KG
11365
113

C.8

INSTRUMENTAL CORRECTIONS

1863 Dec. 29th

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

KG 11365.113

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	1862 o-c	′	1863 o-c	″	c-c				Jan 1 - Apr 30 '64		
	Δα and δ A.	N	Δδ B.	N	Δα / k	Δδ / k		Δδ	Δα C,		
5 Ursae B	-.005	8	-.012	19	+.01	~~-~~	1	-.010	-.006	4	4 obs. Wash. give a considerable decrease
6 " "	+.015	13	+.011	10	+.13	+.003	4	+.015.5	+.020	3	Gr. gives more exact; Wash. a decrease
43 Cephei H	+.007	14	+.007	14				+.007	+.026	12	3 obs. G. 3 Wash. give a decrease
Polaris	+.002.4	35	+.021.3	75				+.015.2	+.016	21	
14 Camel B	-.057	8	-.007	25				-.019	-.033	10	More decrease by G. W.
10 Ursae min B	-.028	6	+.004	12				-.007	-.039	3	Wash. agrees very well 4 obs
Gr 527	-.050	8	-.014	12				-.028 20	-.023	6	
323 Cephei B	-.003	3	+.031	13				+.025 16	-.046	4	G. and W. do not accord,
57 Ursae B	-.044	3	-.048	10				-.047 13	-.002	6	All obs. indicate a decrease.
Gr 750	+.006	2	+.018	15				+.016.5	+.074	4	Wash. (1 obs.) accords
6 Ursae B	+.090	1	+.062	14				+.064	+.101	5	
ε Ursae	-.013	13	-.019	10				-.016	+.041	1	G. and W. do not agree here
64 Camel B	-.002	5	-.008	12				-.006 17	+.056	1	G. (2 obs.) indicates a decrease
δ Ursae	-.005	18	-.012	27				-.009	+.010	9	
51 Cephei H	-.003	17	-.001.6	32	-.01	-.001	8	-.003 49	-.007	9	G. indicates a decrease
25 Camel ~~H~~	-.017	12	-.025	14	~~+.04~~	~~+.001~~		-.021	-.013	3	G. does not agree in sign with H.C.: al. obs.
λ Ursae B	-.021	6	-.009.4	19	+.04 ~~-.08~~	+.001 ~~-.008~~	6	-.011.7	-.026	1	
156 Camel B	+.013	8	-.006.5	10	-.08	-.008	4	-.003.1	+.026	2	W. is a little larger
λ Ursae minoris	-.006	11	-.001.2	26				-.002.6	+.003	2	G. and W. do not agree in sign; P. agrees with H.C. and G.
Gr Draconis	+.062	8	+.074	12	+.10	+.017	5	+.000.2	+.062	5	comp. with Polaris 068 (6)
1 Draconis H	-.017	12	-.028	23	-.04	-.006	7	-.027 35	-.004	8	All obs. (G 5 W 2) demand a decrease
119 Cephei B	+.047	8	+.046	17				+.046 25	+.020	3	
30 Camel H	.000	13	+.031	8				+.012			Pulkowa does not concur
34 Cephei H	+.039	15	+.077	21				+.061	-.035	2	1 obs. (Wash.) does not concur.
202 Camel B	-.037	13	-.023	14				-.029	-.053	1	
39 Cephei H	+.001	13	+.006	17				+.004	-.014	2	G. and W. do not agree in sign
309 Cephei B	+.024	12	.000	8				+.014			G. and W. do not agree in sign

$k \frac{r+N'}{N'+N''}$

May–Aug 1864.

~~Values used for approximate~~

C_2		
-.012	2	-.010
.000	4	+.014
+.007	13	+.011
+.007	49	+.013
-.036	10	-.025
-.037	8	-.018
-.040	9	-.032
+.014	12	+.012
-.012	16	-.024
-.002	22	+.012
+.002	10	+.070
-.001	17	[illegible]
+.001	15	-.001
+.011	17	-.001
-.003	13	-.003
-.038	1	-.021
		-.012
-.031	1	+.002
-.013	2	-.003
+.156	1	+.079 +.063
-.027	2	-.022 -.028
+.074	1	+.044
-.010	3	+.009
+.098	2	+.061
-.011	2	-.029
-.005	3	+.062 ✓
+.002	3	+.013

.009 ± .004

Result of 2½ yrs' observations

The squares of the North Mark are distant as follows
A from B 0ʳ.294 by 7 obs up to Feb 13 '64 inclusive
C " B 0ʳ.302 " 19 " " "

Marks seen with

186 By 11 Obs Feb 19 1864 to Jan 26th 1865

A–B 0.303 7 .298
B–C 0.300 30

Will be used from to-day Jan 26th 1865

✓ A–B 0.298 } 14
✓ B–C 0.301 } 49

✓ middle of square B coincides with the
✓ point, or rather circle of about 0ʳ.1 = 3″
diameter.

1864 Jan 16th Ill. East.

W. Mark	A	B	C	South Mark	.618
	.019	.707	.408		.610
	.014	.711	.375		.640
	.100	.718	.394		.620
					.604
	.011	.712	.392		.625
					.620

Reversed to Ill West

				Zero
.570	.815	.114	.894	.254
.571	.809	.120	.871	.326
.531	.803	.130	.872	.256
.517	.809	.121	.893	.315
			880	.250
			.885	.326
			.882	.281

Micr. reading of L. Coll.

By 009 A .264
B .260
C .257

By W Mark .260
So Mark .251

Mean .254.5
Zero .281

Coll. of micr. .026.5 = $\pm 0^{s}.061$ + East − West.

Coll. + Daily Aber. $+0^{s}.299$ Ill East 0.387 on Dec 26th
-0.329 Ill West

1863 Dec 29th

														n − i	i − n
Assumed	n + 0.25 c + 0.34					Polaris	−29.82	+56.11	8.391	00	9.811	0.647	6	−.027	
α.						214 Cam B5	29.79	21.80	8.898n	−01	9.801	0.633	2		+.013
1 17	−8°9	+0.30	−29.82		?	20 Urs B	29.69	16.87	8.797n	−01	9.832	0.671	2		+.051
1 24	+14.6	0.42	29.71		2w	57 Urs B	29.52	16.42	8.595n	−01	9.713	0.516	1.8		−.104
1 47	+20.1	0.45	29.74		2w	323 Ceph B	29.52	38.20	8.820	+01	9.759	0.574	1.5	+.046	
2 0	+27.8	0.47	29.75			Gr 750	29.44	36.93	8.933	+.01	9.798	0.629	3	−.009	~~+.009~~
1 37			−29.755		4w	62 Urs B p	29.44	23.61	9.064n	−02	9.816	0.655	1		+.035
Pre Rate				0.139		ε Urs mi sp	29.31	24.06	9.130n	−02	9.780	0.603	5		−.017
Foll (3 days)				0.132	3w	64 Cam B	29.26	35.83	8.930	+01	9.748	0.560	1.8	+.060	
5 59	+14.8	+0.42	−29.02	0.136		δ Urs mi sp	29.14	18.77	8.772n	−01	9.788	0.614	6		−.006
6 39	−16.5	0.28	29.24			51 Ceph	29.09	+43.04	8.683	+01	9.828	0.676	5	−.056	
6 19			−29.13	not used: agrees with pre											

Combine Dec 26th and 29th together (n+c) = 0.620 ... n+c. 0.624 35.1

1863 Dec 30th Combine Dec 30th to Jan 9th inclusive n+c = 0.573

														n − i	i − n
					3w	309 Ceph B	−27.19	+35.17	8.849	+.01	9.752	0.565	2¼	+.008	
1 24	+14.6	+0.42	−27.08	Ang Wire	very good	Polaris	27.01	57.20	8.391	.00	[9.696]	0.497	3	+.076	
1 59	22.8	0.47	26.93		4w	214 Cam B	27.00	19.77	8.899n	−.01	9.759	0.574	2		+.001
3 52	−13.9	0.29	26.59		4w	20 Urs B p	26.92	17.11	8.796n	−.01	9.790	0.617	2		+.044
2 25			−26.867			Gr 577	26.86	30.72	9.200	+.02	9.789	0.615	2	−.042	
Pre Rate			0.117			— 750	26.67	33.36	8.923	+.01	9.749	0.561	3	+.012	
Foll —			0.142		4w	62 Urs B p	26.66	21.19	9.064n	−.02	9.803	0.634	1		+.067
			0.13												
										n+c		0.572	15¼		

1864 Jan 1

1 17	−8.9	+0.30	−20.17		4w	Polaris	−20.76	64.04	8.391		9.767	+0.585	5¼	−.012	
1 24	+14.6	+0.42	20.29			214 Cam B	−20.73	13.10	8.899n	−01	9.759	+0.574	2		+.001
1 20			−20.23									0.582	7¼		
Pre Rate				0.142											
Foll				0.137											

Jan 5			
1 59	+27.8	+0.57	−7.21
2 21	7.8	0.38	7.07
2 55	3.6	0.36	7.13
2 25			−7.14
	Per Rah		0.135
	Foll —		0.122
Jan 6			
0 56	+7.2	+0.38	−4.47
1 17	−8.9	0.30	4.36
1 24	+04.6	0.42	4.26
1 12			−4.36
	Pu Rah		0.135
	Foll		0.146
Jan 8			
12 35	−0.7	+0.34	+4.21
13 18	−10.4	0.30	4.35
13 48	+19.1	0.45	4.30
13 14			+4.29
Jan 9			
0 6	+14.4	+0.42	+5.60
0 37	−18.7	0.28	5.82
0 56	+7.2	0.38	5.83
1 17	−8.9	0.30	5.95
			+5.80
Jan 10			
0 56	+7.2	0.38	+9.08
1 17	−8.9	0.30	9.21
1 11			9.145

									m−i	i−m
Jan 5										
Wires disagree very badly	20 Urs mi B sp	−7.19	+0.33	8.797n	−01	9.634	.431	2		−.142
	Gr 527	7.13	+11.42	9.200	+02	9.834	.682	2	−.109	
3 w	5 Urs Bsp	7.02	−7.74	8.595n	00	9.764	.581	2¼		+.008
2 w	323 Ceph B	7.02	+16.56	8.820	+01	9.800	.131	1½	−.058	
							.578	7¾		
Jan 6.										
	43 Ceph H	−4.41	+11.59	8.891	+01	9.748	.560	3.6	+.013	
	Polaris	4.37	25.99	8.391		9.726	.532	3.6	+.041	
	214 Cam B	−4.34	−1.34	8.898n		9.652	.449	2		−.174
							.525	9.2	0.556 0.601	4 3½
Jan 8th morning obss.										
									+14	−14
1 w	309 Ceph B sp	+4.11	−10.98	8.848n	−01	9.685	.485	1.5	~~+.05~~	−.088
3 –	6 Urs mi B	4.16	+18.27	8.433	.00	9.784	.608	3	−.035	
4 w	43 Ceph H sp	4.24	−12.20	8.891n	+01	9.792	.610	3.6		+.037
	Polaris sp.	4.28	−29.53	8.391n	.00	9.793	.611	6		+.038
Jan 9							.597	14.1		
0.134 } 0.131 }	6 Urs mi B sp	+5.73	−28.80	8.433n	−.00	9.796	.625	4		+.052
4 w	43 Ceph B	5.81	+1.06	8.891	+01	9.738	.535	3.6	+.038	
	Polaris	5.85	+15.84	8.391	.00	9.727	.534	6	+.039	
	214 Cam B sp	5.88	−12.17	8.898n	−01	9.697	.498	2		−.075
	20 Urs mi B sp	5.98	−15.88	8.797n	−01	9.793	.621	2	~~−.048~~	+.048
	Gr 527	6.02	−1.97	9.200	+02	9.810	.646	2	−.073	0
2 w	5 Urs B sp	6.15	−19.67	8.595n	00	9.725	.531	1.8		−.042
5 –	323 Ceph B	6.15	+3.30	8.820	+.01	9.796	.625	2	−.052	
Jan 10	It is uncertain to which period						574	Jan 10 belongs 23.4		
	Polaris	9.14	+13.53	8.391		9.746	.557	6		
	214 Cam B sp	9.16	−16.99	8.598n	−.01	9.792	.610	2		
							.570	8		

4.

Period Jan 11-12 (n+c) = +0.634
14 (n+c) = +0.582
16 n+c −0.082 21.5 Reversed

														Wt.	m-i	i-m
Jan 11	0 56	+7.2	+0.38	+13.01		4w	43 Ceph H	+12.94	-5.63	8.891	+01	9.756	0.570	3.6	+64	
	1 17	-8.9	0.30	13.16			Polaris	12.99	+10.72	8.391		9.766	0.583	6.	+51	
	2 55	+3.5	0.36	13.35			214 Cam B sp	13.01	-20.89	8.898n	-01	9.795	0.624	2.		-10
	3 52	-13.9	0.19	13.29			Gr 750	13.63	-6.47	8.923	+01	9.766	0.583	3.	+51	
	4 28	+16.2	0.43	13.39		4w	62 Cam B sp	13.44	-20.52	9.064n	-02	9.915	0.822	1.		+188
	2 44			+13.24			δ Urs sp	13.81	-25.16	8.773n	-01	9.828	0.695	1.		+47
					0.161 0.106	4w	51 Ceph H	13.87	+1.59	8.682	+01	9.871	0.743	4.5	-109	
													0.643	26.1		
Jan 12th	1 17	-8.9	+0.30	+15.67		4w	43 Ceph H	+15.67	-7.33	8.891	+01	9.813	0.657	3.6	-17	
	3 52	-13.9	0.29	16.04			Polaris	15.70	+8.99	8.391		9.763	0.607	6.	+27	
	4 5	-7.2	0.31	16.02		4w	214 Cam B sp	15.72	-23.83	8.899n	-01	9.808	0.643	2.		+9
	3 5			15.91		3w	Gr 750	16.00	-9.20	8.923	+01	9.757	0.568	2¼	+66	
					.172		~~51 Ceph H~~						0.617	13.9		
															m-i	i-m
Jan 14th	0 1	+28.3	+0.53	21.45			~~25 Camel H~~									
	0 6	14.4	0.41	21.41		4w	43 Ceph H	21.43	-14.25	8.891	+01	9.748	0.560	3.6	+22	
	2 0	22.8	0.47	21.59			Polaris	21.52	+1.04	8.391	.00	9.744	0.555	6	+27	
	6 39	-16.5	0.28	22.13			214 Cam B	21.54	-28.62	8.899n	-01	9.750	0.563	2		-19
	2 12			21.645	0.13	3w	δ Urs min sp	22.17	-32.92	8.773n	-01	9.805	0.638	4.5		+56
					0.128	3w	51 Cephei H	22.23	-9.73	8.682	+01	9.780	0.603	3.75	-21	
							25 Camel H	22.27	-18.13	9.106	+02	9.725	0.531	1.	+51	
													0.582			

M. West.

Jan 16th M.T.c	-0.33 n + 0.25					4w	43 Ceph H	+27.62	-29.41	8.891	+01	9.141n	-0.138	3.6	+56	
	0 37	-0.45	~~-16.7~~	27.58			Polaris	27.66	31.01	8.391		8.916n	-0.083	6	+1	
	0 56	-0.30	+7.2	27.59												
	1 17	-8.9	-0.37	27.64			214 Cam B sp	27.68	26.14	8.899n	-01	9.083n	-0.121	2		-39
	6 30	+16.5	-0.27	28.37		4w	δ Urs min sp	28.31	27.38	8.773n	-01	8.737n	-0.055	5.4	~~+7~~	+27
	6 39	-16.5	-0.42	28.43		4w	51 Ceph H	28.36	29.45	8.682	+01	8.712n	-0.052	4.5	+30	~~+30~~
	3 12			27.922									-0.082	21.5		

Rate +.135

we

208

I cannot bring the obs. of Feb 5th into decent accordance any way.

	c − 0.33	n + 0.25	c = −0.02
−30	−0.52	−0.47	−0.40
−20	−0.44	0.11	−0.37
−10	−0.38	0.07	−0.36
0	−0.33	−0.02	−0.35
10	−0.29	+0.02	−0.37
20	−0.26	0.07	−0.33
30	−0.24	0.11	−0.36
40	−0.22	0.17	
45	−0.22	0.21	

	−27 n+c	s		
Jan 21		−0.109	53.05	
Feb 4. 5a		−0.148	11.4	
—	5b	+0.238	9.7	+0.211
—	8	+0.186	+3	
—	10−13	+0.243	29.4	

The change of collimation took place between ~~Bond & Arietis~~ δ Arietis and ξ² Cephei. It was
+ ~~0.23~~ 0.26 by these stars
+ 0.31 by collimation itself
+ 0.38 by Polaris

1864									log(n+c)		n+c		m−i.	i−m
Jan 21st	0 56	+7.2	+43.87		43 Cep H	+43.81	−45.80	8.891	9.188n	−01	−0.154	4	+35	
	1 17	−8.9	43.96		Polaris	43.84	48.70	8.391	9.077n		0.179	6	+00	
	1 24	+14.6	43.91	3w	214 Camel B sp	43.87	42.00	8.899n	9.168n	−01	0.147	1.8		−28
	2 0	+22.8	43.95		323 Ceph B	44.14	44.30	8.820	8.050n	−01	−0.011	2	−108	
	3 52	−13.9	44.10											
	4 5	−7.2	+44.17		62 Urs B sp	44.24	−44.31	9.066n	7.842	+01	+0.007	1		+126
	2 14		+43.993								−0.109	14.8		
			+.109											
Jan 25th	3 4	+19.2	54.68		57 Urs B sp	+54.62	−51.22	8.595n	9.125n	−01	0.133	3		−14
	6 0	14.8	54.90											
	6 30	16.5	54.89	4w	δ Ursae sp	54.94	52.65	8.773n	9.131n	−01	0.135	5.4		−16
	5 11		+54.823		51 Cephei H	54.98	57.71	8.682	9.115n	+01	0.131	5	+12	
			+0.105								−0.133	13.4		
Jan 27th	0 1	+28.3	+59.45	4w	43 Cephei H	+59.42	−61.52	8.891	9.215n		−0.164	3.6	+45	
	0 6	+14.4	59.35		Polaris	59.47	64.77	8.391	9.115n		0.131	6	+12	
	6 40	−16.5	60.00	3w	57 Urs B sp	59.69	56.64	8.594n	9.079n	00	0.120	2.25		−1
	7 32	+5.6	60.04		62 Urs B sp	59.75	59.63	9.064n	8.105n	−01	0.013	1		+106
	7 37	28.3	60.16		δ Urs m sp	60.01	58.27	8.773n	9.011n	−01	0.103	6		+16
	4 23		+59.80		51 Cephei H	60.05	62.36	8.682	9.044n	+01	0.111	5	−8	
			.110		25 Camel H	60.09	60.73	9.106	8.898n	+02	0.079	1	−40	
Feb 4th	1 24	+14.6	+20.55	4w	Polaris	+20.52	−26.42	8.391	9.161n		−0.145	5.4		
Feb 5th	0 1	+28.3	−4m 23.03 .110		Polaris	−4m 23.14	−29.28	8.391	9.179n		−0.151	6		
Feb 5	2 0	+22.7	+23.27		Gr 527	23.06	−21.35	9.200	+.02	9.438	+0.274	2	−63	
	5 8	−8.4	23.15	4w	57 Urs B sp	23.15	−22.70	8.594n	.00	9.338	0.218	2.7		+07
	6 39	−16.5	23.20		51 Cephei H	23.49	−18.60	8.682	.01	9.371	0.235	[5]	−34	~~[illegible]~~
	3 56		23.21 .105											
Feb 8th	2 21	+7.8	−1m +30.56		Polaris	+29.65	+37.28	8.391	9.274		+188	6	~~−20~~	
	6 39	−16.5	30.87		Gr 527	−29.51	30.02	9.200	8.924	+02	.084	2	−124	
	6 53	−28.8	30.94		51 Cephei H	−29.07	33.56	8.682	9.335	+01	.217	5	−9	
	5 18		+30.79											
			+.112											
Feb 10	2 55		−24.11		Polaris	−24.31	+34.19	8.391	9.386		243	6		
Feb 11				4w	Polaris	−21.83	+28.91	8.391	9.241		.174	5.4		

In the period Feb. 5b to Feb. 13 we will employ (n + c) = 0.208. This is specially derived from Polaris hence Polaris will have no resulting right-ascension wire = Intervals

The last examination of wire = intervals included observations up to Nov. 30th 1863 inclusive.

