KG
11366
v.799

TIME SERVICE

DEC. 16-1892 TO JAN. 2-1894

Note,-

The record of clock windings, will be found in the small sheepskin covered Time Service book, such as used by Mr. Edmands. Only a few scattering clock comparisons (by shed observers) will be found in the book alluded to; the majority were recorded in this book.

Record of "clock stopping" will also be found ~~it~~ in the small pattern-book.

Record of "change of clock weights" will also be found there.

No attempt at a "small ~~de~~ M.T. error" has been made; within a second has been deemed sufficient, though at times the error has reached 4s.

J A Dunne.

Jan 3-1894

J.A.D. Asr.

1892 19 Lyrae (seq.) +55°29′
Dec 16.5

7 12 37.0	4.7	40.8	42.2	
40.5	11.1	45.3	46.8	
45.0	17.3	50.0	51.2	
49.4	24.2	54.3	55.5	
54.0	30.6	58.2	0.7	
225.9	87.9	248.8	256.4	
45.18	17.58	49.72	51.28	51.28
77.58			49.72	49.72
110.50			101.00	1.56
233.26			50.50	.78
17.75				
78				
18.53				

7 13 18.53
7 14 9.43
− 0 50.90
00
− .60
− 0 51.50

ι Gem. +28°1

7 17 48.4	6.1	30.2
51.2	10.5	33.0
54.0	14.9	36.0
56.7	19.2	38.8
59.4	23.3	41.3
269.7	74.0	179.3
53.94	14.80	35.86
95.86	14.90	
41.92	14.90	
20.96	260	

7 18 14.87
7 19 . 5.49
− 0 50.62
00
− 60
− 0 51.22

ρ Gem. +32°0′

7 21 19.2	39.6
23.8	42.8
28.2	45.6
32.5	48.5
	51.3
103.7	227.8
25.93	45.56
−2.16	−21.77
23.77	23.79

lg. 0.2625
0.0716
0.3341
1.2662
0.0716
1.3378

7×4 = 28
9×5 = 45
173
8

7 21 23.78
7 22 14.37
− 0 50.59
00
− 60
− 0 51.19

− 0 51.50
22
19
53
144
51.36

α Gem. +32°8

7 26 28.5	47.2	12.25	12.5
31.5	51.2	15.15	15.4
34.6	56.3	18.00	18.3
37.3	0.3	20.9	21.2
40.2	4.6	23.4	24.0
172.1	279.6	89.7	91.4
		17.94	18.28
			17.94
			36.22
34.42	55.92		18.11
78.11	56.26		
43.69			
21.84	56.27		
	45		

7 26 56.15
7 27 47.08
− 0 50.93
00
− 60
− 0 51.53

Clock slow 0ᵐ 51ˢ.36

1892

Chronograph clock comparisons.

Dec. 16.5

15 27.67
17 43 12.00
F1327 7 30 59.87 Bond394 13 31 000
2 13.23
~~3 55.90~~
7 31 52.90 7 31 52.90
+0 53.03

Dec 17.0

15 27.67
17 43 12.00
F1327 17 57 42.61 Bond394 23 56 000
17 58 35.57 3 55.90
+0 52.96 17 58 35.57

Dec 18.9

15 27.67
17 51 5.12
F1327 16 55 24.90 Bond394 22 46 000
16 56 17.19 3 44.40
+0 52.29 16 56 17.19

Dec 19.9

15 27.67
17 55 1.68
F1327 16 41 19.44 Bond394 22 28 000
16 42 10.79 3 41.44
+0 51.35 16 42 10.79

JAD-Asr.

1892
Dec: 20 7

	o Androm			α Pegasi	
	+41° 45′			+14° 37	
74	0.2	7.6	1.1	96	0.7
08	7.0	7.8	35	7.3	0.8
4.0	3.6	7.6	6.3	45	0.8.
7.5	0.2	7.7	8.7	1.8	0.5
0.7	7.0	7.7	1.3	9.4	0.7
8.8	8.9	7.7	7.6	30	0.6
40	4.0	80	1.5	9.2	0.7
		8.9			35.4
		1330			1.80 2
22	56	8.86	22 58		35.34
22	56	58.36	22 59		24.69
− 0		49.50	− 0		49.35
		±00 −60			±00 −60
− 0		50.10	− 0		49.95

Clock slow 0^{m} 5.02

1892
Dec 20.2

Chronograph clock comparison.

F1327 22 48 19.80
22 49 10.92
+0 51.12

Bond 394
15 27.67
17 58 58,24
4 34 000
0 0 45,01
22 49 10,92

Dec 24.0

F1327 18 13 30.36
18 14 21.81
+0 51.45

Bond 394
15 27.67
17 58 58.24
23 56 000
3 55,90
18 14 21.81

JAD obs

	η Pegasi +29°39'			λ Pegasi +23°0'		
1892 Dec 21.2	1.6	5.5	7.1	6.7	7.5	4.2
	4.5	2.8	7.3	9.4	5.0	4.4
	7.4	0.0	7.4	2.0	2.3	4.3
	0.1	7.0	7.1	4.8	9.4	4.2
	3.1	4.2	7.3	7.4	6.9	4.3
	0.0	7.2	7.2	4.0	0.2	4.2
	4.4	3.0	7.4	8.1	6.2	4.3
			8.7			32.2
			1295			1321
	22	37	8.63	22	40	32.14
	22	37	57.74	22	41	21.29
		− 0	49.11		−0	49.15
			00			00
			−.60			−.60
			~~49~~			
		− 0	49.71		−0	49.75

Clock slow $0^m\ 49^s.73$

1892
Dec 21.2

Chronographic clock comparisons.

15 27.67
18 2 54.80

F1327 22 42 14.67 Bond 394 4 24 0.00

22 43 5.84
+0 51.17

0 43.37
22 43 5.84

Dec. 21.9

15 27.67
18 2 54.80

F1327 16 18 8.80 Bond 394 21 57 0.00

16 18 58.82
+0 50.02

3 36.35
16 18 58.82

Prof. S. Asn (this sheet)

1892
Dec 22-23

γ Androm.	θ Persei	41 Arietis	36 H Cass	π Ceti
+41°49	+48°46	+26°49 4.4	+72°21	−14°19'
	2 35 2 36			
8.8 18 0.6	28.7 39.9	59 85 4.5	45 9.0 3.5	9.5 78 7.3
24 8.7 1.1	326 36.2	8.8 57 4.7	3.1 15 4.6	2.0 55 7.5
5.7 54 1.1	362 325	15 32 4.8	1.3 3.3 4.6	4.8 27 7.5
90 20 1.0	40.0 28.7	44 04 46	9.5 5.1 46	7.0 0.2 7.2
24 86 1.0	436 250	7.0 76 45	7.3 6.8 41	9.7 7.6 7.3
	1811 1623			
0.7 0.6 1.3	3622 2246	4.0 05 48	7.6 6.5 41	6.1 1.3 7.4
5.6 5.6 1.2	92.46	8.2 66	0.0 4.5 4.5	9.8 7.6 7.4
	128.68			
	4.32			
306		524	2.2	138
179		347	322	554
1 56 30.53	2 36 4.32	2 42 52.31	2 27 2.14	1 38 13.69
1 57 19.53	2 36 53.45	2 43 41.10	2 27 52.13	2 38 62.11
−0 49.00	−0 49.13	−0 48.79	+0 49.99	+0 48.42
+.01	+.11	−.19		
−.60	−.60	−.60	+3.143	
			−0.255	
−0 49.59	−0 49.62	−0 49.58	+3.398 +1.57	+.47
			13593	
			21080	

Statement:—
The N term is to be applied positively to Stars north of zenith.
n = .47

Clock slow 0m 49.60s

1892 Dec 22.1

Chronograph clock comparisons

15 27.67
18 10 47.91
Z1327 20 31 46.96 Bond 394 2 6 0.00
20 32 36.28
0 20.70
+0 49.32
20 32 36.28

Dec 24.0

15 27.67
18 14 44.47
Z1327 18 53 27.38 Bond 394 0 24 0.00
18 54 16.08
0 3.94
+0 48.70
18 54 16.08

Dec 25.9

15 27.67
18 18 41.03
Z1327 17 26 4.22 Bond 394 22 49 0.00
17 26 53.59
3 44.89
+0 49.37
17 26 53.59

Dec 26.9

15 27.67
18 22 37.59
Z1327 16 36 51.58 Bond 394 21 56 0.00
16 37 41.45
3 36.19
~~0 19.06~~
+0 49.87
~~2 34 24.32~~
16 37 41.45

Dec 27.9

15 27.67
18 26 34.15
Z1327 17 43 59.26 Bond 394 22 59 0.00
17 44 48.36
3 46.54
+0 49.10
17 44 48.36

J.S.D. obs

1892 Dec 28.2	o Androm			β Pegasi			τ Pegasi		
	~~×~~2,4 +41°44			+27°30			+23°9		
	× 9.0			0.3	3.2	3.5	6.7	7.6	4.3
	× 5.8			3.2	0.5	3.7	9.4	5.0	4.4
	9.4	2.4	1.8	5.9	7.6	3.5	2.0	2.3	4.3
	2.7	9.2	1.9	8.7	4.8	3.5	4.8	9.6	4.4
	1.0	0.7	1.7	1.4	2.0	3.4	7.3	6.9	4.2
	6.0	6.0	2.0	8.4	5.2	3.6	4.1	0.3	4.4
			11.0	2.7	1.0	3.7	8.3	6.2	4.5
						46.8			32.2
			18.4			10.17			$\boxed{3.27}$
	22	56	10.93	22	57	46.78	23	14	32.18
	2	56	58.22	22	58	33.83	23	15	19.20
	−	0	47.29	−	0	47.05	−	0	47.02
			+.00			−.18			−.23
			−.60			−.60			−.60
	−	0	47.89	−	0	47.83	−	0	47.85

Clock slow −0 47.86

1892
Dec 28.2

Chronograph clock comparison

15 27.67
18 30 30.71
J1327 23 2 51.72 Bond394 4 18 0.00
23 4 40.76 0 42.38
+0 49.04 ~~4 50.62~~
23 4 40.76

Dec 28.9

15 27.67
18 30 30.71
J1327 17 12 50.30 Bond394 22 24 0.00
17 13 39.16 3 40.78
+0 48.86 17 13 39.16

Prof. S. obsns (this sheet)

1892
Dec 29·3

γ Androm			θ Persei			τ Persei 41 Arietis		
+41° 49			+48° 46			+23°? +26° 49		
0.5	3.5	4.0	^{35} 0.4	1.5	1.9	7.5	0.1	7.6
4.0	0.5	4.5	4.1	7.7	1.8	0.4	7.5	7.9
7.3	6.9	4.2	7.7	4.0	1.7	3.3	4.6	7.9
~~x~~0.6	3.6	4.2	1.5	0.3	1.8	5.8	1.8	7.6
3.8	0.3	4.1	5.2	6.4	1.6	8.6	9.0	7.6
2.1	1.9	4.0	x	x		5.6	2.4	8.0
7.0	7.0	4.0	x	x	—	9.7	8.1	7.8
		32.2						54.0
		15⌊31.2			10⌊5.88			5.84
1	56	32.08	2	36	5.88	2	42	53.89
1	57	19.44	2	36	53.36	2	43	41.06
−0		47.36	−0		47.48	−0		47.17
		+.01			+.11			+.19
		−.60			−.60			−.60
−0		47.95	−0		47.97	−0		47.96

Clock slow $0^{m}\ 47^{s}.96$

15 27.67
18 34 27.27

Dec 29.9 F1327 18 18 57.84 Bond 394 23 26 0.00
18 19 45.91 3 50.97
+0 48.07 18 19 45.91

1892
Dec 30.2

ι Androm
+42°40'

24 62 8.6
5.9 30 8.9
9.2 96 88
28 6.3 9.1
6.0 29 89
4.3 45 88
9.3 9.5 88
44
663
23^h 32 $4^s.42$
23 32 51.83
− 0 47.41
00
− 60
− 0 48.01

λ Androm
+45°52'

23^h 30 56.8
0.5
40
76
11.1
32 00
31 4.00
26.64
23 31 30.64

0.1573
1.2682
1.4255

23 31 30.64
23 32 18.08
− 0 47.44
+.06
− .60
− 0 47.98

Clock slow 0^m $48^s.00$

Chronograph
Clock comparisons

1892

Dec 30.2

~~15~~ 15 27.67
18 38 23.82

F1327 23 10 45.51
23 11 33.71
+0 48.20

Bond 394 4 17 0.00
0 42.22
23 11 33.71

Dec 30.9

15 27.67
18 38 23.82

F1327 18 03 50.78
18 04 39.34
+0 48.56

Bond 394 23 7 0.00
3 47.85
18 4 39.34

1893
Jan 1.9

15 27.67
18 46 16.94

F1327 18 10 42.50
18 11 32.29
+0 49.79

Bond 394 23 6 0.00
3 47.68
18 11 32.29

Prof S. obs. (his sheet)

1893

January 2.3 - 1893

γ Androm			θ Persei			41 Arietis		
+41°49			+48°46			+26°49'		
0.5	3.5	4.0	2 35	30.4	26.6	7.6	0.4	8.0
4.0	0.4	4.4		34.2	30.4	0.5	7.5	8.0
7.3	7.0	4.3		38.0	34.2	3.3	4.8	8.1
0.6	3.7	4.3		41.6	38.0	6.0	2.0	8.0
4.0	0.3	4.3		45.5	41.6	8.7	9.1	7.8
2.2	2.0	4.2		189.7	170.8	5.8	2.2	8.0
7.2	7.1	4.3		37.94	34.16	0.0	8.2	8.2
7		32.3		+28.14	-28.01			54.0
				66.08	66.15			
1	56	32.14	2	36	6.12	2	43	54.01
1	57	19.38	2	36	53.31	2	43	41.03
	−0	47.24		−0	47.19		−0	47.02
		+.01			+.11			−.19
		−.60			−.60			−.60
	−0	47.83		−0	47.68		−0	47.81

83 × 15
68 × 10
81 ×

15 × 15 = 225
0 × 10 0
13 × 15 195
(40) 420 (1.05
22

Clock slow $0^m\ 47^s.78$

1893
Jan 3.0

Chronograph clock comparisons

15 27.67
18 54 10.06
71327 19 19 50.67 Bond 394 0 11 0.00
19 20 39.54 0 1.81
+0 48.87 19 20 39.54

1893
Jan 4.2

Chronograph clock comparison

15 27.67
Z1327 21 59 13.52 Bond 399 18 58 6.62
22 0 1.56 → 2 46 0.00
+0 48.04 0 27.27
22 0 1.56

Jan 5.2

15 27.67
19 2 3.18
Z1327 22 28 14.79 Bond 399 3 11 0.00
22 29 2.23 0 31.38
+0 47.44 22 29 2.23

Ezt + Eon Comparison

Jan 6.1

15 27.67
19 5 59.74
7 21 11 57.8 Bond 1 51 0.00
21 12 45.64 0 18.23
+0 47.84 21 12 45.64

Jan 7.0

15 27.67
15?
19 5 59.74
7 19 ~~16~~ 14.60 B. 23 50 40.00
19 16 2.43 3 54.91
0.11
+0 47.83 19 16 2.43
−0 46.79 = 7 slow
1.04 fast B

Verification of min of Jan 7.0
Same comp. used.

19 9 56.30 Jan 7.0 S.T.
−0 46.79
19 9 9.51
9 21.84 S.T. for 23h 50 40.00 M.T. of Bond
18 59 47.97
15 27.67
B. 19 15 15.64 (then min is 15 not 16
7. 19 15 14.60
fast 1.04 error of Bond

Prof S. [illegible] (his shed)

1893
Jan 33

No. 32			No. 40			No. 44		
γ Androm			θ Persei			41 Arietis		
+41° 49′			+48° 46′			+26° 49′		
0.8	3.6	4.4	0.5	1.8	2.3	8.0	0.4	8.4
4.1	0.4	4.5	4.4	8.1	2.5	0.9	7.7	8.6
7.5	7.1	4.6	8.0	4.5	2.5	3.6	5.0	8.6
0.9	3.9	4.8	2.0	0.6	2.6	6.4	2.3	8.7
4.1	0.7	4.8	5.6	6.9	2.5	9.1	9.5	8.6
2.5	2.1	4.6	4.9	7.3	2.2	6.0	2.6	8.6
7.4	7.3	4.7	0.5	2.0	2.5	0.1	8.4	8.5
		323			6.2			54.4
		347			933			644
1	56	32.31	2	36	6.22	2	42	54.29
1	57	19.36	2	36	53.29	2	43	41.02
−	0	47.05	−	0	47.07	−	0	46.73
		+01			+.11			−19
		−.60			−60			−.60
−	0	47.64	−	0	47.56	−	0	47.52

64
56
52
172
57

Clock slow $0^{m}\ 47^{s}.57$

Prof. S. Obs. (his clock)

1893
Jan 7.3

No 32
χ Andromedae
+41°49

1.9	4.5	6.4
4.8	1.6	6.4
8.4	58.1	6.5
11.6	55.0	6.6
15.0	51.6	6.6
23.4	43.2	6.6
28.2	38.3	6.5

33.2
15 | 4.88
1 56 33.25

No 240
θ Persei
+48° 46'

31.5	27.7	46.8	
35.3	31.4	51.0	
39.0	35.3	53.0	29.2
42.7	39.0	59.5	26.8
46.3	42.6	3.5	24.3
194.8	176.0	10.5	21.5
38.96	35.20	13.1	18.7
28.14	28.01		15.9
67.10	7.19		

2 36 7.15

No 244
41 Arietis +26°49

28.7	21.5	0.2
31.5	18.7	0.2
34.5	15.9	0.4
37.3	13.1	0.4
40.0	0.5	0.5
46.8	3.5	0.3
51.0	89.5	0.5

55.0
15 | 7.7
2 42 55.17

1 56 33.25	2 36 7.15	2 42 55.17
1 57 19.29	2 36 53.22	2 43 40.98
− 0 46.04	− 0 46.07	− 0 45.81
+.01	+.11	−.19
−.60	−.60	−.60
− 0 46.63	− 0 46.56	− 0 46.60

Clock slow 0^{m} $46^{s}.60$

1893
Jan 8.9 Chronographic clock comparisons.

~~Bond~~
F1327 17 33 12.83 Bond 394
17 33 57.53
+0 44.70

15 27.67
19 13 52.85
22 01 0.00
3 37.01
17 33 57.53

Jan 9.9
F1327 19 15 25.85 Bond 394
19 16 10.19
+0 44.34

4 15 27.67
19 17 49.41
23 39 0.00
3 53.11
19 16 10.19

Jan 14.0
F1327 19 43 26.57 Bond 394
19 44 10.69
+0 44.12

15 27.67
19 25 42.53
0 03 0.00
0 0.493
19 44 10.69

Jan 11.2 – 1893

Broken Aberration used Provisionally until subsequent stars can be secured.
Very bad seeing and illumination by means of a lantern held by Prof. Searle; Gas supply defective.

ν Piscium J.A.D. obs.

+26°41′

t 12 39.9 3.3
44.2 6.3 –.036 1.2662
48.3 8.6 8.5563 0.049
53.4 11.9 0.049 1.3152
57.6 14.5 8.6053
2434 446 .0402 20.66
48.68 8.92
+04 –20.66
48.72 48.26
.26
98
t 12 48.49 .41
1 13 34.34 .47
–0 45.85 287
–19 164
–.60 .1927
–0 46.64

Comparison

15 27.67
19 25 42.53
71327 1 7 18.40 Bond 394 5 26 0.00
1 8 3.75 0 53.55
+0 45.35 1 8 3.75

Observation untrustworthy
Observation untrustworthy

1893
Jan 11.9

Chronograph clock comparison.

						15	27.67
					19	25	42.53
7 1327	19	08	15.47	Bond 394	23	24	0.00
	19	9	0.84			3	50.64
	+	0	45.37		19	9	0.84

Jan 13.0

						15	27.67
					19	29	39.09
7 1327	19	44	14.90	Bond 394	23	56	0.00
	19	45	2.66			3	53.90
	+	0	47.76		19	45	2.66

J A Dodson

1892
Jan 13.2

α Triang +29°3′

6.4	0.1	6.5
9.4	75	6.9
2.3	4.6	6.9
5.0	1.8	6.8
7.8	9.0	6.8
4.9	20	6.9
9.2	75	6.7

13.4
509

1 46 13.39
1 46 58.34
— 0 44.95
— .17
— .60
— 0 45.72

β Arietis +20°17′

X	2.2	
~~8.6~~ 6.1	0.7	68
8.6	8.2	68
1.3	5.4	67
4.1	2.8	69
0.3	6.4	67
4.3	2.4	67

584
1090

1 47 58.38
1 48 43.22
— 0 44.84
— .25
— .60
— 0 45.69

Clock slow ᵐ0 45.70

Chronograph clock comparisons

1892
Jan 13.2

15 27.67
19 33 35.65

71327 1 50 14.49 Bond 394 6 1 0.00
1 51 2.62 0 59.30
+0 48.13 1 51 2.62

Jan 14.0

15 27.67
19 37 32.21

6
(7)

71327 20 7 14.96 . Bond 394 0 14 0.00
20 7 2.18 0 2.30
+0 47.22 20 7 2.18
+0 45.58 = 71327
1.64

Verification of min of 71327 Jan 14.0 Same comp.

C S.T. of (0h.7 MT) Jan 14.0 = 20 7 2.18
-0 45.58
20 6 16.60 = ~~[illegible]~~ Bond (Then min of 71327 above is 6 not 7.)
20 6 14.96 = ~~Bond~~ 71327
1.64

Jan 14.3 — 1893 Prof S[illegible] His sheet

No 32			No 34			No 40		
+41° 49'			+34° 29			+48° 46		
γ Androm			β Triang			θ Persei		
25	5.4	7.9	6.5	35	0.0	235	325	286
5.9	2.4	8.3	9.8	05	0.3		365	324
9.0	9.0	8.0	2.6	7.5	0.1		400	36.1
2.8	5.9	8.7	5.6	4.6	0.2		437	39.9
6.0	2.6	8.6	8.8	1.6	0.4		475	435
4.2	4.3	8.5	6.1	4.0	0.1		2002	1805
9.2	9.3	8.5	0.6	9.7	0.5		40.04	36.10
							28.14	28.01
							8.18	8.09
		34.2			25.2			
		(627			(768			
1	56	34.18	2	2	25.12	2	36	8.14
1	57	19.17	2	3	10.07	2	36	53.09
−0		4499	−0		4495	−0		4495
		±01			−.10			+.11
		−.60			−.60			−.60
−0		45.58	−0		45.65			544

m used
Jan 14.3 = .47

58
65
44
167
56

Determination of m

No 38	No 547
36 H Cassae	π Ceti
+72° 21	−14° 19
T 2 27 5.29	T 2 38 17.64
RA. 2 27 51.04	RA. 2 39 1.89
+ 45.75	+ 44.25

+3.143
−0.255
+3.398] +1.50 L ~~+.44~~ = m
1.36
1.40

N is ~~positive~~ north of zenith.

Clock slow 0^{m} $45^{s}.56$

Chronograph clock
comparisons.

Jan 14.3

15 27.67
19 37 32.21
71327 3 20 26.36 Bond 394 7 27 00.0
3 21 13.31
+0 46.95
1 1,3.43
~~12.77~~
3 21 ~~12.65~~
13.31

Jan 15.9

15 27.67
19 41 28.76
71327 17 40 44.42 Bond 394 21 41 00.0
17 41 30.15
+0 45.73
3 33.72
17 41 30.15

Jan 16.3 - 1893 Prof & obser Hirshed

Nr 32			Nr 34			Nr 40	
+41° 49'			+34° 29'			+48° 46'	
γ Androm			β Triang			ο Persei	
23	5.0	7.3	6.6	3.1	97	32.3	28.5
5.8	2.1	7.9	9.6	0.3	99	36.0	32.1
9.0	8.7	77	23	7.5	98	39.8	36.0
25	5.4	79	55	4.4	99	43.6	39.8
5.7	20	77	8.7	23	0.0	47.3	43.4
4.0	4.0	8.0	5.9	3.9	98	1990	1798
90	8.9	79	0.7	95	0.2	39.80	35.96
		33.9			24.9	28.14	28.01
						7.94	7.95

1 56 33.89
1 57 19.12
~~+~~ 0 45.23
+01
-60
-0 45.82

2 2 24.95
2 3 10.03
-0 45.08
-.10
-60
-0 45.78

2 36 7.94
2 36 53.05
-0 45.11
+.11
-60
-0 45.60

82
78
60
220
73

Clock slow 0^{m} $45^{s}.73$

Chronograph clock
comparisons...

Jan 17.0

Z1327 21 17 15.62
21 18 1.54
+0 45.92

Bond 394
15 27.67
1 13 000
0 11.99
19 49 21.88
21 18 1.54

Jan 18.0

Z1327 20 26 2.95
20 26 49.07
+0 46.12

Bond 394
15 27.67
19 53 18.44
0 18 —
0 2.96
20 26 49.07

Jan 19.0

Z1327 19 47 52.67
19 48 38.72
+0 46.05

Bond 394
15 27.67
19 53 18.44
23 36 000
3 52.61
19 48 38.72

January 19-1893

No 32	No 34	No 40
+41° 49'	+34° 29'	+48° 46'
γ Androm	β Triang	θ Persei
2.0 5.2 7.2	63 30 93	2 35 32.0 28.0
5.5 2.0 7.5	9.3 0.2 95	35.7 31.8
8.8 8.6 7.4	2.1 7.3 94	39.3 35.6
2.0 5.0 7.0	5.1 4.2 93	43.1 39.4
5.5 1.6 7.1	8.2 10 92	46.9 43.0
3.8 3.5 7.3	5.7 3.7 94	1970 1778
8.8 8.6 7.4	0.2 9.4 96	3940 3556
		2814 2801
		7.54 7.55
33.5	24.8	
15)544	)705	
1 56 33.63	2 2 24.70	2 36 7.54
1 57 19.08	2 3 9.97	2 36 52.99
− 0 45.45	− 0 45.27	− 0 45.45
+ 01	− 10	+ 11
− 60	− 60	− 60
− 0 46.04	− 0 45.97	− 0 45.94

104
97
94
295
98

Clock slow. $\overset{m}{0}$ $45\overset{s}{,}98$

1893
Jan 20.0

Chronograph clock comparison

15 27.67
20 1 11.55
7 1327 20 27 54.72 Bond 0 12 —
20 28 41.19
0 1.97
+0 46.47
20 28 41.19

Jan 21.0

~~7~~ 15 27.67
20 5 8.11
7 1327 20 48 53.64 Bond 394 0 29 0.00
20 49 40.54
0 476
+0 46.90
20 49 40.54

Jan 22.9

15 27.67
20 9 4.67
7 1327 18 26 23.81 Bond 394 21 59 .000
18 26 69.02
3 36.68
+0 45.21
18 26 69.02

Jan 24.2

15 27.67
20 16 57.78
7 1327 0 10 15.69 Bond 394 3 38 0.00
0 11 1.26
0 35.81
0 45.57
0 11 1.26

Jan 24.9

15 27.67
20 16 57.78
7 1327 18 49 18.38 Bond 394 22 14 000
18 50 4.59
3 39.14
+0 46.21
18 50 4.59

Prof. S [illegible]

Jan 13

No 32

+41° 49'

γ Androm

19 48 6.7

5.2 18 70

86 83 69

20 50 70

X 18 X

35 34 69

8.7 83 70

33.5

13|450

33.46

1 57 19.04

- 0 45 58

+01

60

- 0 46.17

Clock slow 0m 46.17

1893
Jan 25.9

Z1327 | 19 33 20.50
19 34 7.72
+0 47.22

Bond 394
15 27.67
28 20 54.34
22 54 9.00
3 45.71
19 34 7.72

Jan 27.0

Z1327 21 36 36.66
21 37 23.83
+0 47.17

Bond 394
15 27.67
20 28 47.45
0 53 —
1 8.71
21 37 23.83

Jan 28.0

Z1327 20 14 18.84
20 15 6.25
+0 47.41

Bond 394
15 27.67
20 28 47.45
23 27
3 51.13
20 15 6.25

Ref S. Asc

Jan 27.2

Nr 34 +34°29 β Triang. ~~+42°49 γ Androm~~

2 1 54.0 38.7
57.0 41.9
59.9 45.0
62.9 48.0
65.9 50.7
299.7 224.3
59.94 44.86
~~24.88 22.76~~
24.82 20.10
22.50 22.40
22.44 22.46

2 2 22.45 = clock
2 3 9.89 = R.A
− 0 47.44
− 10
− 60
− 0 48.14

Nr 40 θ Persei +48°46'

2 35 29.5 40.5 0.0
33.3 37.2 0.5
37.0 33.4 0.4
40.8 29.6 0.4
44.6 26.0 0.6
54.0 16.7 0.7
59.8 11.0 . 0.8
5.3
15)78.7
2 36 5.25 = clock
2 36 52.82 = RA
− 0 47.57
+ 11
− 60
− 0 48.06

Nr 50 β Persei +40°32'

2 59 53.8 42.5
57.0 45.9
0.1 49.0
3.5 52.3
6.7 55.4
301.1 245.1
0.22 49.02
24.40 24.29
24.62 24.73

3 0 24.67
3 1 12.00
0 47.33
− 03
− 60
− 0 47.96

Clock slow 0 48.06

Jan 29.9 Chronograph clock comparison

Z1327 18 55 57.33
18 56 45.25
+0 47.92

Bond 394
15 27.67
20 36 40.57
22 1 0.00
3 37.01
48 56 45.25

JAD. obs.

