

KG
11345
120

This book seems to
belong to series C.

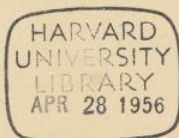
This label was put upon
it May 25, 1868.

C 12, (better C15)

Noted July 30, 1877. This book contains
some of the same observations found in A7¹⁴
and others for dates for which there is no record in A7¹⁴.
It was perhaps used to record observations made
for time only, not for star places. It should
be marked C15, as there is a small book C12.

KG 11365.120

KG 11365.120



Value of Rev. of screw $34''28 = 2^{\circ}285$ 1865 Oct 2^d Constants for Harvard College Observatory

$$\tan \varphi = 0.91 \quad 2464$$

$$\sec \varphi = 1.35 \quad 3648$$

$$\varphi = 42^{\circ} 22' 48''.6$$

$$\log = 9.9602 \quad 120$$

$$\log = 0.1315 \quad 055$$

$$\text{used in Reduction } \tan \varphi = 0.91$$

$$\text{"" "" "" } \sec \varphi = 1.35$$

$$\begin{aligned} \text{One division of the Level} &= 1''.00 + 0''.0037 (B-120) & \left\{ \begin{array}{l} \text{Length of Bubble} = B \\ B = E+W \end{array} \right. \\ \text{"" "" "" ""} &= 0''.07 + 0''.0002 (A-120) & \end{aligned}$$

$$\begin{aligned} (\text{Not Constant}) \text{ Collimation} = C &= -0''.28 \quad \text{all west} & (C - 0''.02) &= -0''.30 \\ & -0''.02 = \text{diurnal aberration} \end{aligned}$$

$$Q = \delta - \alpha + \Delta T + m + n \tan \delta + (C - 0''.02) \sec \delta$$

$$m = b \sec \varphi + n \tan \varphi$$

$$m = 1.35 b - 0.91 n$$

$$\text{Long Cambridge to Berlin } (+) 5^h 38^m 5''.6$$

$$\text{"" "" Paris } (+) 4^h 53^m 57.29$$

$$\text{"" "" Greenwich } (+) 4^h 44^m 30.66$$

$$\text{"" "" Washington } (-) 0^h 23^m 41.5$$

$$\text{dec of day } 0.2348 \quad \text{used in Reduction } \frac{1}{4} \text{ day}$$

$$\text{"" "" "" } 0.2040 \quad \text{"" "" "" } \frac{1}{4} \text{ day}$$

$$\text{"" "" "" } 0.1975 \quad \text{"" "" "" } \frac{1}{4} \text{ day}$$

$$\text{"" "" "" } 0.0164$$

$$\text{Berlin Ephemeris } S.T.M.N. + 55.54 = \text{Cambridge } S.T.M.N.$$

$$\text{Paris "" "" "" } + 48.28 = \text{"" ""}$$

$$\text{Greenwich "" "" "" } + 46.74 = \text{"" ""}$$

$$\text{Washington "" "" "" } - 3.89 = \text{"" ""}$$

1865 November The mean of ^{interior} 5 wires is very nearly the same as the middle wire
 - marks
 A flask of new oil about 0.01
 over, 11 in number

1865 Oct 2^d All West 1865 Oct 3^d All West

C = -0.30

Level 4 ^h 30m			Level 4 ^h 10m			Polaris 4 ^h			2. Korealis	236 Compensated
E	W	B	E	W	B	13 ^h	5 ^m	56.0		44.0 EC 17 ^h 9 ^m 24.4
+ 46.3	67.4	114.	70.0 + 54.2		124.2				48.0	11 10.0
63.7	+50.0	114.	+51.5	72.5	124.0				50.8	1 45.6
64.4	+49.8	114.	+51.5	72.3	123.8		10 ^m	40.5	54.6	EC - 40.7
+ 45.8	66.3	112	71.0 + 54.0		125.0		12	25.4	58.0	236 feet 1 4.9
220.2	253.5		244.0	253.0			15	2.0	255.4	
55.05	58.38		61.0	63.25						
55.05			61.00							
2/3.33			2/2.25							
1.66			1.12							
.07			.07							
b = +0.1162			+0.0784							
b = +0.12			b = +0.08							
						T = 13 ^h 10 ^m	26.82	17 ^h 7 ^m	51.08	
						AR = 1 11	6.73	17 8	31.45	
							-39.91		-48.37	

Polaris 4^h

13^h 5^m 50.1
52.0
55.5
59.0
62.7
277.8
55.76
31.58

+ 7

10^m 32.0
34.6
36.8
39.3
42.9
46.7
50.4
283.7

40.5
11.04

12^m 19.3
21.4
24.7
36.0

101.4
25.4
55.92

14^m 56.2
15 58.5

2.1
5.2
7.6

127.7
9.9

15^m 1.78
4 38.20

Old intervals
for wires used

10 29.5

10 26.5

10 23.8

27.3
26.82

$$O = -40.37 + \Delta t + m + .26u + 1.03c$$

$$O = -39.91 + \Delta t + m - 40.71u - 40.73c$$

$$O = +0.46 + \Delta t - 40.97u - 41.76c$$

$$O = +0.01 - u - 1.02c$$

$$u = +0.29 \quad m = 1.35u - 0.91u$$

$$m = 0.11 - 0.26$$

$$m = -0.15$$

$$O = -40.37 + \Delta t - .15 + .08 - .29$$

$$O = -40.73 + \Delta t$$

March 8^d 3^h 45^m
Levels

84.5
100.5
1.85

94.5
78.5
173

12.9

$$3.00 = 0.22 \text{ C end High}$$

C-7836

$C \Rightarrow +0.26$

1863 Oct 9 Ill East AM observer

Level 4th 15m x 2 Lyrac

	E	n	B
+186	48.3	76.2	124.5
	69.3	+57.2	123.5
	69.0	+57.3	123.3
	+47.9	74.0	121.9
	<u>234.5</u>	<u>258.7</u>	<u>13.2</u>