E. Dec 29 & 57   Jan 11 δ

Polaris		A−c	B−c	D−c	E−c	M−c	Air	O−m
1863 Dec 9th	88° 35′ 24.1″	4 43.5	2 32.1	1 47.1	4 23.5	13.00	2	2 0.10
" 15	25.5	40.0	26.0	52.3	26.6	9.42	2ᵃ	1.72
" 21	26.4	49.4	29.5	50.6	18.6	13.94	2	4.54
" 26	27.3	40.5	23.2	53.9	25.3	8.90	1	2.80
" 29	27.7	42.2	25.0	51.3	24.6	10.26	1	1.56
1864 Jan 8	28.4	47.0	25.2	53.2	22.5	11.30	3	4.50
" 9	28.5	45.7	29.2	49.3	22.0	12.72	2	2.02
" 10	28.6	34.9	24.3	53.5	28.0	7.54	2?	1.04
" 11	28.6	41.1	24.0	56.2	21.6	9.46	2	5.66
" 12	28.6	40.5	28.2	53.4	28.5	8.36	1ᵃ	1.76
	88 35 27.35	4 42.48	2 26.17	1 52.08	4 24.12	10.49		2.57
		~~4 42.95~~	~~2 26.58~~	~~1 53.2~~	~~4 25.58~~	~~10.06~~		
Jan 14	88 35 28.6	4 41.4	2 24.6	1 49.8	4 24.5	10.34	1	
— 16	28.6	40.9	22.8	51.9	27.5	8.86	2	
— 21	28.6	39.6	25.5	51.7	26.9	9.30	2	
27	28.2	41.6	26.1	50.8	24.8	10.42	2	
Feb 5	27.3	40.6	26.3	50.6	27.2	9.82	2	
8	26.9	41.5	25.3	51.7	24.7	10.08	2	
10	26.6	42.1	24.5	53.2	23.9	9.90	3	
12	26.2	41.3	25.9	49.9	27.0	10.06	2	
13	26.0	39.4	25.6	51.8	27.2	9.20	2	
	88 35 28.00	4 40.93	2 25.18	1 51.27	4 25.97	9.78.		
23	24.1	40.7	26.1	47.1	26.6	10.62	2ᵃ	
Mch 3	21.8	37.1	26.0	48.4	28.6	9.22	2ᵇ	
" 8	20.5	40.4	26.5	49.9	27.2	9.96	2ᵇ	
Apr 21	6.7	41.0	24.5	48.8	26.6	10.02	2ᵃ	
" 22	6.4	39.3	26.8	46.5	26.1	10.70	2ᵇ	
" 29	4.6	38.1	27.1	46.3	25.6	10.66	2ᵃ	
" 29	4.4	36.6	26.1	52.6	25.6	8.50	3	
May 3		39.9	25.7	51.2	27.2	9.44	2ᵃ	
Repeat Apr 7		42.6	32.1	48.8	24.5	10.28		

			A	B.	D.	E		
10 Obs Polaris Dec 29 – Jan 12	88 35 27.35	8.39077	0.86176	0.55563	0.44030	0.81254	9.41155	
			6.946	3.594	2.756	6.494	0.258	10
			~~6.688~~	~~3.336~~	~~0.258~~	~~3.044~~	~~6.702~~	
4 obs. Polaris Nov 22 – Nov 30	~~Three~~ 88 35 20.85	8.39132	0.86303	0.55738	0.44680	0.81551	9.39614	
9 obs Jan 14 – Feb 13	88 35 28.00	8.39071	0.83931	0.55262	0.43709	0.81554	9.38106	
			6.967	3.609	2.797	6.539	0.248	4
			6.907	3.570	2.736	6.539	0.240	9

There seems to have been a change in the intervals about Oct 20th 1863. It will be necessary to wait till observations of Polaris to date are read off. JHS 1864 Feb. 12th.

The assumed value 0.253 of the interval between mid = wire (C) and mean has not changed sensibly

The following are the results to be used until further notice

(1864 Feb 17th)

for Castor	M.	E Above	w Log.	2 Urs	4 Urs	6 Urs	Polaris	5 Urs	57 Urs	51 Cephei		E above	w above
+7.90	A – M	+ 6.685 –	0.82510	+5	+6	+2	+3	+1	+2	+1	$\frac{14+8}{2}$	–0.042 +	
+3.94	B – M	+ 3.338 –	0.52349	+1	+1	+1	+1				$\frac{11+10}{2}$	+0.487 –	
–0.29	C – M	– 0.249 +	9.39620								x1	–0.249 +	
–3.55	D – M	– 3.004 +	0.47770	+1	+1	+1	+1						
–8.00	E – M	– 6.768 +	0.83046	+5	+6	+2	+3	+1	+2	+1			
		w. E Below											

These values were also used for 1863 Dec 21 which happened not to be reduced until quite long after the wire errors were computed for other dates

1864 Feb 13th Illumination West

	North Mark A	B	C	South Mark	Comind
About 1h 20m Sid T					
	.697	.010	.295	.053	.260
	.706	.994	.308	.040	.331
	.689	.990	.306	.052	.260
				.068	.320
	.697	.998	.303	.001	.268
				5) .274	.326
				.055	.294
About 2h 10m					
	.706	.974	.290	.093	~~.265~~ 2
	.700	.005	.293	.080	
	.715	.996	.305	.055	
	.707	.992	.296	.065	
				.070	
				.073	

After Reversal & East

	.836	.511		.750	.263
	.795	.509		.748	.342
	.810	.535		.741	.266
	.808	.525		.749	.538
	.824	.528		.756	.163
	.815	.522	.824	.749	.340
	.403		Rot B 3.	.820	.302
	.409				.294
Lin of Coll N Mark	.406				.298
S —	.411				
	.406.5				
	.298				

0s.110.5 = 0s253 Coll of Mid Wire + West
− East.

Using intervals det. by Aug 3 '63 Coll + Daily Aberration −0s.015 East
−0.015 West

There has been a large change in the Error of Collimation. By Polaris it appears to have taken place between Feb 5th [Polaris] ~~and 7 10 at least~~ and Feb 8th.

Further examination will show whether it happened on the evening of Feb 5th

Employing the same intervals which have for some time been in use we get

			c
Jan16	Ill	E	+0.299
	"	W	−0.329
Feb. 13	"	W	−0.015
	"	E	−0.015

Now the obs. of Feb. 5th and 8th compared show a change between those dates of (a+c) of about that amount.

1864 Feb 19 Marks very tremulous.

S Mark	N Mark		Red to B
.775	.085 A	A .078	.784
848	.072 A	B .772	.756
.835	.770 B	C .454	.771
.839	.773 B		
.824	.495 C		
	.421 C		
	.446 C		

Δn $-0^{s}.049$

Δs $+0.075$

Hence it appears that the azimuth has changed since Feb. 19th by $0^{s}.062$, and c by 0.013; the latter an insensible quantity so far as the Obser. of the marks were concerned.

1864 Feb 23
S Mark
invisible

N Mark
tremulous

.785	B	
.836	B	.797
.769	B	
.514	C	
.450	C	.496
.523	C	

1864 Feb 26th $0^{h}\,26^{m}$ Sid T.
N Mark nearly still

.848	B		.254	
.838	B	.839	.337	295
.832	B		.266	
.520	C		.340	303
.550	C		.256	
.556	C	.542	.340	298
				299

S Mark
.684
.687
.704
.666
.691

N Mark B .842
S Mark .686

Since Feb 13
Δn $+0^{s}.027$
Δs -0.063

The slight change $\frac{1}{2}(n+s)$ $-0^{s}.018$ is of opposite sign to that on Feb. 19th, and very it is likely be the effect of lateral refraction

1864 Mch 3

SO Mark	No. Mark		
.72³	.802	B	
.720	.818	"	.810
.720	.809	"	
.710	.510	C	
.710	.506	"	.505
Quite nearly still	.498	"	

Ended at 2h 52m Sid T.
Began " 2 42. "

Since Feb 13th Δn –.011
Δs –.021
+.016 = +0.s04

1864 Mch 12th

SO Mark	NO Mark	
.644	.816	B
.650	.822	B
.653	.811	B
.671	.516	C
.660	.515	C
.656	.523	C
	.816 .512	

Since Feb 13th

Δs – .093
Δn – .003
Δc +.048 = +0.s11

1864 Apr 29th IUE

So Mark (tremulous faint)	N Mark		
.490	.058	A	.065
.476	.079		
.478	.059		
.494	.738	B	.740
.459	.745		
.479.4	.738		
	.447	C	.443
	.448		
	.434		
	Red. to B		.752

.771
.740
.745

Since Feb. 13

Δs –.270
Δn –.068

Δ. L. of Coll –.169 Δc + 0.s386

Reversed to IUW.
next pass Oct 2.

72.

+0.36 -0.02

-30	-.23
-20	.15
-10	.09
0	-.02
10	+.04
20	.11
30	+.19
40	+.28

n+c

Feb 13 Mer 2	+.251
18	.348
19	.491
23	.400
26 27	.[illegible]
25	.32

				0.103									n+c			
1864 Feb 12	2 0	22.7	+19.28	~~+.260~~			Polaris	-19.37	+28.80	8.391		9.366	+232	6		
				+0.196												
181																
1864 Feb 13	3 14	49.2	-16.86	~~+.263~~			Polaris	-17.08	+26.43	8.391		9.362	+.230.	6		
							323 Ceph B	-16.85	+20.64	8.820	+01	9.400	+.251	1.5		
			+.113												m-i	i-m
1864 Feb 18	4 78	+16.2	-3.04			2w	Gr 750	-3.22	+5.43	8.923	+01	9.267	+186	1.8	+.162	
	5 8	-8.4	-3.14			4w	62 Urs Br	-3.31	+0.05	9.064	-02	9.564	.366	1		+.018
	5 48	+7.4	-3.07				ε Urs min sp.	-3.10	+0.15	9.130	-12	9.600	.398	5	+.348	[+.050] 7.8 omit
	5 8		-3.083	+.112												
Feb 19	5 8	-8.4	-0.44			1w	Polaris	-0.85	+20.78	8.391	.00	9.690	+.490	3		
	5 48	+7.4	-0.28				25 Camel H.	-0.18	+4.03	9.106	+03	9.695	+.495	1		
	5 28		-0.36													
			Rate 19-23 +0.117										+.491	4		
Feb 23	2 0	+22.7	+10.67	10.66	n.m 2.28		Polaris	+10.38	+4.99	8.391		9.578	0.379	6	+0.021	
	2 55	3.6	10.65													
	7 26	32.2	11.16			4w	δ Urs min	10.98	-17.51	8.773	-01	9.650	0.447	5.4		+0.047
	7 32	5.6	10.99	11.07	7 32	1w	51 Ceph H	11.01	-3.74	8.681	+01	9.543	0.349	2.5	+0.051	
	7 37	26.4	10.99													
	5 32		+10.89									n+c	0.400			
				+0.090											m-i	i-m
Feb 24	7 26		+13.26				156 Cam B	+13.26	-9.60	8.986	+.02	9.552	0.357	2		
	7 32		13.20													
	7 37		13.25													
	7 32		+13.24													
				+0.097												
Feb 25	6 58	-15.3	+15.42													
	7 12	+22.2	15.66			3w	25 Cam H	+15.52	-13.03	9.106	+02	9.506	0.321	1	+36	
	7 32	+5.6	15.55				156 Cam B	15.59	-12.30	8.986	+02	9.506	0.321	2	-36	
	7 37	26.4	15.59													
~~Feb 26~~	7 55	26.2	15.57													
	7 27		+15.56	Feb 26		4w	δ Urs min sp	+17.90	-23.05	8.773	-01	9.486	0.306	5.4		+22
Feb 26	6 30	+16.5	+18.07				51 Ceph H	17.94	-12.57	8.681	+01	9.412	0.258	5.	+26	
	6 39	-16.5	17.86			3w	λ Urs Dep	18.08	-31.76	8.283		9.419	0.262	3.75		-22
	6 53	-28.8	17.92													
	6 58	-15.4	17.93													
	7 12	+22.2	18.03													
	7 32	+5.6	18.00	Rate +0.103												
	7 55	+26.2	18.14													
	8 25	+20.9	18.12													
	7 16		+18.004													
m Feb 27																

Feb 26 mean 0.284.

~~n+c Mch 3-8 n+c 0.301~~

1864 Feb 24 - March 8	+0.299	n+c	It is doubtful whether there is yet any evidence of change
March 9	0.375	8	
12	0.344	13	
14	0.373	2	
16	0.322	7	
19	0.302	10.2	

1864 Feb 29 5 7 +25.67
5 8 +25.58
25.62

1864 Mch 3 Rate +0.097
+59
1 59 22½ 32.37
2 55 3½ 32.30
7 21 32 32.94
7 32 6 32.81
7 37 28 32.83
5 30 32.65

Mch 7th Rate +105
7 37 28 43.09
9 20 -8 43.03
8 28 43.06

+.102

β Arietis
α Arietis 2 11 44.84

Mch 9
γ Gemini 6 30 +.08 47.45
Sirius 6 39 -.13 47.29
α Cani. 6 53 -.22 47.77
γ Cani. 6 57 -.12 47.75
Castor 7 27 +.21 47.60
Proc 7 32 +.01 47.40
Poll 7 37 +.18 47.55
7 5 47.416
0.089
circos for n+c

Mch 12
5 25 -0.5 +54.56
5 27 -16.5 54.62
5 29 -1.5 54.60
9 20 -8.1 54.67
6 25 -6.6 +54.66

8 40 +6.9 54.79
9.11 +16.3 54.82
8 55 +12.6 54.805

Hence 7 17 54.71
+0.06 Approx
54.77

Hence Rate per n.o 0.21 o.11 0.102 0.107
Mch 15th 9 38 +0.21 -13.82 Ur+14
9 53 0.14 13.78
10 1 +0.16 13.81
9 51 13.81

							n+c	m-i	i-m	Wt.
1864 Feb 27		+19.92	-7.14							
Feb 29	ε Ursae min	+25.68	-27.95	-.02	9.130n	9.588	-0.327			3¾
Mch 3	Polaris	+32.23	-21.49		8.391	9.422	0.264	+37		6
	64 Camel B	32.63	-29.75	+.02	8.930	9.392	0.247	+54		2
	25 Camel H	32.66	-30.43	+.02	9.106	9.458	0.287	+14		1
	15 Camel B	32.87	-29.93	+.02	8.987	9.458	0.287	+14		2
3d.	Ursae min B	32.90	-50.04	.00	8.283n	9.517	0.329		+28	3¼
	74 Draconis sp	32.95	-35.53	-.03	9.212n	9.629	0.427		+126	2
Mch 7	15 Camel B	42.98	-40.29	+.02	8.987	9.420	.263	+38		2
	74 Draco sp	43.08	-45.46	-.03	9.212n	9.594	.392		+.91	2
	1 Draco H	43.15	-41.16	+.02	9.148	9.451	.282	+19		2
Mch 8	Polaris	44.75	-32.84	.00	8.391	9.467	.293 .301	+8		6
Mch 9	51 Cephei H	47.37	-41.13	+.04	8.681	9.477	.300	[+15]		5
	4 Ursae min B	47.43	27.50	.00	8.234	9.533	.341	-26		3
Mch 12	ε Ursae min sp	+54.54	-57.38	-.02	9.129n	9.585	.385		+041	5
2d	δ Ursae min sp	54.67	59.35	-.01	8.773n	9.444	.278		-066	3
3d	74 Draconis sp	54.91	54.94	-.02	9.213n	9.525	.335		-009	1
	1 Draco H	54.97	52.57	+.02	9.148	9.532	.340	+004		2
	119 Cephei B sp	54.99	56.13	-.02	9.041n	9.541	.348 .344		+004	2
Mch 14	119 Cephei B sp	+0.13	-3.52	-.01	9.041n	9.572n	0.373			2

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1864 Apr 29th after Reversal

No. Mark		So Mark		
.696	B	.981	.250	.298.5
.700	"	.985	.347	
.706	"	.990	.262	.301
.996	C	.984	.340	
.998	C	.994	.267	.301
.997	C		.335	
.701	B	.987		.300
.997	C	.479		
.302		.233 Line of Coll		

.695 C red to B
.701 B
.698 Mean
.753
.725 Line of Coll. No Mark
.233 " So Mark
.729
.300
~~0s.429 + 0.9[illegible] Coll. of Mid. wire~~
− 0s.071

M. of Wires + Daily Aberration

Coll. Midwire 2M E + 0s.162 } + 0.~~400~~ 396 = 0
" W − 0.162 } − 0.~~43~~ 426 = 0.

~~The~~ A change of collimation has taken place since Mch. 17th of about +0s.38 2M E.

No change of any sensible amount has taken place in the reduction from mid = wire to mean of wires.