Jan 30, 2

β Androm.	β Arietis.	γ Androm
+35 3'	+20°16	+41°48
6.2 3.5 97	x · 0.0	x 2.0
9.3 0.7 0.0	x 7.4	2.3 9.0 1.3
2.3 7.5 98	x 5.6	5.6 5.3 1.9
5.3 4.5 98	7.9 20 9.9	9.2 2.0 1.2
8.3 1.6 99	0.3 9.4 9.7	2.3 8.8 1.1
6.0 4.0 0.0	7.0 28 98	0.7 0.5 1.2
0.4 9.6 0.0	1.0 8.9 9.9	5.7 5.5 1.2
55.0	55.0	30.7
15.742	14.43	13.86
1 2 54.95	1 47 54.92	1 56 30.66
1 3 43.25	1 48 43.00	1 57 18.87
−0 48.30	−0 48.08	−0 48.21
− .09	− .24	.60
− .60	− .60	− .60
− 0 48.99	−0 48.92	−0 48.81

99
92
81
27²
90

Clock slow 0^m 48.90

Jan 30.2 Chronograph clock comparison

71327 1 14 59.55 ~~Bb~~
1 15 47.34
+0 47.79

Bond 394
15 27.67
20 40 37.12
4 19 —
0 42.55
1 15 47.34

Jan 30.9

71327 20 8 5.53
20 8 52.97
+0 47.44

Bond 394
15 27.67
20 40 37.12
23 9 0.00
3 48.18
20 8 52.97

Feb 1.1

71327 0 25 42.91
0 26 31.08
+0 48.17

Bond 394
15 27.67
20 48 30.23
3 22 0.00
0 33.18
0 26 31.08

Feb 2.1

71327 0 44 41.40
0 45 30.11
+0 48.71

Bond 394
15 27.67
20 52 26.79
3 37 0.00
0 35.65
0 45 30.11

Feb 3.2 71327 1 14 41.80
1 15 30.94
+0 49.14

Bond 394
15 27.67
20 56 23.35
4 3 0.00
0 39.92
1 15 30.94

1893
Feb 4.2

γ Persei	ρ Persei	β Persei
+53°5'	+38°25	+40°32'
2.2 0.3 25	28.5 46.0	0.4 2.6 3.0
6.9 6.4 33	33.3 49.2 52.2	4.0 9.0 30
0.8 2.2 30	38.0 55.3 58.3	7.2 6.1 3.3
5.0 8.1 31	99.8 261.0	0.9 2.8 3.7
9.0 3.9 2.9	33.27 52.20	3.9 9.4 33
8.7 3.8 25	0.5635 1.2662	1.7 1.3 30
5.4 7.9 3.3	0.1059 0.1059	7.0 6.6 3.6
	0.6694 1.3721	~~t.5~~ 21.5
11.6 22.2	4.67 23.56	13)24.4
11.48	28.60 28.64	21.63

2 56 11.48	2 57 28.63	3 0 21.63
2 57 2.05	2 58 18.65	3 1 11.85
−0 50.57	−0 50.02	−0 50.22
+.18	−.05	−.03
−.60	−.60	−6.0
−0 50.99	50.67	−0 50.85

Clock slow 0^m $50^s.87$

Feb 4.2 Chronograph Comparison

~~B~~

~~F~~ 1327 3 2 54.98
3 3 44.57
+ 0 49.59

Bond 394
15 27.67
21 0 19.90
5 47 0.00
0 57.00
3 3 44.57

Feb 6.2 F 1327 2 26 38.00
2 27 30.46
+ 0 52.46

Bond 394
15 27.67
21 8 13.01
5 3 0.00
0 49.78
2 27 30.46

Feb 7.2 F 1327 ~~3 35 0~~
1 21 22.75
1 22 15.68
+ 0 52.93

Bond 394
15 27.67
21 12 9.57
3 57 0.00
0 38.44
~~1 3 12.56~~
1 22 15.68

1893
Feb 7.2

γ Persei
+53°5′

2 55.6 ~~34.0~~ 58.3
31.6 ~~39.0~~ 4.5
36.0 ~~43.0~~ 11.0
40.0 ~~47.0~~ 16.9
44.0 ~~51.1~~ 23.0
48.1
19.97 ~~21.47~~ 35.37
39.94 ~~42.94~~ 10.74
30.88 ~~30.88~~ .06
10.82 ~~12.82~~ 10.80

0.2215 0.2215
1.2682 8.5563
1.4897 8.7778

30.88 .06

h m s
2 56 10.80
2 57 1.97
−0 51.17
+.05
−.60
−0 51.72

β Persei
~~+40°~~ 33′

~~0.0 1.5 1.5~~ 0.0 1.5 1.5
~~3.2 8.8 1.7~~ 3.2 8.8 1.7
~~6.3 7.0 3~~ 6.3 5.0 1.3
~~0.8 3.9 7~~ 9.8 1.9 1.9
~~7.0 0.8~~ 3.0 8.8 1.8
~~3.0 2.5~~ 1.0 .05 1.5
~~8.0 7.8~~ 6.0 5.7 1.7
~~228~~ 208
1.122
20.81
20.87

s
20.87
3 1 11.79
−0 50.92
+.02
−.60
−0 51.54

Clock slow 0 m 51.63 s

Chronograph clock comparison

Feb 7 9

15 27.67
21. 12 9.57
7 1327 22 26 27.31 Bond 394 19 58 0.00
3 16.80
17 28 54.04
24

15 27.67
21
7 1327 22 26 27.31 Bond 19 58 0.00

15 27.67
7 1327 19 57 27.31 Bond 394 21 12 9.57
19 58 18.52 22 27 0.00
+0 51.21 3 41.28
19 58 18.52

JAD. obs

1893
Feb. 8.2

γ Androm			α Arietis			θ Persei		
+41°49'			+22°57'			+48°47'		
5.6	8.7	4.3	1.0	1.7	2.7	5.0	6.3	1.3
9.0	5.3	4.3	3.6	9.1	2.7	9.0	2.8	1.8
2.3	2.0	4.3	6.2	6.4	2.6	2.8	9.0	1.8
5.7	8.7	4.4	9.0	3.7	2.7	6.5	5.2	1.7
9.0	5.4	4.4	1.5	1.0	2.5	0.3	1.3	1.6
7.0	7.0	4.0	8.2	4.2	2.4	9.3	2.0	1.5
2.0	2.3	4.3	2.2	0.4	2.6	5.2	6.5~~6.5~~	1.7

γ Androm	α Arietis	θ Persei
27.2	16.2	1.0
15)107.2	15)9.44	15)1.24
1 55 27.15	2 0 16.30	2 36 0.83
1 57 18.70	2 1 7.68	2 36 52.53
−0 51.55	−0 51.38	−0 51.70
+.01	−.22	+.11
−.60	−.60	−.60
−0 52.14	−0 52.20	−0 52.19

14
20
19
53

Clock slow $\overset{m}{0}$ $\overset{s}{52}.18$

Chronograph click comparisons.

Feb. 9. 2

```
Z 1327  2 16 24.58     Bond 394     15 27.67
        2 17 16.51              21  20  2.68
       -----------               4  41  0.00
       + 0 51.93                     0 46.16
                                ------------
                                 2  17 16.51
```

1893
Feb 10

JAD obs

41 Arietis	τ Persei	γ Persei	ρ Persei	β Persei
+26°48′	+52°19′	+53°5	+38°25	+40°32
2.4 5.0 7.4	8.9 5.4 4.3	0.3 8.5 8.8	26.5 44.0	9.0 0.5 9.5
5.2 2.0 7.2	3.0 1.5 4.5	~~5.1~~ 4.7 9.8	31.3 47.0	2.2 7.5 9.7
8.0 9.2 7.2	7.0 7.3 4.3	9.0 0.4 9.4	36.0 50.3 53.6 56.5	5.5 4.1 9.6
0.7 6.7 7.4	1.0 3.3 4.3	3.0 6.4 9.4	93.8 251.4	8.6 1.0 9.6
3.6 4.0 7.6	4.9 9.2 4.1	7.0 2.3 9.3	31.27 50.28 4.67 23.56	2.0 7.7 9.7
0.3 7.0 7.3	~~4.0~~ 9.3 ×	7.1 1.9 9.0	26.60 26.72	~~4~~ ~~5~~96 ×
4.7 2.8 7.5	1.0 9.3 4.3	3.4 6.0 9.4		49 ~~9.5~~47 96
48.8	47.2	9.7		19.8
130.4	93.0	14.48		12.95
2 42 48.70	47.16	9.65	26.66	9.81
2 43 40.50	2 46 39.26	2 57 1.89	2 58 18.53	3 1 11.73
−0 51.80	− 52.10	−52.24	−51.87	−51.92
−.18	+.17	+.18	−.05	−.03
−.60	−.60	−.60	−.60	−.60
−0 52.58	−52.53	−52.66	−52.52	−52.55

ρ Persei
Reduction

0.5635	1.2662
0.1059	0.1059
0.6694	1.3721

.58
.53
.66
.52
.55
2.84
.57

Clock slow 0m 52s.57

Feb 11.0 Chiming with clock comparisons

15 27.67
#1327 22 29 37.49 Bond 394 21 27 55.79
22 30 31.18 0 47
+0 53.69 0 7.72
22 30 31.18

Feb 13.2
15 27.67
#1327 2 55 11.51 Bond 394 21 35 48.91
2 56 6.52 5 04 0.00
+0 55.01 0 49.94
2 56 6.52

J A D. Asr.

Feb 14 2

α Ceti			ρ Persei			β Persei		
+3°39′			+38°25			+40°32′		
4.1	1.0	5.4	5.1	5.0	0.1	7.5	9.0	6.5
6.8	8.7	5.5	8.4	2.0	0.6	0.8	6.0	6.8
9.1	6.2	5.3	1.5	8.8	0.3	4.0	2.5	6.5
1.6	3.8	5.4	4.6	5.5	0.1	7.0	9.3	6.3
4.0	1.3	5.3	7.9	2.3	0.2	0.3	6.0	6.3
0.2	5.0	5.2	5.7	4.3	0.0	8.4	8.0	6.4
4.0	1.3	5.3	0.3	9.9	0.2	3.4	3.7	6.6

α Ceti	ρ Persei	β Persei
477	252	183
1148	767	1237
2 55 47.65	2 57 25.11	3 0 18.25
2 56 40.76	2 58 18.46	3 1 11.65
−0 53.11	−0 53.35	−0 53.40
−.37	−.05	−.03
−0 53.48	−0 53.40	−0 53.43
−60	−60	−60
−0 54.08	−0 54.00	−0 54.03

Clock slow $\overset{m}{0}$ $\overset{s}{54.04}$

Feb 14.2 Chronograph clock comparison

F 1327 3 4 10.36
3 5 3.59
+0 53.53

Bond 394
15 27.67
21 39 45.46
5 9 ——
0 50.76
3 5 3.89

Feb 15.2 F 1327 2 40 1.28
2 40 55.84
+0 54.56

Bond 394
15 27.67
21 43 42.01
4 41 0.00
0 46.16
2 40 55.84

Feb. 16.2

F 1327 3 12 1.30
3 12 57.00
+0 55.70

Bond 394
15 27.67
21 47 38.57
5 9 0.00
0 50.76
3 12 57.00

Feb 17.2

F 1327 ~~5 16 40.00~~
3 23 38.54
3 24 34.82
+0 56.28

Bond 394
15 27.67
21 51 35.13
~~3 23 38.54~~
5 16 40.00
0 51.91
0.11
3 24 34.82

Feb. 18.2

F 1327 3 7 11.89
3 8 8.03
+0 5614

Bond 394
15 27.67
21 53 37.68
4 56 20.00
0 48.62
.06
3 8 8.03

Feb. 20.2

F 1327 3 40 50.95
3 41 45.36
+0 54.41

Bond 394
15 27.67
22 3 24.74
5 22 0.00
0 52.90
3 41 45.36

JAD obs

Feb. 21.2

α Persei	δ Persei	γ Persei	η Tauri
+49°28′	+47°26′	+42°14′	+23°46′
72 9.3 6.5	6.4 5.5 1.9	6.6 0.0 6.6	5.0 1.3 1.3
1.2 5.6 6.8	0.2 2.1 2.3	0.0 69 69	8.0 36 1.6
47 19 6.6	39 8.7 26	33 33 6.6	0.5 1.0 1.5
88 8.0 6.8	7.3 48 2.1	68 00 68	3.2 81 1.3
2.5 43 68	1.0 1.2 2.2	9.8 6.6 64	59 53 1.2
20 4.8 68	0.1 2.0 2.1	83 83 6.6	25 89 1.4
76 9.0 66	56 6.5 2.1	3.2 34 66	65 4.9 1.4
3 15 43.4	~~3~~ 34 21.2	3 36 58.3	3 40 10.8
503	~~26.3~~ 16 5	558	105
3 15 43.36	3 34 21.10	3 36 58.37	3 40 10.70
3 16 40.12	3 35 17.70	3 37 54.94	3 41 7.06
−0 56.76	−0 56.60	−0 56.57	−0 56.36
+.11	+.08	.00	−.21
−.60	−.60	−.60	−.60
−0 57.25	−0 57.12	−0 57.17	−0 57.17

25
12
17
17
71
18

Clock slow 0^{m} $57^{s}.18$

Chronograph clock comparisons

Feb. 21.2

F 1327 3 26 43.68
3 27 38.95
+0 55.27.

Bond 394
15 27.67
22 7 21.34
5 4 —
0 49.94
3 27 38.95

Feb. 23.0

F 1327 21 32 33.74
21 33 32.76
+0 59.02

Bond 394
15 27.67
22 11 17.90
23 5 —
3 47.19
~~5 32.76~~
45
21 33 32.76

Feb. 24.2

F 1327 4 0 31.52
4 1 32.23
+1 0.71

Bond 394
15 27.67
22 19 11.01
5 26 0.00
0 53.55
4 1 32.23

JAD obs

Feb 24.2

τ Tauri	41 Cam	ι Tauri
+22° 44'	+56° 34'	+18° 39'
6.6 7.2 3.8	4.6 9.6 4.2	4.6 4.3 8.9
9.2 4.8 4.0	9.0 5.6 4.6	7.2 1.7 8.9
2.0 2.0 4.0	3.4 1.0 4.4	0.0 9.0 9.0
4.5 9.3 3.8	8.0 6.4 4.4	2.6 6.3 8.9
7.2 6.6 3.8	2.3 1.8 4.1	5.1 3.9 9.0
3.9 9.9 3.8	3.5 0.7 4.2	1.4 7.3 8.7
8.0 6.0 4.0	0.5 4.0 4.5	5.5 3.4 8.9
52.0	7.2	9.4
~~52.09~~	7.18	9.45
51.95		
4 35 49.34	4 39 5.25	4 45 6.94
−0 57.39	−0 58.07	−0 57.49
−.22	+.26	~~+~~.26
−.60	−.60	−.60
−0 58.21	−0 58.41	58.35

21 −.11
41 +.09
35 −+.05
97
32
35 assumed

Clock slow $0^{m}\ 58^{s}.35$

1893
Feb 25.2

Chronograph clock comparison

F1327 4 11 30.42
4 12 29.93
+0 59.51

Bond 394
15 27.67
22 23 7.56
5 33
0 54.70
4 12 29.93

Feb 27.2

F1327 4 41 26.20
4 42 26.66
+60.46

Bond 394
15 27.67
22 31 0.67
5 55
0 58.32
4 42 26.66

Feb 28.2

F1327 4 13 17.64
~~4 14 37.96~~
4 14 17.96
+60.32

Bond 394
15 27.67
22 34 57.23
5 23
0 53.06
~~4 14 37.96~~
4 14 17.96

Mar. 2.2

F1327 5 1 18.23
5 2 17.63
+59.40

Bond 394
15 27.67
22 42 50.33
6 3
0 59.63
5 2 17.63

1893
Feb 27.2

Sid. obs.

τ Tauri +22°44′ 4 Cam +56°34′

5.2	6.1	1.3	3.7	1.7	5.4	3.6	84	2.0
8.0	3.4	1.4	82	7.6	5.2	82	43	2.5
0.6	0.8	14	2.5	24	49	24	9.8	22
3.4	8.0	14	7.0	87	5.2	7.0	53	23
6.0	5.3	1.3	1.6	3.7	5.3	1.6	09	2.5
2.6	8.6	1.2	28	9.6	24	28	9.6	2.4
6.8	4.6	1.4	96	27	3	9.6	27	2.3
					6.3			

508
102
4 34 50.68
4 35 49.28
−0 58.60
−22
−60
−0 59.42

64
926
4 38 6.18
4 39 5.15
−0 58.97
+26
−60
0 59.31

42
31
73

Clock slow $0^m\ 59^s.36$

1893
Mar 22

τ Tauri	4 Cami.	η Aurigae
+22°44	+56° 34	+41°5
$\overset{m}{34}$) 3.9 4.5 8.4	$\overset{m}{37}$) 2.1 7.1 92	9.4 15 0.9
6.7 21 8.8	6.7 28 95	28 84 1.2
9.2 93 8.5	1.0 92 0.2	6.0 5.0 1.0
20 67 8.7	5.7 3.8 9.5	9.3 17 1.0
45 4.0 8.5	0.2 9.4 9.6	25 84 0.9
1.2 7.3 8.6	1.2 8.1 9.3	0.7 0.3 7.0
5.3 3.4 8.7	8.2 1.8 0.0	5.8 5.5 1.3
34 49.3	$\overset{m}{38}$ 48	~~8~~ 0.5
139 4	72'	7 8
4 34 49.30	4 38 4.80	4 38 0.52
4 35 49.23	4 39 5.06	4 38 60.69
− 59 93	−60 26	− 60.17
−22	+26	+01
−.60	−.60	−60
−60.75	−60.60	−60.76

Clock slow $60\overset{s}{.}70$

1893

Chronographic clock comparisons

Mar 4.2

Eye & ear.
71327 4 39 7.40 Bond 394
4 40 5.81
+0 58.41

15 27.67
22 50 43.44
5 33
0 54.70
4 40 5.81

Mar 3.2

71327 4 14 7.2 Bond 394
4 15 5.81
+ 58.61

15 27.67
22 46 46.89
5 12
0 51.25
4 15 5.81

Mar 6.0

~~71327 23 8 2.41 Bond 394~~
~~23 9 3.39~~

~~15 27.67~~
~~22 54 39.99~~
~~23 55 0~~
~~3 55.73~~
~~23 9 3.39~~

Mar 6.0
1st comparison

71327 23 7 0.24 Bond 394
23 8 3.23
+62.99

15 27.67
22 54 39.99
23 54 0.00
3 55.57
23 8 3.23

Mar 6.0
2nd comp.

71327 23 26 3.31 Bond 394
23 27 6.36
+63.05

15 27.67
22 58 36.55
0 13 0.00
0 2.14
23 27 6.36

1893
Mar 7.2

Chronograph clock comparisons.

Z1327 5 5 54.70
5 6 57.94
+63.24

Bond.394 23 15 27.67
5 48 2 33.10
0 57.17
5 6 57.94

1893
Mar 7.2

J.A.D. obs

ß5 Aurigae +40°55′	η Aurigae +41°5′	α Aurigae +45°53′	15 λ Coch. (C.T.) +40°0′
6.0 80 4.0	26.6 58 16.0	0.5 80 8.5	3.5 49 8.4
9.5 5.0 4.5	30.1	4.0 4.5 8.5	6.8 16 8.4
2.6 1.6 4.2	33.3 25.6	7.8 0.9 8.7	0.0 8.3 8.3
6.0 8.2 4.2	36.5 29.0	1.2 7.3 8.5	3.2 5.0 8.2
9.3 5.0 4.3	39.8 22.4	4.8 3.8 8.6	6.4 2.0 8.4
7.3 6.8 4.1	166.3 93.0	3.8 5.0 8.8	4.6 3.9 8.5
2.2 2.0 4.2	33.26 23.25	9.0 9.6 8.6	9.2 9.0 8.2

ß5 Aurigae	η Aurigae	α Aurigae	15 λ Coch.
57.1	0.1229 0.1229 1.2682 9.9638 1.3911 0.0867	44.3	34.2
15)1066 105 16	0.1229 1.2662 1.3891	15)0.45 60 45	15)626 60 26 15 110
	3326 23.25 24.61 1.22 57.87 22.03 24.50 57.53		
4 53 57.11 4 54 59.78 −62.67	4 57 57.72 4 58 60.58 −62.86	5 7 44.30 5 8 47.06 −62.76	5 10 34.18 5 11 36.85 −62.67
−62.67 −02 −60 −63.29	−62.86 02 −60	−62.76 +05 −60 −63.31	−62.67 −03 −60 62.30

Clock slow:- 63.30s

Chronograph clock comparisons.

Mar 9.1

Bond 394
15 27.67
23 10 26.21
3 41 0.00
0 36.30
3 7 30.18

Z1327 3 6 28.32
3 7 30.18
+61.86

X

Mar 10.0

Z1327 23 35 45.50
23 36 51.58
-66.08

Bond 394
15 27.67
23 14 22.76
0 7
0 1.15
23 36 51.58

Mar 10.7

Z1327 5 8 39.90
5 9 46.12
+66.22

Bond 394
15 27.67
23 14 22.76
5 39 —
0 55.69
5 9 46.12

Mar 11.0

Z1327 0 41 52.27
0 42 58.33
+66.06

Bond 394
15 27.67
23 18 19.32
1 9 —
0 11.34
24 42 58.33

Mar 12.9

Z1327 22 38 24.80
22 39 29.91
+1 5.11

Bond 394
15 27.67
23 22 15.87
22 58 —
3 46.37
22 39 29.91

Mar 13.2

ε Aurig. +43° 39			η Aurig +41° 5'			α Aurig. +45° 53		
9.0	38	2.8	3.6	5.8	9.4	7.3	4.7	2.0
2.3	0.5	2.8	7.0	2.6	9.6	1.0	1.4	2.4
5.9	7.0	2.9	0.2	9.3	9.5	4.4	7.7	2.1
9.3	3.7	3.0	3.4	6.0	9.4	8.0	4.0	2.0
2.6	0.2	2.8	6.8	2.8	9.6	1.5	0.5	2.0
1.2	1.8	3.0	5.0	4.5	9.5	0.4	1.6	2.0
6.4	6.5	2.9	9.9	9.5	9.4	5.6	6.4	2.0

11.6
15)21.8(1.45
15
68
60
80
75

548
15)71.2(4.75
60
112
105
70

41.1
15)15.6(1.04
15
60

4 53 11.45
4 54 17.11
−65.66
−.02
−.60
−66.28

4 57 54.75
4 58 60.47
−65.72
+02
−.60
−66.30

5 7 41.04
5 8 46.91
−65.87
+05
−60
−66.42

Clock slow $1^m\ 6^s.33$

Mar 14.2

Z 1327 4 1 12.94
4 2 18.70
+1 5.76

Bond 394
15 27.67
23 30 8.98
4 16
0 42.05
4 2 18.70

Mar 15.0

Z 1327 0 27 32.59
0 28 39.61
+ 67.02

Bond 394
15 27.67
23 34 5.53
0 39
0 6.41
0 28 39.61

Mar 16.2

Z 1327 5 12 13.91
5 13 22.16
+1 8.25

Bond 394
15 27.67
23 38 2.09
5 19
0 52.40
5 13 22.16

Mar 17.2
Eye & ear

Z 1327 5 48 15.3
5 49 23.97
+1 8.67

Bond 394
15 27.67
23 41 58.64
5 51
0 57.66
5 49 23.97

Mar 18.0
Eye & ear

Z 1327 1 3 24.2
1 4 33.21
+1 9.01

Bond 394
15 27.67
1 3
0 10.35
23 ~~45~~ 55.19
25 4 33.21

1893
Mar 18.3

o² Cancri m.	ι Ursa maj.	10 Ursa maj	κ Ursa maj	(Cadet) 3097 B.A.C. Lyncis ~~(C.T.)~~
+31° 6′	+48° 28′	+42° 12′	+47° 35′	+38° 53′
2nd 3rd		2nd 3rd		7.5 7.8 5.3
28.6 53.2	1.9 3.0 4.9	31.0 64.4	~~3~~8.8 9.6 8.4	1.0 ~~4~~7 5.7
33.0 56.0	6.0 9.4 5.4	36.0 57.9	2.8 5.2 8.0	4.0 1.8 5.8
37.5 58.8	9.7 5.5 5.2	41.0 1.2	6.4 1.3 7.7	7.2 8.4 5.6
41.6 2.0	3.4 1.5 4.9	45.5 4.6	8.0 7.5 7.5	0.3 5.3 5.6
46.0 4.6	7.0 8.0 5.0	26.0 7.8	3.7 4.0 7.7	8.2 7.2 5.4
186.7 294.6	6.2 8.5 4.7	179.5 305.9	2.7 4.7 7.4	3.0 2.4 5.4
37.34 58.92	1.8 3.3 5.1	35.90 61.18	8.2 9.2 7.4	3.80
+.04 21.53		+.051 −24.92		14.68
37.38 37.39	47.5	35.95 36.26	14.0	
			5.81	
~~8~~ 37.38	8 50 11.27	36.10	13.87	~~8~~ 58 37.79
	47.51			

Comp. for o² Cancri
1.2662
0.0669
1.3331 21.53

8 47 44.59	8 51 54.86	8 53 43.37	8 56 21.19	8 59 45.23
~~−14 −60~~	~~+10 −60~~	~~.10 −60~~	~~+08 −60~~	~~−04 −60~~
~~8 47 45.73~~	~~5.36~~			
−1 7.21	−1 7.35	−1 7.27	−1 7.32	−1 7.44
−14	+10	00	+08	−04
−60	−60	−60	−60	−60
−1 7.95	−1 7.85	−1 7.87	−1 7.84	−1 8.08

Comp. for 10 Ursa maj
1.2662
0.1303
1.3965 24.92

Clock slow 1^m 7.92^s

1893
Mar 20.2

~~E~~ Eye & ear comp.

