<u>56.4</u>	<u>13.7</u>	<u>46.1</u>	<u>42.4</u>	<u>33.1</u>
246.8	93.4	195.6	176.9	130.8
49.36	18.68	39.12	35.38	26.16
22 .. 08 .. 49.36	22 .. 10 .. 06.68	22 .. 19 .. 39.12	22 .. 23 .. 35.38	22 .. 27 .. 26.16

1857.

Oct 17. th catalogue stars
A Hall.

Lamp West.

Oct ¹⁹/₂₀. AM.

		5 Pegasi		γ Leonis.	
22 .. 30 .. 23.9	22 .. 31 .. 36.5-	22 .. 34 .. 44.2	10 .. 12 .. 18.8		
27.6	40.2	47.9	32.7		
31.0	43.5-	51.4	36.3		
34.4	46.9	54.8	39.9		
38.0	50.5-	58.2	43.8		
154.9	217.6	256.6	181.5		
30.98	43.52	51.32	36.30		
22 .. 30 .. 30.98	22 .. 31 .. 43.52	22 .. 34 .. 51.32	10 .. 12 .. 36.30		

1857

Oct 21stOct 21st
catalogue stars

Ill. West.

 $a = -18$ $b = +32$ $c = +08$

A.H.

A.H.

α Lyrae	ϵ Pegasi			
18.. 32.. 26.9	22.. 34.. 45.0	22.. 39.. 54.4	22.. 44.. 49.9	22.. 47.. 00.1
31.6	48.8	—	53.1	3.4
35.8	52.5	—	56.8	6.6
40.3	55.8	—	0.0	10.3
44.7	59.4	8.3	3.8	14.0
179.3	261.5		163.6	34.4
35.86	52.30		32.72	6.88
18.. 32.. 35.86	22.. 34.. 52.30		22.. 44.. 56.72	22.. 47.. 06.88
— .01				
+ .41				
+ .11				
18.. 32.. 36.37				
18.. 32.. 6.72				
66	+29.65			

1857.

Oct 21st catalogue stars.
A Hall.

Ill West.

22 .. 49 .. 06.1	22 .. 53 .. 21.9	22 .. 58 .. 3.6	23 .. 13 .. 58.0	23 .. 24 .. 12.9
9.7	25.8	7.3	1.8	16.8
13.1	—	11.0	5.3	20.1
16.5	—	14.5	8.3	23.5
20.2	—	18.2	11.9	27.2
65.6		54.6	85.3	100.5
13.12		10.92	17.06	20.10
22 .. 49 .. 13.12		22 .. 58 .. 10.92	23 .. 13 .. 05.06	23 .. 24 .. 20.10

1857

Oct 21st catalogue stars.
A. Hall

Ill. West.

23 .. 27 .. 30.8	23 .. 29 .. 31.4	23 .. 33 .. 01.8	23 .. 34 .. 24.6	23 .. 37 .. 16.3
33.9	35.1	5.6	28.8	20.1
37.9	38.5	8.6	32.0	23.9
40.9	41.8	12.5	35.0	27.4
<u>44.7</u>	<u>45.6</u>	<u>16.0</u>	<u>39.2</u>	<u>30.5</u>
188.2	192.4	44.5	159.6	118.2
37.64	38.48	8.90	31.92	23.64
23 .. 27 .. 37.64	23 .. 29 .. 38.48	23 .. 33 .. 08.90	23 .. 34 .. 31.92	23 .. 37 .. 23.64

1857

Oct 21stOct 21st

" Ill. West.

A.H.	A.H.	A.H.	A.H.
Catalogue Star.	α Leonis	γ Leonis	Polaris. S.P.
23 . 41 . 56.2	10 . 01 . 9.2	10 . 12 . 29.1	13 . lost
59.9	13.1	32.9	13 . 06 . 17.5
3.4	16.6	36.5	08 . 31.1
6.8	19.9	40.0	10 . 44.7
10.4	23.7	44.0	13 . 08.5
136.7	82.5	182.5	
27.34	16.50	36.50	
23 . 41 . 03.34	10 . 01 . 16.50	10 . 12 . 36.50	

1857.

 $a = -18$
 $b = +32$
 $c = +08$
GA 24th

" Ill. West.

A.H.	A.H.	A.H.	A.H.
α Lyrae	β Lyrae	Vis II. limb	Spot
18.32 .. 26.5	18.45 .. 09.7	19.20 .. 33.0	1 st wire lost
31.1	14.0	37.1	19.21 .. 21.0
35.5	18.0	41.2	24.9
39.9	22.1	45.15	28.8
44.5	26.5	49.3	33.0
177.5	90.3	205.65	
35.50	18.06	41.13	
18.32 .. 35.50	18.45 .. 18.06	19.20 .. 41.13	
-.01	-.04		
+.41	+.37		
+.11	+.10		
18.32 .. 36.01	18.45 .. 18.49		
18.32 .. 06.66	18.44 .. 49.12		
66 + 29.35	66 + 29.37		

1857.

Oct 26th

Ill. West.