1864 May 3.

Seeing fine

So Mark	No Mark
.980	.722 B
.976	.729 B
.976	.728 B
.977	.025 C
	.030 C
	.726.3
	.725.5
	.726 Reduced to B

Δs $-0.^{s}010$
Δn $+0.028$
$\frac{\Delta(s+n)}{2} = +0.^{s}009$

Obs. made between $8^{h}39^{m}$ and $8^{h}47^{m}$ Sid. Time

1864 May 4
$9^{h}41^{m} - 9^{h}50^{m}$ Sid Time
Marks very tremulous

	No Mark		So Mark
B	.748		.012
	.739	737 B	.006
	.723		.026
C	.018		.989
	.036	031 C	.020
	.040		.011

Corr to B .729
B .737
.733

~~from 29~~

from Apr 29 Δs $+.024$
Δn $+.035$
$+.030 = +0.^{s}068$

The blow which the eyepiece received May 3, immediately after the last observation ($15^{h}+$ Sid Time $= 12^{h}+$ mt) seems to have altered the value of c ~~collimation~~ by about $+0.^{s}068$.

This view is not confirmed by the observations of polar stars.
1864 The indication is rather that the change in c took place between Apr 29 and 30.

It has been assumed in deducing these numbers that the large change in c took place between Mch 19 and 21.

Hence. c = +0.s11 March 14–19   +0.s396 Mch 21 – Apr 29.

Illumination East.

I shall assume for the present that Mr. Rogers obs. are right after Apr 6. So far as personal equation different for different stars goes.

assumed m = +0.s21 c = +0.s11

				Hor. Rate	
1867 Mch 16	9 21	+0.08	+4.61	+0.101	
			−6m	+0.096	
Mch 19 Safford	5 48	+0.14	+11.41		
	6 30	+0.18	11.52	6 19 +11.44	
	~~6 30~~	~~+0.05~~	~~11.39~~		
Rogers	7 26	+0.20	11.57		Examine observers
	7 37	+0.26	11.46		
	8 40	+0.14	11.36		
	9 21	+0.14	11.53		
	9 38	+0.21	11.40		
	9 53	+0.14	11.49	9 54. 11.46	
Mch 21	10 12	−0.14	11.50		
	8 58		11.47		
9 38 +0.48 −27.07 9 53 +0.41 −27.05	6 39	+0.37	−27.33		δ.
	6 53	0.58	27.15		−
	7 26	0.54	[illegible] 21		R
	7 32	0.40	27.02		
	7 37	0.51	27.40		
	9 11	0.45	27.07		Rogers
Mch 24	6 30	+0.45	−21.44		
	6 53	0.38	21.38		
	6 58	0.37	21.49	9 11 −21.25	
	7 12	0.47	21.52		
	7 26	0.54	21.26		
Safford	7 37	0.51	21.36		
	7 55	0.51	21.29		
	8 2	0.37	21.24		
	8 40	0.41	21.18	Rate 0.08	
	7 28		21.35		
	11 42	+0.44	−21.03		
	11 43	0.40	20.97		
	11 43		21.00		
Apr 6				Rate +.088	
Apr 7	7 55	+0.51	+8.29		
	8 25	0.47	8.20		
	8 40	0.41	8.23		
	9 38	0.48	8.35		
	8 40		+8.27	Rate +082 .075	
Apr. 9	8 40	+0.41	11.78		
	9 11	0.45	12.08		
	9 21	0.38	11.98		
	9 38	0.49	11.87		
	9 53	0.41	11.95	10 58 12.11	
	9 37		+11.96	+.096	
Apr 15	8 40	+0.41	−34.35		
	9 21	0.38	34.22		
	9 38	0.49	34.40		
	10 1	0.43	34.07		
	9 25		−34.26		

7m

	−dt−m	α−t		log(n+c)	(n+c)	wt	m−i	i−m	
1 Drac H	+4.59	−2.95 +02	9.148	9.368	.233	2	+089		
202 Cam B	4.81	−2.27 +02	9.150	9.558	.361	1	−039		
39 Ceph H sp	4.82	−10.75 −01	8.779n	9.553	.357	4		+035	
					.322	7			
δ Ursae min sp	11.46	−16.34 −01	8.773n	9.464	0.291	6		(+ 2)	
51 Ceph H	11.47	+5.57 +01	8.681	9.453	0.284	3	+ 5		
~~1 Drac H~~	11.50	−8.67 +02	9.148	9.603	0.401	~~1~~2	−.142		Rogers
51 Ceph H	−27.25	+36.88 00	8.681	9.666	0.463	3 3/4			
~~25 Cam H~~	−27.33	+31.76 +01	9.106	9.753	0.566	1	−103		Rogers
							m−i		
Polaris	−21.85	+44.79	8.392	9.753	.568	5.4	+017		
δ Ursae min sp	21.45	11.28	8.773n	9.780	.603	5.4		+018	
76 Drac sp	21.26	17.33 −01	9.213n	9.809	.644	2		+059	
1 Drac H	21.74	25.83 +01	9.148	9.811	.648	2	−.063		Rogers)
309 Ceph B sp	20.99	13.31	8.849n	9.734	.543	2.7		−.042	
5 Ursae min B	20.97	32.77	8.690	9.762	.578	3	+.007		
			Mean of JHS.		585	16.5			
Polaris	+5.59	+15.09	8.392	9.707	.509	4.5	+002		
~~Polaris~~	+7.63	+13.83	8.392	9.723	.524	6	−013		Rogers
~~1 Drac H~~	+8.32	−4.44 +01	9.148	9.738	.547	2	−036		"
m A R									
1 Drac H	+11.93	−8.31 +01	9.148	9.708	.500	2	+011		"
34 Ceph H sp	+12.05	−15.34 −01	9.120n	9.638	.435	2		−076	"
Apr 15m									
76 Drac sp	−34.34	+30.95 −01	9.213n	9.744	.555	2		+044	
1 Drac H	−34.27	+37.56 +01	9.148	9.667	.464	2	+047		
119 Ceph B sp	−34.26	+29.21 −01	9.041	9.690	.490	1.5		−021	

From March 21 – Apr 27 the values assumed were

	n	c
	0.12	0.39
	9.079	9.591

n sec δ + c sec δ   n(tan δ − sec δ)

n tan δ + c

Illumination East.

Decl.	n tg δ + c sec δ	
+40	0.61	−91
30	0.519	−60
20	0.459	−42
+10	0.417	−27
0	0.390	−15
−10	0.375	−4
20	0.371	+10
30	0.381	+29
−40	0.41	

Mch 21	0.484	4¾
24	0.591	18½
Apr 6	0.509	4½
7	0.528	8
9	0.468	4
15	0.505	5½
16	0.564	1
21	0.511	36
22	0.514	22
27	0.499	2

wt   m−i   i−m

1864 Apr 16   9 11   +0.45   −32.16 · Apr 16   202 Lam B   −32.06   +36.04 +01   9.150   9.751   +0.564   1/23   −053   Rogers
9 21   0.38   32.26 ·
9 38   0.48   32.26
Rogers   9 53   0.41   32.11
10 1   0.53   32.10
10 25   0.42   32.23   .079
10 42   0.42   32.10
10 58   0.41   32.02
11 12   0.37   32.18 ·
10 9   −32.158 ·

n + c.   m−i   i−m

0.082 ·   Apr 21

Apr 21   8 40   0.41   −22.39 ·   lw   3 Cephei H   −22.18   +13.57   .00   8.779   9.717   +0.521   3.6   +10   Rogers
7 26   0.54   22.34 ·   30 — B   22.14   14.69   .00   8.849   9.721   0.526   3   +15   "
Safford   7 32   0.40   22.49 ·   5 Ursae B   22.12   32.75   .00   8.690   9.717   0.521   3   −10   "
7 37   0.51   22.42 ·   43 Cephei H   22.02   14.88   .00   8.892   9.746   0.557   4   +46   Safford
9 38   0.48   22.41 ·   Polaris   21.99   +0.84   .00   8.393   9.718   0.532   6   +11   "
10 1   0.43   22.23 ·   244 Lam B   21.97   28.68   .00   8.898   9.725   0.531   2   −20   "
Rogers   11 42   +0.44   −22.23
12 27   0.37   22.03
Safford   12 34   +0.39   22.04 ·   lw   Gr 537   21.88   19.02 −01   9.201   9.659   0.456   2   −55   "
13 3   0.38   22.08 ·   lw   57 Urs B   21.81   34.04   00   8.595   9.682   0.481   3   +30   "
13 18   0.37   21.97   Gr 750   21.76   15.47 −01   8.923   9.722   0.527   3   +16   "
14 26   0.53   21.94   62 Urs B   21.76   25.59 +01   9.064   9.648   0.445   1   +66   "
14 43   0.37   21.79   Polaris   21.01   40.40   00   8.393   9.679   +0.477   5.4   +34   "
14 43   0.37   21.77
14 58   0.50   21.85
15 9   0.38   21.71
DHS No 10 32   22.24
5 14 5   21.85
11 48   22.10   12 4   −22.13

396   36

Apr 22

+0.511

Apr 22   Rate
9 21   +0.38   −20.34   +0.082   1 Drac H   −20.35   +24.18   +01   9.148   9.732   0.540   2   −26
11 13   0.37   20.21   119 Ceph B   20.34   15.02 −01   9.043   9.769   0.587   2   +76
11 30   0.39   20.25   39 — H   20.17   11.04   .00   8.779   9.740   0.550   4   ~~−39~~   +39
11 42   0.44   20.17   6 Urs B   20.11   37.45   .00   8.431   9.670   0.468   4   +43
Reverse   11 44   0.40   20.07   43 Ceph H   20.06   13.64   .00   8.892   9.700   0.507   4   −   −09
12 3   0.37   20.13   −11.26   11.26   Polaris   20.03   0.75   .00   8.392   9.679   0.515   6   −33
12 27   0.37   20.14   Apr 27
12 34   0.39   20.11   +0.514   22
13 3   0.38   19.96   Apr 27   9 21 +0.38   9 39 0.48   +0.076   1 Drac H   −11.28   +24.82   +01   9.148   9.698   +0.499   2   +11
13 18   0.37   20.02
20.035

Values obtained c − 0.401

Assumed n + 0.09 for May 3–6
c − 0.36
8.954
9.556n

+40°	−.394	+31
30	.363	13
20	.350	0
+10	.350	−10
0	.360	22
−10	.382	34
20	.416	51
30	.467	79
−40	−.546	

Apr 29th n + c − 0.344
Apr 30–May 4 " −0.266 38
May 5 – 6 −0.333 36

									n4 15 = 0 log(n+c)	n+c	wt	n−i	i−m	
1864 Apr 29	13 18	−0.45	−7.36		5 Urs B	−7.50	+1.06	8.690	9.499n	.315	3	−29		JHS
Asd	14 9	0.43	−7.40	3w	43 Ceph H n	7.45	12.16	8.892n	9.565n	.367	3		−23	"
n = +0.06 c = −0.43	14 43	0.46	−7.25		Polaris sp	7.43	22.16	8.393n	9.561n	.364	6		−20	
	14 43	0.46	−7.27	.075	214 Camel B	7.41	3.92	8.898	9.441n	.276	2	−68		
	15 29	0.45	−7.35		20 Urs B	7.36	3.21	8.797	9.415n	.260	2	−84		
	14 28		−7.326		Gr 527 sp	7.33	9.65	9.200n	9.565n	.367	2		−23	
					323 Ceph B sp	7.26	+11.92	8.820n	9.489n	.308	2		+36	
	Assumed n +0.10 c −0.43			+.065	Polaris	[1.64]	−8.93	8.393	9.585n	.384	6	+40		
										344	26			
1864 Apr 30	10 1	−0.42	−5.92		31 Ceph H n	−6.02	+8.09	9.120n	9.436	+.273	2		+006	Rogers
W.A.R.	11 43	−0.43	6.01		309 B sp	5.95	9.93	8.849n		.281	3		+014	"
					5 Urs B.	5.93	0.67	8.690	9.411	.258	3	+009		"
	13 18	−0.45	5.95	4w	Polaris sp	5.86	16.29	8.393	9.412	.259	3		−008	"
	11 41		−5.96							+.267	11			
1864 May 3	7 37	−0.36	−0.51 x	+0.081	30 Camel H	−0.23	+.01 −1.77	9.070	9.373n	−0.236	1	−30		JHS
	~~8 40~~	−0.35	~~−0.24~~		43 Ceph H sp	−0.02	+3.63	8.892n	9.450n	−0.282	3		−16	
	~~10 13~~	−0.35	~~−0.25~~		Polaris sp	+0.01	+11.71	8.393n	9.462n	−0.290	6		−24	
	~~10 21~~	−0.35	~~−0.20~~											
	~~12 35~~	−0.36	~~−0.06~~		214 Camel B	+0.02	−2.58	8.898	9.306n	−0.202	2	−64		
	12 50	−0.39	0.00											
	13 18	−0.36	−0.02		20 Urs. B	+0.08	−4.40	8.797	9.432n	−0.270	2	+4		
	14 9	−0.35	+0.08											
	14 43	−0.40	+0.24		Gr 527 sp	+0.12	+1.69	8.201	9.459n	0.288	2		−22	
	14 43	−0.40	+0.15											
	12 54		−0.012							−0.271	16			
				+0.076										
May 4	10 1	−35	+1.57		43 Ceph H sp	+1.82	+1.78	8.892n	9.448n	−0.271	3		−5	JHS
	14 10	−35	+1.95		Polaris sp	+1.84	+8.81	8.393n	9.420n	−0.263	6		+3	
	12 6		+1.76		214 Camel B	+1.85	−4.63	8.898n	9.342n	−0.220	2	−46		
				Rate .079						−0.257	11			JHS
					3							n−i	i−m	
May 5	10 1	−35	3.52											~~JH~~
	14 10	−35	3.81		30 Camel H	+3.52	−6.08	9.070	9.478n	−0.301	1	−0.032		
	14 43	−40	3.92											
	14 43	−40	3.85	4w	Polaris sp	3.76	+6.91	8.393n	9.422n	0.264	54		+0.069	
	13 24		3.775	4w	214 Camel B	3.77	−7.14	8898	9.426n	0.267	2	−0.066		
					Gr 527 n	3.86	−1.65	9.201	9.565n	0.351	2		−0.018	
				Rate +.056	Polaris	4.58	−22.23	8.393	9.640n	0.437	6	+0.104		
May 6	10 1	−35	+4.96											JHS
	11 44	−36	5.10		30 Camel H	4.93	−7.83	9.070	9.562n	0.365	1	+0.032		30 Cam
	13 18	−38	4.98		34 Ceph H sp	4.96	−4.95	9.120n	9.423n	0.265	2		+0.068	34 Ceph
	11 41		5.01	3w	202 Camel B	4.99	−7.46	9.150	9.583n	0.349	1	+0.016		202 Cam
				4w	39 Ceph H sp	5.0[illegible]	−[illegible].33	8.729n	9.448n	0.281	3		+0.052	39 Ceph
				3w	43 Ceph [illegible]	5.[illegible]4	−[illegible].79	8.4[illegible]	9.576n	0.377	36	+0.044		[illegible]
										0.352	3		−0.019	43 Ceph
													020	

Assumed n = 0 c = -0.36

May 9 - 18
40° - 0.47
30 0.42
20 0.38
10 0.37
0 - 0.36

May 9-10 - 0.362 34.4
18-19 - 0.314 39.5

May 19 assumed n = +0.06 c - 0.36

1864 May 9	12 3	-0.39	+9.30	
	12 27	0.49	9.43	
	13 3	0.36	9.44	Rate
	13 18	0.37	9.46	+.060
	13 28	0.36	9.42	
	13 55	0.36	9.51	
	13 2		9.43	Rate +.058
May 10	14 43	-0.38	10.98	
	14 43	-0.38	10.92	
	14 39	-0.41	10.86	
	15 10	-0.37	11.07	
	15 29	-0.41	10.88	
	14 57		+10.94	
				Rate +0.070
May 18	11 42	-0.38	+24.06	
	12 3	0.39	24.13	
	12 13	0.46	24.14	
	12 27	0.39	24.31	
	12 50	0.46	24.25	
	14 10	0.38	24.38	
Rogers	12 34		+24.272	
	13 2	0.36	24.44	
	13 18	0.37	24.34	
	14 39	0.41	24.39	
	14 43	0.38	24.35	
	14 53	0.38	24.41	
Safford	14 5		+24.386	Rate 0.075
May 19 R.	10 58	-0.36	26.03	
	11 13	-0.39	25.97	
	11 43	-0.36	25.93	
	11 44	-0.36	25.97	
Rogers	12 40	-0.42	26.01	
	11 54		+25.982	
	13 3	-0.36	26.30	15 9 -0.38 +26.31
	13 18	-0.38	26.00	15 29 -0.38 26.21
	13 49	-0.36	26.08	15 38 -0.36 26.23
	14 10	-0.36	26.14	
	14 39	-0.38	26.12	
	14 24		+26.166	

				Log(n-c)			m-i	i-m	
309 Ceph B	+9.36	-4.23	8.849	9.559	-362	3		0	Rogers
5 Um B	9.38	-16.74	8.690	9.557	361	3	-1		"
Polaris sp	9.44	+5.90	8.393	9.581	371	54		-9	"
20 Um B	9.49	-14.63	8.797	9.511	324	2	-38		"
Polaris	10.14	-26.64	8.393	9.610	.407	6	+45		J.H.S.
34 Ceph H sp	10.70	-8.93	9.120	9.368	.233	2		+129	"
3.5 43 — H sp	10.82	-6.02	8.892	9.573	.374	3		-3	"
Polaris sp	10.84	+4.04	8.393	9.565	.367	6.		+5	"
Br 527 sp	10.91	-6.66	9.201	9.553	.357	2		+5	"
323 Ceph B sp	10.96	-5.94	8.820	9.521	.332	2.		+30	"
			Mean		-.362		m-i	i-m	
39 Ceph H sp	+24.14	-17.64	8.779	9.592	-.391	3.6		-065	W.A.R.
309 — B sp	24.16	-20.01	8.849	9.467	.293	3		+033	"
6 Um B	24.24	-35.88	8.431	9.497	.313	3	-013		"
Polaris sp	24.32	-11.23	8.393	9.475	.299	6		+027	J.H.S.
24 Lam B	24.33	-27.88	8.898	9.556	.360	2	+034		"
		Mean			-.326	17.6			

May 19

							m-i	i-m	
24 Lam B	+25.94	-27.81	9.150	9.423	-265	0.9	-038		W.A.R.
39 Ceph H sp	25.95	20.88	8.779	9.484	.305	4		-002	"
43 Ceph H sp	26.07	22.91	8.892	9.392	.247	3		+056	J.H.S.
Polaris sp	26.09	14.06 -.01	8.393	9.473	.297	6		+006	"
Br 527 sp	26.19	23.65	9.201	9.568	.370	2		-067	"
323 Ceph B sp	26.26	22.38	8.820	9.409	.257	2		+046	"
Br 750 sp	26.30	22.63	8.923	9.488	.308	3		-005	"
62 Um B	26.30	29.65	9.064	9.589	-.388	1	+085		"

-.303 21.9

1864 May 28th

Illumination West.