~~B~~ 71327 4 55 54.1
4 57 3.12
+1 9.02

Bond 394
15 27.67
23 53 48.30
4 47
0 0 47.15
4 57 3.12

Mar 21.2

Chronograph

71327 5 55 59.90
5 57 8.87
+1 8.97

Bond 394
15 27.67
23 57 44.85
5 43
0 56.35
5 57 8.87

JAD obs.

Mar 21. 2

β Aurigae
+44°56

9.2 53 4.5
26 20 4.6
6.0 8.5 4.5
96 5.2 4.8
3.1 14 4.5
1.9 28 4.7
73 7.4 4.7
~~2~~ 32.3
34.6
5 50 32.31.
5 51 40.90
1 8.59.
+.04
−.60
1 9.15

θ Aurigae
+37°12

34.0
37.2
40.3
43.4
46.3
201.2
40.24

1,2662
.0988
1.3650

23.17
5 51 17.07
5 52 25.62
1 8.55
−.07
−.60
1 9.22

η Gem.
+22°32'

14 2.2 3.6
4.2 9.6 3.8
6.8 6.9 3.7
9.5 4.2 3.7
2.1 1.5 3.6
8.8 4.9 3.7
2.7 1.0 3.7
16.9
10.27
6 7 16.85
6 8 . 25.35
1 8.50
−.22
−.60
1 9.32

Note: Perhaps the
n assumed, is not
now correct. A new
n will be immediately
determined.

Clock slow ~~=~~ 1^m 9.23^s

1893
Mar 22.0

Chronograph

7 1327 23 46 55.15 Bond 394
23 48 4.31
+1 9.16

~~3~~ 15 27.67
3 51.79
23 31
23 57 44.85
23 48 4.31

Mar 23.2

~~[illegible]~~

7 1327 6 1 51.92 Bond 394
6 3 1.65
+1 9.93

15 27.67
0 5 37.96
5 41
0 56.02
6 3 1.65

Mar 24.2

7 1327 5 32 42.64 Bond 394
5 33 52.78
+1 10.14

0 15 27.67
5 8 34.51
0 50.60
5 33 52.78

Mar 25.0

7 1327 0 56 53.42 Bond 394
0 58 3.50
+1 10.08

.15 27.67
0 13 31.07
0 29
0 4.76
0 58 3.50

Mar 25.2 7 1327 6 17 45.93 Bond 394
6 18 56.07
1 10.14

15 27.67
0 13 31.07
5 49
0 57.33
6 18 56.07

Eyet ecc.

Mar 27.0

7 1327 1 32 19.6± Bond 394
1 33 31.12
+1 11.52

15 27.67
0 21 24.17
0 56 30.00
9.20
6.08
1 33 31.12

1893
Mar 25.2 JDD obs

+22° 3K μ Gem

~~5~~4.2 143
56.9 153
595
2.1
48

29 75
5 9.50 -0347
20.09 1.2682

6 15 19.59 1.3029
6 16 29.44

1 9.85
-22
-60

1 10.67

Corr'n 1 10.57 (see page 62)

Clock slow 1 10.57

1893
Mar 28.2

Eye & Ear

7 1327 4 42 15.7±
4 43 28.15
+1 12.45

Bond 394
0 15 27.67
4 25 20.73
2
0 39.75
4 43 28.15

Mar 29.2

~~7 1327 6 50 32.3~~

~~Bond 394~~
~~0 13 27.67~~
~~6 29 17.28~~
~~6~~
~~1 0.12~~
~~6 49 45.07~~

Chronograph

Mar 29.2

7 1327 7 6 35.19
7 7 47.70
1 12.50

Bond 394
0 15 27.67
6 29 17.28
22
1 2.75
7 7 47.70

Eye & ear.

Mar 30.1 7 3 38 57.25
3 40 9.59
1 12.34

Bond 394
0 15 27.67
2 33 13.83
51
0 28.09
3 40 9.59

Eye & ear

Mar 31.2

7 1327 5 20 10.3±
5 21 22.09
1 11.79

Bond 394
0 15 27.67
4 37 16.39
28
0 44.03
5 21 22.09

April 1.2

Eye & Ear

7 1327 6 33 18.4±
6 34 29.97
1 11.57

Bond 394
15 27.67
0 41 6.94
5 37
0 55.36
6 34 29.97

April 3.0

7 1327 0 11 5.3±
0 12 19.18
+1 13.88

Bond 394
0 15 27.67
23 45 3.50
8
3 48.01
0 12 19.18

J A D obsr

1893
Mar. 29.2

+39° 30'

63 Aurigae

0.2	0.4	0.6
4.0	7.8	1.8
5.5	5.0	0.5
8.1	2.5	0.6
1.8	0.0	1.8
7.4	3.2	0.6
2.4	9.2	1.6
	35.3	
	15 | 82.8	

6 56 35.52
6 57 46.18
− 1 10.66
−22
−60
− 1 11.48

+20° 43'

ζ Geminis.

7.0	7.8	4.8
0.3	4.6	4.9
3.4	1.3	4.7
6.7	8.1	4.8
9.9	5.0	4.9
7.8	7.0	4.8
2.7	2.3	5.0
~~8.3~~	~~7.8~~	7.3
	~~12.7~~ 15	111.2

7 3 7.41
7 4 18.34
− 1 10.93
−.04
−.60
−1 11.57

Clock slow 1m 11s.52

J A D

1893
April 4.2

δ Gem.	β Canis min.	α Gem.
+22° 11	+8° 30	+32° 8
5.3 5.8 1.1	3.9 1.0 4.9	5.1 0.8 5.9
8.1 3.3 1.4	6.2 8.7 4.9	8.2 7.8 6.0
0.7 0.7 1.4	8.8 6.2 5.0	1.2 5.0 6.2
3.3 8.0 1.3	1.3 3.6 4.9	4.0 2.0 6.0
6.0 5.2 1.2	3.9 1.2 5.1	0.9 9.0 5.9
2.7 8.6 1.3	0.0 5.0 5.0	4.2 1.8 6.0
6.5 4.6 1.1	3.9 1.3 5.2	8.5 7.3 5.8
12 30.7	20 7.6	26 33.0
15|9.5 0.63	15|11.26 105 7.51	15|44.8 33.00
7 12 30.63	7 20 7.51	7 26 33.00
7 13 44.38	7 21 21.24	7 27 46.73
−1 13.75	−1 13.73	1 13.73
−.12	−.19	−.06
−.60	−.60	−.60
1 14.47	−1 14.52	−1 14.39

Missing no. .25

Mean error will soon be determined

47
52
39
138
.46

Clock slow 1m 14.46s

Comparison, eye & ear

1893

April 5.7 71327 5 32 51.9±
5 34 3.71
+1 11.81

Bond394
15 27.67
0 56 53.16
4 21 —
0 42.88
5 34 3.71

April 6.0 71327 0 59 0.5±
1 0 14.76
+1 14.26

Bond 394
15 27.67
0 56 53.16
23 44 —
3 53.93
1 0 14.76

April 6.9 71327 22 47 32.7
22 48 49.13
+1 16.43

Bond394
15 27.67
1 0 49.71
21 29 —
3 31.75
22 48 49.13

April 7.9 71327 23 27 35.5±
23 28 51.60
1 16.10

Bond394
15 27.67
1 4 46.27
22 5 —
3 37.66
23 28 51 60

April

April 10.1 71327 5 26 24.33
5 27 42.20
1 17.87

Bond394
15 27.67
1 16 35.93
3 53
0 38.60
5 27 4220

April 11.2

71327 3 9 17.60
5 11 35.47
1 1787

Bond394
15 27.67
1 20 32.48
3 35 000
0 35.32
5 11 3547

1893
April 11.3

	β Cancri	31 Lyncis	Br. 1197	o Urs. maj.	Gr. 1450
	+9°31	+43° 32'	-3° 33'	+61° 45'	+38° 23
	0.0 7.6 7.6	9.7 4.2 3.9	6.5 3.3 9.8	8^h 20	9.2 8.9 8.1
	2.8 5.3 8.1	3.0 1.3 4.3	9.0 1.0 0.0	~~32.25~~ $32^s.25$	2.2 6.0 8.2
	5.0 2.5 7.5	6.2 7.5 3.7	1.4 8.4 9.8	~~36.45~~ 37.40	5.4 2.6 8.0
	7.6 0.2 7.8	9.9 4.3 4.1	3.9 6.0 9.9	~~39.05~~ 42.40	8.7 9.4 8.1
	0.2 7.8 8.0	3.3 0.9 4.2	6.3 3.5 9.8	~~41.40~~ 47.70 52.60	1.9 6.2 8.1
	6.4 1.4 7.8	2.0 2.4 4.4	2.5 7.2 9.7	212.35	9.8 8.5 8.3
	0.2 7.8 8.0	× 7.2	6.3 3.6 9.9	8 20 42.470 39.00 8 20 3.47	4.2 3.8 8.0
	8 9 24.0	8 14 12.0	8 19 0.0	1.2662 0.3249	39.0
	58.8	26.6	+9	1.5911 39.00	135.8
	8 9 23.92	8 14 12.05	8 18 59.93	8 20 3.47	8 39.05
	8 10 43.32	8 15 31.71	8 20 19.33	8 21 24.00	8 25 58.55
	-1 19.40	-1 19.66	-1 19.40	-1 20.53	-1 19.50
	-.44	+.02			-.07
	-.60	-.60			-.60
	-1 20.44	-1 20.24			-1 20.17

Observed for n

1 20.53 +1.86 n
1 19.40 -0.062
1.13 1.923

log 0.0492
0.2840
9.7652

n = .582

Another n to be determined.

β Cancri not used:—

Clock slow ~~=~~ $1^m\ 20^s.24$

1893

April 11.9

7 1327 23 55 18.98
23 56 39.79
+1 20.81

Bond 394
15 27.67
1 20 32.48
22 17
3 39.64
23 56 39.79

April 13.0

7 1327 1 39 28.55
1 40 52.77
+1 24.22

Bond 394
15 27.67
1 24 29.04
23 57.
3 56.06
1 40 52.77

April 13.9

7 1327 23 54 6.62
23 55 31.42
1 24.80

Bond 394
15 27.67
22 8 —
1 28 25.59
3 38.46
23 53 31.42

April 15.1

7 1327 4 1 43.00
4 3 7.89
1 24.89

Bond 394
15 27.67
1 36 18.70
2 11
0 21.52
4 3 7.89

April 16.9

7 1327 0 55 2.20
0 56 29.13
1 26.93

Bond 394
15 27.67
~~1~~ 40 15.25
22 57
3 46.21
0 56 29.13

April 18.2

7 1347 5 40 43.38
5 42 11.84
1 28.46

Bond 394
15 27.67
3 38
0 35.81
1 48 8.36
5 42 11.84

JAD lev

April 12.3

β Cancri
+9° 31′

59.1 75.2
61.5 79.0
64.2 82.8
66.6 86.6
69.0 90.3
320.4 413.9
64.08 82.78
1.2682 18.80
00060 2.88 2.78
1.2742

22.83
8 10 43.30
-1 20.47
-44
-60
-1 21.51
+.20 correction { See Apr 11.3; β Cancri (not used then) $-\overline{1}\ 20^s.44$
Error assumed for Apr 11.3 $\overline{1}\ 20.24$
+.20

Another way, as follows:- β Cancer April 11.3, $-\overline{1}\ 20^s.44$
" " 12.3 $\overline{1}\ 21.31$
clock lost $1^s.07$
then error assumed for April 11.3 is $\overline{1}\ 20^s.24$
Hence Error Apr 12.3 is $\overline{1}\ 21^s.31$

Clock slow $\overline{1}$ 21.31

JAD

1893

April 18,5

17 H Can Ven
+37°44'

26.5	53.2
31.2	56.3
36.0	59.5
40.5	2.6
45.3	5.7
179.5	297.3
35.90	59.46
27.05	-23.34
35.95	36.12

13 28 36.03
13 30 3.40
-1 27.37
-.09
-.60
-1 28.06

1.2662 8.5363
0.1019 0.1019
1.3681 8.6582

2334 .045

1.3678
0.0968
1.4646
29.15

25 C de Chasse
+36°51
Com star
(i.e. the last)

13 31^m $46^s.38$
-29.15
13 31 17.23

13 31 17.23
13 32 44.86
-1 27.63
-.10
-.60
-1 28.33
Not used

η Urs Maj
+49°51

8.2	0.8	9.0
2.2	7.2	9.4
6.0	3.3	9.3
9.9	9.3	9.2
3.8	5.4	9.2
3.0	6.1	9.1
9.0	0.5	9.5
	54.7	
		69.4

13 41 54.63
+.05
13 41 54.68
13 43 22.35
-1 27.67
+.16
-.60
1 28.11

Clock slow 1^m $28^s.08$

1893
Apr 19.1

71327 3 59 22.50
4 0 51.15
+1 28.65

Bond 394
15 27.67
1 52 4.92
1 53
0 18.56
4 0 57.15

April 20.1 71327 3 36 14.41
3 37 43.27
+1 28.86

Bond 394
1 15 27.67
1 56 14.7
1 26
0 14.13
3 37 4327

April 21.0 71327 1 36 48.45
1 38 19.62
+1 31.17

Bond 394
1 15 27.67
56 1.47
23 23 000
3 50.48
25 38 19.62

April 22.0 71327 3 15 58.96
3 17 31.78
+1 32.82

Bond 394
15 27.67
0 58
2 3 54.58
0 9.53
3 17 3178

April 24.0 71327 2 13 38.87
2 15 13.39
+1 34.52

Bond 394
15 27.67
23 48
2 ~~17~~ 51.14 ~~47.64~~
3 54.58
~~2 19 9.94~~
2 15 13.39

April 25.5

71327 13 36 25.5
13 38 1.16
1 35.66

Bond 394
15 27.67
2 15 44.25
11 5
1 49.24
13 38 1.66

April 1893 23.5

τ Boötis +18° 0'	η Urs maj +49° 51'			η Boötis +18° 57'		
162	3.8	67	0.5	×	03	×
190	80	30	1.0	35	76	1.1
214	1.8	9.1	0.9	6.0	51	1.1
242	58	×	×	87	2.3	1.0
266	9.3	12	0.5	12	00	1.2
1074	86	20	0.6	75	34	09
21.48	47	6.4	~~0.8~~ 1.1	1.8	96	1.4
19.50		506		5.6	6.6	
4098			52	96		73
			50.40			5.56

0.0218
1.2682
1.2900
19.50

13 40 40.98	13 41 50.40	13 48 5.56
13 42 12.51	13 43 22.36	13 49 37.28
− 1 31.53	− 1 31.96	− 1 31.72
− .36	+ 18	− 36
− .60	− .60	− 60
− 1 32.49	− 1 32.38	− 1 32.68

never needed

49
68
38
68

49 } weight of each star ⅓ zenith star as n is evidently not known)
68 } ^
117
.39 from 2 southern stars,
.38 from η Urs maj
.38 mean

Clock slow 1m 32s.38

April 25.9

71327	0 41 14.25	Bond 394	2 15 27.67
	0 42 50.08		22 15 44.25
			8
	+1 35.83		3 38.16
			0 42 50.08

April 26.9

71327	0 56 13.87	Bond 394	2 15 27.67
	0 57 48.43		22 19 40.80
	+1 34.56		3 39.96
			24 57 48.43

April 28.8

71327	4 4 39.98	Bond 394	2 15 27.67
	4 6 15.22		1 27 33.91
			23
	+1 35.24		0 13.64
			4 6 15.22

april 29.2

71327	4 44 40.80	Bond 394	2 15 27.67
	4 45 17.52		1 31 30.47
			58
	+1 36.72		0 19.38
			4 45 17.52

~~May~~
April 30.9

71327	1 8 53.96	Bond 394	2 15 27.67
	1 10 34.17		22 35 27.03
			16
	+1 40.21		3 39.47
			1 10 34.17

May 2.8

71327	23 24 26.62	Bond 394	15 27.67
	23 26 8.88		20 24 20.14
			2 43
	+1 42.26		3 21.07
			23 26 8.88

JAS h

1893
April 26.3

+42° 3
μ Ursae maj.

5.0 7.6 2.6
8.3 4.4 2.7
1.5 1.2 2.7
5.0 7.8 2.8
8.2 4.5 2.7
6.2 6.3 2.5
1.4 1.2 2.6

10 ~~14~~ 16.3
949

10 14 16.33
10 15 58.96
−1 42.63

wrong star

+37° 16
31 Leon. min.

9.8 8.4 8.2
2.9 5.5 8.4
5.8 2.4 8.2
9.0 9.2 8.2
2.1 6.3 8.4
9.8 8.3 8.1
4.6 3.8 8.4

10 20 9.3
1372

10 20 9.15
10 21 ~~53.76~~ 43.35
−1 3420
−60
−1 3480

Clock slow 1^m 3480

May 3.9 71327 1 23 43.28
1 25 24.32
+1 41.04

Bond 394 22 19 15 27.67
2 47 16.69
3 39.96
1 25 24.32

May 5.2 71327: 6 32 27.98
6 34 10.83
+1 42.85

Bond 394: 3 23 15 27.67
0 33.35
2 55 9.81
6 34 10.83

May 6.0 71327 3 5 52.88
3 7 32.88
+1 40.03

Bond 394 23 53 15 27.67
55 9.81
2 ~~59 6.36~~
3 55.40
3 7 32.88

May 7.1 71327 5 25 15.58
5 26 55.71
+1 40.13

Bond 394 2 12 15 27.67
2 59 6.36
0 21.68
5 26 55.71

May 7.9 71327 0 38 18.85
0 40 0.53
+1 41.68

Bond 394 21 18 15 27.67
3 3 2.92
3 29.94
0 40 0.53

May 8.9 71327 1 16 20.94
1 18 2.67
+1 41.73

Bond 394 21 52 15 27.67
3 6 59.47
3 35.53
1 18 2.67

May 9.9 71327 2 31 28.85
2 33 10.89
+1 42.04

Bond 394 23 3 15 27.67
3 10 56.03
3 47.19
2 33 10.89

J.A.D. obs

1893
May 5&3

20 Comae +21° 30	8 Can. Ven. +41° 57'	24 Can Seq. +18° 58'	12 Can. Ven. seq. +38° 54'
8.0 8.3 6.3	1.0 4.3 5.3	0.5 23.0	4.0 4.3 8.3
1.0 5.9 6.9	4.5 1.0 5.5	4.3 25.4	7.4 1.5 8.9
3.5 3.3 6.8	7.8 7.6 5.4	8.3 27.8	0.8 8.3 9.1
6.2 ~~8.0~~ 1.0 7.2	1.2 4.2 5.4	12.5 30.3	4.0 5.0 9.0
9.0 8.0 7.0	4.5 0.7 5.2	16.4 33.0	7.0 1.8 8.8
~~8.1~~ ~~7.4~~ 1.2 6.3	2.4 2.6 5.0	42.0 139.5	4.8 3.8 8.6
9.4 ~~43.3~~ 7.4 ~~43.3~~ 6.8	7.5 7.8 5.3	84.0 279.0	9.5 9.3 8.8
43.3	2.6	+04 19.52	24.4
50.6	39.7	8.44 8.38	65.9
		1.2662	
		0.0243	
		1.2905	24.40
12 22 43.37	12 27 2.65	19.52	
12 24 22.56	12 28 41.95		12 51 3.61
~~—~~ −1 39.19	−1 39.30	8.41	−1 39.21
−15	±00	12 29 47.50	−.03
−.60	−.60	~~39~~ 1 39.09	−.60
		−.18	
		−.60	
−1 39.94	−1 39.90	−1 39.87	−1 39.84

8 Can Ven 39.30 0.900
24 Can Ven 39.09 0.344
21 .556

.556) .21 (about .4 = m

12 Can Ven 39.21 .807
20 Comae 39.19 .394
.02 .413

.413) .02 (

8 Can Ven 39.30 0.900
20 Comae 39.19 .394
.11 .506

.506) .11 (about .2 = m

approximate m = 0.3

20 Com .94 }
24 Can Seq. .87 } weight of 1/2 .91
8 Can Ven .90 .90
12 Can Ven .84 .84
.88

Clock slow 1m 39s.88

May 8.5

β Boötis			ψ Boötis		
+40°48'			+27°21		
6.2	8.0	4.2	7.0	0.0	7.0
9.4	5.0	4.4	0.0	7.2	7.2
2.4	1.4	3.8	2.5	4.3	6.8
5.8	8.3	4.1	5.4	1.4	6.8
9.0	5.0	4.0	8.1	8.5	6.6
7.2	6.9	4.1	5.1	2.0	7.1
2.0	2.0	4.0	9.3	7.6	6.9
	17.2				13.5
		10.58			5.19
14	56	17.05	14	58	13.46
14	57	57.38	14	59	53.73
	−1	40.33		−1	40.27
		−01			−12
		−60			−60
	−1	40.94		−1	40.99

Clock slow 1^m 40.96^s

JAB obs

1893
May 10.5

α Serpentis
+6° 45.7

128 364
166 391
203 415
241 438.1
278 340

1016 1948
2032 3896
1839
20.32 20.37
20.35

1.2662
.0031
1.2693
1839

15 37 20.35
15 38 61.72
−1 41.37
−.24
−60
−1 42.21

β Serpentis
+15° 45.4

1.2 9.9 1.1
38 75 1.3
64 5.0 1.4
90 2.3 1.3
15 9.6 1.1
79 3.3 1.2
18 9.4 1.2

35.7
15)843
~~123~~
35.62

15 39 35.62
15 41 16.86
−1 41.24
−.19
−60
−1 42.03

κ Serpentis
+18° 28.3

1.2 0.5 1.7
39 8.2 2.1
64 5.6 2.0
9.0 3.0 2.0
1.7 0.2 1.9
8.0 3.8 1.8
2.0 9.8 1.8
~~6.0~~ 16.0

~~9.8~~ 15)189.3
15.95

15 42 15.95
15 43 57.37
−1 41.42
−.17
−60
−1 42.19

21
03
19
143
.14

Clock slow 1m 42.14s

1893

May 11.0	71327	~~4 0~~ 3 59 39.26 4 1 21.25 +1 41.99	Bond 394	15 27.67 0 27 3 18 49.14 0 ~~30~~ 4.44 4 1 21.25
May 12.0	71327	3 50 33.26 3 52 15.67 +1 42.41	Bond 394	15 27.67 0 14 3 22 45.70 0 2.30 3 52 15.67
May 13.9	71327	2 (2)2 10.58 2 23 53.83 +1 43.25	Bond 394	15 27.67 22 22 3 22 45.70 3 40.46 2 23 53.83
May 14.9	71327	2 42 7.46 2 43 52.19 +1 44.73	Bond 394	15 27.67 22 54 0.00 ~~2 42~~ 3 30 38.81 3 45.71 2 43 52.19
May 15.9	71327	2 36 1.55 2 37 47.11 +1 45.56	Bond 394	15 ~~15~~ 27.67 22 44 3 34 35.37 3 44.07 2 37 47.11
May 17.2	71327	~~4 6~~ 8 2 50.92 8 4 36.57 +1 45.65	Bond 394	15 27.67 4 6 3 42 28.49 0 40.41 8 4 36.57
May 18.0	71327	4 6 7.56 4 7 53.70 +1 46.14	Bond 394	15 27.67 0 6 3 ~~50~~ 46 ~~21.60~~ 25.04 0.99 4 7 53.70

1893
May 14.3

JAB bm

+41° 16′

2 Can. Ven.

2.9	57	7.9
6.1	1.9	8.0
0.3	85	8.8
3.9	5.4	9.3
66	20	8.6
5.0	3.9	8.9
0.0	86	8.6

40

15 | 64 1

12 9 4.27
40
~~66~~

12 10 47.96

− 1 43.69
or
−60

− 1 44.29

1893
May 18,9 71327 Bond 394 15 27.67
3 15 54.82 23 12
3 17 41.38 3 46 25.04
+1 46.56 3 48.67
3 17 41.38

May 20.2 71327 9 22 50.52 Bond 394 15 27.67
9 24 37.41 5 14
1 46.89 3 54 18.16
0 51.58
9 24 37.41

J.A.D. obs

1893
May 20.2

& α Leonis
+12° 29'

6.1 4.1 0.2

8.7 1.7 0.4

1.2 9.1 0.3

3.8 6.6 0.4

6.3 4.0 0.3

2.5 7.7 0.2

6.4 3.9 0.3

0.2

23

10 1 0.15

10 2 41.15

−1 41.00

−.21

assuming on equable .3 −60

−1 41.81

Clock slow −1 41.81 } See opp page

6h 35m

Determination of Collimation

Micrometer found at 32.678

S. coll. on N. coll.; Microscope used for collimating is missing; assuming for the moment that N & S. collimators are well placed on each side;

Tel. on ~~South~~ North Coll. 32.956 } See page 86
978
980

1893
May 20.2

β Urs Maj	α Urs Maj	ψ Urs. Maj.
+56° 57	+62° 20	+45° 5'

middle 3 of 1st tally
all of 3rd " "

R. A. 10 55 25.09 | 10 57 9.79 | 11 3 40.57

0.5	6.4	6.9
5.1	2.1	7.2
9.8	7.6	7.4
4.2	3.0	7.2
8.8	8.4	7.2
0.0	7.2	7.2
6.8	0.3	7.1
	43.7	

~~50.3~~

20.2
28.2
36.1
84.5
28.17

log 1.2662
sec 0.3327
1.5989
39.71

57.2
2.5
8.71
13.4
18.5
3397
67.94
39.71
28.23
28.17

~~6.0~~ 6.0	2.5	8.5
9.3	9.0	8.3
2.9	5.5	8.4
6.4	2.0	8.4
0.0	8.4	8.4
8.5	9.7	8.2
3.9	4.3	8.2
	59.2	
		1376

10 53 43.59	10 55 28.21	11 1 59.17
10 55 25.09	10 57 9.79	11 3 40.57
− 1 41.50	− 1 41.58	− 1 41.40
+ 19	+30	+03
− 60	−.60	−60
−1 41.91	−1 41.88	−1 41.97

41.91
41.88
41.97
276
41.92

−1 41.92
06 approximate correction for error of collimation
−1 41.86

Clock slow ~~+ 41.92~~ 1^{m} 41.86 s

Note: The collimation was left during these observations at 32.980; the micrometer during the α Leonis observations read 32.678.

β collimation determined next page

Sunday, May 28, 1893

72^h 45^m

Collimation

South Collimator on North collimator
North coll. lines very indistinct,

Reading 26.4
290
278 285
26.5 2 5.70
238 Set at 25.7

Telescope on South Collimator,
Micrometer found, as left yesterday at 32.~~678~~980 (Was found, yesterday at first, at 32.678)

Reading
32.542
572 249
548 32.5598
532
535

Telescope on North Collimator

32.981
996
985 Lines of reticule well
993 adjusted to motion of
994 telescope.