58.62 64.68 123.3
58.62
 2/6.06
 3.03
07
 $L = +0.321$

$$L = +0.521$$

T 18 31
AR 18 32

39.1
 43.3
 48.2
 51.3
 56.5
 238.2
 47.64
 23.67
 -36.03
 0
 -36.03

51 *Rept. H. sp.*

18	33	57.1
	35	17.9
	36	11.6
	37	27.1
	38	35.2
		148.9
		88.9
18	36	17.7
6	36	44.1
		-23 ⁸³
		-23 ⁸³

236 Compared

EC 18 38 59.4
236 10.0
 Eyecolor 10.6
 (EC 18 43 0.0
 236 18 44 10.7)
 Adopted
 236 fast 201 ~ 10.6

4. Agulac

10.8
 14.1
 17.8
 20.5
 24.6
 87.8

 $19 \quad 39 \quad 17.56$
 $19 \quad 39 \quad 53.24$
 $- 35.68$
 $\quad .04$
 $- 35.72$

α Lepore $0 = -36.503 + \Delta t + m + .80n + 1.25c = -35.43 + \Delta t (-.03)$
 γ Aquilae $0 = -35.72 + .18n + 1.02c = -35.38 + \Delta t (+.02)$
 δ — $0 = -35.74 + .15n + 1.01c = -35.42 + \Delta t (-.02)$
 β — $0 = -35.70 + .11n + 1.01c = -35.39 + \Delta t (+.01)$
 3.19 124 32 162
 $-35.40 + \Delta t = \text{mean}$
 μ Cassiope $0 = -23.33 + \Delta t + m - 20.71n - 20.74c$
 $0 = -12.45 + 21.02n + 21.82c$
 $0 = -0.59 + n + 1.04c$
 $0 = -0.32 + n$
 $n = +0.32$ $m = -.01$ $m = 1.35 - 0.91n$
 $m = +.28 - .29$
 $m = -.01$

2 Aquilae 3 Aquilae

32.2

1.4

35.5

4.7

39.3

8.5

41.8

11.0

45.8

15.0

194.6

40.6

19 43 38.92 19 48 8.12

19 44 14.62 19 48 43.78

- 35.70 04 - 35.66 14

- 35.74

- 35.70

$$d = +0.26$$

865 Oct 16th Ill East AM observer

α Aquarii	236 Compensated	α Pic Austrini	α Pegasi	α Andromedae
16.6	EC 22h 1m 26.0	36.2	27.9	50.3
20.0	236 22h 3m 10.0	40.0	31.3	53.9
23.6	236 fast EC 1m 44.0	44.3	35.2	58.3
26.0	-31.1	47.3	37.8	1.1
30.2	1m 12.9	51.8	41.9	5.6
116.4		217.6	174.1	169.2
				289.2
21 58 23.28		22 49 43.92	22 57 34.82	ok 0 57.84
21 58 54.46		22 50 14.84	22 58 6.11	0 1 29.22
-31.18		-30.92	-31.29	-31.38
0		.03	.04	.07
-31.18		30.95	-31.33	-31.45
Int Cor + 0.13		0	+ 0.23	+ 0.35
-31.05		-30.95	-31.10	-31.10

	m	$n \sin \delta$	$c \cos \delta$
α Aquarii	$0 = -31.18 + \Delta t + m - .02n + 1.00c$	-0.12	-.01 + .26 = +0.13
α Pic Austr	$0 = -30.95$	-0.12	-.18 + .30 = 0
α Pegasi	$0 = -31.33$	-0.12	+.08 + .27 = +0.23
α Andromedae	$0 = -31.45$	-0.12	+.17 + .30 = +0.35
γ Pegasi	$0 = -31.34$	-0.12	+.08 + .27 = +0.23
	125	+46	36

Mean	$0 = -31.25 + \Delta t + m + .09n + 1.07c$	22.86	1.3591
Palanis	$0 = -54.11$	40.67	1.6093
	$0 = -22.86$		9.7478
	$0 = -0.56$	39.70	1.5788
	+0.23		1.6093
	$0 = -0.31 + n$		9.7875
	$n = +0.31$		

$$m = 1.356 - 0.91n$$

$$n = .16 - 0.28$$

$$m = -0.12$$

Regulus

Polaris

$\delta = 88^{\circ} 35' 40''$

Level

43.2	1	5	44.9	+4	29.06	
46.6		7	57.0	+2	16.96	46.02
50.5		10	27.4	-	13.44	
53.1		12	8.4	-1	54.44	
57.1		14	52.1	-4	38.14	46.02
250.5			189.8			

21 ^h	20 ^m	B
80.7	+65.8	146.5
+62.3	83.2	145.5
+61.9	83.2	145.1
79.2	+65.0	144.2
284.1	297.2	

0	5	50.10	1	10	13.96
0	6	21.37	1	11	8.18
-31.27					-54.22
.07					.10
-31.34					-54.11
+0.23					
-31.11					