S mark .992 N mark B .625
991 641
986 668 645
976 C .962
949 960
979 940 954
852
from Ap. 29 Δs −.008 645
Δw −.050 Reversed to Ill. East 648 — W
−.029

N mark B .807
.775
.770 .784
C .490
494
.506 .497
.799 red to B
.784
.792 — E

.220 Line of Collimation

Coll. of mid wire $0^r.054 = 0^s.123$ + E .235
− W .310 .272
0 + 0.346 E .242
− 0.076 W .312 .277
.238
.308 .273
.274

1863phae.proj..113P

Wire-intervals to April 29th.

Polaris . subpolar			A-6	B-6	D-6	E-6	M-6	
		88 35 14.02	4 39.43	2 26.17	1 47.83	4 26.78	10.20	6 obs
δ Ursae	Feb 23	86 36 1.2						
	Mch 19	35 58.9	1 55.0	59.2	46.5	1 51.9	316	
51 Cephei	Feb 26	87 14 51.2	2 25.0	1 14.6	55.7	2 17.0	5.38	
	Mch 9	52.9	2 22.8	14.4	57.2	2 18.6	4.28	
		52.05	3.9			7.8		
156 Camel	Feb 24	84 26 23.8	1 11.5	38.2	27.7	1 7.3	2.94	
	— 25	24.0	1 10.9	37.2	28.3	1 7.8	2.40	
	Mch 3	25.5	1 11.3	36.6	26.9	1 7.9	2.62	
	— 7	26.4	1 10.9	37.1	27.2	1 7.0	2.76	
		24.92	11.15	37.[illegible]	27.525	7.50	2.68	
1 Draconis	Mch 7	81 55 19.8	49.5	25.5	18.7	47.3	1.80	
	— 12	21.1	48.9	25.1	19.1	47.3	1.52	
	— 16	22.1	49.9	25.8	19.1	46.3	2.06	
	— 24	24.0	48.5	25.5	19.7	47.6	1.34	
Rogers	Apr 7	26.4	48.6	25.3	18.9	47.0	1.60	
	— 15	27.3	49.0	24.9	19.6	47.2	1.42	
	— 22	27.8	50.3	25.7	19.1	46.4	2.10	
	— 27	28.0	49.4	25.5	19.1	47.4	1.68	
		24.56	49.26	25.41	19.16	47.06	1.69	
5 Ursae B	Mch 24	87 11 21.8	2 19.1	1 12.5	55.1	2 15.3	4.24	
	Apr 21	29.5	2 19.8	1 13.1	55.5	2 15.2	4.44	
	— 29	31.6	2 22.4	1 14.2	54.7	2 14.5	5.48	
		27.6	20.43	3.27	55.1	15.00	4.72	

The above are not all the stars observed; but are all those of which 4 or more complete obs. were made during the interval; to which I added δ Ursae and 51 Cephei and 5 Ursae B as the most advantageous of the rest.

		A	B	D	E		
	8.39191	0.83815	0.55676	0.42464	0.81804	9.4005	6
	8.77314	.83384	.54546	.44059	.82197	9.2728	1
	8.68139	.83944	.55355	.43306	.82063	9.3654	2
	8.98625	.83843	.55767	.42598	.81555	9.4144	4
	9.14766	.84016	.55266	.43005	.82031	9.3755	8
	8.69026	.83772	.55516	.43141	.82059	9.3642	3
Polaris		6.889	3.604	2.658	6.577	0.251	6
51 Ceph		6.909	3.577	2.711	6.617	0.232	2
5 Urs B		6.882	3.591	2.700	6.616	0.231	3
δ Ursae		6.821	3.511	2.758	6.637	0.187	1
156 Camel		6.893	3.611	2.667	6.540	0.260	4
1 Draco H		6.921	3.570	2.692	6.612	0.237	8
		6.898	3.586	2.685	6.593	0.241	
		6.657	3.345	2.936	6.834		

| Used till June 19th inclusive |

From ~~24~~ 33 transits Feb 23 - ~~Apr 29~~ May 19th ~~excluding the last obs of Polaris above pole Apr 29th~~.

			log.	2 Urs	4 Urs	6 Urs	Polaris	5 Urs	51 Ceph	1 Ceph	Castor	α Librae
A-M	+ ~~6.657~~	- 6.660	0.82347	+ 5	+ 6	+ 2	+ 3	+ 1	+ 2	+ 1	+ 7.87	+ 6.91
B-M	+ ~~3.345~~	- 3.346	0.52452	+ 1	+ 1	+ 1	+ 1				+ 3.95	+ 3.47
C-M	- ~~0.241~~	+ 0.238.	9.37658								- 0.28	- 0.25
D-M	- ~~2.926~~	+ 2.936	0.46776	+ 1	+ 1	+ 1	+ 1				- 3.47	- 3.05
E-M	- ~~6.834~~	+ 6.830	0.83442	+ 5	+ 6	+ 2	+ 3	+ 1	+ 2	+ 1	- 8.07	- 7.09

9 transits of Polaris Apr 29 - May 19 give

A-C 6.896
B-C 3.176
D-C 2.733
E-C 6.189

0.229

6.892
3.587
0.242
2.703
6.585

The numbers in pencil are to be used from 1864 March 16th to ______

No change till after June 19th.

4.

−019 19
−017 18

for May 28
+0.262 115

Assumed n −0.06 .778 c +0.35 .544
n −0.15 c +0.35

+40	+0.407	−38
30	0.369	−19
20	0.350	−5
10	0.345	5
0	0.350	17
−10	0.367	27
20	0.394	45
30	+0.439	
40	0	

May 22	14 10	+0.35	30.28	
H.A.R	14 43	0.38	30.53	
	14 43	0.38	30.37	
	15 29	0.36	30.44	
	15 38	0.34	30.45	+.059
	16 21	0.42	+30.69	Porits
	15 11		+30.43	+.05
				.070
May 23 J.H.S	10 1	+0.35	31.82	
	11 42	0.35	31.87	
	11 44	0.35	31.93	
	11 9		+31.87	
May 27	11 44	+0.35	38.25	~~+0.066~~
	13 14	0.35	38.37	
	14 10	0.38	38.33	
	14 43	0.37	38.51	
Rate +0°.66 per	14 43	0.37	38.40	
	15 29	0.39	38.42	
	14 1		+38.380	
				0.058
May 28	12 35	+0.35	+39.71	
	13 50	0.34	39.57	
	13 3	0.36	39.76	
	13 18	0.38	39.78	
	14 9	0.32	39.67	
	14 39	0.31	39.78	
	14 59	0.31	39.81	
	15 9	0.38	39.91	
	13 50		39.75	0.075

	May 22								m−i	i−m	
	309 Ceph B sp	+30.24	−33.45	8.849	−	9.355	+0.227	2.7		−.026	H.A.R
	6 Urs B	30.25	−41.16	8.431	−	9.469	0.295	3	−.039		"
	43 Ceph H sp	30.29	33.86	8.892	−	9.445	0.279	3		+.026	"
2w	Polaris sp	30.31	39.85	8.393		9.373	0.236	3.6		−.017	"
	323 Ceph B sp	30.44	36.25	8.820		9.584	0.384	1.8		+.131	"
	Gr 750 sp	30.48	32.11	8.923		9.135	0.136	2.7		−.117	"
	Polaris	31.17	22.37	8.393		9.337	0.217	5.4	+.036		J.H.S
	May 23										
	43 Ceph H sp	31.99	35.90	8.892		9.484	.305	3		+.052	"
	Polaris sp	32.01	43.03	8.393		9.535	+.272	3.6		+.019	"
							+.253	28.8			
	May 27								m−i	i−m	
	5 Urs mi B	+38.26	−31.37	8.690		9.531	.350	3	−241		J.H.S
1w	Polaris sp	38.32	−51.84	8.393		9.523	.333	5.4	~~−7~~	+17	
3w	214 Camel B	38.34	−34.10	8.898		9.525	.325	1.8	−19		
4w	20 Urs mi B	38.38	−32.64	8.797		9.556	360	2	−44		
	323 Ceph B sp	38.47	−42.99	8.820		9.475	299	2		−17	
	Gr 750 sp	38.51	−42.41	8.923		9.514	326	3		+10	
2w	62 Urs B	38.51	−36.96	9.013		9.253	179	0.9	+137		
	Polaris	39.02	27.33	8.393		9.461	.259	6	+27 −86 not average		
							.316	24.1			
	Polaris sp	39.71	−47.45	8.393	+.10	9.281	+.191	6		−12	H.A.R
4w	20 Urs mi B	39.76	−36.20	8.797	−.08	9.369	.229	2	−20		"
	Gr 527 sp	39.79	−41.00	9.201	.11	9.287	.193	2		−10	"
3w	323 Ceph B sp	39.84	−43.35	8.820	−.10	9.365	.232	1.8	~~−29~~	+29	"
							.203	11.8			

May 29th	13 18	+0.37	+41.49
	14 10	0.34	41.46
	14 43	0.39	41.65
	14 43	0.36	41.59
	15 29	0.34	41.70
	15 38	0.34	41.82
	14 40		+41.62
	12 50	+0.33	44.~~37~~35
	13 3	+0.36	44.28
	13 18	+0.38	44.38
	13 28	+0.35	44.25
	14 43	0.39	44.43
	14 43	0.39	44.35
	15 29	0.34	44.32
	16 21	0.43	44.48
	14 22		+44.357
June 2 N.A.R.	12 27	+0.42	+47.29
	12 35	0.35	47.14
	12 50	0.46	47.23
	13 3	0.36	47.31
	13 18	0.37	47.30
	13 55	0.35	47.44
	14 10	0.33	47.23
Mean	13 9		+47.216
	14 26	+0.35	47.32
	14 39	0.34	47.36
	15 10	0.37	47.64
	15 29	0.34	47.48
	15 37	0.34	47.53
	15 4		+47.466

5
S − R +0.13

Rate 0.057

0.064

May 29th

									m−i	i−m	
3w	6 Urs mi B	+41.51	−31.84	8.431		9.416	+.261	3	+10		NAR
3w	43 Ceph H sp	41.48	44.49	8.892n		9.369	.234	3		−57	"
4w	Polaris sp	41.51	52.15	8.393n		9.420	.263	5.4		−8	"
2w	214 Camel B	41.52	37.54	8.898		9.498	.314	1.8	−43		"
	20 Urs mi B	41.58	36.37	8.797		9.514	.327	2	−56		"
~~3w~~	~~323 Ceph B sp~~	Mean of NAR					.271	15.2			"
? 4w	Polaris (ex alle						~~.271~~	~~15.2~~			THS
							~~.271~~	~~15.2~~ w			

May 31

									m−i	i−m	7
3w	43 Ceph H sp	44.26	−47.70	8.892n	00	9.429	.269	3		+.021	THS
2w	Polaris sp	44.28	−54.34	8.393n	00	9.396	.249	3.6		+.001	"
	214 Camel B	44.29	−40.70	8.898	00	9.453	.284	2	−.036		"
3w	20 Urs mi B	44.37	−40.37	8.797	00	9.395	.248	1.8	.000		"
	Gr 527 sp	44.36	−45.57	9.201n	+01	9.280	.190	2		−.058	"
2w	323 Ceph B sp	44.41	−48.48	8.820n	00	9.429	.269	2		+.021	"
3w	Gr 750 sp	44.44	−47.21	8.924n	00	9.366	.232	2¼		−.016	"
	62 Urs mi B	44.44	−43.17	9.063	−01	9.163	.146	1	+.102		"
							.244	17.65			

June 2

3w	43 Ceph H sp	47.20	−50.67	8.892n	9.432	+.270	3		+.022	NAR
4w	Polaris sp	47.22	−57.83	8.393n	9.419	.262	5.4		+.014	"
2w	214 Camel B	47.23	−43.74	8.898	9.441	.276	1.5	−.028		"
	Gr 527 sp	47.43	−48.85	9.201n	9.353	.226	2		−.022	THS
	323 Ceph B sp	47.49	−50.94	8.820n	9.332	.215	2		−.033	"
	Gr 750 sp	47.52	−50.76	8.924n	9.434	.272	3		+.024	"
4w	62 Urs mi B	47.52	−45.78	9.063	9.303	.201	1	+.047		"
						.252	17.9			

~~June~~

Mean May 29 – June 2
+.248

June 3d.				0.052
	2h 0m	+0.34	49.31	
4h				+0.050
	14 43	+0.39	50.06	
	14 43	+0.39	49.97	
2w	15 29	+0.35	49.84	
	15 37	+0.34	50.00	
	15 8		49.958	
				+0.058
	14 39	+0.42	-67.61	
	14 59	+0.42	-67.63	
	15 10	+0.39	-67.52	
	15 38	+0.36	-67.54	
	16 7	+0.35	-67.31	
	15 19		-67.522	JHS
NAR June 6th				
	19 28	+0.37	-67.34	
	19 40	0.37	67.32	
	20 10	0.35	67.38	
	20 37	0.54	67.23	
	19 59		-67.32	

June 3-4

							m-i	i-m	
	Polaris 4h	+49.27	-30.88	8.393	9.658	+.4556	-.039		JHS
3w	43 Ceph H sp	49.85	54.99	8.892	9.603	.4013		-.015	″
4w	Polaris sp	49.86	65.33	8.392	9.583	.38354		-.033	″
4w	57 Urs mi B	49.98	38.41	8.594	9.657	.45127	-.038		″
4w	Gr 750 sp	50.07	55.06	8.924	9.627	.4242		+.008	″
	62 Urs mi B	50.01	47.54	9.063	9.456	.286	+.130		″
					20.1	.416 L			

June 6

	Gr 527 sp	-67.57	+65.57	9.201	9.502	+.317		-.072	″
	323 Ceph B sp	-67.52	+62.30	8.820	9.538	.345		-.054	″
	156 Camel B sp	-67.34	+63.65	8.987	9.554	.358		-.031	N.A.R.
4w	δ Urs mi B	-67.32	+90.06	8.283	~~9.644~~ 9.648	.437	-.048	-	″
1w	74 Draconis	-67.28	+68.71	9.212	9.367	.233	+.156		″
	1 Drac H sp	-67.35	+64.88	9.148	9.541	.348		-.041	″
4w	Polaris	-67.02	+85.00	8.393	9.648	.345	∓.056		″
					24.1	.387			

1864 June 7th Illumination East

N mark tremulous

B .844
.858
.855
.852

C. .575
.560
.578
.571

.852
.873

B. 2d. East. .862

After Reversal to WEST

B .595
.592
.586 .591

C .890
.894
.892 .892

Line of collimation
By B .221"
" C .231"
.226.5

.250
.325
.249
.328
.256
.320
Mean .288

Collimation of Mid = Wire
$0^{r}.061.5$ + E $+0^{s}.141$
− W -0.141

Value of c.

June 7 + 0.364 E
May 20 + 0.346
0.355

June 7 − 0.394 W
− 28 − 0.326 W
−0.

After June 7th single wires of pole-stars omitted

The approximate clock-errors given in these pages are computed with n = -0.13 c = -0.31

+40°	-0.422
+30	0.369
+20	0.337
+10	0.319
0	0.370
-10	0.311
-20	0.323
-30	-0.345

Wire-intervals May 29 - June 6th

n+c for June 7 - 9 ∓0.335
10 - 13 -0.261

For details see observing book for these dates

	s	h m		
δ Leonis	-1 6.44	11 7	Rogers 14 32	-1 6.175
β ——	-1 6.32	11 42	J.H.S. 13 57	-1 6.140
12 Canum	-1 6.18	12 50	S-R	
θ Virginis	-1 6.12	13 3	Rate { Rogers	+0.061
α ——	-1 6.12	13 18	Jolly	0.056
ζ ——	-1 6.08	13 55	Rogers	
α¹ Librae	-1 6.19	14 43	S-R	+0.070
α² ——	-1 6.14	14 43		
ψ Bootis	-1 6.29	14 59		
α Coronae	-1 6.17	15 29	JHS	
α Serpentis	-1 6.07	15 38		
δ Ophiuchi	-1 5.94	16 7		
α Scorpii	-1 5.90	16 21		
June 8th				
α Virginis	-1 4.82	13 18	JHS 13 59	-1 4.749
θ Virginis	-1 4.75	13 3	Rogers R	+0.056
η Bootis	-1 4.78	13 48	Jolly R	+0.068
τ Virginis	-1 4.70	13 55		0.062
ρ Bootis	-1 4.80	14 26		
α¹ Librae	-1 4.71	14 43		
α² ——	-1 4.68	14 43		
ψ Bootis	-1 4.92	14 59	W.A.R. 15 47	-1 4.729
β Librae	-1 4.76	15 10		
α Coronae	-1 4.81	15 29	S-R	+0.09
α Serp.	-1 4.73	15 38		
δ Ophiuchi	-1 4.65	16 7		
α Scorpii	-1 4.55	16 21		
ζ Herculis	-1 4.70	16 36		
β Scorpii	-1 4.71	15 58		
June 9th				
12 Canum	-1 3.38	12 50		
June 10th				
β Corvi	-1 1.44	12 27	JHS 14 15	1 1.433
12 Canum	-1 1.69	12 50	Rogers R	0.068
θ Virginis	-1 1.62	13 3	Jolly	0.065
α ——	-1 1.46	13 18		0.067
ζ ——	-1 1.38	13 28		
α Bootis	-1 1.49	14 10		
α¹ Librae	-1 1.31	14 43		
α² ——	-1 1.38	14 43		
α Scorpii	-1 1.14	16 21	Am —	
ζ Herc.	-1 1.46	16 36	JHS	
κ Ophiuchi	-1 1.39	16 51	Am —	
α Herc.	-1 1.36	17 9	Am —	
α Ophiuchi	-1 1.10	17 14	JHS	
	h			
June 13	JHS		W.A.R.	
δ Leonis	- 56.91	11 7	β Scorp. -56.61 15 57	
β ——	56.87	11 42	δ Ophiuchi -56.64 16 7	
12 Canum	56.86	12 50	56.625 16 2	
θ Virginis	56.75	13 3	13 53 -56.729 S	
α ——	56.66	13 18		
ζ ——	56.72	13 28	16 2 56.625 R	
ε Bootis	56.76	13 39		
α¹ Librae	56.54	14 43	Rogers R 0.065	
α² Librae	56.69	14 43	Jolly 0.039	
β Librae	56.69	15 10		
α Coronae	56.76	15 29		
α Scorpii	56.			