449

Set at 32.787

32,9898
15496
32775
012
32787

May 21.9, 1893

Note; There seems ~~to~~ no ground from ~~these~~ this determination of collimation to assume that any change in collimation was sufficiently great to account for the apparent discrepancy in the assumed place error of +1.327, prolonged from the last observation, May 14.3.

Note 2nd; Level was determined May 20.9 also and this, too, gives no ground for assuming that in the position of the telescope lies the explanation of the startling change of +1.327.

Note 3rd.: Observations May 21.3 (next page) Sunday, show that the clock itself was the delinquent; and show that the clock has now a gaining rate decreasing the error instead of as heretofore a losing rate increasing the error; the change in the rate was apparently sudden and sharp and not gradual, as in cases of change before. This makes the Bond 394 clock out 5ˢ; changed the weights ~~bac~~ yesterday, Mr. Bond, about 12.30 P.m.

J.R.D.

Sunday, May 21.3, 1893

J D Olsen

12 Can Ven
+38° 54

24 2.5 4.9
5.5 9.5 5.0
8.8 ~~9.5~~ 6.3 5.1
20 ~~6.3~~ 3.1 5.1
5.2 0.0 5.2
2.7 2.1 4.8
7.7 7.2 4.9

12 49 22.5
37.5
12 49 22.50
+04
12 49 22.54

~~30~~

43 Comae
+28° 25

13 4 1st 47.1
50.0
52.5
55.3
58.3
263.21
52.64

0.0557
1.2682
1.3239 21.09
13 5 13.73

+33° 29
δ Urs maj. pr.

2nd 3rd
45.8 22.8
52.1 27.0
58.8 31.6
5.6 36.0
12.2 40.1
294.5 157.5
58.90 31.50

0.2469
1.2662
1.5131 32.59
58.90 58.91
+04
58.94 58.91
58.92

12 51 3.47 | 13 6 54.75 | 13-19-39.98
-1 40.93 | -1 41.02 | -1 41.06
-03 | -.11 | +.16
-60 | -.60 | -.60
-1 41.56 | -1 41.73 | -1 41.50

assuming
n = .3

.56 × 3 = 168
.73 × 1 = 73
.50 × 2 = 100
6)341
.57

Clock slow 1^m 41.57

1893
May 21.9 F1327 3 1 45.19
3 3 26.79
+1 41.60

Bond 394
24 15 27.67
~~22~~ 46
3h 8m 14.72
3 44.40
3 3 26.79

May 23.2 F1327 8 46 37.79
8 48 19.20
+1 41.43

Bond 394
15 27.67
4 26 00
4 6 7.83
0 43.70
8 48 19.20

May 23.9 F1327 3 39 43.30
3 41 24.83
+1 41.53

Bond 394
15 27.67
23 16
4 6 7.83
3 49.33
3 41 24.83

May 25.0 F1327 4 31 47.61
4 33 29.28
+1 41.67

Bond 394
15 27.67
0 4
4 14 0.95
0 0.66
4 33 29.28

May 26.2
F1327 9 8 29.90
9 10 10.51
+1 40.61

Bond 394
15 27.67
4 36
4 17 57.50
0 45.34
9 10 10.51

May 27.1 F1327 6 21 58.69
6 23 39.14
+1 40.45

Bond 394
15 27.67
1 46
4 21 54.06
0 17.41
42.88
6 23 39.14

May 29.8 F1327
2 50 12.5
~~2 51 52.19~~
+1 39.69

Bond
15 27.67
22 3
4 29 47.18
3 37.34
2 51 52.19

JAD

1893
May 22.3

ε Urs. maj.			12 Can. ven.		
+56° 32			+38° 54		
8.5	3.5	2.0	2.5	2.7	5.2
3.2	9.3	2.5	5.6	9.7	5.3
7.5	5.0	2.5	8.9	6.5	5.7
2.2	0.3	2.5	2.2	3.3	5.5
6.8	5.7	2.5	5.2	0.0	5.2
7.8	4.8	2.6	2.9	2.0	4.9
4.8	8.0	2.8	8.0	7.3	5.3
	41.6		~~26~~	226	

12 47 41.27
12 49 22.13

−1 40.86
+.19
−.60

−1 41.27

39.7
12 49 22.65
12 51 3.46

−1 40.81
−03
−60

−1 41.44

44
27

71

Clock slow ^{m} 1 ^{s} 41.36

SAD obs

1893
May 25.3

+38°54′ 12 Can. Ven. seq.			
0.7	2.9	3.2	6.1
9.3	6.1	0.0	6.1
	9.3	6.8	6.1
	2.3	3.5	5.8
	5.6	0.5	6.1
	3.4	2.2	5.6
	8.3	7.9	6.2
		230	
		450	
		23.00	
	12 51	3.42	
	−1	40.42	
		−03	
	−1	40.45	
		−60	
	−1	41.05	

+28°25′ 43 Comae			
7.5	0.5	1.0	8.5
0.5	3.3	8.3	8.8
3.3	6.2	8 ~~3~~ 5.4	8.7
6.2	9.0	~~5.4~~ 2.5	8.7
9.0	6.0	~~2.5~~ 9.8	8.8
6.0	~~6.0~~	~~9.8~~ 7.5 2.6	8.6
0.2	~~0.2~~	~~2.5~~ 8.7	8.9
		144 ~~187~~	
			654
			14.36
13 6			54.72
−1			40.36
			−12
−1			40.48
			−6.0
−1			41.08

+53°29′ 5 Urs. maj. seq.		
8.0	0.7	8.7
2.5	6.8	9.3
7.0	2.4	9.4
1.2	8.0	9.2
5.7	3.6	9.3
6.2	2.5	8.7
3.0	6.0	9.0
	59.6	
		1432
		59.55
13 19		39.91
−1		40.36
		+15
		40.21
		−.60
−1		40.81

105 }
108 }

107 }
81 } .94
188

Clock slow 1^m $40^s.94$

1893

May 31.0 71327 5 43 37.20 Bond 394
5 45 16.50
+1 39.30

~~15.27~~
0 5.2
15 27.67
4 37. 40.29
0. ~~45.50~~ 8.54
5 45 ~~53.46~~
16,50

June 1.1 71327 6 52 42.58 Bond 394
6 54 23.74
+1 41.16

15
1 57 27.67
4 41 36.85
0 19.22
6 54 23.74

June 2.1 71327 7 20 45.36 Bond 394
7 22 24.24
+1 38.88

15
2 21 27.67
4 45 33.41
0 23.16
7 22 24.24

June 2.9 71327 3 26 4.25 Bond 394
3 27 41.70
+1 37.45

15
22 23 27.67
4 45 33.41
3 40.62
3 27 41.70

June 5.1 71327 6 47 27.45 Bond 394
6 49 6.53
+1 39.08

15
1 36 27.67
4 57 23.09
0 15.77
6 49 6.53

JAD

1893
May 31.4

μ Böotis	β Coron. bor	ι Böotis	α Coron. bor
+37°45'	+29°29'	+41°12'	+27°5'
1.5 0.6 2.1	× ×	8.3 0.3 86	~~0.0~~ 7.0 96 6.6
46 7.7 2.3	× ×	1.6 7.3 8.9	~~24~~ 00 7.0 7.0
× 4.5 ×	× ×	4.9 4.3 9.2	~~53~~ 26 47 6.8
1.0 1.4 2.4	× ×	8.0 0.5 8.5	~~83~~ 55 1.3 6.8
40 8.1 2.1	× ×	1.4 7.4 8.8	~~5.0~~ 83 86 6.9
1.6 0.3 1.9	0.5 7.7 8.2	9.6 9.1 8.7	~~9.7~~ 50 18 6.8
6.3 58 2.1	5.0 3.4 8.4	45 40 8.5	~~3.3~~ 92 75 6.7
51.2	49.15	29.3	33.3
141	4575	1405	509
15 18 51.08	15 21 49.15	15 25 29.37	15 28 33.40
15 20 29.24	15 23 27.32	15 27 7.68	15 30 11.68
−1 38.16	−1 38.17	−1 38.31	−1 38.28
−.04	−.10	−.01	−.12
−.60	−.60	−.60	−.60
−1 38.80	−1 38.87	−1 38.92	−1 39.00

80
87
92
100
359
90

Clock slow 1^{m} $38^{s}.90$

JAD obs

1893
June 1.4

1.2662
0.0799
1.3461

δ Boötis
+33° 43'

2nd tally	3rd tally
26.6	51.7
31.0	54.7
35.8	57.6
40.1	0.5
44.6	3.6
178.1	288.1
35.62	57.62

22.19
35.43
35.62
15 ~~40~~ 9 35.52
~~+3~~
15 17 13.68
−1 38.16
−.08
−.60
−1 38.84

μ Boötis
+37° 45'

1.5	0.7	2.2
4.5	8.0	2.5
7.6	4.4	2.0
0.9	1.6	2.5
4.1	8.4	2.5
1.7	0.6	2.3
6.6	5.9	2.5

51.25
17.75
15 18 51.18
15 20 29.23
−1 38.05
−.04
−.60
−1 38.69

β Coron. bor.
+29° 29

2.2	6.0	8.2
5.2	3.3	8.5
8.1	0.4	8.5
0.9	7.8	8.7
3.6	4.7	8.3
0.7	7.5	8.2
5.1	3.5	8.6

49.4
138.4
15 21 49.23
15 23 27.32
−1 38.09
−.10
−.60
−1 38.79

84
69
79
23.2

Clock slow 1^m $38^s.77$

JAD

June 5.1, 1893

β Geminorum

+28° 16

2.4 5.5 7.9

5.3 3.0 8.3

8.1 0.0 0.1 8.2

1.0 3.0 ~~7.3~~ 7.3 8.3

39 01 ~~45~~ 45 8.4

0.6 23 7.9

48 33 8.1

9.1

15 | 136 229.08

135

120

12

7 37 9.08

7 38 46.01

1 36 93

−0 3

−.60

1 37.56

June 7.0 – 1893

Note; the clock Bond 394 was found stopped on June 5.3; dial read 6^h 55^m 6^s;

Note 2nd; June 7.0; Mr Aston out; inspected clock; furnished him by request, with true time by means of the 71327 & B. & C. 1182; See below;

×

1st comparison –

71327 3 38 14.5 B&C 1182 22 $\frac{15}{20}$ 27.67
3 40 27.45 5 1 19.65
3 40.13
(B&C 1182) – 2 12.95 3 40 27.45
71327 – 1 37.00
35.95

B&C 1182 is $36^s.00$, (say: the $^s.95$) of true time;
then set Bond 394 by B&C 1182.

2nd comparison –

71327 3 50 53.3± Bond 394 22 $\frac{15}{32}$ 27.67
3 52 29.42 3 42.10
+1 36.12 5 1 19.65
3 52 29.42

Bond $0^s.95$ slow; Mr Aston moved pendulum, to ~~correct this~~.

3rd comparison.

71327 3 59 53.4 Bond 394; 22 $\frac{15}{41}$ 27.67
4 1 30.90 5 1 19.65
+1 37.50 3 43.58
Bond about $^s.50$ fast. 28 1 30.90

Left at this.

June 7.4, 1893

Reverse order of Star Designation

α Coronæ bor. +27°5'		ν¹ Boötis +41°12'	β Coron bor. +29°29'
6.1		9.3 18 1.1	8.3 1.1 9.4
8.9		30 88 1.8	1.3 8.3 9.6
11.7		6.1 5.4 1.5	4.0 5.4 9.4
14.7		9.5 20 1.5	6.7 2.7 9.4
17.2		28 88 1.6	9.4 9.9 9.3
58.6		07 07 1.4	6.3 3.1 9.4
11.72		58 57 1.5	0.5 9.1 9.6
21.20	1.2662	30.9	34.7
	.0603		
50.52	1.3268	15)113	15)708
~~50.98~~			
15 21 50.92		15 25 30.75	15 28 34.72
β Coron bor 15 23 27.32		15 27 7.66	15 30 11.69 α Coron bor
−1 36.80		−1 36.91	−1 36.97
−.10		−.01	−.12
−.60		−.60	−.60
−1 37.50		−1 37.52	−1 37.69

weights: α + β Cr. bor = ν' Boötis

50 } 70 } .60

.52

.56

Clock slow 1^{m} $37^{s}.56$

June 9, 10, 1893

Note:– (See Page 96) the clock, (Bond 394) ran only a few hours after Mr. Aston started it: yesterday afternoon (June 9) Mr. Gerrish connected the clock Ball. 103 with the Observatory Time Signal Relay and started the clock approximately to standard time; Bond 394; as yet unattended to.

Chronograph comparison

June 9th F1327 6. 4 6.40
6 5 43.07
+1 36.67

Ball. 103 0 37 ~~15 27.67~~
0 6.08
5 13 9.32
6 5 43 07

June 10th F1327 6 ~~38~~ 38 ~~23~~ 7.70
6 39 44.56
1 36.86

Ball 103 1 7 ~~15 27.67~~
~~4~~ 5 17 5.88
0 11.01
6 39 44 56

1893
June 10.5

σ Herculis
+42°40′

3.8	7.6	1.4
7.3	4.4	1.7
0.6	1.0	1.6
4.0	7.6	1.6
7.3	4.3	1.6
5.6	5.7	1.3
0.8	0.7	1.5
	5.8	
		115
		5.77

+.05
5.82

ξ Herculis
(N.A.) +31°47′

56.6 } last 2 of
59.8 } 2nd Tally
58.2

0.0706
0.7412
0.8118
6.48

−6.48
51.72

η Herculis
+39°8′

1st tally
19.25 } last 2 20.77
22.30 }

2nd tally
57.5 } 1st

0.1101	0.1101
1.1712	1.1309
1.2813	1.2410
19.11	17.42
+19.11	−17.42
39.88	40.08

Gr. 2377
+56°59′

2nd tally
29.4
36.3
43.0 } 215.3
50.0 } 43.06
56.6

3rd
8.0 }
12.5 } 1st 3 12.33
16.5 }

0.2639	0.2639
8.5563	1.2041
8.8202	1.4680
.066	29.38
+.07	−29.38
43.13	42.95

16 29 5.82	51.72	39.98	43.06
16 30 41.74	16 37 17.50	16 39 16.13	16 43 19.19
−1 35.92	−1 35.78	−1 36.15	−1 36.13
±.00	09	−.03	+.18
−.60		−.60	−.60
−1 36.52	Wrong star	−1 36.78	−1 36.55
		Rejected	

Clock slow 1^{m} 36.52

Chronograph comps

June 120 ~~B~~ 71327 5 2 45.24 Ball 103 23 24 — 15 27.67

5 4 20.75 3 50.64

1 35.51 5 21 2.44

5 24 20.75

[illegible]

120 71327 5 20 49.05 Bond 394 23 42 — 15 27.67

5 22 23.71 5 21 21.44

1 34.71 3 53.60

5 22 23.71

Note: Ballou 103 is about $4^{s}.5$ slow and is giving signals;

Bond 394 has started fast (June 10) and is now $1^{s}.2$ slow.

1893

June 13.0 71327 6 29 55.25 Ball 103 ~~[illegible]~~ 0 47 15 27.67

6 31 30.94 5 28 55.55

1 35.69 0 7.72

6 31 30.94

Ballou is giving signals.

Ballou fast / slow } 0.00

71327 6 42 61.± Bond 394 1 0 15 0 27.67

6 44 33.08 5 28 55.55

1 32.08 0 9.86

6 44 33.08

Bond 394 is about 3.6s slow; 6 gr added now, June 13.0

June 14.2 71327 ~~5 9~~ Ball 103 5 15 27.67

10 56 34.53 ~~10 59 34.53~~

10 58 10.54 5 32 52.11

+1 36.01 0 50.76

10 58 1054

June 15.2 15 27.67

71327 9 50 19.6 Ball 103 3 59 00

9 51 55.60 5 36 48.67

+1 36.00 0 39.26

9 51 55.60

June 16.1 15 27.67

71327 8 32 3.2 Ball 103 2 37 —

8 33 38.69 5 40 45.23

+1 35.49 0 25.79

8 33 38.69

1893
June 15

+30°51
ρ Boötis

129 311
16.0 357
188 403
215 443
242 486
934 2000
1868 40.00

1,2682
0.0665
1,3347
21.62
4030 40.00

14 25 40.15
14 27 15.20
−1 35.05
− .09
∓ .60
−1 35.74

+38°47
γ Boötis

.83 305
132 last 339
181 4 370
229 of 2nd T. 401
.433
625 1848
15.63 36.96

0,2625 1,2662
0.1083 0.1083
0.3708 1.3745
2349 23.69
1328 13.27

14 26 13.28
14 27 48.39
−1 35.11
∓ .03
∓ .60
−1 35.74

+44°52'
33 Boötis

5.3 1.9 7.2
9.2 8.5 7.7
2.5 5.1 7.6
6.2 1.4 7.6
9.7 7.8 7.5
8.0 9.2 7.2
3.8 4.0 7.8
188
15731 4 | 8.76
120
114
105
90

14 33 18.76
14 34 53.72
−1 34.96
+ .03
∓ .60
−1 35.53

53 +
74
127
.63

Clock slow 1^m $35^s.63$

1893
June 16.9

71327 4 1 15.1
4 2 50.24
+1 35.14

Ball 103
15 27.67
22 3
5 40 45.23
3 37.34
4 2 50.24

June 19.1

71327 8 7 48.25
8 9 22.46
+1 34.21

Ball 103
2 15 27.67
1
5 52 34.91
0 19.88
8 9 22.46

June 19.9

71327 ~~23 28 20.59~~
5 39 20.57
5 40 55.69
+1 35.12

Ball 103
23 29 15 27.67
5 52 34.91
3 53.11
5 40 55.69

1893

June 19.3

33 Boötis			2 Boötis		
+44°52′			+27°32		
6.8	2.9	9.7	0.5	3.4	3.9
0.3	9.4	0.2	3.4	0.8	4.2
3.7	5.9	9.6	6.2	8.0	4.2
7.4	2.5	9.9	9.0	5.1	4.1
1.0	9.0	0.0	1.6	2.2	3.8
9.3	0.4	9.7	8.5	5.2	3.7
4.6	5.3	9.9	3.0	1.2	4.2
	20.0			47.0	

15 | 14~~9~~.0 (9.93
13.5
1 ~~4~~0
13.5
50

19.93

15 | 1.051 (701
1.05
1

47.01

14	33	19.93	14	38	47.01
14	34	53.67	14	40	20.97
−	1	33.74	−	1	33.96
		~~+2~~			~~+1~~
		−60			−60
−	1	34.34	−	1	34.56

Regularity in which must be determined as soon as possible

Clock slow $1^{m}\ 34.^{s}45$

Comparison with Bond 394
Eye & Ear

1893
June 21.1 71327 7 58 27.7 Bond 394 15 27.67
8 0 12.78 1 44 ——
+1 45.08 6 0 28.03
0 17.08
8 0 12.78

Bond is about 15s fast; } rewnd 8 h. a.m.
Last comp. June 13.0 } June 21.1

Bond merely kept at approximate time

Chronographic comparison
Ballou & 71327

June 21.1 71327 8 5 42.20 Ball 103 15 27.67
8 7 13.93 1 51 ——
1 31.73 6 0 28.03
0 18.23
8 7 13.93

June 22.1 71327 10 23 59.25 Ball 103 15 27.67
10 25 32.50 4 5. ——
+1 33.15 6 4 24.58
40.25
10 25 32.50

June 23.1 71327 7h 56 30.53 Ball 103 15 27.67
7 58 4.25 1 34 ——
+1 33.72 6 8 21.14
0 15.44
7 58 4.25

Comparison with Bond 394.
Eye & ear

1893
June 23.9

15 27.67
71327 5 35 31.5 Bond 394 23 9 30
5 37 7.07 3 48.18
+1 35.57 .08
Bond is about 2s.6 fast } added 2gr 6 8 21.14
Bond is merely kept at approximate time. 29 37 7.07

June 24.1

15 27.67
71327 7 12 19.32 Ball 103 0 46 —1
7 13 52.93 0 7.56
1 33.61 6 12 17.70
7 13 52.93

June 24.3

δ Boötis +30°51			γ Boötis +38°47 (last tally)		33 Boötis +44°53		
5.7	0.4	6.1			8.4	4.5	2.9
8.7	7.5	6.2	33.6		2.0	×	
15	4.7	6.2	36.9		5.5	×	
4.5	1.8	6.3	40.0	1,2662	9.0	×	
7.3	9.0	6.3	43.2	0,1083	2.4	0.8	3.2
4.3	1.9	6.2	46.3	1,3745	1.0	2.0	3.0
8.7	7.5	6.2	200.0	23.69	6.4	6.8	3.2
	43.25		40.00			21.7	
	46.75		23.69				114.0
	3.117		16.31				21.56

14 25 43.12	14 26 16.31	14 33 21.56
14 27 15.12	14 27 48.28	14 34 53.60
−1 32.00	− 31.97	−1 32.04
w	w	w
−.60	−.60	−.60
−1 32.60	−1 32.57	−1 32.64

n assumed to be zero.

60
57
64
181
60

Clock slow 1^{m} $32^{s}.60$

1893

Chronograph comp with Ballm 103

June 25.9

	5	15				15	27.67
71327	~~22~~	~~41~~	52.91	Ballm 103	~~5~~	~~16~~	
					22	42	
	5	17	25.67		6	16	14.26
		+1	32.76			3	43.74
					5	17	25.67

Eye & ear comp. with Bond 394

June 26.1

						15	27.67
71327	8	8	22.5	Bond 394	1	34	
	8	9	53.93		6	20	10.82
		1	31.43			0	15.44
					8	9	53.93

Bond is about $9^s.6$ slow;
Bond is merely kept at approximate time

June 27.1

						15	27.67
71327	9	19	29.45	Ball 103	2	41	
	9	21	1.50		6	24	7.38
		+1	32.05			0	26.45
					9	21	1.50

June 28.1

						15	27.67
71327	10	9	34.15	Ball 103	3	27	
	10	11	5.61		6	28	3.94
		+1	31.46			0	34.00
					10	11	5.61

1893
June 28.5

IAD obs

θ Cygni
+49° 58'

0.0 2.9 2.9
4.0 9.1 3.1
8.0 5.0 3.0
1.5 1.3 2.8.
5.5 7.7 3.2
5.0 8.2 3.2
0.7 2.~~4~~
9.6 7.4 3.1
3.4 6.7

15 | 98.0 (6.53
90
80
75
50
45

19 32 6.53
19 33 36.68
— 1 30.15
— .60
— 1 30.75

neglecting m

ρ Cygni
+44° 51'

6.6 3.0 9.6
0.2 9.6 9.8
3.3 5.9 9.2
6.9 2.3 9.2
0.5 8.6 9.1
9.4 0.3 9.7
4.7 5.2 9.9

100
15 | 146.5 (9.77
135
115
105
100

19 40 9.77
19 41 40.14
— 1 30.37
— .60
— 1 30.97.

172

Clock slow 1^m 30.86^s

1893

Jan 29.1 71327 8 4 9.90 Ball 103 15 27.67
8 ~~6 32.57~~ 5 40.98 1 15
~~22.67~~ 6 32 050.
+1 31.08 9 12.81
~~4.40~~
~~8 6 32.57~~
8 5 40.98

June 30.1 71327 8 ~~40~~ 39 12.24 Ball 103 15 27.67
8 40 42.63 1 49
+1 30.39 0 17.91
6 35 57.05
8 40 42.63

Comparison with Bond 394

June 30.1 71327 9 36 26.4 Bond 394 15 27.67
9 37 51.99 2 46
+1 25.59 1 6 35 57.05
0 27.27
9 37 51.99

Bond is about $\overset{5}{3}$.4 slow; Added 2 gr at June 30.4
last compar. June 26.1
Bond is merely kept at approximate time.

July 2.9 71327 4 57 24.80 B394 15 27.67
4 58 54.02 21 56
+1 29.22 6 43 50.17
3 36.18
4 58 54.02

1893
July 4.4

+36° 55′
(~~good~~ fair tally)
π Herculis

24.2
27.3
30.3
33.6
36.5

151.8
30.36

1.2682
.0971

1.3653
23.19

~~53.55~~
17 9 53.55
17 11 21.61

−1 28.06
−.60

−1 28.66

(assuming 'm to be zero)

JAD obs

+32° 37′
ω Herculis (c. de Temp)

45.5 1.2 6.7
48.8 8.5 7.3
1.6 5.7 7.3
4.5 2.6 7.1
7.4 29.7 7.1
4.7 2.4 7.1
9.2 18.1 7.3

13.5

15) 53.4 (3.56
45
84
75
90

17 15 13.56
17 16 41.69

−1 28.13
−.60

−1 28.73.

Clock slow 1^{m} $28^{s}.70$

1893
July 5.1

Chronographic Comps

15 27.67
71327 10 18 11.– Ball 103 3 8
10 19 38.40 6 55 39.85
1 27.40 0 30.88
10 19 38.40

July 6.1
15 27.67
71327 8 56 53.55 Ball 103 1 43 0.0
Ball 103 8 58 21.00 6 59 36.41
+1 27.45 0 16.92
8 58 21.00

July 6.9

Comparison with Bond 394
(eye & ear)
15 27.67
71327 6 29 60.5 Bond 394 23 12 30.
6 31 22.83 6 59 36.41
+1 22.33 3 48.67
Bond is $5^{s}.4$ slow .08
Last comp June 30.1; then $5^{s}.4$ slow 6 31 22.83

July 7.0
15 27.67
71327 7 5 31.75 Ball 103 23 48
7 6 58.66 6 59 36.41
+1 26.91 3 54.58
7 6 58.66

#93

Jun 7.9

7+327

Bull 103

July 7.~~6~~5

o' Cygni
+46° 24'

7.5	5.2	2.7
1.2	1.7	2.9
4.5	8.2	2.7
8.2	4.6	2.8
1.6	11.1	2.7
0.8	2.1	2.9
5.9	6.8	2.7

51.4

15)208(139
15
58
45
130
135

20 8 51.39
20 10 18.06
−1 26.67
00
−60
−1 27.27

assumed m = zero
m to be
determined soon

24 Vulpec
+24° 20'

2.3	3.6	5.9
5.0	14.3	6.3
7.7	8.4	6.1
0.6	5.7	6.3
3.2	2.9	6.1
0.8	6.1	5.9
4.0	2.0	6.0

48.0

15)12.06(8.04
120
60

20 10 48.04
20 12 14.66
−1 26.62
.00
.60
−1 27.22

Clock slow $\overset{m}{1}$ $\overset{s}{27}.25$

1893
July ~~8.9~~ 7.9

Chronographic Comparison

This note entered July 10.1
[Record omitted; taken on slip of paper
(~~Ball 40~~ 71327 – Ball 103 = +1 27.~~08~~ 12
Later: paper found: 71327 5 34 12.50
5 35 39.62
+1 27.12

Ball 103 ~~15~~ 15 27.67
22 13 —
7 3 32.97
3 38.98
5 35 39.62

July 9.9 71327
5 4~~4~~3 18.20
5 44 32.89
+1 14.69

Ball 103 15 27.67
22 14 —
7 11 26.08
3 39.14
5 44 32.89

Comp. with Bond
(Eye & ear.)