71.02	74.30	145
71.02		
3.28		
1.84		
.07+		
0.1148		
$\Delta = +0.12$		

1	5	39.4
		42.0
		45.3
		47.7
		49.9
		224.3
		44.9

-31.05	-0.01
-30.95	-0.11
-31.10	+0.04
-31.10	+0.04
-31.11	+0.05
.31	

7	53.0
	55.3
	57.8
	61.9
	228.0
	57.0
10	21.6
	26.6
	29.2
	32.3
	109.7
	27.4

-31.06	
35.70	
134.34	(.61 0.61)
4272	
680	

12	3.6
	6.6
	10.6
	13.0
	33.8
	8.4

14	45.7
	50.3
	54.8
	57.5
	208.3
	52.1

$$C = +0.26$$

1865 Oct 19th All East AM

Polaris up

13 6 27.3
 9 5.3
 13 21.0
 15 36.6

13 6 22.4
 25.8
 28.8
 32.2
 109.2
 27.3
 8 39.6
 9 2.2
 5.1
 8.0
 11.4
 81.3
 26.3
 5.3
 17.4
 13 19.7
 21.9
 24.6
 84.1
 21.0
 15 31.3
 33.9
 36.8
 39.5
 41.6
 183.1
 15 36.6

1865 Oct 20th All East AM

Lunar

13 11 5.44 +55.8 76.2 1350
 10 59.74 75.1 56.3+ 131.4
 75.2 56.0+ 131.2
 11 4.04 +54.2 76.3 1305
 11 7.54 260.3 264.8 1
 16.76 65.08 66.20 132.
 65.08
 13 11 4.14 1.12
 1 11 8.22 .56
 -4.08 .07
 .0392

$$y = +.04$$

2 Lunar

45.9
 41.9 18 39 8.3
 54.8 236.18 40 10.0
 58.0
 3.2
 211.8
 271.8
 18 31 54.36
 18 32 23.40
 -29.04

236 Compared

$$\alpha \text{ Lunar } 0 = -29.04 + \Delta t + m + .50n + 1.28c$$

$$\text{Polaris } 0 = -4.08 \quad -40.76m -40.77c$$

$$0 = -24.96 \quad +41.56m +42.05c$$

$$0 = -0.61 \quad +n + 0.26$$

$$0 = -0.35 + n$$

$$n = +0.35$$

$$m = 1.356 - 0.91n$$

$$.05 - .32$$

$$m = -0.27$$

$$\begin{aligned} &-29.04 \\ &-0.27 \\ &+0.28 \\ &+0.33 \\ &\hline &= 28.70 \end{aligned}$$

$$\begin{array}{r} 31.06 \\ 28.70 \\ \hline 2.36 \\ 385 \overline{) 2310} \end{array} \quad 0.60$$

$$\begin{array}{r} 24.96 \quad 1.3972 \\ 41.56 \quad 1.6187 \\ \hline 0.61 \quad 9.7785 \\ 42.05 \quad 1.6238 \\ \hline 1.01 \quad 1.6187 \\ \hline \quad 0.0051 \end{array}$$

1865 Oct 23^d All West AM Observer

$$C = -0^{\circ}23$$

α Lyrae	57 Cephei H sp	236 Compared	Level	α Aquilar
48.3	18 34 4.9		79.2 62.3+ 141.5	41.2
53.3	35 12.1 8018	39 55.9	62.7 80.2 142.9	45.1
56.4	36 29.5 23618	41 10.0	63.5+ 79.6- 143.0	47.9
1.2	37 20.9	1 14.1	81.4 61.9+ 143.3	51.5
53	38 44.6		283.8 283.9	57.7
164.5	1120		71.70 70.98 142.	240.4
284.5	8870 14.9		70.98	

18 31 56.90	18 36 22.40
18 32 23.33	6 36 45.87

$$-26.43$$

$$- .38$$

$$-26.81$$

$$-23.47$$

$$\alpha \text{ Lyrae } 0 = -26.43 + \Delta t + m + .80m + 1.28C$$

$$57 \text{ Cephei spo} = -23.47 +$$

$$-29.6$$

$$-20.71 -20.73$$

$$21.51a + 22.01C$$

$$-0.14$$

$$-0.23$$

$$37$$

$$n + 1.02C$$

$$2.96$$

$$21.51$$

$$0.4713$$

$$1.3326$$

$$9.1387$$

$$22.01$$

$$1.3426$$

$$1.3326$$

$$1.01$$

$$0 = -26.82 + \Delta t$$

$$28.70$$

$$3) 1.88$$

$$0.62$$

$$26.82$$

$$32$$

$$26.50$$

$$26.88$$

$$26.81$$

$$26.79$$

$$248$$

$$26.82$$

B Aquilae

11.2 10.7
 45-1 14.5
 47.9 17.0
 15 20.5
 27 24.1
 0.4 86.8

108 19 48 1736
 37 19 48 43.54

24 - 26.18
 03 .03
 32 - 26.21
 6 - 58
 8 26.79

$$\begin{array}{lcl}
 \alpha \text{ Lyrae } 0 = -26.43 + \Delta t + m + .80n + 1.28c & \left\{ \begin{array}{l} m \text{ } n \text{ } c \end{array} \right. & \begin{array}{l} \text{uncor} \\ \text{cor} \end{array} \\
 \alpha \text{ Aquilae } 0 = -26.32 & + .15n + 1.01c & \left\{ \begin{array}{l} 0.39 + .30 - .29 = -.38 \\ 0.39 + .06 - .23 = -.56 \\ 0.39 + .04 - .23 = -.58 \end{array} \right. \\
 \beta \text{ ————— } 0 = -26.21 & + .11n + 1.01c &
 \end{array}$$

$$\begin{array}{lcl}
 \text{Mean } 0 = -26.32 + \Delta t + m + .35n + 1.10c & 96 & 106 \quad 3.30 \\
 51 \text{ Aphi } 0 = -23.47 & -20.71m -20.73c & \\
 & -2.45 & +21.06n + 21.83c
 \end{array}$$