S.C.	S.C.	S.C.	S.C.	S.C.
ψ capricorni	32 Vulpeculae	ν Aquarii	Moon I Limb	Centre Sp. Earth horizon
20 .. 38 .. 02.5	20 .. 48 .. 51.3	21 .. 02 .. 13.7	21 .. 09 .. 17.9	21 .. 10 .. 27.2
6.3	55.7	17.3	21.8	31.2
10.1	59.3	20.8	25.6	34.9
14.1	3.2	24.3	29.4	38.7
18.0	7.0	28.0	33.2	42.6
51.0	176.5	1041	127.9	174.6
10.20	35.30	20.82	25.58	34.92
20 .. 38 .. 10.20	20 .. 48 .. 59.30	21 .. 02 .. 20.82	21 .. 09 .. 25.58	21 .. 10 .. 34.92
	-06			
	+35			
	+08			
	20 .. 48 .. 59.07			
	20 .. 48 .. 30.02			
	80 + 29.65			

1857

 $a = -.18$
 $b = +.32$
 $c = +.08$
Oct 26th

Ill. West.

S.C.	S.C.	S.C.		
<i>i Capricorni</i>	<i>♂ Capricorni</i>	<i>Baquarii</i>		
21..14.. 42.2	21..18.. 55.4	21..24.. 27.4		
46.3	59.2	31.0		
49.7	2.9	34.5		
53.3	6.8	37.8		
<u>57.0</u>	<u>10.6</u>	<u>41.4</u>		
2485	134.9	172.1		
49.70	26.98	34.42		
21..14.. 49.70	21..19.. 12.98	21..24.. 34.42		
		- .14		
		+ .21		
		<u>+ .08</u>		
		21..24.. 34.57		
		21..24.. <u>41.64</u>		
		ET + 29.43		

1857

Oct $\frac{29}{30}$

A.H.

Ill. West.

$$a = -.31$$

$$b = +.38$$

$$c = -.01$$

 α Leonis

A.H.

 γ Leonis

A.H.

 δ Leonis

10 .. 01 .. 10.1

10 .. 12 .. 29.8

11 .. 06 .. 54.1

13.7

33.6

57.9

17.2

37.0

1.7

20.8

40.8

5.3

24.4

44.6

9.1

86.2

185.8

128.1

17.24

37.16

25.62

10 .. 01 .. 17.24

10 .. 12 .. 37.16

11 .. 07 .. 01.62

-16

-13

-12

+35

+38

+38

-.01

-.01

-.01

10 .. 01 .. 17.42

10 .. 12 .. 37.40

11 .. 07 .. 01.87

10 .. 00 47.49

10 .. 12 .. 07.45

11 .. 06 .. 31.98

86 + 29.93

86 + 29.93

86 + 29.89

1857.

Oct 30th

Ill. West.

S.C.	S.C.	S.C.	S.C.	S.C.
21. Piscium	w Piscium	γ Pegasi	d Piscium	13. beti
23 " 42 " 34.5	23 " 52 " 24.5	0 " 6 " 18.6	0 " 13 " 40.9	0 " 28 " 19.7
38.0	28.0	22.2	44.4	23.6
41.6	31.5	25.7	47.9	26.8
45.0	35.0	29.3	51.2	30.0
48.4	38.5	32.9	54.8	34.0
207.5	157.5	128.7	239.2	134.1
31.50	31.50	25.74	47.84	26.82
23 " 42 " 41.50	23 " 52 " 31.50	0 " 06 " 25.74	0 " 13 " 47.84	0 " 28 " 26.82

1857

Oct 30th

Ill. West.

S.C.	S.C.	S.C.	Sc	S.C.
α Cassiopeae	δ I. Lint.	π Proclus	Spot.	Spot
0 " 32 " 45.3	0 " 36 " 39.8	0 " 36 " 52.8	0 " 37 " 22.4	0 " 37 " 49.5
52.1	43.8	56.5	25.8	53.2
58.1	47.2	6.2	29.4	56.8
4.4	50.8	3.4	33.0	0.4
10.5	54.6	7.3	36.8	4.0
1704	236.2	120.2	147.4	163.9
3408	472.4	240.4	29.48	3278
0 " 32 " 58.08	0 " 36 " 47.24	0 " 37 " 0.04	0 " 37 " 29.48	0 " 37 " 56.78

1857.

Oct 30th

Ill. west.

S.C.	S.C.	S.C.
Gassendi	20. beti	ϵ Piscium
0 .. 38 .. 30.4	0 .. 46 .. 8.8	0 .. 55 .. 58.2
34.0	12.6	1.7
37.6	15.7	5.0
41.0	19.2	8.4
44.7	22.6	12.2
1877	78.9	85.5
37.54	15.78	17.10
0 .. 38 .. 37.54	0 .. 46 .. 15.78	0 .. 55 .. 5.10

1857.

Nov. 23.
A.H.M. West.
A.H.
$$a = -.31$$

$$b = +.38$$

$$c = -.01$$

α Uro. Maj.	δ Leonis	β Leonis
10 .. 55 .. 9.5	11 .. 06 .. 55.1	11 .. 42 .. 11.0
17.6	59.0	14.6
24.7	2.6	18.2
32.5	6.3	21.7
40.0	10.2	25.6
124.3	133.2	91.1
24.86	26.64	18.22
10 .. 55 .. 24.86	11 .. 07 .. 02.64	11 .. 42 .. 18.22
+ .31	- .12	- .14
+ .77	+ .38	+ .36
- .02	- .01	- .01
10 .. 55 .. 25.92	11 .. 07 .. 02.89	11 .. 42 .. 18.43
10 .. 54 .. 54.97	11 .. 41 .. 47.57	
EC + 30.95	EC + 30.85	EC + 30.86
EC + 30.83		