July 9.9 71327
5 59 67.6
6 1 35.69
+1 28.09

Bond 394 15 27.67
22 31 —
7 11 26.08
3 41.94
6 1 35.69

Bond is about 1.8 fast } Rate now about (gaining 1ˢ.7 daily)
Last comparison July 6.9

July 9.9
Note; On comparing Ball 103 this morning, found that it has been affected since July 7.9 by some unknown cause to such an extent that it is 12ˢ slow this morning (July 9.9). Bond 394 will be transferred in its place. C.F.A. circuit broken by JAD to prevent signals going out of Obsty.

July 10.1 Bond 394 is connected with relay instead of Ball 103 by Mr. Gerrish.

1893
July 10.6

74 Cygni +39°55			π Cygni +48°48		
5.8	6.9	2.7	1.8	2.7	4.5
9.5	3.7	3.2	5.4	9.4	4.8
2.5	0.6	3.1	9.0	5.3	4.3
5.6	7.5	3.1	2.8	1.7	4.5
9.0	4.2	3.2	6.4	7.9	4.3
6.5	6.3	2.8	3.9	8.4	4.3
1.6	1.3	2.9	1.7	2.6	4.3

16.6
15) 247.6 (16.507
90
76
75
100

27.25
15) 108.25 (7.217
105
32
30
25
15
100

21	31	16.51	21	41	27.22
21	32	41.85	21	42	52.45
	−1	25.14		−1	25.23
		−60			−60
	−1	25.74		−1	25.83

assuming n to be zero

Giving 74 Cygni weight 3 (N) (07)   3 × 74 = 222
" π Cygni 1 (.24)   1 × 83 = 83
4) 305
76

Clock slow 1m 25.s76

1893

Chronographic Comp.

July 10.6

7132~~7~~ 21ʰ 43 42.29 Bond 394 14 12 15 27.67
21 45 10.27 7 15 22.64
+1 27.98 2 19.96
21 45 10.27

July 11.0 71327 8 10 25.76 Bond 394 0 37 15 27.67
8 11 52.95 7 19 19.20
+1 27.19 0 6.08
8 11 52.95

July ~~12.0~~ 12.0 71327 6 39 8.35 Bond
Beck 394 23 2 0.00 15 27.67
6 40 33.90 7 19 19.20
+ 1 25.55 3 47.03
6 40 33.90

July 12.0 Eye+ear. Ball 103
71327 7 23 0.0 Bond 103 23 45 33.0 15 27.67
7 24 14.1 7 19 19.2
+ 1 14.1 3 54.2
7 24 14.1

Ball. about 11ˢ ~~fast~~ slow

July 13.0 71327 6 32 4.05 Bond 394 22 51 0.00 15 27.67
6 33 28.65 7 23 15.76
1 24.60 3 45.22
30 33 28.65

1893

Chronographic Comp -

						15	27.67	
July 13.0	7 13 27	7 10 50.8	Ball 10 3	23	29	30.00		
		7 12 5.0		7	23	15.76		
		+ 1 14.2			3.	51.54		
				7	12	4.97		

Ball about $12^{s}.3$ slow.

added 5 gr.

J.A.D. obsr.

July 13.2

+19°45 α Boötis			+38°47 γ Boötis		
9.7	9.4	9.1	4.2	4.7	8.9
2.4	7.0	9.4	7.6	1.2	8.8
5.1	4.3	9.4	0.7	8.3	9.0
7.8	1.5	9.3	3.8	4.9	8.7
0.2	9.1	9.2	7.0	1.7	8.7
6.8	2.5	9.3	4.9	3.8	8.7
0.6	8.5	9.1	4.5	9.0	8.5
		24.5			24.4
		15)69.3			15)65.7

14 9 24.62 — 14 26 24.38

14 10 48.41 — 14 27 47.97

−1 23.79 — −1 23.59

+.16 — −.03

−.60 — −.60

−1 24.23 — −1 24.22

Clock slow 1m 24.22

F. E. Fowle obsr

this star taken from a practice sheet of Mr Fowle and not being used as a time star the record is not preserved

July 13.3

η Ophiuchi

−15°35

8.7 7.3 6.0

1.4 4.9 2.3 6.3

4.0 2.3 9.8 6.3

6.4 9.8 7.0 6.2

8.8 5.3 7.0 0.8 6.8

5.4 9.2 7.0 0.8 6.2

9.2 7.0 ~~5.3.2~~ 6.2

53.2

15)46.2

17 2 53.08

17 4 16.97

−1 23.89

this, in the absence of a star sufficiently far north, will, when combined with γ Boötis, observed a few hours earlier, decl. +39° give an approximate n.

The N term to be used as positive for stars south of zenith

n = .3

July 14.0 71327 6 49 3.93
6 50 27.34
+1 23.41

~~Ball 103~~ Bond 394
15 27.67
23 ~~14~~ 0.00
7 27 12.31
3 47.36
6 ~~05~~ 50 27.34

July 14.9 71327 5 54 51.44
5 56 14.37
+1 22.93

~~Ball 103~~ Bond 394
22 6 0.00
15 27.67
7 31 8.87
3 37.83
5 56 14.37

July 16.0 71327
8 12 4.65
8 ~~14~~ 13 ~~45.06~~ 32.78
~~+ 35.41~~
+1 23.13

Bond 394
15 27.67
0 19
7 39 1.99
3.12
~~1 15.40~~
~~8 14 45.06~~
8 13 32.78

[illegible]

July 17.0 71327 7 57 35.5
7 58 56.30
+1 20.80

Ball 103
15 27.67
0 0 3.00
7 42 58.55
.08
58 56.30

Ball no. 103 is about 1.4 slow
last comparison July 13.0; then $12^s.3$ slow
Rate gaining 2.7 daily; Rem 1 gr. to lessen rate

Ball 103 merely kept at approximate time

July 17.0 71327 8 26 8.70
8 27 30.98
+1 22.28

Bond 394
15 27.67
0 29
7 42 58.55
4.76
8 27 30.98

1893
July 17.5 7132 20 40 9.57 [Bond 394] 12 41 0.00
20 41 31.23 15 27.67
+ 1 21.66 7 42 58.33
2 5.01
20 41 31.23

July 17.9 7132 6 37 47.97 Bond 394 22 37 15 27.67
6 39 9.14 3 42.92
+1 21.17 7 42 58.33
6 39 9.14

July 18.5 7132 20 44 6.33 [Bond 394] 12 41 0.0
20 45 27.78 15 27.67
+1 21.45 7 46 55.10
2 5.01
20 45 27.78

July 19.0 7132] Bond 394] 15 27.67
7 41 53.56 23 37
7 43 15.55 7 46 55.10
+1 21.99 3 52.78
7 43 15.55

These three stars below observed by Mr. Forde on July 19th but he omitted to put down the star designations or the sidereal time. Knowing approximately the mean time he observed I converted into sidereal time as follows;

M. Time 10h 25m =		15	27.67
	10	25	—
	7	50	51.69
		1	42.00
	18	33	1 Sid. Time

Next reading up the stars and for convenience sake assuming a temporary minute for the first star I determined the observed diff. in min. & seconds between the stars as follows; 1st star minus 2nd = 7m 44.42; 2nd minus 3rd = 4m or 5m probably 5. Searching in the Jahrbuch and knowing that all the three stars were observed in a limit of (3rd star − 1st) 12 min. I assumed the stars were, α Lyrae +38° 41, 110 Herculis +20° 26; and β Lyrae +33° 14'; next, I computed the first tally wire

According to your instruction these data were put on seperate piece of paper & I would have transferred them when I read them up. Supposing this only a practice sheet I did not suppose Mr. Dunne would need them. Forde

0.3	0.3	0.6	9.7	9.7	9.4	1.1	7.0	8.1
3.5	7.2	0.7	23	7.1	9.4	4.0	4.3	8.3
6.5	39	0.4	49	4.3	9.2	7.5	1.2	8.7
9.6	1.0	0.6	7.5	20	9.5	0.3	8.4	8.7
2.7	7.5	0.2	0.2	9.2	9.4	3.0	5.3	8.3
0.9	9.8	0.7	7.0	2.5	9.5	0.1	7.9	8.0
5.5	50	0.5	0.9	85	9.4	~~7.24~~ 4.8	3.5	8.3
	0.3			44.6			49.15	
[0]	0.27		[7]	44.69		[11 or 12]	49.17	

interval for each star at its declination as follows;

α Lyrae, +38° 41	110 Herculis +20° 26	β Lyrae +33° 14'
0.4014	0.4014	0.4014
0.1077	0.0281	0.0774
0.5091	0.4295	0.4788
3.2 (computed)	2.7 (computed)	3.0 (computed)

By inspecting the above chronograph readings we see that the observed intervals respectively are

3.2 (observed	2.7 (observed	3.0 (observed)

this checks nicely, and assuming the stars identified, and rejecting now the minutes in brackets which were only used for convenience ~~at~~ we have

0.27 (seconds of T)	44.69 (seconds of T)	49.17 (seconds of T)
18 33 21.40 = α	18 41 5.84 = α	18 46 10.24 = α
−1 21.13	−1 21.15	−1 21.04
+03	+.15	+.08
−.60	−.60	−.60
−1 21.70	−1 21.60	−1 21.56

assuming n = .3

P.S. July 22; Saw Mr Forde who verified my assumption as to the stars observed. Had mislaid his packet containing notes.

Clock is slow 1m 21.62s

J A Dunne

1893

Eye & Ear.

July 20.1 71327 10 0 38.5
10 2 4.20
+1 25.70

Ball 103 ~~5~~ 1 51 30.0 (15 27.67)
0 18.23
0.08
2 7 15.98
7 54 48.22
10 2 4.20

Ball 103 is about 4.3 fast; last comp. taken on July 17.0; then 12.3 slow.
Rem 3 gr July 20.1

July 20.1 71327 10 13 16.29
10 14 36.26
+1 19.97

Bond 394
15 27.67
2 4
7 54 48.22
0 20.37
10 14 36.26

July 21.2 71327 12 41 37.57
12 42 56.48
+1 18.91

Bond 394
15 27.67
4 28
0 44.03
7 58 44.78
12 42 56.48

Eye & ear

July 21.9 71327
7 26 34.6
7 28 0.79
+1 26.2

Ball is 57 fast
Rem 2 gr

Ball 103
15 27.67
23 10
7 58 44.78
3 48.34
7 28 0.79

July 22.2

71327 14 25 48.88
14 27 9.45
+1 20.57

Bond 394
15 27.67
6 8
8 2 41.33
1 0.45
14 27 9.45

July 24.0

71327 9 6 49.39
9 8 9.02
+1 19.63

Bond 394
15 27.67
~~12~~ 0 42
8 10 34.45
~~2 5.18~~
0 6.90
~~9 10 7.30~~
9 8 9.02

(eye & ear)

July 25.3

71327 15 15 45.6
15 17 5.38
+1 19.78

Bond 394
15 27.67
6 46
8 14 31.01
1 6.70
15 17 5.38

July 26.3

71327
15 31 43.78
15 33 3.91
+1 20.13

Bond 394
15 27.67
6 58
8 18 27.57
1 8.67
15 33 3.91

July 27.2

71327 14 33 30.45
14 34 50.27
+1 19.82

Bond 394
15 27.67
5 56
8 22 28.12
0 58.48
14 34 50.27

1893

July 23.5

F.E.F. obs

ζ Aquilae			θ Lyrae			β Cygni		
+13° 42'			+37° 58'			+27° 44'		
8.0	6.0	4.0	2.1	1.4	3.5	0.3	3.5	3.8
0.6	3.6	4.2	5.4	8.4	3.8	3.5	0.9	4.4
3.1	1.1	4.2	8.4	5.4	3.8	6.0	8.0	4.0
5.3	8.8	4.1	1.6	2.3	3.9	8.9	5.1	4.0
8.2	6.0	4.2	4.6	9.2	3.8	1.8	2.3	4.1
4.7	4.7	4.4	2.4	1.2	3.6	8.7	5.4	4.1
8.5	6.0	4.5	7.4	6.5	3.9	3.0	1.1	4.1
	122			220			7.0	
	15)318			15)283(189 15 133 120 130			15)105.5(7.03 1.05 0.50	
	12.12							
18	59	12.12	19	11	21.89	19	25	7.03
19	0	32.02	19	12	41.63	19	26	26.81
	−1	19.90		−1	19.74		−1	19.78
		+22			+04			+12
		−.60			−.60			−60
	−1	20.28		−1	20.30		−1	20.26

28 } 27 } 29
26 } 30 }

Clock slow 1m 20.29s

F. E. Fowle obs

July 27.5

ι Lyrae
+35° 56

50 2.5 7.5
8.1 9.7 7.8
1.2 6.6 7.8
4.0 36 7.6
7.0 04 7.4
4.5 29 7.4
9.2 84 7.6

14.0
15)57.1(3.80
45
121
120
10

13.80

19 2 13.80
19 3 31.50
−1 17.70
+06
−.60
−1 18.26

θ Lyrae
+37° 56

4.2 38 8.0
7.3 04 7.7
0.2 7.2 7.4
34 4.2 7.6
6.6 1.1 7.7
4.3 30 7.3
9.2 87 7.9

24.0
15)57.6(3.84
45
126
120
60

23.84

19 11 23.84
19 12 41.62
−1 17.78
+04
−.60
−1 18.34

β Cygni
+27° 43'

2.5 5.4 7.9
5.3 3.0 8.3
8.1 3.0 8.1
0.8 7.0 7.8
3.7 4.5 8.2
0.8 7.5 8.3
4.8 3.5 8.3

~~134~~
9.1
15)136.0(9.06
135
100
90
100

19 25 9.06
19 26 26.83
−1 17.77
+12
−.60
−1 18.25

26
34
25)
85
28

Clock slow 1^m $18^s.28$

Chronograph Comp.

July 28.2

7132 7 15 25 34.76 Bond 394 ~~15 25~~ 15 ~~15.5~~ 27.67
15 26 54.72 6 44
+1 19.76 8 26 20.68
1 6.37
15 26 54.72

Ball 103 Comparison
eye Dean.

15 27.67
July 29.2 7132 7 13 0 2.5 Ball 103 4 15
13 1 26.80 8 30 17.24
+1 24.30 0 41.89
13 1 26.80

Ball 103 is about 6.9 fast
Last comp. July 21.9: then 5.7 fast

July 29.2

15 27.67
7132 7 13 20 11.45 Bond 394 4 35
13 21 30.09
~~13 22 8.69~~ 8 30 17.24
0 45.18
~~1 57.24~~ ~~1 23.78~~
+1 18.64
13 ~~22 8.69~~
21 30.09

July 31.0 7132 7 Bond 394 15 27.67
9 9 24.82 0 17
9 10 40.81 8 38 10.35
+1 15.99 0 2.79
9 10 40.81

July 29 5

θ Lyrae			β Cygni			θ Cygni,		
+37° 56			+27° 44			+49° 58		
5.0	4.5	9.5	3.3	6.4	9.7	3.3	6.2	9.5
8.2	1.4	9.6	6.1	3.7	9.8	7.2	2.6	9.8
1.3	8.1	9.4	.89	0.9	9.8	1.0	.86	9.7
4.4	5.0	9.4	1.8	7.8	9.6	5.0	5.0	0.0
7.5	2.0	9.5	4.5	5.2	9.7	8.8	1.0	9.8
5.2	4.2	9.4	1.4	8.1	9.5	8.4	1.4	9.8
0.0	9.4	9.4	5.8	4.1	9.9	4.4	5.7	0.1
249			99			200		
15)71 (4.74			15)1479 (9.86			15)1487 (19.24		
60			135			135		
111			129			37		
105			120			30		
60			90			70		

19	11	24.74	19	25	9.86	19	32	19.92
19	12	41.62	19	26	26.83	19	33	36.83
	−1	16.88		−1	16.97		−1	16.91
		+.04			+.12			+.09
		−.60			−.60			−.60
	−1	17.44		−1	17.45			17.60

44 } 44 }
45 } 60 } 52

Clock slow 1m 17.52s

1893

Aug 1.2 71327 14 31 11.60 Bond 394

14 32 29.45

+1 17.85

15 27.67

5 34

8 42 6.91

0 54.87

14 32 29.45

Aug 4.0 71327 10 43 19.80 Bond 394

10 44 39.69

+1 19.89

15 27.67

1 34

8 53 56.58

0 15.44

10 43 39.69

Aug 5.2 71327 14 25 58.50 Bond 394

14 27 12.22

+ 1 13.72

15 27.67

5 13 0.00

8 57 53.13

0 51.42

14 27 12.22

Aug 7.2 71327 13 53 52.67 Bond 394

13 54 58.77

1 6.10

(Bond chr. 6.7 slow: Trouble?)

15 27.67

4 33

9 5 46.25

0 44.85

13 54 58.77

---

eye & ear

Aug 7.2 71327 14 17 42.5 Ball 103

14 19 2.71

1 20.21

15 27.67

4 57 00.00

9 5 46.25

0 48.79

14 19 2.71

NB: Disconnected C.F.A. wire.

Aug 25, 1893

β Cygni			θ Cygni			δ Cygni		
+27 44			+49 58			+44 51		
54	8.2	3.6	55	84	3.9	24	84	0.8
8.3	55	3.8	93	44	3.7	6.1	50	1.1
1.0	27	3.7	30	08	3.8	9.1	14	05
38	00	38	68	6.6	3.4	2.7	82	0.9
65	7.1	3.6	05	3.0	3.5	6.1	4.3	0.4
3.3	0.1	3.4	05	33	38	48	58	0.6
7.4	61	35	6.0	78	38	0.1	08	0.9
	118			219			25.5	
	15⟌27 21.81 15 122 120 20			15⟌278 2185 15 128 120 80			5⟌59 38 45 120 120	
19	25	11.81	19	32	21.85	19	40	25.38
19	26	26.82	19	33	36.80	19	41	40.33
	−1	15.01		−1	14.95		−1	14.95
		+12			−.08			−.03
		−60			−60			−60
	−1	15.49		−1	15.63		−1	15.58

49
63
58
170
57

Clock slow 1^m $15^s.57$

1893

F. E. Fowle obser
J.C. Folker

Aug 5.5

δ Cygni -			ψ Cygni -		
+44° 51'			+52° 9'		
3.9	9.9	53.8	2.8	9.2	2.0
7.4	6.6	54.0	6.7	5.4	2.1
1.0	3.0	54.0	0.9	1.1	2.0
4.4	9.7	54.1	5.0	7.0	2.0
7.9	6.2	53.9	8.9	3.1	2.0
6.6	7.5	54.1	9.0	3.1	2.1
1.7	2.3	53.9	5.½	7.½	2.1
		27.0			41.0
		15) 40.45			15) 15.23
19	40	26.99	19	51	41.02
19	41	40.31	19	52	54.29
	-1	13.32		-1	13.27
		-.60			-.60
		-.03			-.11
-1		13.95	-1		13.98

Mean - 1 13.96

∴ Clock slow 1m 13s.96.

Aug 7.5

7327 19 37 47.76 Rad 394

19	37	47.76
19	38	55.11
+1		7.35

10	16	0.00
	15	27.67
9	5	46.25
	1	41.19
19	38	55.11

Aug 7.9

eye & ear.

71327 6 41 53.2
6 43 3.92.
+1 10.72

Bnd 394 21 18 20.00
15 27.67
3 29.94
.06
9 5 46.25
30 43 3.92

71327 6 42 33.3
6 43 44.03
+1 10.73

Bnd 394 21 19
15 27.67
3 30.11
9 5 46.25
6 43 44.03

Mean +1 10.70 { Bnd now 2.3 slow.

Cambridge Fire Dept. called up through telephone and requested signals (which were broken yesterday afternoon); gave them connections and informed them signals would be 2.3 slow.

Aug 8.1 (2h 45m)

Rem. 15 gr from B394.

Comp. (eye & ear) ~~1st~~

71327 12 14 26±
12 15 38.40
+1 12.40

B394 2 50
15 27.67
9 9 42.80
0 27.93
12 15 38.40

Aug 8.2 (4h 32m)

Comp. (eye & ear)

71327 13 56 43
13 57 55.15
+1 12.15

B394 4 32
15 27.67
9 9 42.80
0 44.68
13 57 55.15

Aug 8.5

71327 19 43 40.45
19 44 51.99
+1 11.54

B394 10 18. 0.00
15 27.67
9 9 42.80
~~4 41~~ 41.52
19 44 51.99

1893
Aug 8.8

ap Dean

15 27.67
71327 7 1 53.± Bond 394 21 34 20
7 3 3.10 9 7 42.80
+1 10.10 3 32.57
06
7 3 3.10

Aug 9.5

15 27.67
71327 20 11 39.74 B394 10 42 0.00
20 12 52.49 9 13 39.36
+1 12.75 1 45.46
20 12 52.49

Aug 9.6

71327 0 54 25.76 B394 15 24 0.0
0 55 38.82 15 27.67
+1 13.06 9 13 39.36
2 31.79
0 55 38.82.

Aug 9.9

ap Dean

71327 Bond 394
15 27.67
8 12 37.6 22 41 —
8 13 50.61 9 13 39.36
+1 13.01 3 43.58
8 13 50.61

Aug 10.5

15 27.67
71327 19 45 31.25 B394 10 12 0.00
19 46 44.12 9 17 35.91
+1 12.87 0 4 40.54
19 46 44.12

F. E. Fowle obser

Aug 9.5

θ Cygni			δ Cygni –		
+49° 57′			+44° 51′		
9.8	2.6	2.4	6.5–	2.9–	9.4
3.7	9.0	2.7	0.3	9.4	9.7
7.6	4.5	2.1	3.9	5.8	9.7
0.6+	1.2	2.8	7.2–	2.5–	9.5
4.9	7.3	2.2	0.6	8.9	9.5
4.9	7.9	2.8	9.5–	0.3–	9.8
0.5	1.8–	2.3	~~4~~6	5.1+	9.7
		26.3+			30.0
		15) 39.36			15) 44.73

19^h	32^m	26.24^s	19^h	40^m	29.82
19	33	36.74	19	41	40.29
	–1	10.50		–1	10.47
		–.60			–.60
		–.08			–.03
	–1	11.18		–1	11.10

clock slow 1^m $11^s.14$

1893

J. E. F. Ass

Aug 8.5

φ Cygni			ο¹ Cygni			ν Cygni		
+52° 9'			+46° 24'			+39° 54'		
4.8	1.2	6.0	2.9 ~~6.0~~	0.9	3.8	3.8	4.8	8.6
8.7+	7.4	6.1	6.4 ~~1.4+~~	7.4	3.8	7.1	1.7	8.8
2.9-	3.0	5.9	0.0 ~~7.8~~	3.6	3.6	0.2	8.6	8.8
6.9-	9.0	5.9	3.6 ~~2.3~~	0.1	3.7	3.4	5.3	8.7
0.9	5.1	6.0	7.2 ~~7.7~~	6.5 ~~3.6~~	3.7	6.6-	1.9	8.5
0.9	4.9	5.8	6.0 ~~6.5~~	7.7 ~~0.4~~	3.7	4.7-	4.0	8.7
7.0-	8.9	5.9	1.4 ~~0.1~~	2.3 ~~7.4+~~	3.7	9.4	9.1	8.5
		43.0		33.6	6.9			44.3
		15)446			15)1029			15)649

19	51	42.97	20	9	6.86	20	17	14.33
19	52	54.27	20	10	18.22	20	18	25.79
	-1	11.30		-1	11.36		-1	11.46
		-.60			-.60			-.60
		-.11			-.04			+.03
	-1	12.01		-1	12.00		-1	12.03

Clock slow 1m 12.01s

Aug 11.5

71327	19h	36m	26.35s
	19	37	38.54
	+1		12.19

β394	9	59	0.00
		15	27.67
	9	21	32.47
		1	38.40
	19	37	38.54

1893

F. E. Fowler

Aug 12.5

71327 19 52 27.82
19 53 37.07
+ 1 9.25

B394 10 11 0.00
15 27.67
9 25 29.03
+ 1 40.37
19 53 37.07

71327 20 58 30.0
20 59 47.9
+ 1 17.9

Bul 103 11 17 0.0 Eye + Ear
15 27.7
9 25 29.0
1 51.2
20 59 47.9

Aug 13.5

71327 19 59 24.81
20 0 34.11
+ 1 9.30

B394 10 14 0.00
15 27.67
9 29 25.58
1 40.86
20 0 34.11

φ Cygni
+52° 9′

7.2+ 3.5– 0.7
1.6 9.9 1.5
5.3. 5.6 0.9
9.3. 1.6 0.9
3.3. 7.5 0.8
3.9. 7.3 1.2
9.2. 1.5 0.7

45.6
15)823

19^h 51^m 45.49
19 52 54.21
– 1 58.72
–.60
–.11
–1 9.43

Current failed for other stars tonight.

J. E. F. fer.

1893

Aug 14.5	Σ1327	20 23 24.67	β394	10 34 0.00
		20 24 33.96		15 27.67
		+1 9.29		9 33 22.14
				1 48.15
				20 24 33.96

Aug 15.5	Σ1327	19 45 15.49	β394	9 52 0.00
		19 46 23.61		15 27.67
		+1 8.12		9 37 18.69
				1 37.25
				19 46 23.61

δ Cygni			ψ Cygni			O¹ seq Cygni		
+44°51'			+52°9'			+46°25'		
9.6-	5.5	5.1	8.3+	4.7	3.0	6.4	4.3	0.7
3.1	2.0	5.1	12.3-	0.7	3.0	0.1+	1.0	1.1
6.4	8.6+	5.0	6.5	6.7	3.2	3.5+	7.3	0.8
9.9+	4.9	4.8	0.5	2.6	3.1	7.3	3.7	1.0
3.6-	1.6	5.2	4.5	8.6	3.1	0.8+	9.9	0.7
2.0	3.0	5.0	4.7	8.4	3.1	9.6	1.3	0.9
7.6	7.8+	5.4	0.7	2.4	3.1	4.9	5.9	0.8
		32.5			46.7			10.5
		15)38.1			15)98.3			15)6.5
19	40	32.54	19	51	46.55	20	9	10.43
19	41	40.23	19	52	54.19	20	10	18.17
	-1	7.69		-1	7.64		-1	7.74
		-.60			-.60			-.60
		-.02			-.12			-.04
	-1	8.31		-1	8.36		-1	8.38

Clock slow $1^m\ 8^s.35$

J. E. Fisher

1893.

Aug 16.5	Ƶ1327	20	15	16.67	β394	10	18	0.00	
		20	16	24.44			15	27.67	
		+	1	7.77		9	41	15.25	
							1	41.52	
						20	16	24.44	
	Ƶ1327	22	4	28.7	B103	12	7	0.0	Eye+Ear
		22	5	42.4			15	27.7	
		+	1	13.7		9	41	15.3	
							1	59.4	
						22	5	42.4	
Aug 17.5	Ƶ1327	20	12	12.68	B394	10	11	0.00	
		20	13	19.85			15	27.67	
		+	1	7.17		9	45	11.81	
							1	40.37	
						20	13	19.85	
Aug 18.5	Ƶ1327	20	43	13.46	B394	10	38	0.00	
		20	44	20.84			15	27.67	
		+	1	7.38		9	49	8.36	
							1	44.81	
						20	44	20.84	
	Ƶ1327	21	11	15.7	B103	11	6	0.0	Eye+Ear
		21	12	25.5			15	27.7	
		+	1	9.8		9	49	8.4	
							1	49.4	
						21	12	25.5	

1893

Aug 19.5	Z1327	20	5	5.43	B394	9	56	0.00	
		20	6	10.50			15	27.67	
		+	1	5.07		9	53	4.92	
							1	37.91	
						20	6	10.50	
Aug 20.5	Z1327	20	10	1.79	B394	9	57	0.00	
		20	11	7.21			15	27.67	
		+	1	5.42		9	57	1.47	
							1	38.07	
						20	11	7.21	
	Z1327	20	40	5.6	B103	10	27	0.0	Eye + Ear.
		20	41	12.2			15	27.7	
		+	1	6.6		9	57	1.5	
							1	43.0	
						20	41	12.2	
Aug 21.5	Z1327	20	25	1.54	B394	10	8	0.00	
		20	26	5.58			15	27.67	
		+	1	4.04					
							1	39.88	
						10	0	58.03	
						20	26	5.58	
Aug 22.5	Z1327	20	38	59.92	B394	10	18	0.00	
		20	40	3.77			15	27.67	
		+	1	3.85		10	4	54.58	
							1	41.52	
						20	40	3.77	

J. E. F.

Aug 21.5
1893.