$$0 = -0.14 \quad + n + 1.04c$$

$$0 = -0.24 \quad + n$$

$$0 = -0.38 \quad + n$$

$$n = +0.38$$

$$\begin{array}{r}
 2.85 \\
 21.06 \\
 0.14 \\
 \hline
 0.45-48 \\
 1.32 \quad 35 \\
 9.13 \quad 13
 \end{array}$$

$$\begin{array}{r}
 21.83 \\
 1.04 \\
 \hline
 1.33 \quad 91 \\
 1.32 \quad 35 \\
 0.01 \quad 56
 \end{array}$$

$$m = 1.356 - 0.91n$$

$$\begin{array}{r}
 -0.04 \quad 36 \\
 .04 \\
 \hline
 -0.39
 \end{array}$$

$$\begin{array}{r}
 1.28 \\
 23 \\
 \hline
 3.84 \\
 23.6 \\
 \hline
 29.44
 \end{array}$$

$$\begin{array}{r}
 38 \\
 36 \\
 \hline
 342 \\
 345.8 \\
 \hline
 1.35- \\
 0.3 \\
 \hline
 4.05
 \end{array}$$

$$\begin{array}{r}
 190 \\
 38 \\
 \hline
 57
 \end{array}$$

65 October 29th All West 1865 - Oct 30th All West
 A.M. observer

$$a = -0.23$$

Polaris sp			Level			α Lyrae	236 Compared		
			E	W	B				
13	6	20.0	+66.0	80.4	146.4		52.3	00 18 35	24.5
	8	25.5	84.3	+62.5	146.8		57.7	236 18 37	10.0
	11	2.1	84.0	+62.3	146.3		0.6	236 factor	1 45.5
	12	40.3	+64.0	82.5	146.5		5.5	(By eye only)	1 45.5
	15	29.4	298.3	287.7			9.7		
		117.3	74.58	71.94	146.5		125.8		
		237.3	71.94				5.8		
13 ^h	10 ^m	47.46	2.64			18 32	1.16		
			1.32			18 32	23.17		
1	11	6.81	0.75						
			6.60						
			7.24						
			22.90						
		-19.35					-22.01		
			$\delta = -5.77$				-0.45		
			$z = -1.0$				-22.46		
							+	0	

13 6^m 14.3
 16.1
 18.8
 20.5
 21.8
 23.6
 25.3

137.7
 20.0

8 21.4
 23.2
 25.3
 27.7
 29.8
 27.4 25.5

10 18.8
 0.3
 1.9
 4.3
 3.6
 10.7 11 2.1

12 30.6
 33.1
 35.7
 38.4
 41.6
 44.5
 47.9
 51.2
 32.30 40.3 26.39

15 25.0
 26.7
 29.3
 31.7
 34.2
 146.9 29.4

$$\alpha \text{ Lyrae } 0 = -22.01 + \Delta t + m + 80n + 1.28c$$

$$\gamma \text{ Aquilae } 0 = -21.92 \quad 18n + 1.02c$$

$$\beta \text{ --- } 0 = -21.91 \quad 11n + 1.01c$$

$$\text{Mean } 0 = -21.95 + \Delta t + 81n + 36n + 1.10c$$

$$\text{Polaris } 0 = -19.35 + \Delta t + m - 4080n - 40.82c$$

$$0 = -2.60 + \dots + 41.16n + 41.92c$$

$$0 = -0.06 + \dots + n + 1.00c$$

$$0 = -0.29 + n$$

$$n = +0.29$$

$$m = 1.356 - 0.91n$$

$$m = -0.13 - 0.26$$

$$m = -0.39$$

$$2.60 \quad 0.4150$$

$$41.16 \quad 1.6145$$

$$.06 \quad 8.8005$$

$$41.92 \quad 1.6224$$

$$1.6945$$

$$0.0079$$

γ Aquilae

24.0
27.9
30.6
34.5
37.7
154.7

 β Aquilae

14.6
18.7
21.1
24.9
28.2
107.5

19 39 30.94 19 48 21.50
19 39 52.85 19 48 43.41

- 21.92
- 0.57
- 22.49
+ 0.03

- 21.91
- 0.59
22.50
+ 0.03

m n l m d
- 0.39 + 0.23
- 0.39 + 0.05
- 0.39 + 0.03

correct
- 0.29 = - .45
- 0.23 = - .57
- 0.23 = - .59

α Lyrae - 22.46 + .00 } - 22.46 } Reduced to α Lyrae
 γ Aquilae - 22.49 + .03 } - 22.46 }
 β ——— - 22.50 + .03 } - 22.47 }
- 22.46 mean
45-
- 22.0

1865 Nov 6th L.M. Kent

$$C = +0.23$$

Polaris γ T.H.S. observer
8 88° 35' 48"

α Virginis M.H. observer 236 (compared)

Level

13 11 6.4
12 49.2
15 27.8

13 10 52.5
1 11 5.65
-13.15

44.1 80 13 18 50.0
48.3 236 13 19 10.0
50.9 236 fact +20.0
52.6
57.9
255.8

13 17 51.16
13 18 6.97
-15.81

E M B
84.3 +68.5 153.8
+72.0 80.2 152.2
+70.2 81.0 151.2
82.1 +67.8 149.9
308.6 298.5 152
77.15 74.62
74.62
2.53
1.26
 $t = -1.09$

11 2.6
3.8
4.5
5.2
6.7
10.3
11.6
44.9 6.4

$$\begin{aligned} \alpha \text{ Virginis } 0 &= -15.81 + \Delta t + m \cdot 0.8m + 1.02C \\ \text{Polaris } 0 &= -13.15 \\ 0 &= -2.66 \\ 0 &= -.07 \\ &= -.24 \\ 0 &= -0.31 + m \\ m &= -10.31 \\ m &= -0.40 \end{aligned}$$

$$\begin{aligned} -40.82m - 40.82C \\ +40.64m + 41.85C \\ +m + 1.03C \\ -0.24 \\ m = 1.356 - 0.91m \\ -12.15 \\ -2.8 \\ -40 \\ 31 \\ 71 \\ 273 \\ -242 \end{aligned}$$