	1864 June 7th			Sund			Wt m-i	i-m	
~~1w~~	~~43 Ceph. H~~								JHS
	Polaris sp	-1 6.19	+1 20.38	8.393 n	9.545 n	-351	½	-016	JHS
	20 Urs mi B	-1 6.20	+1 2.67	8.797	9.345 n	.221	-114		W.A.R
1w	~~Br 527 sp~~								"
4w	57 Urs B	-1 6.06	+ 58.08	8.594	9.496 n	.313	-022		JHS
3w	Br 750 sp	-1 6.03	+1 9.24	8.924 n	9.430 n	.269	2¼	+066	"
4w	62 Urs B	-1 6.03	+1 2.85	9.063	9.565 n	.367	+032		"
	Polaris	-1 5.56	+ 49.97	8.393	9.586 n	.386	+051		W.A.R
	June 8th								
	Polaris sp	-1 4.80	-1 17.36	8.393 n	9.492 n	.310	6	+025	JHS
4w	214 Camel B	1 4.79	0.78	8.898	9.501 n	.317	-018		"
4w	323 Cephei B sp	1 4.75	9.94	8.820	9.535 n	.343	2	-008	W.A.R
1w	57 Urs B								"
	June 9th								
	Polaris sp	-1 3.36	+1 18.25	8.393 n	9.566 n	.368	½	-035	JHS
	June 10th							m-i / i-m	
3w	43 Ceph H sp	-1 1.53	+1 5.28	8.692 n	9.466 n	-292	3	-20	JHS
	Polaris sp	1 1.57	1 14.88	8.393 n	9.519 n	.330	6	-58	"
	214 Camel B	1 1.49	0 56.44	8.898	9.382 n	.241	2	-31	"
3w	Br 750 sp	1 1.32	1 3.88	8.924 n	9.332 n	215	2¼	+57	"
	62 Urs mi B	1 1.32	58.73	9.063	9.476 n	299	1	+27	"
	ε Urs min	1 1.25	59.66	9.130	9.331 n	.214	5	-58	"
	64 Camel B sp	1 1.23	1 4.25	8.930 n	9.410 n	.257	2	+15	"
4w	Polaris	1 0.72	49.41	8.393 n	9.446 n	.279	5.4	+7	"
						.272			
	June 12/13th								
5th	Polaris	0 57.52	0 47.97	8.393	9.374 n	-237	6	-10	
	Polaris sp	56.76	1 7.49	8.393 n	9.424 n	.264	6	-17	"
	214 Camel B	56.76	57.24	8.898	9.299 n	.199	2	-48	"
	57 Ursae B	56.650	50.63	8.594	~~9.374 n~~	236	3	-11	"
	Br 750 sp	56.62	60.09	8.924 n	9.464 n	.201	2	[illegible]	W.A.R
	~~64 Camel B~~								

16-19 -0.351

June 14 JHS

δ Leonis	-55.88	11 7	JHS 15 16 -55.643 (15)
β —	55.84	11 42	
12 Canum	55.76	12 50	Pr Rate 0.039
θ Virg	55.78	13 3	Foll 0.050
α —	55.72	13 18	0.044
ε Bootis	55.93	14 39	R Opy
α¹ Librae	55.73	14 43	
α² —	55.78	14 43	WAR 15 59 -55.753 (7)
ψ Bootis	55.89	14 58	
β Librae	55.73	15 19	
α Coronae	55.80	15 29	
α Serpentis	55.66	15 38	Rev Rate
β Scorpii	55.65	15 57	
δ Ophiuchi	55.57	16 7	
α Scorpii	55.56	16 21	
κ Ophiuchi	55.61	16 51	
α Herculis	55.66	17 9	
α Ophiuchi	55.58	17 29	
μ Herculis	55.62	17 41	
α Sagitt	55.40	18 6	
β Lyrae	55.82	18 45	Rogers
ζ Aquilae	55.59	18 59	

						wt.	m-i	i-m	
sw 43 Ceph H.	55.78	[illegible]	8.892n	9.457n	-.286	3		+29	
Polaris sp	-55.76	+68.87	8.393n	9.510n	.324	6		∓9	
57 Urs. B	55.67	46.64	8.594	9.550n	.355	2.7	+40		
Gr 750 sp	55.64	59.29	8.924n	9.467n	.307	2.7		+8	
ε Ursae min	55.60	53.11	9.129	9.525n	.335	5	+20		
64 Camel B	55.58	59.18	8.930	9.481n	.306	2		+9	
δ Urs mi	55.54	+50.21	8.772	9.498n	.315	6	00		
51 Ceph H sp	55.65	62.58	8.682n	9.455n	.286	5		+29	WAR
					.315	32.4			

There seems to be a progressive increase. Each day to be taken by itself

June 16th JHS

ζ Virginis	-53.39	13 26
η Bootis	53.43	13 48
α —	53.38	14 10
ρ —	53.37	14 26
α¹ Librae	53.35	14 43
α² Librae	53.41	14 43
α Coronae	53.31	15 29
α Serpentis	53.28	15 38
β Scorpii	53.13	15 58
δ Ophiuchi	53.30	16 7
α Scorpii	52.99	16 21
α Herculis	53.15	17 9
θ Ophiuchi	53.06	17 24
	53.273	15 20

Preceding Rate 0.050

Following " 0.062

0.056

3sw Polaris sp	-53.39	+68.42		9.570n	-.372	4.5		-7
nw 20 Urs B	-53.34	+47.64	8.797	9.553n	.357	2	-8	
sw 57 Urs B	-53.27	44.73	8.594	9.525n	.335	2.7	-30	
sw Gr 750 sp	-53.24	56.03	8.924n	9.604n	.402	2.25		-37
ε Urs mi	-53.18	50.42	9.129	9.570n	.371	5	+6	
64 Camel B sp	-53.16	57.21	8.930	9.537n	.344	2		+21
					-.365	18.45		

June 17th

Polaris sp	-51.91	+66.39		9.554n	-.358	6		-23
4w 57 Urs B	-51.78	+43.74	8.594	9.499n	.315	2.7	-20	
Gr 750 sp	-51.75	+55.92	8.924	9.544n	.350	3		-15
Prev Rate +0.062 3w ε Urs mi	-51.68	+49.46	9.129	9.475n	.298	3.75	-37	
					-.335	15.45		

June 16th-19th incl. -.351

June 17th JHS

12 Canum	-51.81	12 50
θ Virg	-51.93	13 3
α —	-52.00	13 18
ζ —	-51.92	13 28
ε Bootis	-51.86	14 26
α¹ Librae	-51.77	14 43
ψ Bootis	-51.89	14 59
β Librae	-51.88	15 10
α Coronae	-51.91	15 29
α Serpentis	-51.82	15 38
β Scorpii	-51.74	15 58
δ Ophiu	-51.61	16 7
α Scorp.	-51.55	16 21
ζ Herc.	-51.78	16 36
κ Ophiuch	-51.72	16 57
α Herc.	-51.70	17 9

After June 19th use for appr. clock-errors n = +0.04 c = −0.31

40°	−0.372
30	0.335
20	0.315
10	0.308
0	0.310
−10	0.322
20	0.345
30	0.381
−40	−0.438

June 18th W.A.R.

α Coronae	−50.74	15 29
α Serp.	−50.71	15 38
β Scorpii	−50.64	15 58
δ Ophiuchi	−50.59	16 7
~~α Scorpii~~		
κ Ophiuchi	−50.65	16 57
	−50.666	16 1

Am. 11
13 55 −50.48
14 10 50.80
14 2 50.74

June 19th W.A.R.

α Virginis	−49.39	13 18
ζ —	49.57	13 28
	−49.550	13 23

June 21st W.A.R.

τ Virginis	−46.83	13 55	
	JHS		
ρ Bootis	−46.92	14 26	46.75
ε —	46.78	14 39	46.74
α¹ Librae	46.72	14 43	46.
α² —	46.72	14 43	
α Coronae	46.75	15 29	
α Serpentis	46.72	15 38	
β Scorpii	46.71	15 58	
δ Ophiuchi	46.59	16 7	
α Scorpii	46.53	16 21	
ζ Herculis	46.60	16 36	
κ Ophiuchi	46.58	16 51	
α Herculis	46.70	17 9	
θ Ophiuchi	46.43	17 14	
α —	46.60	17 28	
μ Herculis	46.63	17 41	
μ Sagitt	46.39	18 5	
α Lyrae	46.63	18 32	
β —	46.65	18 45	
	−46.647	16 28	

Br. R +0.055
0.053
0.054

June 18th

							m−i	i−m
Am 20 Un B	−50.74	+46.18	8.797	9.456n	(.286)		(−65)	
W.A.R. Gr 750 up 4hr	−50.67	+55.17	8.924n	9.577n	−.378	2.7		−27
ε Ursae min	−50.62	+46.29	9.129	9.496n	−.313	5	−38	

June 19th

W.A.R. Polaris Tr 4w	−49.46	+64.15	8.393n	9.557n	−.361	5.4		−10
	Mean June 18–19				−.357	13.0		

June 21st

							m−i	i−m
JHG 20 Un B	−46.80	+42.07	8.797	9.466n	−.294	2	+062	
4h 57 Un B	−46.71	42.78	8.594	9.250n	.178	3	−054	
2h Gr 750 up	−46.68	49.27	8.924n	9.337n	.217	1.8		+015
64 Cam D up	−46.60	49.78	8.930n	9.432n	.270	2		−038
δ Ursae min	−46.55	42.91	8.772	9.333n	.216	6	−016	
51 Cephei H up	−46.53	51.26	8.182	9.357n	.228	5		+004
Polaris	−46.19	36.16	8.393	9.394n	.248	6	+016	
					−.232	25.8		

June 21 − .232
22-27 − .294

June 22d

ε Bootis	14 26	−45.67
ξ —	14 39	45.67
α² Librae	14 43	45.41
ψ Bootis	14 58	45.62
β Librae	15 9	45.48
α Coronae	15 29	45.51
α Serpentis	15 38	45.50
β Scorpii	15 58	45.32
δ Ophiuchi	16 7	45.43
ζ Herculis	16 36	45.46
κ Ophiuchi	16 51	45.37
α Herculis	17 8	45.48
α Ophiuchi	17 29	45.33
μ Herculis	17 41	45.36
	15 55	−45.472

									m-i	i-m	
4w	Gr 527 sp	−45.55	+48.04	9.201n	~~9.204~~	9.594n	−.392	2		−98	R
3w	— 750 sp	45.47	49.75	8.924n		9.555n	.359	2¼		−60	"
	ε Ursae min	45.41	43.44	9.129		9.423n	.263	5	−36		"
2w	δ —	45.35	40.20	8.772		9.484n	.305	3,6	+16		"
						Mean	−.311	12.85			

Par R +0.053 [illegible] + 0.051

June 23d

June 23 w. AR

Prec Rate +0.051

α Virginis	13 18	−44.36
ζ —	13 28	44.35
η Bootis	13 46	44.47
τ Virginis	13 55	44.29
	13 37	44.367
JHS		
	14 9	−44.25
	14 26	44.30
	18 6	43.92
	18 32	44.01
	16 18	−44.120

							m-i	i-m	
Polaris sp	−44.39	+55.77	8.393n	9.448n	−.281	6		+14	R
δ Ursae	44.02	39.09	8.772	9.466n	.292	6	−3		S
51 Ceph sp	44.00	50.53	8.682n	9.497n	.314	5		+19	S
Mean					.295	17			

June 24 | T.W.S.

	h m	s
α Bootis	14 10	−42.98
β —	14 26	43.05
ε —	14 39	43.03
α² Librae	14 43	42.85
δ —	14 43	42.87
κ Ophiuchi	16 51	42.82
α —	17 28	42.68
	15 17	−42.897

Prec R 0.053
Folly ~~0.049~~
0.046

A.M.

ε Bootis	14 58	−43.21
β Librae	15 10	42.97
α Coronae	15 28	43.11
α Serpentis	15 38	43.06
δ Ophiuchi	16 7	42.99
α Scorpii	16 21	43.04
	15 37	−43.083

S − M = +0.151

							wt	m−i	i−m
Lw	α Ursae min	−42.83	+41.02	9.129	9.387n	−.244	6.5	−50	
Lw	64 Cam Bop	42.80	45.89	8.930n	9.420n	−.264	2		+30
					n + c	−.250	6.5		

June 27th
n.A.R.

α Virg	13 18	−39.66
β Librae	15 10	39.48
α Coronae	15 29	39.68
α Serp	15 38	39.35
	14 54	−39.562

Prec R +0.048
Folly

R − M +0.06

A.M.	14 26	−39.61
	14 38	39.62
	14 32	39.615

							wt	m−i	i−m
	Polaris sp	−39.63	+51.79	8.393	9.478n	−.301	6	~~+3~~	−7
Lw	Gr 527 sp	−39.62	42.21	9.201	9.614n	(−.411	2		(−117) A.M.*
Lw	57 Urs. Maj. 13	−39.51	31.99	8.594	9.478n	−.295	1.8	+1	Ed
						−.299	7.8		

Mean June 22−27 n + c = −0.294 wt. 44.15

* Mr. McConnel's polar-star obs. will be omitted as on June 18th for the present

After Reversal to East

on June 28th

Assume

$\Delta\varphi$	+ 0.12 c = + 0.32 −
	9.079 9.505
40°	+ 0.519
30°	0.438
20	0.384
10	0.346
0	0.320
−10	0.304
20	0.296
−30	0.300
−40	+ 0.317

June 28th

α Virginis	13 18	−37.47
ε Bootis	14 39	37.34
α¹ Librae	14 43	37.33
α²	14 43	37.33
β Librae	15 10	37.40
α Coronae	15 29	37.34
α Serpentis	15 38	37.37
β Scorpii	15 56	37.35
α Lyrae	18 32	37.04
	15 21	37.330
		+ .06
		37.27

5

S−R

Br R 0.09
0.065
0.078

								m−i	i−m	
4w	Polaris sp	+20.20	−37.53	8.393n	9.632	.429	5.4		+.034	S
	57 Urs B	47.34	37.33	8.594	9.594	.392	3	+.003		"
2w	δ Ursae min	43.46	−37.10	8.772	9.574	.375	3.6	+.020		"
	51 Ceph H sp	27.55	37.08	8.682	9.662	.459	5		+.064	"
	Polaris	52.98	−36.60	8.393	9.607	.405	6	−.010		N.A.R

June 29th

α Virginis	13 18	−35.92
α¹ Librae	14 43	35.70
α²	14 43	35.80
α Coronae	15 29	35.68
α Serpentis	15 38	35.69
	14 46	35.758

Br R + 0.065
Joll + 0.072
0.068

	Polaris sp	+19.15	−35.86	8.393n	9.616	.413	6		+.018	S
	57 Urs B	46.54	35.72	8.594	9.628	.425	3	−.030		S

Mean + .416 32

June 30

α¹ Librae	14 43	−34.07
α²	14 43	34.01
α Scorpii	16 21	33.91
α Coronae	15 29	34.03
α Serp	15 38	34.08
		5

JHS

15h 16m − 33.997

NAR

15 33 − 34.055

July 3 NAR

α Virginis	13 18	−28.93
α Coronae	15 29	28.80
α Serpentis	15 38	28.71
α Scorpii	16 21	28.80
α Herculis	17 8	28.79
α Ophiuchi	17 29	28.62
	15 54	−28.775

Br R + 0.087
Jolly + 0.057
0.072

2d

	Polaris sp	+10.22	−28.97	8.393n	9.667	.464	6		−.069	R,
	57 Urs mi B	38.02	−28.81	8.593	9.558	.361	2¼	+.034		R
	Gr 750 sp	24.28	28.77	8.924n	9.576	.377	2.7		−.018	R,
	ε Urs min	31.24	28.70	9.130	9.534	.342	5	+.053		R
	66 Camel B sp	25.07	28.68	8.930	9.488	.308	2		−.087	R
	δ Urs mi	33.51	28.60	8.772	9.463	.290	3.6	+.105		R
	51 Ceph H sp	22.09	28.58	8.682n	9.494	.312	5		−.083	R

Mean + .359 26.5

July 4.

α Virginis	13 18	−27.54
α¹ ~~[illegible]~~	14 43	27.34
α² Librae	14 43	27.32
~~Bootis~~	14 9	27.34
α Coronae	15 29	27.23
α Serp	15 38	27.30
α Scorpii	16 21	27.16
α Herc	17 8	27.27
α Ophiuchi		

NAR

15 49 − 27.266 JHS
5

360 15.7 [illegible]
329 10.55 [illegible]
41

	Polaris sp	+10.15	−27.56	8.393n	9.634	.431	6		+.036	R 4.8
	57 Urs B	+36.89	−27.29	8.593	9.575	.376	1.8	+.019		S
	ε Urs mi	+29.63	−27.19	9.130	9.517	.329	5	+.066		S
	66 Cam B	+22.31	−27.15	8.930n	9.618	.414	2		+.019	S

Clock-Errors

July 5th JHS	~~α Librae~~			
		α¹ Librae	−25.85	14 50
		α² —	25.88	14 43
		α Coron.	25.84	15 29
		α Serp.	25.79	15 38
		α Lyrae	25.54	18 32
		γ Aquilae	25.56	19 40
	Prev R 0.065			
	Today 0.064	JHS.	25.743	16 28
	0.064			
July 6th WAR		α Coronae	−24.29	15 29
	0.064 } 0.068 }	α Serpentis	24.36	15 38
		W.A.R.	24.325	15 33
July 8th JHS		α Virginis	−21.22	13 18
	0.068 }	α² Librae	21.14	14 43
	0.072 }	α Coronae	20.97	15 29
		α Serpentis	20.97	15 38
		δ Scorpii	20.86	16 21
		JHS	−21.032	15 6
July 9th		α Virginis	−19.41	13 18
		α¹ Librae	19.33	14 43
	Prev R +0.072	α Coronae	19.28	15 29
	+0.056	α Serpentis	19.26	15 39
	0.064	γ Aquilae	19.06	19 40
		JHS	−19.264	15 46
July 10				
	Prev R +0.056	ζ Herc.	−17.94	
		κ Ophiuchi	17.90	
		WAR	−17.920	16 44