O' seg. Cyg.			γ Cygni		
+46°24'			+39° 54'.		
0.3	8.3	8.6	1.3	2.3	3.6
3.9+	4.7	8.6	4.6+	9.1	3.7
7.4−	1.0	8.4	7.7+	6.0	3.7
1.1+	8.4	8.5	1.0	2.7	3.7
4.5−	3.9	8.4	4.1−	9.3	3.4
3.6	5.1	8.7	23	1.3	3.6
8.9+	9.5	8.4	7.2	6.5	3.7
		14.3			22.0
		15)39			15)274
20^h	9^m	14.26	20^h	17^m	21.83
20	10	18.11	20	18	25.72
	−1	3.85		−1	3.89
	−	.60		−	.60
	−	.04		+	.02
	−1	4.49		−1	4.47

∴ Clock #1327 slow 1^m 4^s.48

Aug 22.5

#1327	22	39	20.0	B703	12	18	0.0 Eq. tim-
	22	40	23.5			15	27.7
	+	1	3.5		10	4	54.6
						2	1.2
					22	40	23.5

Aug 23.5

#1327	20	38	54.77	B394	10	4	0.00
	20	39	58.03			15	27.67
		+1	3.26		10	8	51.14
						1	39.22
					20	39	58.03

1893.

Aug 23.5 Z1327 24 4 1.9 B103 10 39 0.0 Ey + Een.

21 5 3.8 15 27.7

+ 1 1.9 10 8 57.1

1 45.0

~~1 45 0.0~~

24 05 03.8

Aug 24.5 Z1327 20 41 53.44 B394 10 13 0.00

20 42 56.06 15 27.67

+ 1 2.62 10 12 47.69

1 40.70

20 42 56.06

η Pegasi			λ Pegasi,			o Androm.		
+28°39'			+22° 60'			+41° 44'		
3.0	6.9	9.9	8.0	8.8	6.8	~~9.3~~	~~2.0~~	(Sent out ½ guess, so reject)
6.0	4.7	0.1	0.7	6.4	7.1	2.9.	8.9	1.8
8.9-	1.3	0.2	3.3+	3.6	6.9	6.0	5.7-	1.7
1.7-	8.4	0.1	6.0	0.9	6.9	9.2+	2.3	1.5
4.3	5.6	9.9	8.7	8.3	7.0	2.6-	9.0	1.6
1.4	8.6	0.0	5.4	1.7	7.1	0.8.	0.6	1.4
5.7	7.3	0.0	9.3+	7.5	6.8	5.9	5.6	1.5
		0.01			23.4+			0.9
	15)	.2		15)	42.0		13)	10.4
22	~~38~~ 36	0.01	22	~~37~~ 40	23.47	22	56	0.80
22	37	~~25.50~~ 61.82	22	41	25.30	22	57	2.48
−	1	1.81	−	1	1.83	−	1	1.68
		−.60			−.60			−.60
+		.10			+.15			.00
−1		2.31	−1		2 28	−1		2.28

Clock slow 1^m $2^s.29$,

1893

Aug 25.5

#1327	20	30	49.69	B394	9	58	0.00
	20	31	50.16			15	27.67
	+	1	0.47		10	16	44.25
						1	38.24
					20	31	50.16

λ Cygni			ε Cygni			α Cygni		
+36°5'			+33°34'			+44°53"		
6.7	4.5	1.2	5.9	2.2	8.1	5.0	1.2	6.2
9.9	1.6	1.5	9.0	9.3	8.3	8.6	7.8	6.4
2.7	8.5	1.2	1.9	6.3	8.2	2.1	45	6.6
5.7	5.6	1.3	4.8	3.3	8.2	5.5	0.9	6.4
8.8	2.4	1.2	7.8	0.4	8.2	9.0	7.3	6.3
6.5	4.7	1.2	5.2	3.0	8.2	7.8	8.6	6.4
11.2	20.2	1.3	9.7	8.6	8.3	2.8	3.6	6.4
		15.6			54.1			48.3
	15)	95		15)	16		15)	30
20	42	15.63	20	40	54.11	20	36	48.20
20	43	16.88	20	41	55.41	20	37	49.47
	−1	1.25		−1	1.30		−1	1.27
	−	.60		−	.60		−	.60
	+	.05		+	.08		−	.03
	−1	1.80		−1	1.82		−1	1.90

Clock slow −1m 1.85

#1327	22	41	6.7	B103	12	8	0.0	Ey thin
	22	42	11.5			15	27.7	
	+	1	4.8		10	16	44.2	
						1	59.6	
					22	42	11.5	

1893

aug 26.5	Ƶ1327	20^{h}	40^{m}	47.60^{s}	B394	10^{h}	4^{m}	0.00^{s}
		20	41	47.69			15	27.67
		+	1^{m}	0.09^{s}		10	20	40.80
							1	39.22
						20	41	47.69

γ Cygni -

+40° 45′

1.7	3.5	5.2	−1	0.85
4.9+	0.3	5.2	−	.60
8.3	7.0	5.3	+	.02
1.6	3.8	5.4	−1	1.43
4.8-	0.6	5.4		
3.1	2.3	5.4		
7.9-	7.6	5.5		
~~2.7~~		12.7		
		15)101		

∴ Ƶ1327 in 1^{m} $1^{s}.43$ slow,

20^{h}	52^{m}	12.67
20	53	13.5$\overset{2}{5}$
−	1	0.85

aug 27.5	Ƶ1327	20	37	41.85	B394	9	57	0.00
		20	38	43.09			15	27.67
		+	1	1.24		10	24	37.35
							1	38.07
						20	38	43.09

Ƶ1327	20	5~~4~~5	41.7	B~~3~~403	10	15	0.0	Eqn + Ec
	20	56	46.1			15	27.7	
	+	1	4.4		10	24	37.4	
						1	41.0	
					20	56	46.1	

1893

Aug 28.5 Σ1327 20 42 38.98
20 43 39.82
+1 0.84

β39$\overset{4}{7}$ 9 58 0.00
15 27.67
10 28 33.91
1 38.24
20 43 39.82

Aug 29.5 Σ1327 20 46 36.33
20 47 36.37
+1 0.04

β394 9 58 0.00
15 27.67
10 32 30.46
1 38.24
20 $\overset{4}{3}$7 36.37

ν Cygni.
+40° 45′
2.9 5.0 7.9
6.4. 1.8 8.2
9.6 8.4 8.0
2.8 5.1 7.9
6.1+ 1.9 8.0
4.1+ 3.8 $\overset{}{7}$.9
9.2 9.0 8.2
14.1
15)602
20 52 14.01
20 53 13.49
−0 59.48
− .60
+ .02
−1 0.06

61 Cyg. prec.
+38° 13′.
9.3 2.9 $\overset{4}{8.3}$
$\overset{9.8}{6.0}$
2.7 9.7 8.7
5.7 6.6 8.6
8.9. 8.6 8.6
2.0 4.0 8.6
~~9~~.9 . ~~9.4~~ 8.5
4.6 8.6
~~4.6~~
9.4
15 44
21 1 9.29
21 2 8.60
−1 59.31
− .60
+ .04
59.87

[illegible] − D″ $5\overset{3}{9}$.97

1893

Aug 29.5	Ƶ1327	22	~~37~~ 41	~~53.0~~ 53.7	B103	11	~~49~~ 53	0.0	Eq + Ecu -
		22	42	55.3			15	27.7	
		+	1	1.6		10	32	30.5	
							1	57.1	
						22	42	55.3	
Aug 30.5	Ƶ1327	20	41	31.66	B394	9	49	0.00	
		20	42	31.45			15	27.67	
		+	0	59.79		10	36	27.02	
							1	36.76	
						20	42	31.45	
	Ƶ1372	23	9	55.7	B103	12	17	0.0	Eq Ecu
		23	10	55.8			15	27.7	
		+	1	0.1		10	36	27.0	
							2	1.1	
						23	10	55.8	
Aug 31.5	Ƶ1327.	21	17	33.89	B394	10	21	0.00	
		21	18	33.26			15	27.67	
		+	0	59.37		10	40	23.57	
							1	42.02	
						21	18	33.26	

σ Cygni.
+38° 56'

6.9 6.8 $\overset{3}{3}$.7
9.8+ $\overset{3}{8}$.5 3.4
2.5 0.5 3.0
6.0 7.3 3.3
9.2. 4.3 3.6
7.4 6.3 3.7
1.8 1.4 3.2
16.6

21 12
Place not in almanac

74 Cygni
+39° 55'

3.1 4.2 7.3
6.5 0.9 7.4
9.4 7.8 7.2
2.5 4.7 7.2
5.9 1.3 7.2
3.8 3.5 7.3
8.7 8.5 7.2
43.7
15)54.5

21 31 43.63
21 32 42.14
− 0 58.51
− .60
+ .02
− 0 59.09

∴ Clock slow on 59.$\overset{8}{0}$9

Sept 1.5 Σ1327 20 $\overset{2}{3}$9 22.56
20 30 21.27
+ 0 58.71

β394 9 29 0.00
15 27.67
10 44 20.13
1 33.47
20 30 21.27

Sept 2.5 Σ1327 $\overset{21^h}{}$ 21 28.9
21 22 25.8
+ 0 56.9

β103 10 17 0.0 Eq. Tem.
15 27.7
10 4~~4~~ $\overset{8}{}$ ~~20.7~~ 16.7
1 41.4
21 22 25.8

1893

Sep 2.5 Z1327 21 15 26.61 B394 10 11 0.00
21 16 24.72 15 27.67
+ 0 58.11 10 48 16.68
1 40.37
21 16 24.72

Sep 2.5 7 Cygni 74 Cygni
+37° 35′ +39° 55′

7.0	6.0	3.0	4.3	5.5	9.8
10.0	3.0	3.0	7.6	2.3	9.9
2.1	9.9	3.0	0.9	9.1	10.0
6.4	6.6	3.0	4.0	5.9	9.9
9.3	3.7	3.0	7.2	2.7	9.9
7.2	5.8	3.0	5.3	4.6	9.9
2.0	1.0	3.0	0.1	9.8	9.9
		36.6			44.9
		15)97.6			15)742

21 9 36.57
not in Jahrbuch

21 31 44.95
21 32 42.13
— 0 57.18
.60
—
~~+ 5 .03~~

∴ Cl, ~~0 57.18~~ slow —
0 57.75

Sep 3.5 71327 21 35 26.43 B394. 10 27 0.00
21 36 23.91 15 27.67
+ 0 57.48 10 52 13.24
1 43.00
21 36 23.91

1893.
Sept 2.5

Σ1327 20 3 17.84
21 4 14.55
0 56.71

B394 9 51 0.00
15 27.67
10 56 9.79
1 37.09
21 4 14.55

Sept 3.5

θ Pers.
+48° 47'

4.7+	5.0	9.3
8.0	1.8	9.8
1.9	8.1	0.0
5.8	4.2	9.7
9.7 ~~7.4~~	0.6	9.9
8.8	1.1	9.9
4.3	5.6	9.9
		0.0

15) 1485

2 35 59.92
2 36 56.23
− 0 56.31
− .60
− .07
− 0 56.98

τ Persei.
+52° 20'

8.5−	4.8	3.3
2.3	1.1	3.4
6.5−	7.3	3.8
0.8	3.0	3.8
4.6	8.9	3.5
4.7+	8.8	3.5
0.9	3.0	3.9

46.9
15) 121

2 45 46.81
2 46 43.04
− 0 56.23
− .60
− .12
− 0 56.95

∴ Cl. slow 0^m 5$\overset{5}{6}$.97

Sept 5.5

Σ1327 14 24 8.93
14 25 5.06
+ 0 56.13

B394 3 9 0.00
11 0 6.34
15 27.67
0 31.05
14 25 5.06

1893

Sept. 6.6 ∓1327 2 30 4.83 B394 15 9 0.00

2 30 59.90 | 15 27.67

+ 0 55.07 | 11 4 2.90

2 29.33

2 30 59.90

∓1327 2 42 6.3 B103 15 21 0.0

2 43 1.9 | 15 27.7

+ 0 55.6 | 11 4 2.9

2 31.3

2 43 1.9

Sept 7.5 ∓1327 22 3 17.53 B394 10 29 0.00

22 4 12.09 | 15 27.67

+ 0 54.56 | 11 7 59.45

1 44.97

22 4 12.09

Sept 7.6

I Pers.			T Pers.			
+48° 47′			+52° 20′			−0 53.24
						− .60
7.6	8.6	6.2	1.7	8.1	9.8	− .07
1.5	5.1	6.6	5.9	4.2	0.1	−0 53.981
5.0	1.1	6.1	9.6	0.3	9.9	
8.5	7.5	6.3	3.7	6.3	0.0	−0 53.19
						− .60
2.5	3.8	6.3	7.8	2.3	0.1	− .12
1.8	4.3	6.1	8.0	2.0	0.0	−0 53.91
7.5	8.8	6.3	4.0	5.9	9.9	

3.2 | 50.3

15)21 | 15)751 ∴ Cl. slow 0^m $53^s.91$

2 36 3.14 | 2 45 50.01

2 36 56.38 | 2 46 43.20

1893

Sept 8.5 Σ1327 21 36 9.26 β394 10 8 0.00
21 37 3.56 15 27.67
+ 0 54.30 11 11 56.01
+ 1 39.88
21 37 3.56

Sept 9.5 Σ1327 21 52 9.4 β394 10 20 0.0 Eye & ear.
21 53 2.1 15 27.7
+ 0 52.7 11 15 52.6
1 41.8
21 53 2.1

Sept 9.5 Σ1327 21 54 8.9 β103 10 22 0.0 Eye & ear.
21 55 2.4 11 15 52.6
+ 0 53.5 15 27.7
1 42.1
21 55 2.4

Sept 8.5 ν Pers. δ Pers.

ν Pers.			δ Pers.				
+48°.5′			+50° 9′			−0	52.49
0.8	10.9	1.7	1.1	4.3	5.4	−	.60
4.3	7.6	1.9	5.0	0.3	5.3	−	.06
8.1	3.8	1.9	9.0	6.6	5.6	−0	53.15
2.0	9.9	1.9	2.7	2.7	5.4		
5.4	6.4	1.8	6.6	9.0	5.6	−0	52.49
4.7	7.0	1.7	6.1	9.2	5.3	−	.60
0.3	1.7	2.0	2.0	3.5	5.5	−	.08
		36.0			7.8	−0	53.17

15)889 15)109

1 30 35.93 1 36 7.73 ∴ cl. slow 0m .53s.16
1 31 28.42 1 36 60.22
−0 52.49 −0 52.49

1893.										
Sept 10.5	Z1327	23	18	20.6	B394		11	42	0.0	Eyet Ears
		23	19	12.1				15	27.7	
			+ 0	51.5			11	19	49.1	
								1	55.3	
							23	19	12.1	
Sept 11.2	71327	15	42	2,22	Bond 394	4		15 3	27.67	
		15	42	53,26			11	23	45.67	
			+ 0	51,04				0	39.92	
							15	42	53.26	
Sept 12.2	71327	15	54	0.85	Bond 394	4		11	—	
		15	54	51,12				15	27.67	
			+ 0	50.27				0	41,23	
							11	27	42,22	
							15	54	57.12	
Sept 13.2										
	f1327	17	0	7.56	Bond 394	5		15 13	27.67	
		17	0	57.87			11	31	38.78	
		+	0	50,31				0	51,42	
							17	0	57.87	

Sept 11.5 1893

o Androm.	β Pegasi	α Pegasi	
+41°44'	+27°30'	+14°37'	
04 3.3 3.7	1.0 3.6 4.6	52.0	
38 0.1 3.9	35 09 4.4	54.7	
7.0 6.5 3.5	64 80 4.4	57.3	1.2662
04 3.2 3.6	94 5.1 4.5	59.9	0.0143
3.6 0.0 3.6	17 25 4.2	62.5	1.2805
2.0 20 4.0	88 .54 4.2	286.4	19.07
7.0 6.8 3.8	30 14 4.4	57.28	
		19.07	
		38.21	

11.7
(5) 27.8 (11.85
128
120
80
11.85

47.2
(5) 107.9 (47.19
90
17
15
29
15
140
47.19

22 56 11.85	22 57 . 47.19	22 58 38.21
22 57 2.61	22 58 37.99	22 59 28.70
−0 50.76	−0 50.80	−0 . 50.49
+.01	+.08	+.18
−.60	−.60	−.60
−0 51.35	−0 51.32	−0 50.91

Clock slow 0^m $51^s.30$

J A Dolan

1893
Sept 13?

ι Herculis
(3rd tally;
last 3 lost)

+46° 4′

5.3
8.9
12.2
26.4

8.80

0.1614
1.3216
1.4830

30.41

17 35 38.39
17 36 27.87
−0 49.48
−.02
−.60
−0 50.10
(not used)

γ Draconis
+51° 30′

×	6.7	×
×	2.7	×
9.3	8.9	8.2
3.4	5.0	8.4
7.4	1.0	8.4
7.2	1.1	8.3
3.1	5.1	8.2

19.1

11) 206 (19.14
99
16
11
50

17 53 19.14
17 54 8.40
−0 49.26
−.07
−.60
−0.49.93

ο Herculis
+28° 45

7.7	1.2	8.9
0.7	8.5	9.2
3.3	5.6	8.9
6.3	2.8	9.1
9.0	0.0	9.0
6.0	3.0	9.0
0.3	8.9	9.2

34.5

15) 67.8 (4.52
60
78
75
30

18 2 34.52
18 3 23.74
−0 49.22
+.07
−.60
49.75

Clock slow $0^{m}\ 49.80^{s}$

1893

Sept 14.0 71327 11 1 4.47
11 1 54.96
+ 0 50.49

Bond 394 15 27.67
23 11
11 31 38.78
3 48.51
35 1 54.96

Sept 15.2 71327 17 47 8.48
17 48 57.39
+ 0 48.91.

Bond 394 15 27.67
5 52
11 39 31.88
0 57.82
17 47 57.37

Sept 15.9 71327 ~~22 23~~
10 20 51.91
10 21 40.17
+ 0 48.26

Bond 394
15 27.67
22 23
11 39 31.88
3 40.62
10 21 40.17

1893
Sept. 16.2

J.A.D. obsr.

γ Draconis
+51°29

3.4	8.5	1.9
7.6	4.6	2.2
1.4	0.9	2.3
5.0	6.8	1.8
9.4	3.0	2.4
9.2	3.0	2.2
5.1	7.1	2.2
	21.0	

17	53	~~16.0~~ 21.07
17	54	8.29
	−0	47.27
		−.07
		−.60
	−0	47.89

18^2 1 7.4
100
×
15.5
18.4

Pen defective, and
current also

Clock slow 0^m $47^s.9$ ~~58.00~~

1893
Sept 18.0

71327 11 1 52.42
11 2 38.70
+0 46.28

Bond 394
15 27.67
22 56
11 47 24.99
3 46.04
11 2 38.70

Sept 19.1

71327 14 47 26.51
14 48 11.56 ~~43.23~~
~~16.72~~
+0 45.05

Bond 394
15 27.67
2 37
11 53 18.10
0 25.79 ~~57.46~~
14 ~~49 43.23~~
48 11.56

Sept 20.0 ~~19.1~~

71327 11 55 54.85
11 56 39.58
0 44.68

Bond 394
15 27.67
23 42
11 55 18.10
3 53.76
11 56 39.58

Sept 21.0

71327 11 48 49.70
11 49 34.11
+0 44.41

Bond 394
15 27.67
23 31
11 59 14.65
3 51.79
11 49 34.11

Sept 21.9

71327 ~~22~~ 10 33 34.30
10 34 17.69
+0 43.39

Bond 394
15 27.67
22 12
12 3 11.21
3 38.81
10 34 17.69

Sept 23.0

71327 12 2 45.90
12 3 28.21
+0 42.31

Bond 394
15 27.67
2~~3~~ 37
12 7 7.76
3 52.78
12 3 28.21

Sept 19?

JAD obs

109 Herculis

+21°43

00 0.4 0.4
28 7.9 0.7
54 5.1 0.5
80 2.5 0.5
9.7 0.0 0.7
7.3 3.3 0.6
4.3 9.3 0.6

25.4

~~15)339(22.6~~
~~30~~
~~39~~
~~30~~
~~90~~

15)794(5.29
75
44
30
140

18 18 25.29
18 19 9.99

− 0 44.70
+ .10
− .60

− 0 45.20

α Lyrae

+38°41

× 3.8 ×
× 2.7 ×
× 9.3 ×
× 6.1 ×
8.4 2.8 1.2
6.3 5.1 1.4
0.9 0.6 1.5

35.7

7)39.8(5.69
35
48
42
60

18 32 35.69
18 33 20.40

− 0 44.71
− .02
− .60

− 0 45.39

Clock slow 0^m $45^s.30$

1893
Sept 21.3

o Herculis
+28°45'

3.6	x	x
6.5	4.3	0.8
9.3	1.4	0.7
2.0	8.8	0.8
5.0	6.0	1.0
1.9	8.9	0.8
6.2	x	x
	40.5	

11) 46 (42
44
20

18 2 40.42
18 3 23.57

− 0 43.15
+ 07
− 60

− 0 43.68

α Lyrae
+38°41

x	6.5	x
0.0	3.6	36
3.0	0.4	3.4
6.4	7.3	3.7
9.5	4.0	3.5
7.0	6.4	3.4
2.1	1.5	3.6
	36.7	

~~13) 279 (214~~
~~26~~
~~19~~
60

13) 879 (676
78
99
91
80

18 32 36.76
18 33 20.35

− 0 43.59
+ 02
− 60

− 0 44.17

30
17

Clock slow $0^m\ 44.^s30$

1893

Sept 23.2

F1327 17 23 37.85
17 25 20.93
+43.08

B394 4 58 15 27.67
12 11 4.31
0 48.95
17 25 20.93

Sept 24.9

F1327 11 18 31.40
11 19 12.78
~~18.62~~
+0 41.38

B394 22 45 15 27.67
12 15 0.87
3 44.24
11 19 12.78

Sept 25.9

F1327 11 28 29.19
11 29 10.31
+0 41.12

B394 22 51 15 27.67
12 18 57.42
3 45.22
11 29 10.31

Sept 26.9

F1327 10 14 13.21
10 14 54.05
+0. 40.84

B394 21 33 15 27.67
12 22 53.97
3 32.41
10 14 54.05

Sept 28.0

F1327 12 16 28.97
12 17 9.99
+0 41.02

B394 23 31 15 27.67
12 26 50.53
3 51.79
12 17 9.99

Sept 29.0

F1327 13 8 35.74 ~~52.35~~
13 9 14.42
38.68

B394 0 19 15 27.67
12 34 43.63
0 3.12
13 9 14.42

1893

J A Dolan

Sept 28.2

ξ Drac.
+56°53'

200
24.4
290
33.4
38.2
2d tally
1450
29.00.

γ Drac.
+51°30'

2.0 6.8 8.8
5.5 3.1 8.6
9.4 9.2 8.6
3.4 5.0 8.4
7.5 1.0 8.5
7.4 1.2 8.6
3.4 5.2 8.6
293
15|1394 (9.30
135
44

α Lyrae
+38°41'

x 1.5 x
x 8.6 x
x 5.3 x
x 2.0 x
4.2 9.0 3.2
2.2 1.0 3.2
7.0 6.4 3.4
~~4.1~~ 1.0
41.7
~~40.1~~
7|11.5
41.64

β Lyrae
+33°14'

2nd tally
~~3.8~~
~~3.2~~
~~6.0~~
~~3.0~~

3rd tally
47.0
50.0
52.9
53.8
58.5
264.2
52.84

1.2682
0.2627
1.5279
3372

0.5635
0.1077
0.6712
4.690

1.2662
0.1077
1.3739
2355

0.7419
.0774
0.8193
6597

1.2662
0774
1.3436
2206

~~17~~ 50 62.72
17 51 41.27
−0 38.55
−.12
−.60
−0 39.15

29.30
17 54 7.89
−38.59
−.06
−.60
−39.19

41.64
18 33 20.18
−38.54
+.02
−.60
−39.14

39.60 30.78
18 46 9.20
−38.42
+.06
−.60
−39.02.

$$\underbrace{-0\ 39.15\quad -39.19}_{-39.16}\qquad \underbrace{-39.14\quad -39.02}_{-39.08}$$

Clock slow 39.12

1893

Sept 30.0 71327 13 24 33.83 B394 0 31 15 27.67
13 25 12.95 12 38 40.19
+0 39.12 0 5.09
13 25 12.95

Oct 1.0 71327 12 18 21.15 Bond394 23 21 15 27.67 000
12 18 58.01 12 38 40.19
+36.86 3 50.15
12 18 58.01

Oct 2.0 71327 13 15 26.56 Bond394 0 14 15 27.67
13 16 3.26 12 46 33.29
+0 36.70 0 2.30
13 16 3.26

Oct 2.9 71327 11 27 5.27 B394 22 22 15 27.67
11 27 41.46 12 46 33.29
+0 36.19 3 40.46
11 27 41.42 ✓

Oct 3.9 71327 12 36 13.85 B394 23 29 15 27.67
12 36 48.65 12 50 24.85
+0 34.80 3 56.63
12 36 ~~47.49~~
48.65

Oct 5.0 71327 14 3 25.62 B394 0 50 15 27.67
14 3 58.84 12 58 22.96
+0 33.22 0 8.21
14 3 58.84

1893
Oct 5.2

J A D obsr

α Lyrae +38° 41′	β Lyrae +33° 14′	R Lyrae +43° 48′	γ Lyrae +32° 32′
3.1 3.0 6.1	4.3 0.1 4.4	6.3 1.4 7.7	3.2 8.7 1.9
6.3 0.0 6.3	7.2 7.3 4.5	9.8 8.0 7.8	6.2 6.0 2.2
9.3 6.8 6.1	0.1 4.4 4.5	3.2 4.4 7.6	9.0 3.0 2.0
2.5 3.6 6.1	3.1 1.4 4.5	6.7 1.1 7.8	2.1 0.0 2.1
5.8 0.5 6.3	6.0 8.4 4.4	0.1 7.8 7.9	5.0 7.0 2.0
3.6 2.7 6.3	3.4 1.1 4.5	8.8 9.1 7.6	2.3 9.9 2.2
8.4 8.0 6.4	7.8 6.8 4.6	3.7 3.9 7.6	6.6 5.4 2.0
7 43.1	32.2	28.8	21.1
46.7	33.6	13.28	15.5
43.11	32.24	18 51 28.85	18 54 21.03
18 33 20.00	18 46 9.04	18 52 5.76	18 54 57.76
− 36.89	−0 36.80	−0 36.91	−0 36.73
~~+.02~~	~~+.04~~	~~+.01~~	~~+.06~~
−.60	−.60	−.60	−.60
~~−0 37.47~~	~~−0 37.36~~	~~−0 37.52~~	~~−0 37.27~~
−0 37.49	−0 37.40	−0 37.51	−0 37.33
.1	.3	.0	.3

remultiplied

β Lyrae } ~~mean~~ 37.40 } 37.36 × 3 = 108
γ Lyrae } 37.33
α Lyrae 37.49 × 1 = 49
R Lyrae 37.51 × 3 = 153
310
44

Clock slow 37.50

(See obs. of Oct 7.2; clock has now changed its rate; probably the ~~s~~ autumn starting of the furnace accounts for it.) Note (Oct 16) the above change was but temporary; the clock at this date resumes its old rate.