15 43.4
48.1
46.9
49.9
52.2
54.0
295.5 49.2

2.66 0.4249 41.85 1.6217
40.64 1.6096 40.64 1.6096
.07 8.8159 1.03 0.0127
27

15 22.6
25.2
25.9
27.4
28.3
29.8
30.7
32.3
222.2 27.8

18
31
18
54
0558

$$\begin{aligned} m &= -0.40 \\ &= -0.06 \\ &= -0.23 \\ &= -0.69 \\ &= -15.81 \\ &= -16.50 \\ &= 22.50 \\ &= 6.00 \\ 7.76 & 54.32 (.77) \\ & 56.8 \end{aligned}$$

30.17
6.93
7.76

53.4
17.2
50.8

1865 Nov 17th All East
AM observer

$$c = -0.34$$

Polaris	sp	88°35'52"	α Virginis	236 Compared	Level
13	6	9.4	39 50	54.2 80 13 19 3.6	.E. .W. .B.
	8	27.2	21.70 61.20	57.8 236 13 20 10.0	+62.8 76.0 138.8
	10	57.3	2.40	1.3	74.0 63.4 + 137.4
	13	7.2	18 30	4.7	73.2 63.8 + 137.0
	15	29.4	40 50 61 20	7.9	+61.9 73.6 - 135.4
		124.5		125.9	271.9 276.7 24.6
		244.5		5.9	67.98 69.48 137.1
13	10	48.90	T. 13 18	1.18	67.98
1	11	1.48	MR 13 18	7.19	1.30
		12.58		-6.01	2 + 0.09

13	6	38			
		6.0			
		7.9			
		10.6			
		13.0			
		15.3	α Virginis	$0 = -6^s.01 + \Delta t + m - 0.18n + 1.02$	0.8176 -6.57
		52.6	Polaris sp	$0 = -12^s.58 + \Delta t + m - 40.85n - 40.86c$	1.6093 -40.67
		9.4		$-6^s.57$	$-40.67n - 41.88c$
8		22.9		$0 = -0.16$	9.2083
		24.7		$+0.38$	1.6220
		26.9		$0 = +0.19 - n$	1.6093
		29.2		$n = +0.19$	1.0127
		32.5		$m = -0.05$	
		136.2	27.2	$m = 1.35b - 0.91n$	
10		49.6		$m = .12 - .17$	
		57.3		$m = -.05$	
		53.0			
		153.9	51.3	$c = -6^s.01 + \Delta t - .05 - .03 - 0.35$	
				$0 = 6^s.44 + \Delta t$	
13		5.1			
		6.7			
		8.8			
		20.6	7.2		
15		24.5			
		28.3			
		30.5			
		32.5			
		117.8	29.4		

1865 Nov 27th Mc East

Level

Polaris

E	m	
82.2	69.7+	15 2.9
72.0 +	78.9	15 0.9
72.0 +	78.8	15 0.8
81.5	68.4+	14 9.9
307.7	295.8	
76.92	73.95	
73.95		
2.97		
1.48		
-0:11 = 6		

1	11	2.8	1	11	5.2
	13	30.9			9.2
	15	46.1			6.6
					21.0
			1	11	1.0

8 88° 35' 55"