Use n+c = +0.395 June 28-July 5

								m-i	i-m	
July 5th	Polaris sp	+7.99	-25.96	8.393	9.648	6	.444		+.049	
	57 Urs B	38.06	25.81	8.593	9.681	3	.480	-.085		
	δ Urs mi	31.62	25.63	8.772	9.551	6	.356	+.039		
	51 Ceph H sp	17.87	25.61	8.682	9.571	4.5	.372		-.023	
					n+c	19.5	.406			
July 6th								m-i	i-m	
	57 Urs B	+33.49	-24.34	8.593	9.549	2¼	.354	+.075		R
	Gr 750 sp	21.57	24.30	8.924	9.362	2.7	.230		-.049	R
	62 Urs B	26.31	24.30	9.063	9.366	1	.232	-.047		R
					Mean		.279			
July 8th	Polaris sp	+4.49	-21.16	8.393	9.615	6	.412		+.016	
	57 Urs B	+32.09	21.01	8.593	9.637	3	.434	-.038		
	Gr 750 sp	+15.43	20.98	8.924	9.668	2¼	.465		+.069	
	62 Urs mi B	+24.03	-20.97	9.063	9.549	1	.354	+.042		
						12¼	.422			
July 9th	Polaris sp	+3.27	-19.42	8.393	9.601	6	.399		+.003	
	Gr 750 sp	+14.37	19.26	8.924	9.613	2.7	.410		+.014	
	323 Ceph B sp	+13.19	19.29	8.810	9.605	2	.403		+.007	
	51 Ceph H sp	+11.37	19.10	8.682	9.570	5	.372		-.024	
						15.7	.392			
July 10	ε Urs mi	+20.47	-17.91	9.130	9.538	5	.344	+.052		R

n+c +.396

1864 June 28th

Illumination WEST

Very tremulous
Hard to see
the mark

B	C
.554	.902
.591	.898
.536	.844
.602	.008
.622	.924
.581	.915
.613	
.597	

Reversed & Illumination EAST

.903	.568
.894	.588
.916	.602
.904	.586

By B .242.5
" C .250.5
Line of Collimation .246.5

.202
.267
.199
.271
.200
.270
Coincidence .234.8

Collimation of Mid-Wire

".011.7 = 0s.027
−East + West

Sensibly changed since June 7th

Hence c in W −0.326
− E +0.296

Wire - intervals

	A-M	B-M	C-M	D-M	E-M	58°34'
1864 May 27	4 28.58	2 17.18	0 08.02	1 58.62	4 36.02	58″4
28	30.56	16.16	9.64	2 0.44	4 36.64	58.2
June 3	29.94	15.14	9.86	1 58.96	4 36.26	57.3
— 7	28.42	16.32	10.68	1 58.68	4 35.38	57.0
— 8	29.88	16.08	10.12	1 57.62	4 38.22	56.9
— 9	28.40	16.00	10.40	1 56.90	4 37.10	56.8
— 10	28.38	14.38	8.72	1 56.32	4 39.72	56.7
— 13	28.66	16.16	9.74	1 57.44	4 37.64	56.4
— 14	27.78	16.28	10.32	1 55.62	4 38.12	56.3
— 17	29.12	15.92	10.08	1 56.28	4 38.68	56.1
	4 28.68	2 15.96	9.76	1 57.48	4 37.38	57.07
Log in ″ in 1ˢ	2.42926	2.13340	0.98935	2.06996	2.44305	8.39335
	6.646	3.363	0.247	2.906	6.861	

No essential change yet. Examine farther wires D and E

						58°34'	
June 21	4 31.16	2 16.46	12.84	1 58.64	4 36.14	56″1	s
— 23	4 30.92	17.52	11.28	1 59.68	4 37.68	56.1	
— 27	4 30.46	20.66	13.54	1 56.14	4 41.44	56.0	
— 28	4 29.62	16.02	15.56	1 55.68	4 34.38	56.0	
× — 29	4 29.64	17.24	12.46	1 57.16	4 37.26	56.0	s
July 3	4 29.18	15.38	12.42	1 57.12	4 35.02	56.2	
4	4 30.24	19.14	13.66	1 58.04	4 37.66	56.3	
5	4 29.94	16.94	12.56	1 57.86	4 36.16	56.4	
						56.14	

		E-M	B-M	C-M	D-M	A-M	
δ Urs min	June 21	1 55.08	0 49.88	6.58	57.02	1 54.52	19.0
	23	1 55.70	49.10	5.30	57.50	1 52.60	19.6
	July 5	1 55.18	48.78	5.38	57.02	1 52.32	23.5
							87°14'
51 Cephei H	June 21s	2 19.56	1 9.26	7.14	1 1.04	2 20.44	34.0
	23s	2 19.70	10.00	6.30	0.20	23.20	35.4
	28s	2 19.22	1 11.72	8.58	1.98	20.38	32.7
	July 3s	2 18.66	1 11.16	8.34	0 59.74	21.74	31.9

Wire - Intervals

1864 June 21st -

	-3	-1		-1	-3		
Polaris	-4 30.145	-2 17.42	+13.08	+1 57.52	4 36.97	88° 34′ 56″.4	8
51 Cephei	2 19.28	1 10.48	7.59	1 0.74	2 21.44	87 14 34.0	4
δ Ursae minoris	1 53.15	57.18	5.75	0 49.25	1 55.32	86 36 20.7	3
	2.43156	2.13804	1.11661	2.07010	2.44240	8.39243	
	2.14388	1.84807	0.88024	1.78347	2.15056	8.68218	
	2.05366	1.75725	0.75967	1.69241	2.06191	8.77236	
	6.683	3.400	0.374	2.908	6.852		8
	6.700	3.390	0.365	2.922	6.804		4
	6.699	3.385	0.340	2.916	6.828		3
N° ~~Log.~~	6.691	3.394	0.338	2.913	6.832		

Logs. of reduction		1 Urs	λ Urs	Pol	δ Urs	5 Urs	57 Urs	51 Ceph	+ Libra
A	0.82549	+5	+6	+3	+2	+1	+2	+1	+6.94
B	0.53071	1	1	+1	+1				+3.52
C	9.57892								-0.35
D	0.46434	1	1	+1	+1				-3.02
E	0.83455	+5	+6	+3	+2	+1	+2	+1	-7.99

/ These numbers will be used beginning with June 21st. and ending September 30th 1864. /

+ They are sufficiently near the final values —

1863phae proj..113P

Reversal from E. to W.

1864 July 12^{th} –

Before Reversal

N. mark (rather unsteady / but clear)

B. .888
.893
.890
.884
.890
.889

Av. not well seen

After Reversal

B	.560	.202		
	.558	.275		
	.574	.199		
	.566	.267		
	.570	.198		
	.570	.270		
		.235		

Line of Coll. .230

Coll. of Mid. Wire 0.005 = 0.012 – West + East

Separate Wires		from mean 2.57
E .352 .406	$0^s.379$	−1.86
D .074 .156	$2^s.115$	−2.59
C .198 .272	$3^s.235$	= 0.33
B .842 .906	$4^s.874$	+3.42
.164 .334	$6^s.299$	−6.6
Mean	$3^s.580$	

The relation of wires seems to be usual [illegible]

+0.060
–

Hence
Coll. + Daily Aberration Mt E June 28^{th} +0.296 } +0.312
" E July 12 +0.335 }
" W " 12 −0.365
W " 22 −0.377

Wire = Intervals

Polaris	Sept. 15	4 31.68	2 17.58	15.12	1 57.72	4 36.42		
							88° 35'	
Polaris	July 8	4 29.16	2 16.46	13.84	1 56.84	4 35.74	56".5	
	9	4 28.52	2 20.52	12.68	1 57.81	4 34.08	56.6	
	14	4 28.72	2 17.92	14.28	1 57.18	4 35.18	56.9	
	15	4 29.60	2 17.40	13.30	1 57.00	4 36.70	57.0	
	~~16~~							
		4 28.98	2 18.08	13.52	1 56.85	4 36.68	56.75	8.39337
Urs B	July 18	5 51.66	2 57.96	18.94	2 31.64	5 59.04		
	29	48.96	57.76	18.54	31.74	56.44		
	Sept 16	50.66	3 0.26	18.14	34.24	58.54		
	Oct 25	52.10	2 57.20	15.90	36.00	57.40		
	— 26	49.96	57.26	16.14	33.54	57.54		
	Sept 6	50.32	57.92	15.38	34.48	58.38		
δ Ursae	July 13	1 52.76	57.36	6.04	49.44	1 54.64	86 36 26.1	
	14	53.76	57.26	6.34	49.74	1 54.94	26.5	
	15	52.70	58.00	6.00	48.20	1 56.50	26.7	
		1 53.07	57.54	6.13	49.13	1 55.36	86 36 26.4	8.77216
	14							
51 Cephei H	July 9	2 17.88	1 10.38	7.02	59.32	2 21.92	87° 14' 30".4	
	14	2 17.42	1 11.42	7.58	59.88	2 21.38	28.8	
	30	2 19.16	1 10.46	6.64	60.64	2 22.34	24.2	
	Aug 1	2 18.32	1 10.92	7.58	59.68	2 21.98	23.7	
	Sept 2	2 18.60	1 9.50	6.90	61.80	2 19.40	16.5	
	— 6	2 18.58	1 11.38	7.42	60.72	2 21.82	16.3	
	— 9	2 18.34	1 10.44	7.96	59.36	2 21.46	16.0	
	— 10	2 18.00	1 10.30	6.50	60.20	2 21.60	15.9	
		2 18.29	1 10.60	7.20	60.20	2 21.49	21.48	8.68272
	logs	0.8231 4	0.5335	9.5243	0.4610	0.8354		
		0.8256 3	0.5322	9.5597	0.4635	0.8342		
		0.8235 8	0.5315	9.5400	0.4623	0.8334		
		0.8238	0.5322	9.5398	0.4622	0.8341		
		$6^{s}.665$	$3^{s}.406$	0.3467	$2^{s}.898$	$6^{s}.825$	15.044	

Reversal from W. to E

1864 July 22^d

Before Reversal

B .564
.566
.576 .569
C .867
.870
.866 .868

After Reversal (Very tremulous : Sun out)

B .858
.874
.868 .867
C .601
.590
.584 .592

Line of Coll. by B .218
D" C .230

Mean .224
Comin .235

Comin .207 .239
.271
.202 .235
.268
.200
.263 .232

Coll. of Mid W $0^{r}.011 = 0^{s}.024$
+ E.
− W.

E.	.354 .421	$0^{s}.388$	−6.85
D	.073 .162	$2^{s}.118$	−2.88
C		3.235	∓0.34
B	.828 .911	4.869	+3.40
A	.244 .346	6.295	+6.66
		$3^{s}.382$	

No changes yet in wires

Lw W July 17 − 0.365
" W — 22 − 0.377 − 0.371
" E — 22 + 0.347

48

n +0.08 c −0.37
.548

Assumed

+40°	−0.416
+30	0.382
+20	0.364
+10	0.362
	0.370
−10	0.390
−20	0.422
−30	−0.474

Adopted $\overline{n+c}$ = −.300 wt 96¼
July 12–16

July 12 Th

α Virg	−15.82	13.18
α² Lbr	15.80	14.43
α Coro	15.82	15.29
α Serp	15.65	15.37
	−15.822	14.47

J.H.S. w 0.045 foll 0.056

δ Scorp	−15.71	16.21
α Herc	15.81	17.9
α Ophiuchi	15.75	17.29
	−15.757	17.0

H.A.R. J.R.

July 13th

~~α Coron~~	−15.29	−14.52
~~α Serp~~	15.38	14.53
δ Scorpii	16.21	14.34
α Herc	17.9	14.39
α Ophiuchi	17.29	14.47
α Lyrae	18.32	14.19
~~Aurigae~~	16.46	−14.373

J.H.S. 0.056
0.063

α Aurigae	5.7	−13.47
β Orionis	5.6	13.28
α Canis maj	6.39	13.47
	5.38	−13.39

July 14th
5

α Virginis	−13.02	13.18
α Coronae	12.94	15.29
α Serp	12.96	15.38
δ Scorpii	12.66	16.21
α Ophiuchi	12.77	17.29
γ Aquilae	12.77	19.40
	−12.887	16.19

Prof. R. +0.063
Jolly +0.063

July 15

α Coronae	15.29	−11.50
α Serp	15.38	11.46
δ Scorpii	16.21	11.31
α Herc	17.9	11.33
α Ophiuchi	17.29	11.30
	16.25	−11.380

Prof. R 0.063
0.057
H.A.R. +0.060

July 16

α Herc	17.9	−10.07
α Ophiuchi	17.29	9.98
	17.19	−10.025

Prof. R +0.057
Joll +0.063
0.060

								i−w	
						m−i			
Polaris sp	+21.43	−15.90	8.393 n	9.415 n	−.260	4½		+.040	
323 Cephei B sp	+20.03	15.79	8.820 n	9.447 n	−.280	2		+.020	
Gr 750 sp	+19.24	15.77	8.924 n	9.461 n	−.289	2.7		+.011	
82 Urs min B	+12.62	15.76	9.063	9.560	−.363	1	+.063		
ε Urs min	+12.60	15.76	9.129	9.463 n	−.290	5	−.010		R
64 Cam B sp	+19.19	15.74	8.930 n	9.468 n	−.294	1.8		+.006	R
δ Urs min	+10.81	15.69	8.772	9.460 n	−.288	4½	−.012		R
				Mean	−.286	wt 21.5			
Gr 750 sp	+19.35	14.47	8.924	9.394 n	−.246	2¼		+.054	
ε Urs min	12.26	14.36	9.129	9.451 n	−.282	5	−.018		
64 Camel B sp	18.36	14.34	8.930 n	9.534 n	−.342	2	*	−.042	
δ Urs min	8.90	14.28	8.772	9.503 n	−.318	6	+.018		
51 Ceph H sp	20.46	14.26	8.682 n	9.474 n	−.298	4½		+.002	
				Mean	−.297	19¾			
July 14th									
Polaris sp	+24.25	−13.09	8.393 n	9.440 n	−.276	6		+.024	
323 Ceph B sp	17.70	12.95	8.820 n	9.497 n	−.314	2		−.014	
ε Urs min	10.49	12.84	9.129	9.500 n	−.316	5	+.016		
64 Camel B sp	15.97	12.82	8.930 n	9.428 n	−.268	2		+.032	
δ Urs min	7.40	12.76	8.772	9.500 n	−.316	6	+.016		
51 Ceph H sp	19.92	12.74	8.682 n	9.538 n	−.345	5		−.045	
~~July 15th~~				Mean	−.309	26			
July 15th									
Polaris sp	+24.35	−11.57	8.393 n	9.499 n	−.315	6		−.015	
57 Urs B	4.77	11.44	8.593	9.417 n	.261	3	−.039		
δ Urs min	6.23	11.27	8.772	9.475 n	.299	6	−.001		
51 Ceph H sp	18.05	11.25	8.682	9.445 n	.279	4½		+.021	
				Mean	−.293	19½			
July 16									
Gr 750 sp	+13.45	−10.11	8.924 n	9.448	−.281	3		+.019	R
64 Camel sp	14.03	10.03	8.930 n	9.532 n	−.340	2		−.040	R
δ Urs min	4.17	9.97	8.772	9.535 n	−.343	4½	+.043		R
					−.323	9½			

Adopted (n+c)

Mean July 18-19-20 -.261

This differs much on δ Ursae mi

Mean July 22-28 +.496 m-i i-m

July 18th
α Herc 17 9 -7.09
α Ophiuchi 17 29 6.97
γ Aquilae 19 40 6.88
18 6 6.950 W.A.R. R 0. 0.062

Ellis min +5.08 -7.05 9.129 9.423n -.265 5 +004 R -290
64 Camel B. sp 10.12 7.03 8.930n 9.420n .262 2 -001 R 262
δ Urs min +2.54 -6.97 8.772 9.419n .262 5½ +001 R 262
λ — B -7.96 -6.86 8.261 9.452n .283 5 +022 R 283
-268
.267 17.4 R

July 19th
α Bootis 14 9 -5.74 J.H.S.
α Librae 14 43 5.75
14 26 5.745

α Scorpii 16 21 -5.62 W.A.R.

~~Jul~~ July 19th
Polaris sp +16.15 -5.82 8.393 9.407n -.255 5.4 - +006 S -275
Ellis min +3.76 5.58 9.129 9.389n -.245 5 -016 R 290
64 Camel B sp +8.56 5.56 8.930n 9.407n -.255 2 +006 R 25
δ Urs min +0.79 5.50 8.772 9.445n -.279 5½ +018 R 269
-.261 17.8 -266

July 20th Pre R +0.055
α Herc 17 9 -4.32 Mean 18h 56m -4.162
α Ophiuchi 17 29 -4.18
γ Aquilae 19 40 -4.12
α — 19 44 -4.17
β — 19 48 -4.12

July 20th
64 Camel B sp +7.14 -4.26 8.930n 9.389n -.245 2 +016 S -245
δ Ursae min +0.02 -4.21 8.772 9.394n -.248 5.4 -013 S -236
-.247 7.4 -242

July 22d 2h. East

α Coronae 15 29 -0.92 3w Gr 750 sp -4.61 -0.89 8.924n 9.664 +.461 2¼ — S
α Serpentis 15 38 -0.91 Prev. R +0.073 2w Ellis min +4.65 -0.82 9.129 9.712 +.515 3 — S
α Herculis 17 9 -0.87 Foll " +0.063
α Ophiuchi 17 29 -0.72 +.492 5¼
16 26 -0.855

July 23

α Herculis 17 9 +0.70 Rat 0.060 3w δ Urs min +7.04 +0.78 8.772 9.666 +.468 4½ — R
α Ophiuchi 17 29 +0.72 3w 51 Cephei sp -11.48 +0.80 8.683n 9.711 +.514 4½ — R
α Lyrae 18 32 0.83 +.491
17 43 +0.75

Assumed n = +0.11 c = +0.34
9.041 9.531

July 22–28	n+c	0.496
29–30		0.440
Aug 1st		0.398
8		0.448

M. East

+40°	+0.536
30	0.454
20	0.401
+10	0.364
0	0.348
-10	0.326
-20	0.321
-30	+0.328

July 27th

α Virginis	13 18	+4.57
α Boötis	14 9	4.61
α Coronae	15 29	4.74
α Serpentis	15 38	4.69
α Scorpii	16 21	4.84
α Draco	18 32	4.92
γ Aquilae	19 40	4.92
α —	19 44	4.95
β —	19 49	5.01
α¹ Capric.	20 10	5.07
α² —	20 11	5.12
	17 33	+4.858

Prec. R +0.057

4w Polaris s.p.	+4.61	-27.55	8.393	9.752	+566	5.4	5
δ Ursae min.	+4.90	+3.28	8.772	9.685	484	6	5
					+.523	11.4	

July 28th

α Ophiuchi	17 29	+7.37
α Lyrae	18 32	7.46
γ Aquilae	19 39	7.49
α¹ Capri.	20 10	7.50
α² —	20 11	7.47
	19 12	+7.458

Prec Rate +0.052

4w δ Ursae min.	+7.41	+0.89	8.772	9.691	+.491	5.4	
2w 51 Ceph. H.	+7.43	-16.31	8.683	9.631	.428	3	
					.468	8.4	

July 29th

Prec R +0.060

α Ophiuchi	17 29	+8.86
γ Aquilae	19 39	8.91
α —	19 44	8.88
β —	19 49	8.98
1α Capri.	20 10	8.89
2α —	20 11	9.02
	19 30	+8.923