1893
Oct 5.9

71327 11 5 48.20
11 6 25.67
+0 37.47

B394 21 49 15 27.67
3 35.04
12 58 22.96
1~~0~~ 6 25.67

Oct 6.1

71327 16 4 36.90
16 5 14.61
+0 37.71

Bond394 2 47 15 27.67
13 2 19.51
0 27.43
16 5 14.61

Oct 7.0

71327 13 4 3.55
13 4 40.94
+ 37.39

Bond394 23 43 15 27.67
13 2 19.51
3 53.76
13 4 40.94

Oct 8.9

71327 12 20 48.88
12 21 25.67
+0 36.79

Bond394 22 52 15 27.67
13 10 12.62
3 45.38
4 21 25.67

Oct 9.9

71327
12 19 44.15
12 20 21.40
+0 37.25

B394
22 47 15 27.67
13 14 9.17
3 44.56
12 20 21.40

Oct 11.0

71327 12 56 45.38
12 57 23.38
+0 38.00

B394 23 20 15 27.67
13 18 5.73
3 49.98
12 57 23.38

1893
Oct 7.2

γ Lyrae +32°32′			ι Lyrae +35°56′			κ Cygni +53°10′ (through clouds)	
3.0	8.5	1.5	4.3	2.3	6.6	1st tally:	3rd tally:
6.0	5.7	1.7	7.3	9.3	6.6	2nd 3rd } wires	1st 2nd } wires
8.8	2.7	1.5	0.4	6.1	6.5		
1.9	9.9	1.8	3.5	3.0	6.5	26.7 30.6	23.5 28.3
4.7	7.0	1.7	6.6	0.1	6.7	28.65	25.90
2.0	9.5	1.5	4.2	2.5	6.7	1.2960	1.1691
6.3	5.2	1.5	8.8	8.0	6.8	0.2224 1.5184	0.2224 1.3915
	20.9			53.4		+32.99	−24.63
	15)121(0.81 120 10			15)49.8(3.32 45 48 45 30 30		61.64	61.27

1st tally better ~~no~~ cloud conditions, hence greater weight

γ Lyrae	ι Lyrae	κ Cygni
18 54 20.81	19 2 53.32	19 ~~14~~ 1.50
18 54 57.71	19 3 30.31	19 14 38.54
−0 36.90	−0 36.99	−0 37.04
−.60	−.60	−.60
−0 37.50	−0 37.59	−0 37.64

(n neglected

50 } .55 } .59
59 } 64 }

Clock slow $0^m\ 37^s.59$

1893
Oct 9.2

J A D obs.

β Cygni +27°44		ι Cygni +51°30		θ Cygni +49°58		δ Cygni +44°51		
Tally 1.	Tally 2.	Tally 2.	Tally 3.	Tally 2.	Tally 3.			
22.1	40.4	×	45.6	46.5	19.0	8.8	4.8	3.6
25.0	44.6	18.3	49.8	52.4	23.0			
27.8	48.9	24.0	54.0	58.1	26.8	2.4	1.4	3.8
30.5	53.0	30.1	58.0	4.0	30.8	5.8	8.0	3.8
33.5	57.2	36.0	1.5	9.4	34.1			
138.9	244.1	108.4	268.9	290.4	133.7	9.3	4.5	3.8
27.78	48.82	27.10	53.78	58.08	26.74	2.6	1.0	3.6
						1.3	2.4	3.7
1.2682	8.5563	~~8.5563~~	1.2662	8.5363	1.2662	6.4	7.1	3.5
0.0529	0.2529	0.2625	0.2059	0.1919	0.1919		1.8	
1.3211		0.2059						
	8.8092	0.4684	1.4721	8.7482	1.4581		15)27.6(1.84	
20.94	.06	29.41	29.66	.056	28.72		1.5	
							12.6 12.0 60	
48.72	48.88	24.16	24.12	58.14	58.02			

β Cygni	ι Cygni	θ Cygni	δ Cygni
19 25 48.80	19 26 24.14	19 32 58.08	19 41 1.84
19 26 25.88	19 26 61.35	19 33 35.26	19 41 39.04
−0 37.08	−0 37.21	−0 37.18	−0 37.20
±.08	−.06	−.06	−.02
.60	−.60	−.60	−.60
−0 37.60	−0 37.87	−0 37.84	−0 37.82

Clock slow $0^{m}\ 37^{s}.80$

JAD

1893
Oct 11.2

β Cygni		ι Cygni		θ Cygni			δ Cygni		
+27°44		+51°30		+49°58			+44°51		
Tally 1	Tally 2	Tally 2	Tally 3	1.9	4.3	6.2	9.0	48	3.8
22.5	40.3	×	46.3	5.7	0.9	6.6	2.7	15	4.2
25.4	44.9	18.0	50.0	9.5	68	6.3	6.0	8.1	4.1
28.2	49.0	24.5	54.0	3.1	3.0	6.1	9.4	4.7	4.1
31.1	53.0	30.4	58.1	7.2	90	6.2	2.8	1.1	3.9
33.5	57.3	36.2	61.9	6.4	98	6.2	2.1	2.4	4.5
140.7	244.5	109.1	270.3	2.0	3.8	5.8	6.9	7.4	4.3
28.14	48.90	27.28	54.06		58.2			2.2	
20.94	.06	2.94	29.66		15)121.6(8.1			12)31.1(2.59	
49.08	48.96	24.34	24.40		120 16 15 10			24 71 60 110	
19 25 49.02		19 26 24.37		19 32 58.10			19 41 2.259		
19 26 25.84		19 26 61.28		19 33 35.19			19 41 38.99		
−0 36.82		−0 36.91		0 37.09			−0 36.73		
+08		−06		−06			−02		
−60		−60		−60			−60		
−0 37.34		−0 37.57		−0 37.75			−0 37.35		

75
57
35
34
(201
50

Clock slow $37^{s}.50$

1893

Oct 12,0 ϑ1327 ~~0 14~~
13 54 50.80
13 55 28.80
+ 0 38.00

B394
15 27.67
0 14
13 25 58.83
0 2.30
13 55 28.80

Oct 13,0 ϑ1327 13 48 46.28
13 49 23.72
+0 37.44

B394
15 27.67
0 4
13 29 55.39
0.66
0 ~~12.90~~
13 49 ~~35.46~~
23.72

([illegible])

Oct 13,9 ϑ1327
11 22 38.00
11 23 15.69
+ 0 37.69

B394
15 27.67
21 34 20.
13 29 55.39
3 32.57
.06
11 23 15.69

[illegible]

Oct 16,1 ϑ1327 17 30 10.00
17 30 47.71
+ 37.71

B394
15 27.67
3 33.
13 41 45.05
0 34.99
17 30 47.71

J A D obsr

1893
Oct 16.4

α Androm	β Cass	γ Pegasi	σ Androm
+28°29'	+58°33 3rd tally	+14°35'	+36°11'
1,4 4.7 6.1	20,8	6,0 4,5 0,5	1.9 9.8 1.7
4.0 1,6 5,6	25.2	8,5 2,0 0.5	5.0 7.0 2.0
7.0 9.1 6.1	30.4	1.2 9.4 0.6	8.0 3.7 1.7
9,6 6,3 5,9	34.8	3,6 6,9 0.5	1,0 1,0 2.0
2,5 3,5 6.0	40.0	6,3 4,0 0.3	4.0 7.7 1.7
9,5 6,4 5.9	151 2	3,5 7.7 0.2	1.5 0.0 1.5
4,0 2,3 6,3	30,24	6,3 38 0.1	6.2 5.5 1.7
18.1	0,2825	10.1	11.0
15)120(0/8 120	1,2662 1.5487	15)28(187 15 130 120 100	15)133(887 120 130 120 100
d	35.38		
18.00	54.86	10,19	0 12 10.89
0 2 54.40	31,39	46.61	0 12 47,37
-36.40	-36.53	-36.42	-36.48
-.04	+.06	-.06	-02
-.60	-.60	-.60	-.60
-37.04	-37.07	-37.08	-37.10

a	b
1.64	36.53
0,26	36.42
1,38	.11

log b 9.0414
log a 0.1399
8.9015

.095

n = .1 which agrees with the predicted n for this time of year (see front cover for table of n)

n = .1 positive n. of zenith

Clock slow 0^m 37.07

[see note next page]

1893

Oct 17.0 71327 13 33 27.33
13 34 4.84
+0 37.51

B394 15 27.67
23 33 —
13 41 45.05
3 52.12
13 34. 484

Oct 17.0 Note:- The Ballou 103 clock has not been compared with 71327 for over a month. Frequent eye comparison with Bond 394 (which is the standard mean time) ~~shows~~ shows that Ballou 103, is running with a beautiful rate and differs by a second or less from Bond 394 even though running for over a month untouched.

My plan now is to use Ballou 103 (on account of its nice rate) as a secondary normal clock, and take a chronographic comparison with 71327 every time I observe stars and keep its graphic curve similar to that of 71327. JAD.

Oct 17.0

71327 13 55 31.50
13 56 8.45
+0 36.95

Ballou 103 15 27.67
23 55 0.0
13 41 45.05
3 55.73
13 56 8.45

Oct 18.0 71327 14 17 30.20
14 18 7.97
+0 37.77

Bond 394 15 27.67
0 13 —
13 49 38.16
0 2.14
14 18 7.97

JAD

1893

Oct ~~17~~ 18.3

74 Cygni
+39° 55′

34.6	55	0.1
7.9	2.5	0.4
0.8	9.3	0.1
4.0	6.0	0.0
7.1	2.5	9.6
5.1	4.6	9.7
0.2	0.1	0.3

5.3
15

21 32 5.03
21 32 41.52
− 36.49
00
− .60
− 37.09

π² Cygni
+48° 48′

0.1	1.3	1.4
3.6	7.8	1.4
7.4	3.9	1.3
1.3	0.0	1.3
4.7	6.2	0.9
3.8	6.9	0.7
0.0	1.4	1.4

155
18.9

21 42 15.59
21 42 52.26
−36.67
+02
−.60
37.25

Clock slow $0^{m}.\ 37^{s}.17$

Oct 18.9

Ball 103 (comparison)

713 27 12 37 10.40
12 37 47.44
0 37.04

Ball 103. 22 $\overset{15}{29}$ 27.67
13 49 38.16
3 41.61
12 37 47.44

1893

Oct 18.9

f 1327	12 44 11.55	Bond 394		15	27.67
	12 44 48.59		22	36	
	+ 37.04		13	49	38.16
				3	42.76
			12	44	48.59

Oct 19.9

f 1327	12 41 8.80	Bond 394		15	27.67
	12 41 45.63		22	39	
	+ 36.83		13	53	34.71
				3	43.25
			12	41	45.63

Oct 21.1

f 1327	17 34 50.89	Bond 394		15	27.67
	17 35 28.01		3	18	
	+ 37.12		14	1	27.82
				0	32.52
			17	35	28.01

Oct 21.1

f 1327	18 3 55.95	Ball 103 ~~Bond 394~~		15	27.67
	18 4 32.78		3	47	
	+ 0 36.83		14	1	27.82
				0	37.29
			18	4	32.78

Oct 22.9

f 1327		Bond 394		15	27.67
	12 4 48.70		21	41	
	12 5 25.77		14	5	24.38
	+ 0 37.07			3	33.72
			36	5	25.77

Oct 24.2

~~f 1327~~	~~18 14 47.83~~	~~Bond 394~~		~~15~~	~~27.67~~
	~~18 14 22.29~~		~~3~~	~~46~~	
	~~+ 0 34.46~~		~~14~~	~~13~~	~~17.49~~
				~~0~~	~~37.13~~
			~~18~~	~~15~~	~~22.29~~

JAD. obs

1893
Oct 20.2

α Lyrae +38°41′	γ Lyrae +32°32′	δ Lyrae +37°56′	κ Cygni +53°10′
3.4 3.5 6.9	3.6 9.1 2.7	4.2 3.7 7.9	2.4 1.0 3.4
68 0.4 7.2	6.7 6.3 3.0	7.5 0.5 8.0	6.8 68 3.6
98 7.2 7.0	9.6 3.3 2.9	0.6 7.5 8.1	1.0 27 3.7
3.0 40 7.0	2.4 0.4 2.8	3.9 4.2 8.1	5.1 8.5 3.6
6.1 08 6.9	5.1 7.4 2.5	6.8 1.1 7.9	9.2 4.5 3.7
4.0 30 7.0	25 0.3 2.8	4.6 3.4 8.0	9.3 4.1 3.4
8.7 8.3 7.0	7.0 5.8 2.8	9.5 8.8 8.3	5.3 7.9 3.4
43.5	~~15~~ 21.5	4.0	1.7
15)5 5	15)21.0	15)60.3	15)26.5 0.77 15 115 105 100
43.50	21.40	4.02	
43.50	21.40	4.02	19 14 \ 1.77
18 33 19.63	18 34 57.43	19 12 40.11	19 14 38.09
− 36.13	− 36.03	− 36.09	−0 36.32
−.01	−.03	−.01	+.04
−.60	−.60	−.60	−.60
− 36.74	−36.66	− 36.70	−0 36.88

298

.75

Clock slow −36.75

1893
Oct 21.2

γ Lyrae +32°32′	θ Lyrae* +37°56′	κ Cygni +53°10
3.7 9.2 2.9	4.5 3.9 8.4	2.8 1.0 3.8
6.7 6.4 3.1	7.5 1.0 8.5	7.0 7.0 4.0
9.5 3.5 3.0	0.8 7.8 8.6	1.1 2.9 4.0
2.4 0.4 2.8	3.9 4.5 8.4	5.1 8.8 3.9
5.4 7.5 2.9	7.0 1.4 8.4	9.2 4.5 3.7
2.7 0.2 2.9	5.0 3.7 8.7	9.6 4.3 3.9
7.1 6.0 3.1	9.5 9.0 8.5	5.8 8.1 3.9
21.5	4.3	20
15)222	15)638	15)292
21.48	4.25	19 14 1.95
18 54 57.41	19 12 40.08	19 14 38.05
−0 35.93	−0 35.83	−0 36.10
−.03	−.01	+.04
−.60	−.60	−.60
−0 36.56	−0 36.44	−0 36.66

$\left.\begin{matrix}56\\44\end{matrix}\right\}\ \left.\begin{matrix}50\\66\end{matrix}\right\}\ 58$

Clock slow $\overset{m}{0}\ 3\overset{s}{6}.60$

JAD obs

1893

Oct 24.2

α Lyrae
+38°41

3.5 3.5 7.0
67 05 7.2
99 7.2 7.1
30 4.0 7.0
6.2 0.9 7.1
4.0 3.0 7.0
8.9 8.3 7.2
435

15 | 531 | 3.5
45
81
75
60

γ Lyrae
+32°32′

53.8 12.7
56.5 17.0
59.5 21.5
2.4 25.7
5.2 30.2
2974 1071
59.48 21.42

1.2682
0.0743
1.3425
2200
21.48 21.48

θ Lyrae
+37°56

Lost: —

κ Cygni
+53°10

2.7 0.9 3.6
7.0 7.0 4.0
1.0 28 3.8
5.2 8.7 3.9
9.2 4.4 3.6
9.5 4.2 3.7
58 8.0 3.8
2.0

15 | 284 | 1.90
15
134
135

43.54
18 33 19.55
− 0 36.01
− .01
− .60
− 0 36.62

21.45
18 54 57.35
− 35.90
− .03
− .60
− 36.53

1.90
19 14 37.95
.36 05
+04
.60
− 36.61

62
53
61
176

Clock slow 36.58

1893

Oct 24.2 ~~R~~ 71327 18h 39 52,00 Bond 394
18 40 26.39
+0 36,39

15 27.67
4 11
14 13 17.49
0 41.23
18 40 26.39

Oct 24.2 71327 18 42 50,18 Ball 103
18 43 26,89
+0 36,71

15 27.67
4 14
14 13 17.49
0 41.73
18 43 26 89

Oct 25.1 71327 16 27 26.79 Bond 394
16 28 0.60
+0 33.81

15 27.67
1 55
14 17 14.04
0 18.89
16 28 0.60

Oct 25.2 ~~71327 20 0 0.00 B 394~~

~~15 27.67~~
~~5 26~~
~~14 17 14.04~~
~~0 53.55~~
~~19 49 35.26~~

Oct 25.2 71327 Ball 103
20 22 2.31
20 22 39.04
+0 36.73

15 27.67
5 49
14 17 14.04
0 57.33
20 22 39.04

1893

Oct 25.2

~~o' sq. Cygni~~
+46°24'

6.5	4.7	1.2
0.5	1.4	1.9
4.0	7.9	1.9
7.5	4.3	1.8
1.2	8.5	1.7
0.0	1.7	1.7
5.5	6.3	1.8

21.0

15) 180 (86
120
100

20.86

20 10 16.63

5577

Wrong star

γ Cygni
+39° 54'

7.6	8.6	6.2
1.0	5.6	6.6
4.1	2.3	6.4
7.3	9.1	6.4
0.4	6.0	6.4
8.5	7.8	6.3
3.4	3.0	6.4

48.2

15) 122.9 (82
120
29

48.20
20 18 24.50

− 36.30
+ .00
− 60

— 36.90

Clock slow 0^m $36.^s90$

J A D obs

1893
Oct 26.2

α Lyrae
+38°44

3.0 3.5 6.5
6.5 0.3 6.8
9.8 7.0 6.8
3.0 3.9 6.9
6.0 1.0 7.0
x 3.0 —
8.7 8.2 6.9

43.4
13) 443 (3 41
39
53
52
10

18 32 43.41
18 33 14.50
− 36.09
− .01
− .60
− 36.70

δ Cygni
+44°51

9.3 5.7 5.0
6.9 2.0 4.9
6.8 8.7 4.9
9.9 5.2 5.1
3.4 1.8 5.2
1.9 2.8 4.7
7.2 7.8 5.0

2.4
15) 37.2 (2.48
30
72
60
120

19 41 2.48
19 41 38.58
− 0 36.10
− .60
− 36.70

Clock slow 0m 36s.70

1893

Oct 26.2 Sid: Bond 394 stopped at 12h 15 on Oct 25.5 and on Oct 25.9 signals were transferred to Ball 103, pending an investigation of B394.

Oct 26.2 F1327 18 50 43.30 Ball 103 + 15 27.67
14

18 51 · 20.00 0 41.73

0 36.70 14 21 10.60

18 51 · 20.00

1893
Oct 28

α Lyrae
+38° 41'

(Good definition.—
(Clouds coming on)

3.4 3.3 6.7
6.7 0.3 7.0
9.7 7.1 6.8
2.9 4.0 6.9
6.0 0.8 6.8
4.0 3.0 7.0
8.6 8.3 6.9

43.5

15)51.6(3.44
45
66
60
60

18 32 43.44
18 33 19.46
− 0 36.02
−.01
−.60
− 0 36.63

1893

Oct 30.3

~~B39~~ F1327 21 21 52.16 B394 6 15 29 27.67
21 22 28.39 14 36 56.82
+0 36.23 1 3.90
— 36.60 = F1327 error 21 22 28.39

.37 slow = B394's error

Oct 31.0 F1327 14 31 39.86 B394 23 15 36 27.67
14 32 17.10 14 36 56.82
+0 37.24 3 52.61
14 32 17.10

Note:- Bond 394 now giving signal to C.F. Dept.

Bond 103

Oct 31.0 F1327 14 53 43.83 B103 23 15 58 27.67
14 54 20.72 14 36 56.82
+0 36.89 3 56.23
14 54 20.72

1893
Oct 31,1

SAD obsr

α Lyrae

3.3 3.4 6.7
6.6 0.4 7.0
9.7 7.3 7.0
2.9 4.0 6.9
6.0 0.8 6.8
4.0 3.0 7.0
8.6 8.1 6.7

43.4
15)515(343
45
65
60
50

18 ~~32~~ 4 3.43 = T
18 33 19.40
— 35.97
±.01
—.60
— 36.58

Clock Slow $\overset{m}{0}$ 36.60

1893

Nov 1.0 F1327 15 19 46.80
15 20 20.88
+0 34.08

B394 0 $\overset{15}{20}$ 27.67
14 44 49.93
0 3.28
15 20 20.88

Nov 2.0 F1327 14 26 33.37
14 27 8.08
+0 34.71

B394 23 $\overset{15}{23}$ 27.67
14 44 49.93
3 50.48
14 27 8.08

Nov 2.2 F1327 18 55 16.48
18 55 52.11 ~~14.16~~
~~[illegible]~~
+ 35.63

B103 3 $\overset{15}{51}$ 27.67
14 48 46.49
18 55 14.16
0 37.95
18 53 52.11

Nov 3.0 F1327 14 49 31.86
14 50 7.76
+0 35.90

B394 23 $\overset{15}{42}$ 27.67
14 48 46.49
3 53.60
14 50 7.76

Nov 4.0 F1327 14 54 27.36
14 55 4.47
+0 37.11

B394 23 $\overset{15}{43}$ 27.67
14 52 43.04
3 53.76
14 55 4.47

Nov 6.0 F1327 15 10 21.72
15 10 58.90
+0 37.18

B394 23 $\overset{15}{51}$ 27.67
15 0 36.15
3 55.08
15 10 58.9a

1893

Apr 11. 2

α Lyrae

+38°41′

3.4	3.4	6.8
6.7	0.3	7.0
9.8	7.2	7.0
3.0	4.0	7.0
6.1	1.0	7.1
4.0	3.0	7.0
8.8	8.2	7.0

43.6

15)525(35

45

75

18 32 43.50

18 33 19.38

− 35.88

−.01

−.60

−36.49

SAD [illegible]

1893

Nov 22

α Lyrae

+38° 41

3.5	34	6.9
6.8	0.5	7.3
9.9	7.2	7.1
3.1	4.1	7.2
6.3	0.8	7.1
4.1	3.0	7.1
8.8	8.2	7.0

43.6

15) 533 3 (35.5

45

83

75

80

18ʰ 43.55

18 33 19.36

− 35.81

− .01

− .60

− 36.42

1893
Nov 6.0

Determination of Collimation.

Note: Collimation with this mer. circle has usually been so steady that it has been thought for the present needs of the time service unnecessary to determine it very often, as in the weekly observations during the three years of Prof. Searle's zone work the usual ~~greatest~~ change would only affect observation by a few hundredths of a second:—

South collimator on North collimator

Note; Dec 1, 1893; Coll. here deferred. Determined Nov 29, 1893; result consistent with above remarks.

JAD

1893
Nov 6.2

α Lyrae
+38° 41

4,3 4,4 8.7
7,6 1,3. 8.9
0,6 8,1 8,7
3,9 5,0 8,9
7.0 1,9 8.9
5,0 3,8 8.8
9,6 9,2 8.8

$$\underbrace{44.4}$$
$$15\,\rfloor\,66\,1\;\lfloor 4\,41$$
$$\underline{60}$$
$$61$$
$$\underline{60}$$
$$10$$

18 32 44.41 . .
$\underline{18\ 33\ 19,28}$
−0 3 4.87
−.01
$\underline{-60}$
−0 35.48

1893

Nov 6,2 F1327 18 45 58.64
18 46 34.22
+ 0 35.58

Bal.103 ~~[illegible]~~ 3
15 26 27.67
15 4 32.71
0 33.84
18 46 34.22

Nov 7.0 F1327 16 15 30.90
16 16 5.48
+ 0 34.58

Bond 394 0 52
15 27.67
15 8 29.27
0 8.54
16 16 5.48

Nov 8.0 F1327 $15^h\ 39^m\ 22^s.36$
15 39 55.46
+ 0 33.10

B394 0 12
15 27.67
15 12 25.82
0 1.97
15 39 55.46

Nov 9.0 F1327 15 31 15.88
15 31 50.05
+ 0 34.17

B394 0 00 0.00
15 27.67
15 16 22.38
0 0.00
15 31 50 05

Nov 10.0 F1327 15 42 11.91
15 42 47.75
+ 0 35.84

B394 0 7
15 27.67
15 20 18.93
0 1.15
15 42 47.75

1893
Nov 7.3

74 Cygni +39°55′			π² Cygni +48°48′		
5.7	6.8	2.5	1.0	2.3	3.3
8.9	3.7	2.6	4.8	8.6	3.4
1.9	0.1	2.0	8.7	4.8	3.5
5.5	7.1	2.6	2.4	1.0	3.4
8.7	4.0	2.7	6.1	7.3	3.4
6.5	5.9	2.4	5.3	7.8	3.1
1.3	1.1	2.4	1.0	2.3	3.3
	6.4			16.8	

74 Cygni:

15) 936 (6.24
90
36
30
60

6.24
21 32 41.12
−0 34.88
− .01
− .60
−0 35.49

π² Cygni:

15) 1002 (16.68
90
102
90
120

21 42 16.68
21 42 51.75
~~4~~ 0 35.07
+ .04
− .60
35.63

Clock slow 0 35.55

1893
Nov 9.3

π² Cygni
+48°48'

x 2.5
5.0 9.0 4.0
8.8 5.0 3.8
2.5 1.2 3.7
6.3 7.5 3.8
5.4 8.2 3.6
1.3 2.5 3.8
~~6.8~~ 16.8
13) 89.5 (6.89
78
115
104
110

21 42 16.89
21 42 51.71
− 0 34.82
+ .04
— .60
− 0 35.38

16 Pegasi
+25°24'

3.0 4.8 7.8
5.8 2.2 8.0
8.4 9.5 7.9
1.2 6.7 7.9
3.9 4.0 7.9
0.8 7.1 7.9
4.9 3.0 7.9
39.1
13) 34.4 (8.96
120
144
135
90

21 47 38.96
21 48 13.54
− 0 34.58
— .09
— .60
− 0 35.27

Clock slow 0 35.35

1893

Apr 11.0

Chronograph clock comp

F1327 16 17 13.21
16 17 49.40
+0 36.19

B394 0 38 15 27.67
15 24 15.49
0 6.24
16 17 49.40

Apr 11.1

eye & ear comp
with Ball 103

F1327 17 9 52.±
17 10 28.02
+0 36.02

Ball (403) 1 30 15 27.67 30.
15 24 15.49
0 14.78
.08
17 10 28.02

Ball 103 is about (.08) fast

~~[illegible] 103~~

Apr 12.0

(eye & ear comp)

F1327 16 43 15.4±
16 43 49.58
+0 34.18

B394 1 0 15 27.67
15 28 12.05
0 9.86
16 43 49.58

Apr 13.0

(eye & ear comp)

F1327 15 55 32.5±
15 56 7.67
+0 35.17

B394 0 8 15 27.67 30.
15 32 8.61
0 1.31
.08
15 56 7.67

Apr 14.1

Chronographic

F1327 16 58 8.86
16 58 43.84
+0 34.99

B394 1 7 15 27.67
15 35 5.16
0 11.01
16 58 43.84

1893
Nov 14.9

Observations of Level
(of Meridian Circle)

JHD lu.

	w	e	w − e
Objective South			
Screw W.	33.6	49.6 est.	−16.0
Screw E.	est −1.6	14.4	−16.0
Objective North	est. −2.0	42.0	−44.0
Screw E.	5.5	49.5 est	−44.0
Screw W	6.0	50.0 est	
Objective South			
Screw W			−44.0
Screw E.	−2.5 est.	41.5	−44.0
Objective North			
Screw E	−2.5 est	41.5	−44.0
Screw W	5.5	53.5 est	−44.0

	Begin.	End.
Temp. of room	50.0	
Temp. of mounting (both E & W. therm)	53.0	

Length of bubble ~~16~~ d.