T = 1^h 11^m 7^s.0
 AR = 1^h 10^m 56.30
 + 10.7

2510
 26221
 91.9

1	11	57.9
		0.1
		3.0
		5.2
		7.7
		73.9
		2.8

13	28.6
	31.0
	33.1
	12.7
	30.9

15	41.5
	42.8
	44.8
	46.9
	49.0
	51.5
	276.0
	46.08

$$C = -0.34$$

η Perseus

42.0
56.0
10.3
17.0
20.7
24.0
27.9
31.3
38.3
52.3
6.8

12.09
24.18

326.6

266.6

1.2 24m 24.24

AR=1 24m 20.10

+4.14

7.9336

9.5315

29 9.4601

$$\eta_{\text{Perseus}} \theta = +4.14 + \Delta t + m + 24n + 1.03 C$$

$$\text{Caloris } \theta = +10.7 + \Delta t + m + 40.88n + 40.89 C$$

$$0 = +6.6$$

$$40.62n + 39.86c$$

$$0 = +0.16$$

$$+n + .86$$

$$0 = -0.12 + n$$

$$29$$

$$n = +0.12$$

$$m = 1.35 - .91n$$

$$m = -.15 - .72n$$

$$m = -.27$$

39.86
40.62

1.5423

1.6087

9.9336

.86

1.6

0.8195 -

1.6087

.16

9.2108

$$m = -.34$$

$$n = .18$$

$$C = .34$$

$$0 = +4.14 + \Delta t - .27 + .04 - .35$$

$$- \frac{.27}{.62}$$

$$\frac{4.14}{.62}$$

$$+3.56$$

$$-6.44$$

$$9.48 / 10.00 (+1.56)$$

$$9.48$$

$$5.20$$

$$47.90$$

3.8

$$\frac{71}{13} = 5.46$$

$$\frac{273}{96} = 2.84$$

$$\frac{96}{1183} = 0.081$$

$$\frac{133}{133} = 1$$

$$\frac{148}{148} = 1$$

$$\frac{26}{16} = 1.625$$

$$\frac{15.6}{26} = 0.6$$

$$\frac{26}{0.416} = 62.5$$

$$2738$$

$$17.20$$

$$248$$

1865 Nov 27th All East A.M. Observer

Polaris sp

2 Virgins

2 Bootes

30.4

52.5

44.4

6.9

58.3

22.0

5.0

25.9

8.5

32.5

11.8

36.0

15.4

39.9

18.7

43.4

25.9

50.6

39.6

5.2

53.6

19.7

311.6

337.6

131.6

397.6

13

18

11.96

14

9

36.15

AR 13

18

7.43

9

31.68

+ 4.53

4.47

- 0.64

- 0.60

+ 3.89

3.87

3.56

33

13 6

12.4
14.0
16.7
18.3
21.1
24.0
26.9

8

31.5
32.9
35.0
36.8
39.1
41.0
43.7

11

55.3
57.6
59.5
61.9
64.7
67.5
70.3

13

10.4
12.5
14.7
17.0
19.2
21.4
23.6

15

36.3
38.5
40.6
42.7
44.8

1865 Dec 5th McCurt

Level	m	
732	79.0	152.2
83.3	68.3	151.8
83.0	68.2	151.2
+70.3	80.0	150.3

310.0 2955
 77.50 73.88
 73.88
 3.62
 1.81
 -0.13 = L

Reflex

α Andro.

γ Regan

51.9

7.5

23.1

30.5

34.6

38.3

42.5

46.1

52.9

9.3

25.1

362.8

60

422.8

38.44

38.41

28.76

-37

+10

-38

+50.94

50.95

50.42

16.8

23.5

27.1

30.5

34.3

37.8

44.7

30.64

20.98

-37

+0.5

-35

50.95

50.42

MR

n

n

r

E6 slow
G. Hamill + 50.94

50.42

Beta

19.0

33.4

47.9

54.8

58.5

2.0

5.8

9.3

16.7

30.9

45.6

2

2.17

2.13

52.16

-30.31

-0.06

-11.36

+50.80

D.H.

 α Androm. γ Pygmy

53.3

49.8

8.8

3.9

24.5

18.1

31.9

24.9

39.8

28.6

39.6

32.0

43.7

35.6

47.5

39.1

55.3

46.2

10.8

0.2

26.6

14.5

11) 377.8
60292.9
160

39.80

32.08

0 0 39.76 0 5

32.05

28.67

6

20.91

- 48.91

- 48.86

- .59

- .60

- 49.50

- 49.46

Dr 14th
 $m = .31$
 $a = .18$
 $c = .34$

67 leti

7 leti

52.2	55.9
5.9	9.6
19.8	23.4
26.5	29.6
29.9	33.0
33.2	36.6
36.9	40.2
40.2	43.7
43.0	47.4
1.0	4.0
<u>14.7</u>	<u>17.9</u>

	33.39		36.74
	- .03		- .03
2	9 33.36	2	35 36.71
	10 <u>18.98</u>		36 <u>22.75</u>
	- 45.62		
	<u>- .67</u>		
	- 46.29		

1865 Dec 21st (last AM) observer

Level

E	W	B
91.3	+81.5	172.8
+85.3	89.0	174.3
+86.3	88.5	174.8
73.2	+84.0	177.2
356.1	343.0	17.1
89.02	85.75	174.8
85.75		
3.27		
1.63		

C = -0.13

Reduce to 23^h α Puc Austr α Pegasi

217 Compared

30.5	22.5
34.4	26.0
38.1	29.6
42.5	32.9
46.3	36.7
49.8	40.7
22 49 38.36	22 57 29.54
22 50 13.85	22 58 31.30
-35.49	-35.76
01	0
-35.50	-35.76
-94	-70
-36.44	-36.46

 α Puc Austr α Pegasi α Andromedae γ Pegasi

$$\begin{aligned}
 0 &= -35.50 + dt + m + .58n + 1.16c & m \text{ not used} \\
 0 &= -35.76 & + 2.4n + 1.03c & -0.41 - .14 - .39 = -94 \\
 0 &= -35.77 & + 5.4n + 1.14c & -0.41 + .06 - .35 = -70 \\
 0 &= -35.65 & + 2.4n + 1.03c & -0.41 + .13 - .39 = -67 \\
 & & + 4.8n + 1.36c & -0.41 + .06 - .35 = -76 \\
 & & & \\
 0 &= -35.67 + dt + m + 12n + 1.09c \\
 0 &= -32.41 + dt + m + 40.92n + 40.73c \\
 0 &= +3.24 & + 40.80n + 39.84c \\
 0 &= +0.08 & + n + 0.98c \\
 & & -0.33 \\
 0 &= -0.25 + n \\
 n &= +0.25 \\
 m &= 1.35c - 0.91n \\
 m &= -0.41
 \end{aligned}$$

$$C = -0.34$$

$$\delta = 88^\circ 36' 0.2''$$

 α Andromedae

 γ Cygni

 α Ursae Min (Polaris)

		44.8			38.2				
		48.9			41.6	1	7	48.6 + 2.18.30	6.9
		52.6			44.9		10	4.3 + 2.4	6.7
		56.7			48.7		12	31.8 - 2 21.7	10.1
		0.5			52.2		14	46.6 - 4 39.5	7.1
		203.5			225.4				30.8
		26.35			8				7.70
0	0	52.70	0	5	45.08	1	10	7.70	
0	1	28.53	0	6	20.79	1	10	40.23	
		-35.83			-35.71			-32.53	
		+ .06			+ .06			+ .12	
		-35.77			-35.65			32.41	
		- .67			= .70				
		-36.44			-36.35				