λ Ursae min.	+8.95	+14.12	8.281	9.644	+441	5

n-i i-m
n+

July 30

α Herculis	17 9	10.22
α Ophiuchi	17 29	10.31
α Lyrae	18 32	10.40
	17 43	+10.310

Prec R +0.062

ε Ursae min.	+10.27	-7.20	9.129	+.01	9.618	+415	5	+.024	
14 Camel. B	+10.29	-16.18	8.931	.00	9.701	.503	2		+.064
δ Ursae min.	+10.34	-2.72	8.772		9.654	451	5.4	-.012	
51 Ceph. Hev.	+10.36	-19.17	8.683		9.628	425	5		-.014
			Mean			.439	17.4		

Aug 1st

α Serpentis	+12.69	15 38
α Scorpii	12.84	16 21
α Herculis	12.81	17 9
α Lyrae	12.94	18 32
α Aquilae	12.95	19 44
1α Capric.	12.94	19 59
2α —	12.97	20 10
α Cygni	12.96	20 11
	13.08	20 38

Prec R +0.053

+12.909 18 44

4w δ Ursae min.	+12.88	-5.68	8.772	9.629	+427	5.4	-.029	
51 Ceph. Hev.	12.90	-21.18	8.683	9.602	.400	5		+.002
1 Draco. Hev.	13.04	-15.78	9.158	9.586	.385	2		-.013
119 Cephei B	13.05	-10.60	9.041	9.571	.324	2	+.074	
					.398	14.4		

Aug 5th

Prec R +0.071

α Serpent.	15 38	19.59
α Scorpii	16 21	19.72
	16 0	+19.655

Prec R

Sept 6th – Sept. 9th Assumed n = +0.31 (9.491) c = −0.33 (9.519n)

+40°	−0.17
30	−0.20
20	−0.24
+10	−0.28
0	−0.33
−10	−0.39
−20	−0.46
−30	−0.56
−40	−0.69

Ill. East

Apparent A | 8th

α Scorpii	+23.77	16 21		4w ε Ursae min	+23.81	−20.50	9.129	9.649	+.446	4.5	+2
α Herculis	23.75	17 8		4w δ Ursae mi	23.88	16.21	8.772	9.657	.454	5.4	−6
α Ophiuchi	23.79	17 29	Prec R +.057	4w 51 Ceph H sp	23.90	33.40	8.683	9.662	.459	4.5	+11
α Lyrae	23.95	18 32		4w 25 Camel H sp	23.93	27.14	9.107	9.613	+.410	2	−38
γ Aquilae	23.93	19 40							+.448	16	
β	23.91	19 49									
α¹ Capricorni	24.09	20 10									
α²	24.06	20 11									
	+23.906	18 40									

n−i i−m

From this date
are to be taken fro

Sept 1st
α Scorpii

Sept 2d

α Lyrae	+60.44	18 32
γ Aquilae	60.69	19 40
α	60.73	19 44
β	60.64	19 49
α¹ Capri	60.73	20 10
α²	60.83	20 11
	+60.677	19 41

Sept 2d

51 Ceph H sp	+60.61	−70.47	8.683n	9.677	+.475	5	—	—
4w δ Urs. mi	+60.70	−35.06	8.280	9.684	+.483	4.5	—	
					+.479	9.5		

Reversed to Ill. W

Sept 6th

α Scorpii	−0.52	+1 7.37	16 21	Prec R +0.070 3w	✓ δ Ursae min	+1 7.31	−67.82	8.772	+.01	8.471n	−.030	4.5
α Lyrae	−0.17	7.32	18 32		✓ 51 Ceph H sp	+1 7.33	−66.71	8.683n	+.01	8.482n	−.030	5
γ Aquilae	−0.28	7.52	19 40		156 Cam B sp	+1 7.46	−67.10	8.987n	+.02	8.506n	−.032	2
α	−0.29	~~7.51~~			✓ δ Urs B	+1 7.43	−69.31	8.280	.00	8.556n	−.036	6
β	−0.30	7.38	19 49		74 Draconis	+1 7.48	−68.44	9.213	+.02	9.186	−.154	1.
α¹ Capri	−0.41	7.41	20 10									
α²	−0.41	7.42	20 11									
		1 7.370	19 7									

Sept 7th

α Scorpii	1 9.06	16 21	Prec R +0.080 3w	δ Ur mi	+1 9.22	−69.20	8.772	+.01	7.249	+.002	4.5
α Aquarii	9.52	21 59		~~51 Ceph H~~							2.
	9.290	19 10									

Sept 9th

α Lyrae	1 12.83	18 32									
α Aquilae	12.89	19 44	Prec R +0.075	✓ δ Urs mi	+1 12.83	−1 13.30	8.772	+.01	8.435n	−.027	5.4
β	12.98	19 49		✓ 51 Ceph H	12.86	12.26	8.683n	−.01	8.454n	−.028	5
α² Capricorni	13.01	20 11		✓ δ Ursae mi B	12.97	15.34	8.280	.00	8.655n	−.045	5
	1 12.928	19 34		74 Draconis							

1864 Sept. 6th.

M. East North Mark trembling

B .775
.775
.790 780

C .507
.483
.499 .496

Reversed B .669
to M West .677
.685 .677

C .972
.960
.968 .967

Line of Coll .228 by B
.232 " C
.230

Coll. of Mid-Wire

$0^{s}.003$ E – W

+ $0^{s}.007$ an

+ 0.347 E Sept. 22d
+ 0.330 E Sept. 6th
– 0.360 W "

Comied

.204
.264 234
.186
.274 230
.211
.260 236

Zero .233

Single wires roughly taken

A	.350	6.31
'	.270	
B	.910	4.88
	.846	
C	.260	3.23
	.188	
D	.129	2.11
	.084	
E	.372	0.36
	.342	
		3.378

1864 Sept 9th Apparently reversed. Sept. 10th

Ill West W. Mark slightly tremulous
Undulating rather long but slow

B .666
.649
.646 .654

C .969
.959
.961 .963

Reversed to Ill E.

B .843 (Raining slightly)
.836
.838 .839

C .535
.526
.539 .533

Line of Coll

.246 by B
.248 " C

.247
.226

Coincidence

.196
.244 .220
.194
.248 .221
.196
.258 .226

.226

high wire by micr

E	0.38
D	2.10
C	3.23
B	4.875
A	6.29
	3.375

Coll. of mid-wire
0.021 = 0.048 − E
+ W

Coll. Obs + Daily aber
Sept 6 W −0.360
" 9 W −0.305
" 9 E +0.275

Operations completed at 3 30 m.t. about = 14 50 Sid

+0.28. −0.04
+0.31

	A_1
40	+0.62
30	0.49
20	0.40
10	0.33
0	0.27
−10	0.22
−20	0.18
−30	0.14

c = +0.271 till Sept 16 inclusive
r − 0.044 Sept 17th to Sept. 30th

1864 Sept 10th to Sept. 17th M. East

September 10th by Polaris

Correcting the tabular Azd. by 0.05 or n+c by ± 0.016

Sept 10th

	n+Δc+cos D	Cl. Er	
α Scorpii	+0.16	+1 14.30	16 21
α Herculis	0.36	14.41	17 8
α Lyrae	0.60	14.63	18 32
α Aquarii	0.27	14.76	21 59
α Piscis au	0.14	14.73	22 50
α Pegasi	0.35	14.76	22 58
		1 14.598	19 58

Hm 0.064 pr
0.088 foll
0.076

Sept								
δ Ursae min	+1 14.37	−15.76	8.772	+.01	9.713	0.516	5.4	
51 Cephei H	14.49	24.35	8.683	−.01	9.677	0.475	5	
1 Draconis H							2	
Instr 34 Cephei H	1 14.81	14.36	9.449	+.04	9.662	0.459	1	

Sept 15th

Sept 15th

α Coronae	0.46	−35.29	15 29
β Aquarii			

Sept 10
Hm pr 0.088
foll 0.082
0.085

Polaris sp	−35.38	+15.26	8.392	.00	9.698	+.498	6	0.516 +.01	3 wires
λ Ursae min B	34.91	59.77	8.279	.00	9.674	.472	3		+.01 4 wires
74 Draconis									
1 Draconis H									

Instrumental Correction by 51 Cephei H, δ Ursae minoris

Sept 16th

Sept 16th

α Herculis	+0.36	−33.24	17 8
α Ophiuchi	0.35	33.19	17 29
γ Aquilae	0.33	33.12	19 40
β	0.30	33.02	19 49
α¹ Capri	0.21	32.96	20 10
α²	0.21	32.86	20.10
α Aquarii	0.27	32.77	21 59
α Piscis aus	0.14	32.59	22 50
α Pegasi	0.35	32.69	22.58
		−32.936	20 15

Prek 0.082
Folly 0.079
0.080

Polaris sp	−33.50	+11.48	8.392		9.735	.543	5.4
δ Ursae min	−33.60	41.54	8.772	+.01	9.699	.500	5.4
2w 156 Camel B	−32.98	27.48	8.987	−.01	9.728	.535	1.5
λ Ursae B 84	−32.96	59.21	8.279	.00	9.697	.498	5
74 Draconis							
1 Draconis H sp							
30 Camel H sp	−32.78	+28.51	9.071	−.02	9.703	.505	1
34 Cephei H	−32.73	35.97	9.119	+.02	9.622	.419	2
202 Camel B sp	−32.69	29.64	9.151	−.02	9.638	.435	1
39 Cephei H	−32.68	40.58	8.778	+.01	9.693	.493	4

September 17th

Sept 17th

α Ophiuchi	+0.04	−31.48	17 29		
α Lyrae	0.22	31.14	18 32		
γ Aquilae	+0.02	31.02	19 40		
β	0.00	31.07	19 49		
α Aquarii	−0.05	30.87	21 59	B R	0.079
α Piscis aus	−0.26	30.83	22 49	Folly	0.068.
α Pegasi	+0.05	30.85	22 58		0.074
		−31.037	20 28		

δ Ursae min	−31.20	+35.47	8.772	+.01	9.403	+.253	6
51 Cephei H sp	31.18	25.41	8.683	−.01	9.455	.285	5
3w 4 Ursae min B sp	31.13	16.73	8.239	.00	9.397	.249	2¼
156 Cam B	31.09	28.58	8.987	−.01	9.388	.244	2
11 Drac H sp							
30 Camel H sp	30.90	28.32	9.071	−.02	9.486	.306	1
202 Cam B sp	30.82	29.53	9.151	−.02	9.268	.186	1
4w 39 Ceph H	30.82	35.52	8.778	+.01	9.442	.277	3.6

3w 0.9
2– 0.75

Period Sept 17th to

n = +0.338 9.5289
c = −0.1744 8.6434n

+40	+0.23
+30	+0.16
+20	+0.08
+10	+0.02
0	−0.04
−10	−0.10
−20	−0.17
−30	−0.25

Sept 27th

α Ophiuchi	−22.92	17 29	Prec 0.068
α Lyrae	−22.97	18 32	Foll 0.085
	−22.945 m	18 0	0.076

Sept. 26

α Lyrae	+0.22	−14.64	18 32	
α Aquarii	+0.04	14.56	21 59	
α Pis. austr.	−0.25	14.23	22 50	Prec 0.085
α Pegasi	+0.04	14.38	22 58	Foll 0.067
α Androm	+0.13	14.29	0 1	0.076
	m	−14.420	22 4	

Sept 27

α Lyrae	+0.22	−13.07	18 32	
γ Aquilae	+0.02	−13.01	19 40	
α ——	+0.07	−13.05	19 46	
β ——	0.00	−12.90	19 49	
α Pis. austr.	−0.26	−12.74	22 50	
α Pegasi	+0.04	−12.78	22 58	Prec 0.067
	m	−12.925	20 36	Foll 0.075
				Ad 0.071

~~Sept 30~~ Sept 29th

α Aquarii	−0.05	−9.23	21 59

Sept 30th

α Pis. austr.	−.26	−7.68	22 50	
α Pegasi	+.04	−7.67	22 58	
γ ——	+.04	−7.39	0 6	
	m	−7.583	23 18	Prec 0.066
				Foll 0.087

~~Oct 5th~~

September 22d

										m'–i	i–m'	
4w	δ Ursae min	−22.93	+28.57	8.772	+01	9.579	330	5.4				
	51 Cephei Hyp	−22.90	16.25	8.683n	−01	9.507	.321	5				
	Sept. 26th					Mean	.326					
27	51 Cephei Hyp	−14.68	+9.63	8.683n	−01	9.387	.244	5	~~−040~~	−040	
4w	202 Lamb Hyp	14.32	12.36	9.151n	−02	9.469	.294	1		+010	
	39 Cephei H	14.31	19.01	8.778	+01	9.451	.283	4	+004		
						Mean	.265				
						corrected	.284				
	September 27										
	δ Ursae min	−13.08	+18.05	8.772	+01	9.469	.295	4.5	−006		
	51 Cephei Hyp	−13.06	+11.79	8.683n	−01	9.481	.303	4.5		+014	
	34 Cephei H	−12.77	−14.34	9.119	+02	9.320	.209	2	+080	0	
						Mean	.283				
						corrected	289				
	Sept ~~ember~~ 30th										
3w	34 Cephei H	−7.61	+8.23	9.119	+.02	8.925	.084	1.8	+133		
4w	202 Lamb Hyp	−7.58	6.58	9.151n	−02	9.160	.145	1		−072	
	39 Cephei H	−7.57	11.48	8.778	+01	9.372	.236	4	−019		
	5 Ursae min Hyp	−7.52	7.71	8.691n	−01	9.373	.236	3	–	+019	
	Polaris	−7.46	18.23	8.392	00	9.424	.265	6	−048		.224
						Mean	.224				
						Corrected	217				

δ Ursae min
51 Cephei Hyp
74 Draconis

Oct

1864 Oct 1st.

Ill East — North Mark
undulating ~~tremulous~~

B 907
.897
.879
C .589
.610
.601
B .895 .894 B
.600 C

After Reversal to Ill West.

B .867
.857
.865 .863 B
C .164
.161
.176 .167 C

Line of collim. .378 by B
.384 " C
.381

Coincidence .222

Coincidence
and Zero.
.195
.257 .226
.183
.257 .220
.186
.286 .221
Thr. .222

Coll. of Mid W
$0^r.159 = 0^s.363 - E$
$+W$

Coll. -0.030 E
$+0.010$ W Oct 1st

Period, Oct 5th to 8th inclusive   n + 0.18 c + 0.023 Assumed
Oct 9 to Nov 2   "   n + 0.29 c = +0.023   "

	Bef. Oct 8	After Oct 8
+40°	+0.18	+0.27
30	0.13	+0.19
20	0.09	+0.13
10	0.05	+0.07
0	+0.02	+0.02
−10	−0.01	−0.03
−20	−0.04	−0.08
−30	−0.08	−0.11

Oct 4th

Oct 5th

		~~Instr loc~~		
α Lyrae	+0.17	+2.30	18 32	Prec +0.087
δ¹ Capricorni	−0.02	2.64	20 10	Foll +0.085
α² ——	−0.02	2.64	11	
		+2.527	19 38	Mean 0.086

							wt.
Polaris sp	+1.98	−11.10	8.398n	.00	9.356n	+228	1
δ Ursae min	+2.41	+0.97	8.772	+.01	9.302	.200	0.9
51 Ceph Hev	+2.44	−6.76	8.683n	.00	9.318	.208	1.
74 Draconis							

Oct. 7th

α Ophiuchi	+0.06	+6.25	17 29	
α Lyrae	+0.26	6.33	18 32	
γ Aquilae	+0.05	6.32	19 40	
β ——	+0.04	6.38	49	
α Aquarii	+0.02	6.47	21 59	
α Piscis aust	−0.08	6.66	22 50	
α Pegasi	+0.07	6.49	22 58	
γ Pegasi	+0.07	6.55	0 6	Prec +0.086
		+6.431	17 54	Foll 0.069 0.078

Polaris sp	+6.06	−12.90	8.397n		9.232	+.171	1
δ Ursae min	6.46	−4.02	8.772		9.159	+.144	0.9
51 Cephei Hev	6.48	−9.04	8.683n		9.091	+.123	1
25 Camel Hev	6.52	−7.15	9.107n	−.01	8.913	+.082	0.9
74 Draconis							
1 Drac Hev							
30 Camel Hev	6.76	−8.14	9.071n	−.01	9.214	+.164	1
6 Ursae min Hev	6.92	−16.68	8.433n		9.523	+.265	1
Polaris	7.00	+3.19	8.397		9.405	+.254	1

Oct 8th

α Ophiuchi	+0.06	+8.05	17 29
α Lyrae	±0.26	8.13	18 32
		8.090	18 1

Polaris sp	+7.72	−15.69	8.397n	9.298	+.199	1
δ Ursae min	8.11	−4.92	8.772	9.276	.189	1
51 Ceph Hev	8.14	−11.22	8.683n	9.171	.148	1

m+r Oct 5–8 Polaris adj
+.203

Oct 9th
Polaris sp

Oct 10th
α Cygni
α Aquarii
α Arietis

Oct 10th
1 Drac Hev
39 Ceph H
Polaris
Polaris sp

Oct 11th
α Aquarii
α Piscis aust
α Pegasi
α Andromedae
γ Pegasi

Oct 11
30 Cam H sp
39 Ceph H
Polaris

Assumed n + 0.29 c + 0.023

Oct 17th
α Lyrae
γ Aquilae
β —
~~δ Aquarii~~
α Pisc aust
α Pegasi
α Andr
γ Pegasi
α Arietis
Oct 18th
61 Cygni
ζ —
Oct 19th
α Lyrae
γ Aquilae
β —
α¹ Capri
α² —
Oct 21st
γ Aquilae
β —
α¹ Capri
α² —
α Pisc austr
α Pegasi
Oct 24th
α Lyrae

Oct 16
Polaris sp

Oct 17
45 Cam H sp
156 Cam B sp
1 Drac H sp
34 Ceph H
309 Ceph B
5 Urs B sp
43 Ceph H
Polaris
24 Cam B sp

Oct 18
1 Drac H sp

Oct 19
156 Cam B sp
δ Urs min

Oct 20
Polaris sp
156 Cam B sp
δ Urs B
Polaris

Oct 23 Polaris sp
25 Cam H sp

54.

Assumed n + 0.30 c + 0.0

Oct. 25th
α Lyrae
γ Aquilae
β ——
α' Capri
α'' Capri
α Cygni
α Pisc Austr
α Pegasi
α Androm
γ Pegasi
Oct. 26th
α Lyrae
γ Aquilae
β ——
α' Capri
α'' ——
α Pegasi
α Androm
γ Pegasi

Oct. 31st

α Capri
α'' "
α Cygni
α Arietis
Nov 2d
α Aquilae
β ——
α' Capricorni
α'' ——
Nov. 3d
α Aquilae
β ——
α' Capric.
α'' ——
α Cygni
Nov 4th
α Cygni
α Pisc austr
α Pegasi
α Androm
γ Pegasi

Oct 21
156 Cam B
1 Urs B
Polaris

Polaris

25th
156 Cam
1 Urs B
43 Ceph H
Polaris
~~Oct 31st~~

Oct 31st Polaris
Nov 1st 43 Ceph H
Polaris
Polaris

Nov 2d
1 Urs B.
Polaris

Nov 3
1 Urs B
1 Drac H
~~24~~

Nov 4th
202
39 Ceph H

56.