1892pnae.proj.1803D

1893

Chronographic Comparison

Nov 15.2

F1327 19 12 27.89
19 13 1.75
+0 33.86

B394
15 27.67
3 17
15 40 1.72
0 32.36
19 13 17.5

Nov 16.0

F1327 16 9 52.98
16 11 27.92
+0 34.94

B394
15 27.67
0 12
15 43 58.28
0 1.97
16 11 27.92

Nov 17.2

F1327 21 32 41.21
21 33 16.55
0 35.34

B394
15 27.67
5 29
15 47 54.83
0 54.05
21 33 16.55

Nov 18.3

F1327 22 52 50.60
22 53 25.59
+0 34.99

B394
15 27.67
6 45
1 6.53
15 51 51.39
22 53 25.59

Nov 20.3

F1327 22 15 36.60
22 16 11.32
+0 34.72

B394
15 27.67
6 0
15 59 44.51
0 59.14
22 16 11.32

Nov 21.2

Cape Teeny

F1327 22 13 33.±
22 14 6.88
+0 33.88

B394
15 27.67
5 54
16 3 41.06
0 58.15
22 14 6.88

1893
Nov 14.2

JAB. Sen

π² Cygni
+48°48'

X	2.4	X
X	9.0	X
X	5.2	X
X	1.6	X
X	7.8	X
5.5	8.0	3.5
1.5	2.4	3.9

17.0
5)344 |_688
30
44
40
80

16.88
21 42 51.57
34.69
+0 4
− .60
35 25

16 Pegasi
+25°24'

3.3	5.0	8.3
6.0	2.4	8.4
8.7	9.6	8.3
1.4	6.8	8.2
4.0	4.0	8.0
0.8	7.3	8.1
5.2	X	—

39.0
13)1183 |_91
117
13

21 47 39.10
21 48 13.46
− 0 34.36
− 09
− .60
− 0 35.05

Clock slow 0ᵐ 35.25

J A D

Nov 16.2

74 Cygni
+39° 53
last tally
24.4
27.8
31.2
34.5
37.7
155.6
31.12
24.06
7.06

12462
0.1151
1.3813
24.06

7.06
21 32 40.91
−0 33.85
−~~7~~.02
−60
− 34.47

π² Cygni
+48° 48′

1.4	2.8	
5.5	9.1	4.6
9.0	5.3	4.3
2.7	1.5	4.2
6.6	7.6	4.2
5.6	8.6	4.2
1.4	2.8	4.2

17.0
15)1027(68
90
127
120
16.80
16.80
21 42 51.52
−0 34.72
+.04
−.60
−0 35.28

16 Pegasi
+25° 24

3.3	5.2	8.5
6.1	7.5	8.6
8.8	9.8	8.6
1.5	7.0	8.5
4.2	4.3	8.5
1.1	7.4	8.5
5.2	3.5	8.7

394
15)1393(92
135
43
30
4430
21 47 39.29
21 48 13.43
−~~1~~0 34.14
−10
−60
−0 34.84

16 Peg. 34.74
π² Cyg. 35.32
74 Cyg. 34.47

		N			
16 Peg	34.74	45	.74	07	518
74 Cyg	34.45	07	.45	45	2025
π² Cyg	35.32	25	1.32	25	3800
				77	

77)5843(76
539
453

225
180

750

Clock slow 0m 34s.76

Nov. 18.3	10 Lacertae		ξ of Pegasi			o Androm.		
	+38°29′			+29°39			+41°44′	
	2nd tally:	3d tally	0.3 ~~8.3~~	4.2 1.5	4.5 48	6.5	9.7	6.2
	~~X~~	12.9	6.2	89	5.1	8.0	6.3	6.3
	50.6	15.8	9.0	6.0	5.0	3.4	3.0	6.4
	55.7	19.3	1.8	3.0	4.8	6.5	9.5	6.0
	0.4	22.4	9.0	6.0	5.0	9.8	6.2	6.0
	5.0	25.5	3.2	17	4.9	7.9	8.0	5.9
	2317	959		275		3.3	3.0	6.3
	57.93	19.18					28.2	

15) 111 6 (7.44
105
66
60
60

15) 121 3 (8.08
120
130
120

0.2625 1.2662
0.1065 0.1065
0.3690 1.3727
2.34 23.58

55.59 55.60
22 34 29.48
— 33.88
— .02
— 60
— 34.50

27.44
22 37 61.28
— 33.84
— .07
— 60
— 34.51

22 56 28.09
22 56 61.91
— 0 33.82
.00
— .60
— 34.42

.52 } .50 }
.51 } .42 } 46

Click slow 0ᵐ, 34ˢ.46

1893

JAD lee

Nov. 22.3

(η ~~χ~~ Pegasi +29°39′			o Androm. +41°44′			β Pegasi +27°30		
0.2	4.2	4.4	6.4	9.2	5.6	×	0.0	×
3.3	1.5	4.8	9.8	6.0	5.8	×	7.2	×
6.1	8.5	4.6	3.2	3.0	6.2	×	4.5	×
9.0	5.8	4.8	6.3	9.4	5.7	5.7	1.7	7.4
1.7	3.0	4.7	9.7	6.2	5.9	8.2	9.0	7.2
9.0	6.0	5.0	8.0	8.0	6.0	5.2	2.0	7.2
3.1	1.7	4.8	3.0	3.0	6.0	9.5	7.8	7.3
	×			28.0			3.7	

14) 1331 (7.4 98 51 42 90	15) 1192 (7.95 105 142 135 70	91) 328 (3.64 27 58 54 40
27.74	27.95	22 58 3.64
22 37 61.22	22 56 61.84	22 58 37.48
− 33.98	− 33.89	− 0 33.84
−.07	00	−.08
−.60	−.60	−.60
− 34.65	− 34.49	− 33.52

$\frac{65}{52}$ f .58

Clock slow 0^m $34^s.50$

1893

Mar 22.3 F1327 23 8 38.70 B394 6 $\frac{15}{45}$ 27.67
23 9 11.82 16 7 37.62
+ 33.12 1 6.53
23 9 11.82

Mar 23.0 F1327 16 39 30.00 B394 0 $\frac{15}{13}$ 27.67
16 40 3.99 0 2.14
+ 33.99. 16 11 34.18
16 40 3.99

Mar 24.2 F1327 20 15 59.76 B394 3 $\frac{15}{45}$ 27.67
20 16 35.37 16 15 30.74
+0 35.61 0 36.96
20 16 35.37

eyepiece

Mar 24.2 F1327 20 42 3.± Ball 103 4 $\frac{15}{11}$ 27.67
20 42 39.64 16 15 30.74
+ 0 36.64 0 41.23
20 42 39.64

eyepiece

Mar 25.3 F1327 23h 0 24± B394 6 $\frac{15}{25}$ 27.67
23 0 58.21 16 19 27.29
+0 34.21 1 3.25
23 0 58.21

eyepiece

Mar 27.0 F1327 16 25 8.7 B394 23 $\frac{15}{43}$ 27.67
16 25 45.28 16 23 23.85
bd +0 36.58 3 53.76
16 25 45.28

7 16 32 40 B394 23 $\frac{15}{58}$ $\frac{27}{30}$.67
16 33 16.51 16 23 23.85
±0 36.51 3 54.91
2nd 0.08

1893
Nov 24.2

JAD obs

π² Cygni
+48° 48′

1.7	3.0	4.7
5.3	9.4	4.7
9.2	5.3	4.5
3.0	1.6	4.6
6.6	7.9	4.5
6.0	8.3	4.3
1.6	2.9	4.5

174
15 | 1092 | 72.8
105
42
30
120

17.28

21 42 51.31
− 34.03
+.06
−.60
− 34.57

16 Pegasi
+25° 24′

1st tally:	3rd tally
31.3	54.5
35.5	57.3
39.6	60.0
43.6	62.9
47.8	65.4
197.8	300.1
39.56	60.02

.0442	.0442
8.5563	1.2662
8.6005	1.3104
.040	20.42
39.60	39.60

21 48 13.31
− 33.71
−.13
−.60
− 34.44

π² Pegasi {see below
+32° 39

9.3	4.8	4.1
2.3	x	x
5.0	9.2	4.2
8.0	6.2	4.2
0.9	x	x
8.3	x	x
2.8	10.	38

~~7~~ 57.0
9 | 63.3
7.03

22 3 57.03 = T

22 5 15.76 = RA
1 18.73

Note: evidently not π² Pegasi.
Evidently 27 Pegasi; see Jahrbuch (mean place) pg 188
Reduction fr. π² to 27 Pegasi; viz: —

Mean place 1893.0:- 27 Pegasi +32° 39 → 22ʰ 4ᵐ 29ˢ.16 | π² Pegasi +32° 39 22ʰ 5ᵐ 14ˢ.11

22 5 15.76
+ 1ˢ.65

Hence the app. pl. of 27 Pegasi is
Mean pl. 22 4 29.16
plus + 1.65
22 4 30.81 = R.A of 27 Peg

22 3 57.03 = T
22 4 30.81 = R.A
− 0 33.78
−.67

.57 } .57
.44 } .44
.45 }
} .50

Clock slow 34ˢ.50

Nov. 28.0

F1327 17 34 17.86
17 34 5252
+ 34.66

B394
15 27.67
0 48
16 31 16.97
0 7.88
~~2 42.80~~
~~17 37 27.44~~
17 34 52.52

Nov 28.9

F1327 15 57 58.95
15 58 32.65
+0 33.70

B394
15 27.67
23 8
16 31 16.97
~~2 42.80~~
3 48.01
15 58 32.65

Nov 29.34

F1327
2 34 43.6±
2 35 16.97
+0 33.37

Eyepiece
B394
15 27.67
9 43
16 35 13.53
1 35.77
2 35 16.97

Dec 1.0 (-)

F1327 16 49 1.29
16 49 32.84
+ 31.55

B394
15 27.67
23 51
3 55.08
16 39 10.09
16 49 32.84

=Aph. pl. of
π² Pegasi

Dec 1-1893

Determination of Level

JAD. Ser

Dec 1.1

Note:— The last level observation was made by Mr. Edmands a year or so ago. JAD has endeavored to learn the theory of the Clark level, at various times since last observation but until now failed in doing so,— Mr Edmands apparently being the only one familiar with the level, and he not available (being absent) so as to ascertain the theory.

Adjusted bubble:— {Calling the unmarked space in the middle of glass ~~tube~~ equivalent to 8 div. the length of bubble is ~~13.5~~ 10.0

Objective South

		w.	e	
(1)	Screw west	18.0	[27.0]	length 9d.
	Screw east	[−2.9]	6.1	

Objective North

		w.	e	
(2)	Screw east	[−6.6]	38.9 ~~44.0~~	In reversing tel. bubble changed length greatly } Moved after these telescope in decl. to present bubbles
	Screw west	$7.\overset{5}{7}$	38.0	

Repeated observation (2)

Objective South

		w.	e	
(3)	Screw west	7.2	[54.7]	Turned objective South; then moved telescope in decl. to observe length of bubble again; bubble is 47.5
	Screw east	0.0	47.5	

Objective North

		w.	e	
(4)	Screw east	[−5.0]	43.4	Turned objective North. then moved telescope in decl. to observe length of bubble again; bubble is 48.4
	Screw west	5.0	[53.4]	

Objective South

		w.	e	
(5)	Screw ~~west~~	5.6	[53.1]	Turned object. South; then moved telescope in decl. to observe length of bubble; bubble is 47.5
	Screw east	[−4.8]	42.7	

Objective North

		w.	e	
(6)	Screw east	[−5.0]	41.6	Turned objective North; then moved telescope in decl. to observe length of bubble; bubble is 46.6
	Screw west	6.2	[52.8]	

Dec 1.2 (reduction)

Remarks:- In previous page the figures in brackets are estimated; at each reversal of telescope the telescope tube was moved in decl. in a sufficiently small arc from horizontality to enable the length of the bubble to be lessened, before begining each observation, as the length of the bubble changed at each reversal of the telescope. Although the determination of b sec φ below is consequently approximate yet it is very probable that it is much nearer the true level error than that heretofore used.

{Note:- bubble changes length with reversal; adjusted again}

Note:- {Observations No 1 & 2 are rejected as lengths of bubble were so dispro-portionate.}

bservations, the
bserve the length
Bubble is $45^{d}.51$

Reduction (let "a" = division, and 24 = zero of scale; then (24−a) = W and (a−24) = E)

S $\begin{cases} \tfrac{1}{2}\,\overline{7.2+54.7} = \tfrac{1}{2}\,\overline{61.9} = 30.95 = 6.95\ E \\ \tfrac{1}{2}\,\overline{0.0+47.5} = \tfrac{1}{2}\,\overline{47.5} = 23.75 = 0.25\ W \end{cases}$ 3.35 E

N $\begin{cases} \tfrac{1}{2}\,\overline{(-5.0)+(+43.4)} = \tfrac{1}{2}\,\overline{38.4} = 19.20 = 4.80\ W \\ \tfrac{1}{2}\,\overline{5.0+53.4} = \tfrac{1}{2}\,\overline{58.4} = 29.20 = 5.20\ E \end{cases}$ 0.20 E

Hence West axis is low. $1^{d}.78$

S $\begin{cases} \tfrac{1}{2}\,\overline{5.6+53.1} = \tfrac{1}{2}\,\overline{58.7} = 29.35 = 5.35\ E \\ \tfrac{1}{2}\,\overline{(-4.8)+(+42.7)} = \tfrac{1}{2}\,\overline{37.9} = 18.95 = 5.05\ W \end{cases}$ 0.15 E

N $\begin{cases} \tfrac{1}{2}\,\overline{(-5.0)+(+41.6)} = \tfrac{1}{2}\,\overline{36.6} = 18.30 = 5.70\ W \\ \tfrac{1}{2}\,\overline{6.2+52.8} = \tfrac{1}{2}\,\overline{59.0} = 29.50 = 5.50\ E \end{cases}$ 0.10 W

Hence West axis is low. $0^{d}.02$

$0^{d}.90$

$^{d}.90$ West axis low
$^{s}.22$ value of division
$^{s}.20 = b$
$1.35 = (\varphi)\sec$
$^{s}.27 = b \sec \varphi$

{Note: West axis being low, stars are consequently observed late:- Level error assumed for the present $0^{s}.27$}

1893

Dec 1.3

Chronograph clock comp.

F1327 23 38 6.80
23 38 39.86
+ 0 33.06

B394 6 39 15 27.67
16 43 6.64
1 5.55
23 38 39.86

B394 is $1^{s}.4$ slow (by chronograph)
B103 is 3.5 fast of B394 (by eye & ear)
hence B103 is $2^{s}.1$ fast,

Dec 1.3

Comparison with Ball 103

Dec 2.0

F1327 17 30 0.39
17 30 35.47
+ 0 35.08

B394 0 28 15 27.67
16 47 3.20
0 4.60
17 30 35.47

Dec 2.5

F1327 3 57 42.60
3 58 18.31
+ 0 35.71

B394 10 54 15 27.67
1 47.44
16 47 3.20
3 58 18.31

Dec 4.0

F1327 17 28 50.80
17 29 27.11
+ 36.31

B394 0 19 15 27.67
16 54 56.32
0 3.12
17 29 27.11

Dec 5.0

F1327 17 36 49.89
17 37 24.33
+ 0 34.44

B394 0 23 15 27.67
16 58 52.88
0 3.78
17 37 24.33

Prof. S. [illegible]
(from his Algol series
chron. sheet)

1893
Dec 24

ε Persei
+39°42

0.5 1.6 2.1
37 8.2 1.9
6.8 5.0 1.8
0.3 1.6 1.9
36 8.5 2.1
1.3 0.5 1.8
6.1 5.6 1.7
11.0

15)143 (10.95
135
80

3 50 10.95
3 50 45.04
−0 34.09
−02
−.27 {new level
−0 34.38

Clock slow $\overset{m}{0}$ 34.38

December 4, 1893

(Prof. S. has from his algol series chron sheet)

ε Persei

+39°42'

		Yale I	Yale III
		40.7	28.6
		43.8	32.0
		47.0	35.1
		50.3	38.5
		53.6	41.6
		235.4	175.8
		47.08	35.16
1.2682	12662		
0.1138	0.1138	24.10	23.99
1.3820	1.3800	11.18	11.17

11.18

3 50 45.10

− 0 33.92

−.02

−.27

− 0 34.2~~1~~

1893

Dec 6.0 f1327 18 ~~17~~ 12 52.64 B394 0 ~~59~~ 55 15 ~~2~~7.67
18 13 26.14
+0 33.50
17 2 49.43
0 9.04
18 13 26.14

Dec 7.1 f1327 18 14 48.85 B394 0 53 15 27.67
18 15 22.37
+0 33.52
0 8.71
17 6 45.99
18 15 22.37

Dec 8.0 f1327 18 15 44.67 B394 0 50 15 27.67
18 16 18.43
+0 33.76
17 10 42.55
0 8.21
18 16 18.43

Dec 9.0 f1327 18 8 38.97 B394 0 39 15 27.67
18 9 13.19
+0 34.22
17 14 39.11
0 6.41
18 9 13.19

Dec 10.9 f1327 16 24 11.35 B394 22 47 15 27.67
16 24 47.90
+0 35.55
17 18 35.67
3 44.56
16 24 47.90

Dec 11.4 ~~f1327 16 27 B394 4 1 15 27.67 6.72~~

~~f1327 4 1 6.72 B394 10 27 15 27.67~~
~~4 2 46.34~~
~~17 18 35.67~~
~~1 43.00~~
~~3 6 2 41.52~~
~~46.34~~

Prof. S. fur
(On his Algol series sheet)

1893
Dec 7.4

~~ε Persei +39°42'~~

γ Androm
+41°49'

8.3 1.0 9.3
1.5 7.8 9.3
4.9 4.6 9.5
8.2 1.2 9.4
1.6 7.7 9.3
9.7 9.7 9.4
4.8 4.6 9.4
49.7

15) 145.3 (9.69
135
103
90
130

1 56 49.69
1 57 23.64
— ~~m~~ 0 33.95
.00
— .27
— ~~m~~ 0 34.22

Clock slow $0^m\ 34.22^s$

ge Year

Dec 11.4 f1327 4 21 10±
4 21 45.36
+0 35.36

B394 10 42 15 27.67
17 22 32.23
1 45.46
28 21 45.36

Chromographic comp.

Dec 12.0 f1327 17 44 25.1
17 44 56.95
+0 31.85

B394 0 3 15 27.67
17 26 28.79
0 0.49
17 44 56.95

Dec 13.0 f1327 18 51 32.5
18 52 3.86
+ 0 31.36

B394 1 6 15 27.67
0 10.84
17 30 25.35
18 52 3.86

Dec 14.0 f1327 17 33 11.65
17 33 46.95
+ 0 35.30

B394 23 44 15 27.67
17 30 25.35
3 53.93
17 ~~37 43.51~~
33 46.95

Dec 14.3 f1327
0 36 21.00
0 36 56.28
+ 35.28

B394 6 46
15 27.67
17 34 21.91
1 6.70
0 36 56.28

Dec 15.0 f1327
17 58 12.36
17 58 46.95
+0 34.59

B394
0 5
15 27.67
17 38 18.46
0 0.82
17 58 46.95

1893
Dec 11.4

Prof S. [illegible]
(on his Algol series sheet)

γ Androm
+41°49

8.0 0.6 8.6
1.2 7.3 8.5
4.3 4.0 8.3
7.5 0.8 8.3
1.0 7.6 8.6
9.3 9.4 8.7
4.4 4.2 8.6

494

14)139.0 [9.93
126
130
126
40

1 56 49.93
1 57 23.61
− ~~3~~ 0 33.68
00
−.27
− 0 33.95

1893

Dec 16.1

Z1327 19 34 25.18
19 34 58.63
+0 33.45

B394 15 27.67
1 37
17 42 15.02
0 15.94
19 34 58.63

Dec 17.9

Z1327 17 14 55.39
17 15 27.59
+0 32.20

B394 15 27.67
23 10
17 46 11.58
3 48.34
17 15 27.59

Dec 18.9

Z1327 16 38 40.29
16 39 17.58
+0 37.29

B394 15 27.67
22 30
17 50 8.14
3 41.77
16 39 17.58

Dec 19.2

Z1327 21 9 24.58
21 10 1.94
+0 37.36

B394 15 27.67
3 0
17 54 4.70
0 29.57
21 10 1.94

Dec 19.9

Z1327 15 48 28.54
15 49 ~~28.14~~
5.27
+0 36.73

B394 15 27.67
21 36
4.70
17 5~~4~~ ~~8.14~~
3 32.90
~~2 55.77~~
15 ~~44 31.58~~
~~48 28.14~~
15 49 5.27

Dec 20.9

Z1327 17 39 41.36
17 40 19.41
+0 38.05

B394 15 27.67
23 23
3 50.48
17 58 1.26
17 40 19.41

1893
Dec 18.0

α Lyrae JAD obsn

+38° 41

3.1	3.0	6.1
6.3	0.1	6.4
4.4	6.8	6.2
2.5	3.7	6.2
5.6	0.6	6.2
3.6	2.5	6.1
8.4	7.8	6.2

432
15)466[311
45
16
15
10

18 32 . 43.11
18 33 18.94

−0 35.83
−04
−.27

−0 36.14

$23^h\ 30^m$

Dec $19\frac{10}{10}$ - 1893

Determination of Level of the Mer. Circle.

1. Adjusted bubble; - calling the unmarked space at centre equivalent to 8 divisions, the bubble is   long

2. Adjusted horizontality of bubble-tube.

Objective S.   w.   e

Screw W.

Screw E

Objective N.

Screw E

Screw W

Objective S.

Screw W

Screw E

Objective N

Screw E

Screw W

1893

Dec 21.9

F1327 17 39 35.52
17 40 15.31
+0 39.79

15 27.67
B394 23 19
18 1 57.82
3 49.82
41 38 13.31

Dec 22.9

F1327 16 55 24.72
16 56 3.99
+0 39.27

15 27.67
B394 22 31
3 41.94
18 5 54.38
16 56 3.99

Eyepiece Comps.

1st:-

Dec 25.9

F1327 17 43. 48
17 44 19.63
+ 31.63

15 27.67
B394 23^h 7 20
18 17 44.05
3 47.85
.06
41 44 19.63

2nd

F1327 17 49 29
17 50 0.55
+0 31.55

15 27.67
B394 23 13 0
18 17 44.05
3 48.83
17 50 0.55

Mean:- +0 31.55

Note:- Forgot to come up to attend to clocks on Sunday of Christmas and result is Bond is $4^s.5$ slow

Comp (eyepiece) with Ball 103

Dec 25.9

F1327 17 49 56.5
17 50 30.63
+0 34.13

15 27.67
B394 23^h 13 30
18 17 44.05
3 48.83
.08
17 50 30.63

Hence Ball 103 is now $2^s.0$ slow

Last Comp (Dec 1.3) Ball 103 was - - - - $2^s.1$ fast

(Prof S. obs. on his
algol series sheet)

1893
Dec 23H

ε Persei
+39° 42'

$3^h 49^m$ 51.7
48.4
45.2 totally
42.0
38.6
~~35.2~~
225.9
$3^h 49^m$ 45.18
+24.10
3^h 50 9.28
3 50 45.14
— ~~+0~~ 35.86
.02
—.27
— 36.15

Clock slow $36^s.15$

(Prof S. here on his Algol series chart)

1893
Dec 26.4

ε Persei
+39°42

51.6
48.4
45.0 bd tally
41.9
38.6
225.5
45.10
24.10

3 50 9.20
3 50 45.14

−0 35.94
−.04
−.27

−0 36.25

Clock slow 0^m $36^s.25$

1893
Dec 26.4

Chronographic cont.

F1327 27 34 1.37
27 34 36.33
+ 34.96.

B394
8 $\frac{15}{56}$ $\overline{27.67}$
1 28.05
18 21 40.61
27 34 36.33

Dec 27.1 F1327 19 59 38.37
20 0 17.82
+0 39.45.

B394
1 $\frac{15}{19}$ $\overline{27.67}$
18 25 37.17
12.98
20 0 17.82

Dec 27.9 F1327 18 7 18.79
18 7 55.32
+0 36 53

B394
23 $\frac{15}{23}$ $\overline{27.67}$
18 25 37.17
3 50.48
18 7 55.32

Dec ~~28.9~~
29.1 F1327 19 21 26.67
19 22 3.38
+0 36.71

B394
0 $\frac{15}{33}$ $\overline{27.67}$
18 33 30.29
0 5.42
19 22 3.38

(Prof. S. obs
(on his chart - Algol Series -)

1893
Dec 27.4

ε Persei
+39°42'
51.4
48.0
45.0 totally
41.7
38.4
224.5
44.90
24.10)
3 49 69.00
3 50 45.14
− 36.14
−04
−.27
− 36.45

Clock slow 0^m $36.^s45$

44.2
24.1 Dec 27
8.3
45.12
36.82
−31
37.13

Prof S. has
(on his Algol series
sheet)

1893

Dec 29.4

ε Persei

+39°42

50.7
47.6 bd tally
44.2
41.2
37.9

221.6
44.32
24.10
---
3 50 8.42
3 50 45.12

−0 36.70
−.04
−.27

−0 37.01

Clock slow 0^m 37^s.01

1893
Dec 29.9

Found B394 stopped:- Dial read 15^h 26 2;
transferred to Ball 103, the signals:-

Comp. with Ball 103

F 18 52 20.40
18 52 54.52
+0 34.12

15 27.67
Ball 103 0 0 0
18 37 26.85
0.00
18 52 54.52

Hence Ball 103 is $2^s.9$ slow;
Last comp. (Dec 25.9) Ball 103 was 2.0 slow.

Dec 29.9 {Rate at present of Ball 103 is (losing daily $0^s.23$)
{Error, at present ($2^s.9$ slow)

(Dec 30.0 0^h 50) Added 6 gr to Ball 103 to compensate accumulated error by Jan 1.0

1894
Jan 1.0

Comp (chronographic) with B103.

F1327 18 47 6.80
18 47 45.50
+0 38.70

15 27.67
B103 23 47
18 41 23.41
3 54.42
18 47 45.50

Ball 103 is about $1^s.0$ fast }
rate (gaining 2^s daily }

1894
Jan 20

(Eye bean compared with Ball 103)

L 1327 19 22 38.6
19 23 17.16
+0 38.56

B 103
15 27.67
0 15 30
18 49 16.53
0 2.96
19 23 17.16

1 gr. added to Bullion 103 makes clock gain about
$\overset{s}{.}5$ mm in a day.

1 gr added to Bond 394 makes clock gain about
$\overset{s}{.}64$ in a day.

In cases where weights are removed the
change of rate has the opp. sign.