$$36.44$$

$$= 36.46$$

$$36.44$$

$$36.35$$

$$169$$

$$-36.42$$

$$1 \quad 7 \quad \frac{45.4}{194.5} \quad 48.6$$

$$10 \quad \frac{1.5}{17.1} \quad 4.3$$

$$12 \quad \frac{28.1}{35.5} \quad 1.8$$

$$14 \quad \frac{40.0}{52.7} \quad 46.6$$

1865 Dec 2nd Continued*α Virginis*

51.0

4.9

19.0

23.6

29.3

32.6 -

36.3

39.8

46.5

0.4

14.5

299.9

359.9

13 17 32.72

13 18 8.13

- 35.41

- 0.41

- 0.04

- 0.35 -

- 36.21

1636

32.72

- .18 + 1.02

217 Combined

EC 13 20 4.86

13 20 10.00

5.24

1865 Dec 22^d

α Pegasi

22.5

26.0

29.6

33.2

36.7

1480

22 57 29.60

22 58 35.24

-35.69

- .70

36.39

γ Pyxis

38.1
 41.4
 45.1
 48.6
 52.0
 226.2

0 5 45.24
 0 6 20.78
 - 35.54
 - .70
 36.24

 α Virgini

25.9
 29.4
 32.7
 36.5
 39.7
 164.2

13 17 32.84
 13 18 8.18
 - 35.32
 - 80
 - 36.12

1865 Dec 25th M East

8 88° 36' 0"

Antares		α Cete		Polaris sp		α Virginis		α Bootes	
	58.2		37.7	13	5 ^h 17.2		27.9		51.6
	1.6		41.2		7 ^m 30.6	37.4	31.5		55.4
	5.3		44.5		9 ^s 58.9	$\frac{24.0}{61.40}$	34.8		58.8
	9.2		48.0		12 ^s 10.6	16.00	38.5		2.6
	12.7		51.4		14 ^s 35.7	$\frac{41.10}{61.40}$	41.7		6.1
	87.0		222.8		153.0		174.4		174.5
	27.0				273.0				294.5
1	59 5.40	2	54 44.56	13	9 54.60	13	17 34.88	14	8 58.90
AR 1	39 38.70	2	55 17.82	1	10 36.36	13	18 8.26	14	9 32.40
	-33.30		-33.26		-41.76		-33.38		-33.50
							-0.69		-0.62
							-34.07		-34.12

13	5 ^h	13.6	
		15.5	
		18.6	
		21.0	
		68.7	17.2
	7 ^m	28.7	
		30.6	
		33.0	
		91.9	30.6
	9 ^s	58.1	
		37.8	
		17.9	51.9
	12 ^s	5.8	
		8.9	
		12.1	
		15.5	
		42.3	10.6
	14 ^s	33.6	
		35.5	
		37.9	
		17.0	35.7

$$C = -0.34$$

217 Compound Level

	E	m	B
SC 14 11 7.3	+ 82.0	86.0	1680
21713 11 10.0	89.8	78.3+	1681
217 fact 2.7	89.2	78.4+	167.6
	+ 81.0	86.0	1670
	342.0	325.7	168.
	85.50	82.18	
	82.18		
	3.32		
	1.66		
	$b = -0.13$		

$$\alpha \text{ Virginis } 0 = -33.38 + dt + m - .18n + 1.02c \quad m \text{ n h m } c \text{ m c}$$

$$\alpha \text{ Bootis } 0 = -33.50 + dt + m + 36n + 1.06c \quad -0.31 - .03 - 0.35 - .69$$

$$.88 \quad + 18n + 2.08 \quad -0.31 + .05 - 0.36 - .62$$

$$m \text{ m } 0 = -33.44 + dt + m + 0.9n + 1.04c$$

$$\text{Polaris } 0 = -41.76 + dt + m - 40.92n - 40.93c$$

$$0 = +8.32 \quad + 41.01n + 41.97c$$

$$+ 0.20 \quad + n + 1.02c$$

$$- 0.35$$

$$0 = -0.15 \quad + m$$

$$n = +0.15$$

$$m = 1.356 - 0.91n$$

$$m = -1.17 - .14$$

$$m = -0.31$$

$$41.97 = 1.6229$$

$$41.01 = 1.6129$$

$$1.02 \quad 0.01$$

$$8.32 = 0.9201$$

$$41.01 = 1.6129$$

$$203 \quad 9.3072$$

$$1.35 -$$

$$-0.13$$

$$4.05 -$$

$$1.35 -$$

$$17.55$$

$$18$$

$$91 \quad 27 \quad 36$$

$$15 \quad 18$$

$$45.5 \quad 54$$

$$91$$

$$13.65$$

1866 Jan 10th Sall East
T.H.S. Observed

$$C = -0.34_{18}$$

α Arctus

α Ceti

323 Apheri B

16.0	55.9	~~19~~ 37.6
19.7	59.3	21 16.8
23.3	2.6	22 10.2
27.2	6.2	22 59.8
30.8	9.5	23 54.3
117.0	13.5	24 ~~44.6~~
		185.7

1. 59	23.40	2 55	2.70	3 23	1.1
1 59	38.51	2 55	17.68	3 23	13.23
	-15.11		-14.98		-12.13

α Arctus $0 = -15.11 + .42 + 1.08$

α Ceti $0 = -14.98 + .06 + 1.00$

Mean $0 = -15.04 + .24 + 1.04$

323 Apheri B $0 = -12.13 + 15.12 + 15.16$

$0 = +2.91 + 14.88 + 14.02$

$0 = +0.20 + n + .95 \times -0.34$
 -0.32

$0 = -0.12 + n$

$n = +0.12$

$m = -0.28$

$$\begin{array}{r} 0.4639 \\ 1.1726 \\ \hline 9.2913 \end{array}$$

$$\begin{array}{r} 1.1498 \\ 1.1726 \\ \hline 9.9772 \end{array}$$

$$\begin{array}{r} +.05 \\ -.34 \\ -28 \\ \hline -57 \\ -15.11 \\ -15.68 \\ \hline 15.59 \end{array} \quad \begin{array}{r} +.01 \\ -34 \\ -28 \\ \hline -61 \\ 14.98 \\ \hline 15.59 \end{array}$$

15.56

1866 Jan 18th H.S.*L Tauri*

3.9

7.6

11.0

14.7

18.1

55.3

4 28 11.06

4 28 15.62

-4.56

-0.58

-5.14

1866 Jan 24th - All East AM α Arctus α Ceto

35.7

15.6

39.2

19.0

43.0

22.4

46.9

25.9

50.5

29.0

215.3

121.9

1 58 43.06 2 54 22.38

1 59 38.30 2 55 17.50

- 55.24 - 55.12

- 0.57 - 0.61

- 55.81 - 55.73

33.73 14

15.4

- 55.77 12) 98 7

- 55.8

- 65.7

79.9

+ 1.4

1866 March 27

Call by S mark = +0^s.331 Ill East
 Mean + 0^s.338
 + 0^s.334

Reading on S mark ~~clock~~ Ill W. 86.6
 E 57.0

86.6 = 1.979 West - 0.334 1.645 W of S

= Azimuth of S mark

57.0 = 1.302 W + 0.334 1.636 "

Reading on cr mark Ill W 67.8
 Ill E 38.8

67.8 = 1.549 - 0.334 1.215 E W of cr

38.8 0.886 + 0.334 1.220

1865 Sept 13th All East

AM observer

$C = +0.20$

$t = +0.96$

First Rate used +0.026 per hour

Polaris sp

 α Lyrae γ Aquilae δ Aquilae

13 11 14.84
1 11 0.83
+14.01
+0.19
+14.20

18 32 24.40
18 32 24.35
+0.05
+0.06
+0.11

19 39 53.98
19 39 53.68
+0.30
+0.04
+0.34

19 44 15.34
19 44 15.06
+0.28
+0.03
+0.31

	$U =$	$+0.11 + dt + m + 50n + 1.28c$	m	n	U_{used}	C_{used}	C_{cor}	C_{check}	E_{err}
α Lyrae	$U = +0.11 + dt + m + 50n + 1.28c$		+0.09	+0.11	+0.26		+0.46	+0.57	+0.08
γ Aquilae	$U = +0.34$	+0.18n + 1.02c	+0.09	+0.03	+0.20		+0.32	+0.66	-0.01
α —	$U = +0.31$	+0.15n + 1.01c	+0.09	+0.02	+0.20		+0.31	+0.62	+0.03
β —	$U = +0.34$	+0.11n + 1.01c	+0.09	+0.02	+0.20		+0.31	+0.65	0
α Pegasus	$U = +0.48$	-0.58n + 1.16c	+0.09	-0.08	+0.23		+0.24	+0.72	-0.07
α Pegasus	$U = +0.36$	+0.26n + 1.03c	+0.09	+0.04	+0.21		+0.34	+0.70	-0.05
γ —	$U = +0.28$	+0.26n + 1.03c	+0.09	+0.04	+0.21		+0.34	+0.62	+0.03
	2.22	1.18	54					454	

Mean $U = +0.32 + dt + m + 0.17n + 1.08c$ 41.75 = 1.6207
 Polaris sp $U = +14.20 + dt + m - 40.66n - 40.67c$ 40.83 = 1.6110
 $U = +13.88$ -40.83n -41.75c 13.88 1.1424
 $U = +0.34$ -n -1.03c 1.6110
 $U = +0.34 - 0.21 - n$ 9.5314
 $\{n = +0.13\}$
 $\{n = +0.14\}$ adopted $n = +0.14$

Mean +0.65 21h
+0.75

Polaris $\tau = 1^h 10^m 47.53$
 AR = $1^h 11^m 1.06$

$m = 1.35t - 0.91n$

$m = 0.22 - 0.13$

$m = +0.09$

$39.59 = 1.5976$

$40.49 = 1.6073$

9.9903

$13.94 = 1.1443$

1.6073

$34 9.5370$

Mean $U = -13.62 + dt + m + 40.66n + 40.67c$
 $U = +0.32 + dt + m + 0.17n + 1.08c$
 $U = -13.94$ +40.49n +39.59c
 $U = -0.34$ +n +.98c
 $n = +0.14$

α Aquilae	α Psc Austr	α Pegasi	γ Pegasi
37.9	7.8	59.8	14.9
41.1	11.6	3.1	18.1
44.8	15.8	7.0	22.0
47.4	18.9	9.7	24.7
51.4	23.7	13.7	28.8
222.6	77.8	99.3	108.5
		33.3	21.70
19 48 44.32	22 50 15.56	22 58 6.66 0	6 21.70
19 48 44.21	22 50 15.03	22 58 6.25 0	6 21.34
+0.31	+0.53	+0.41	+0.36
+0.03	-0.05	-0.05	-0.08
+0.34	+0.48	+0.36	+0.28
Reduced to 21h			

α Lyrae	+0.51	Not Cor for Rate	
γ Aquilae	+0.62		
α —	+0.58		
β —	+0.62	+1.0	19 45 —
α Psc Austr	+0.77		
α Pegasi	+0.75		
γ —	+0.70	+71	23 18
			3 23

Occultation α Geminorum		
Emersion		
oh 30m	32:23	
Clock Error	+0:75-	
oh 30m	32:08	

Emersion α Geminorum oh 30m 32:08 Harvard Obs Sec Time

March 27 1866
 or Allenbach Creek
 179° 52' 28" All N
 359 28
 179 57 All E
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