1864 Nov 5th M. West

South Mark has re-appeared

	S Mark	N Mark	
not very steady	.132	A 641	
	.136	.610	.621
	.108	.611	
	.117	B .890	
	.097	.887	.890
	.118	.894	
		C .210	
		.229	.215
		.206	

Red. to B .906

Reversed to M. East

S Mark	N Mark	
.684	C .620	
.716	.644	.632
.709	.632	
.702	B .918	
.686	.922	.920
.699	.910	

	Line of Coll	Zero
By S. Mark	.409	.220 .280
N Mark B	.405	.230 .300
" C	.424	
N. Mark,	.415	.225 .295
Adopted	.412	
Zero	.258	.250 60 65

Coll of Mid -W. +.154 west = 0.352

-.154 East or 0.352

Hence

c = -0,066 M. E

+0.036 M W

collimation appears to have changed before Nov 10.

1864 Dec 9th Ill East

$-1.\overset{5}{3}90$
-11.732

S Mark tremulous	N Mark	A	B	C
.544		.040	784	.470
.546		048	762	428
.564		046	732	468
.566			753	455
.560				

7

Coincid
.239
.307
.238
309
.232
.319
— .274

Reversed to West.

	A	B	C
.962		.784	.090
.961		.798	.070
.957		.786	.093
.953		.789	.078
.953			
.957			

Line of Coll
.256 by S mk
.269 — B
.266 — C
.268 by N mark
.262 Mean
.274 Coincid

The clamp was taken off and not replaced till after the next reversal,
1865 Jan 26th

Coll. of Mid W. [illegible] 0.012 W. [illegible].027
+0.012 E +.027

Aft

Using final intervals
c 1
-.[illegible] -.307
+.[illegible] +.277

58.

5.1 6½
5.8
11.3
5.2
10.1
38.0 32½

11
18
11

For Ellipse moving
See last diagram

Wire Intervals

Sept 10th —

							Dist.	Air
Polaris	Sept 15 sp	4 31.68	2 17.58	15.12	1 57.72	4 36.42		2^b
	— 30	35.18	19.78	17.72	2 1.82	35.42		2^b
	Oct 5 sp	31.16	16.26	12.14	1 59.94	35.34		2^b
	7	30.46	17.36	16.44	1 59.14	32.24	2^a	
	9 sp	31.86	15.56	12.34	1 57.54	37.54	2^a	
	10	29.90	17.80	12.20	2 0.70	34.80	2^a	
	11	31.40	15.50	10.50	1 59.70	36.70	2^a	
	16 17?	30.74	18.24	11.76	1 58.86	37.86	2^a	
	20 sp	29.80	16.60	10.10	1 58.60	37.70	2^a	
	21	29.82	16.82	10.88	1 59.28	36.48		2^b
	23 sp	31.78	17.98	13.02	1 58.62	38.12		2^b
	25	30.52	18.92	13.08	2 0.88	35.66		2^b
	25 sp	28.66	19.96	12.72	1 57.64	38.24		—
	26	31.20	17.90	13.00	1 57.90	38.20		2^b
	31 sp	30.34	18.74	13.46	1 57.86	37.76		2^b
	Nov 1	28.12	17.42	13.18	1 57.98	34.38		2^b
	1 sp	28.52	20.82	10.58	1 59.08	39.88		2^b
	10	31.54	17.04	13.56	1 58.46	36.56	2^a	
	11 sp	32.62	17.62	14.18	2 1.78	34.28	—	
	14	31.46	16.46	10.84	2 1.84	35.24		2^b
	15	31.06	18.06	10.04	2 3.84	35.24		2^b
	16 sp	34.52	15.32	10.58	2 1.98	37.78		2^b
Sept 17	Ditto	1 57.50	58.30	5.80	49.60	1 55.40		
Oct 8		52.62	58.42	4.58	49.08	57.08		
51 Cephei	Sept 17	2 19.14	1 9.54	6.56	* 61.56	2 20.56		
	— 22	18.32	11.02	8.38	59.98	20.98		
	— 26	18.44	10.64	6.96	60.26	21.26		
	Oct 5	18.66	10.16	6.64	60.64	21.54		
	— 7	18.50	10.00	6.70	60.30	21.50		
	— 8	18.08	9.98	6.32	60.52	21.22		
Sept 17	[illegible]	57.50	58.30	5.80	49.[illegible]	1 55.40		
Oct 8	[illegible]	52.62	58.42	4.58	49.08	2 57.08		

Mean of 21 obs. of Polaris Oct 5 – Nov. 16.

				10″
A	4 30.95	log. 2.43289 – 3	+55.7	+0.54
B	2 17.49	2.13867 – 1		+0.27
C	12.20	1.08636		+0.02
D	1 59.81	2.07849 – 1		+0.24
E	4 36.43	2.44158 – 3		+0.54
δ	88°35′27″4	cosine 8.39076		

			E. above W.	
Equat. Interval	A to M	0.82362	+6.662 –	verified by Aug but not used
	B to M	0.52902	+3.381 –	at all. See below
	C to M	9.47712	–0.300 +	
	D to M	0.46929	–2.946 +	
	E to M.	0.83231	–6.797 +	

weak

For the VIIIth period of wire-intervals beginning at Oct 5 1864 and ending on Nov. 16th 1864 the following values will be used definitively

A to M	+ 6.663	log 0.82367	from 27 obs. of the 5 Nautical Almanac Polar Star
B " "	+ 3.381	0.52905	
C " "	– 0.301	9.47857	
D " "	– 2.941	0.46850	
E " "	– 6.803	0.83270	

The IXth period begins Nov 19th 1864 and ends April 26th 1865.

α Ursae	α Aq	IX.			[illegible]	S	h		
8.53	6.79	A to M	+6.663 –	0.82367	+3	+1	+5		7.87
4.33	3.42	B " "	3.354 –	0.52556	1		1	α Gemin	3.96
0.39	0.30	C " "	0.265 +	9.42328					0.31
3.77	2.97	D " "	2.913 +	0.46434	1		1		3.44
8.71	6.88	E " "	6.839 +	0.83499	+3	+1	+5		8.08

Castor

6.91
3.47
0.27
3.02
7.89

1865 Jan 20th Th. W

S Mark	N Mark	
916	513 A	
911	520	516°
906	797 B	~~[illegible]~~ ~~[illegible]~~ ~~[illegible]~~
906	808	
908	090 C	~~790 Red to B~~
	090	
909·4		

s	909	628	1.435
n	801	520	1.187

1.311 − 0.079 = c

known a, τ, κ'

$n = \sigma + u$

s
−0.309 Dec 9-30

−084 16
−078 25
−080 41

1865 Jan 26th Ill West.

N Mark (tremulous) S Mark
548 A. .893
.514 531 .892
.850 B .895
.836 843 .900
.146 C .888 894
.162 154

Reversed to Ill. East

s = 894 613 + $1^s.401$
n = 842 561 + $1^s.263$
$\frac{s+n}{2}$ 1.362 − $0^s.048$
+0.059 − 0.673

Very tremulous
.020 A .648
.995 008 .645
.666 B .620
.685 676 .635
.410 C .620 634
.392 401

Line of Collimation
By A 269 Comics 240
B 260 320 280
C 278 252
315 283
By N mark 269 245
S " 264 315 280
.266.5 .281

Coll. of Mid-Wire $0^s.0145 = 0^s.031$ +E −W, ~~[illegible]~~ E. 0.9 +0.281 E
1.3 −0.311 W

Clamp replaced; has been off since Dec 9th.

s 647 s = 1.479
n 585 n = 1.337
$\frac{s+n}{2}$ = 1.408 − 1.390 + $0^s.018$
$\frac{s-n}{2}$ 0.071 − 0.732 − $0^s.661$

After reversal
s .634 .281
n .696

1864 Nov 10th

1 Drac Hyp
4w. 202 Camel Bop
39 Ceph H
4w 43 Ceph H
Polaris

Nov 11th

1 Drac Hyp
4w 202 Cam Bop
4w 39 Ceph H
3w Polaris
214 Cam Bop
Polaris Bp

Nov 14th

202 Cam Bop
39 Ceph H
Polaris
214 Cam Bop
Polaris Bp

Nov 15th–16th

Polaris Bp
1 Drac Hyp
119 Ceph. B
Polaris
214 Cam Bop
4m 57 Ursa B

1864 Nov. 19th

JHS 2o 34 Ceph H
Am 202 Cam B sp
" 39 Ceph H
" 20 Urs mi B sp
" Gr 527
JHS 323 Ceph B

Nov. 23d

JHS 43 Ceph H
" 214 Cam B sp

Nov. 25th

JHS 1 Drac H sp
" Polaris
Am 214 Cam B sp
" Gr 750

Nov 29th

Am 6 Urs mi B sp
" Polaris

Nov. 30th

Am 5 Urs mi B sp
" 43 Ceph H
" Polaris
" Gr 527

Dec 1st

JHS 202 Cam B sp
" 309 Ceph B

Dec. 5th

Am Polaris

Dec 8th

JHS 43 Ceph H

1864 Dec 9th

JWS 34 Cephei H
" 202 Camel Boz
Am 39 Cephei H
" 5 Ursae min Boz
" Polaris

Dec 14th.

JWS Polaris

Dec. 20th

" 5 Ursae min Boz
" 43 Ceph H
Am Polaris
" 20 Ursae min Boz

Dec. 30th

Am 39 Ceph H.
" 5 Urs Boz
2d " 1 Urs Boz
" 43 Ceph H
" Polaris
" 20 Urs min Boz

End of the Year 1864.

1865 Feb 14th I&E

S Mark .652 N Mark A .946 948
.645 .950
.650 B .662 .662 ~~.650 .647~~
.649 .663
.646 C .342 346
.350

S Mark .648 Mean for B .653
N Mark

Since Jan 26
r
Change in A −.060
B −.014
C −.055

N mark −.043
S mark +.014

Δr −.014

0.

1865 Feb. 22d I&E.

S Mark .612 N Mark A 013 012 Coinc .260 292
.610 010 .325
.626 Formulas B 733 728 .260 296
.624 722 .332
.612 C 405 402 .254
,400 .332 293

S Mark mean .617 N. Mark B .715 mean .294

Since Jan 26
A +004
B +052
r +001
C +018
 −017

no change in r yet.

Line of Coll.

1865 Apl 1st

N Mark [illegible]

A .047
.032
.040
B .752
.756
.762
C .547
.546
.547

S Mark .487
.485
.483
.476
.496
.485

Reversed to N W

S Mark
.983
.975
.980
.980
.987
981

N Mark
A [illegible] wire

.749 B
.738
.743
.024 C
.019
.033

Coinc .250
.309 280
.248
320 284
258
.311 283
282

Imi of Coll
By S mk .233
N mk B .250
" C .236
N Mk, .243
Mean .238
Coinc .284
Coll in S W .044 = 0.^{s}001 − W
+ E

0.351
c^+ + ~~0.[illegible]~~ E
− ~~0.[illegible]~~ W
0.361

1865 April 28th ~~Le~~ West

W Mark
very tremulous

.635 B
.659 645
.640
.956 C
.930 945
.950

Reversed to the E

.825 B
.836 832
.834
.543 C
.533 537
.534

Corrected

.220
.296 .258
.231
.283 .257
.224
.296 .260

Mean .258

Line of Coll.

By B .238
C .241

Mean .240
.258
.018

c = +

Coll. mid - w * .018 = 0.241 - w
+ E

+0.291 E
- 0.321 W
c - [illegible]
- - + [illegible]

1865 May 20th M.E.

N Mark B 810
.814
.823 816

C .520
.504
.508 511

Reversed to M.W.

B. .629
.642
.628 633

C 935
940
929 935

Line of Coll Comind

By B .225 196
C .223 265 230
.224 206
Comind .232 260 233
197
219 233
232

Coll of Mer W

0s.008 = 0s.018 + E
− W

c. −.346 W
+.316 E

Collimation May 1-20 +0.304

1865 July 3 Cl. West

Mark B 573
572
564 570

C 858
876
860 865

Reversed to Cl. East

B 926
922
912 920

C 622
620
619 620

Line of Coll.
By B 245
" C 243

Mean 244

Coincid
212
284 248
215
291 253
210
291 250

Mean 250

Coll. of Mid-Wire

$$0^s.006 = 0^s.014 + E - W$$

Use for C May 20 – July 3 = 0.366

The value of Mean of wires − C will not be changed in next period of wire-intervals

1865 July 17th Cl. East.

B .901
.902
.902 902
C. .600
.604
.604 603

Reversed to Cl. WEST
b. crank trunnions

B .620
.630
.612 621
C .896
.896
.914 902

Line of Coll by B 262
" C 252
Mean 257

Comed 208
264 — 236
210
266 — 238
196
276 — 236
237

Coll. of mid-wire

Cl. E -0r.020 = -0.045
" W +0.020 +0.045

Adopt July 3-17 Cl. E Mid Wire -0.015
0.316
0.301
-0.015
Value of c +0.286

109.04
100.80
98.64
308.48

Definitive - Wire - Intervals

May 3 – June 7 Polaris 18 obs.							
88° 35' 16".3	4m 30s.43	2m 17s.14	12s.75	1m 57s.52	4m 37s.29		8.39172
June 19 – 29 8							
2114 Camel 13 4 obs							
May 24 – June 3	1 24.45	43.03	3.92	36.82	1 26.75	85° 27' 36".1 + 8".0	8.89826
18	0.82378	0.52886	9.49723	0.46183	0.83465		
4	.82486	.53203	.49155	46434	83653		
	6.667	3.384	−0.313	−2.899	−6.839		
	0.82393	0.52943	9.49554	0.46228	0.83499		

To be employed till June 13th inclusive

Castor.	7.88	4.00	0.37	3.43	8.08
α Librae	6.92	3.59	0.33	3.01	7.10

1865 Aug 26th

Illumination West

W Mark B .668
.670
.647 662
C .966
.968
.965 966

Mark indistinct from trees

Reversed to E B .928
.934
.912 925
C 622
617
621 620

Comied 208
277 242
208
282 245
197
272 235
Mean 241

Line of Coll by B 293
C 293
293

Coll of Mid-Wire CW $+0^{r}052$ = $+0^{s}.111$
" E $-0^{r}052$ $-0^{s}.111$

Coll. CW July 17 +0.045 } c −0.286 }
mid-wire Aug .26 +0.111 } −0.220 }

1865 Sept 2 (Sept 22d intended)

Illuminator East

N Mark B .838
.837
.829 .835
C .529
.536
.528 .531

Reversed to Ill W

B. .646
.666
.687
.675 .669
C .980
.960
.004 .981

B is nearly obscured by trees

The mark is more tremulous

Coincidences

.184
.266
.186
.266
.226

Line of Coll. by B .252
" C .256
.254
.526

Coll of Mid Wire

Ill E $\overset{r}{-.028}$ = $-\overset{s}{0.064}$

" W +.028 + 0.064

Aug 26 E c. + 0.190
Sept. 22d E. c. 0.237
Assumed, + 0.21

Sept 22 W − 0.267
Oct 4 W − 0.283
−0.275

74.

1865 October 6th M. West

B 756
.746
.760 754

C .030
.040
.038 036

Reversed to M. East.

B .772
.750
.746 756

C .492
.464
.474 v. tremulous
477

Line of Coll.

By B .255
C .257

Mean .256

.202
.271 236
.196.
.279 238
.188
.276 232

Mean .235

c Oct 6 M.E +0.253
" 21 M.E. +0.216
+0.234

Coll. of Mid Wire −.021 +0.048 W
−0.048 E

1865 Oct. 21st M East

N. mark not very tremulous

A .050 South Mark .552
.039 .545
.058 049 .560
B .758 .552
.768
.758 761
C .459
.460
.468 462
S

Reversed to M. West.

A .480 So. mark .985 Cornice 204
.476 .002 .270 237
.470 475 000 210
B .785 .996 258 234
.778 202
.780 781 256 229
C .068 233
.072
.070 070

Line of Coll. By No. mark A 262
B 271
C 266
.266
So Mark .274

Mean .270
Cornice .233

Coll. of Mid-Wire $-.037 + 0^{s}.085 \;|\; +W$
$-0.085 \;|\; -E$

1865 Nov. 7th LW

So. mk	Mc. mk
.946	A .521
.958	.508
.963	B .796
.968	.790
.971	C .085
	.103

Δs − 0s.034

Δn + 0.040 A

+ 0.112 B

+ 0.024 C

Mean + 0.025

No change of collimation since Oct. 21st

New Wires put in —

Oct 23 – Nov. 9.

c = −0.246 LeW.

Wire - Intervals = Old Wires

Polaris

June 19 – 29	8	4 28.80	2 16.96	12.86	1 57.47	4 35.44	88° 35′ 12″.8
July 3 – 20	10	28.62	17.32	12.73	56.10	37.01	13.5
— 20 – 31	8	28.51	17.21	12.88	55.96	36.92	15.1
Aug 1 – 28	8	29.22	17.90	13.46	56.39	37.28	18.9 } drift
Sept 13 – 30	9	29.67	18.51	14.76	56.35	37.02	32.1 }
Aug 1 – Sept 13	10	28.95	17.94	13.37	56.28	37.24	20.8
		4 28.42 28.75	17.10 17.62	12.51 13.15	56.71 56.12	36.31 37.10	88 35 13.2 18.3
June 19 – Sept. 13	36	4m 28s.58	2m 17s.36	12s.83	1m 56s.41	4m 36s.70	88° 35′ 15″.7
		– 3	– 1				
		2.42908	2.13785	1.10823	2.06598	2.44198	8.39176
		6.619	3.385	0.316	2.869	6.819	
		0.82079	0.52956	9.49969	0.45773	0.83372	

		α Librae	α Coronae	α Herc.	α Virg	α Lyrae	γ Aquil.
6.619	0.82079	6.87	7.44	6.84	6.73	8.48	6.72
+ 3.385	0.52956	3.51	3.80	3.50	3.44	4.34	3.44
– 0.316	9.49969	0.32	0.36	0.33	0.32	0.40	0.32
– 2.869	0.45773	2.98	3.22	2.96	2.92	3.47	2.91
– 6.819	0.83372	7.07	7.67	7.04	6.93	8.73	6.93

α Bootis	β Aquilae
7.04	6.65
3.60	3.40
0.24	0.32
3.05	2.88
7.26	6.85

See book A.74. for last reversal

It was found that coll. of mid wire

$$+0^s.256 \left.\begin{array}{l} + \text{Cl W} \\ - \text{Cl E} \end{array}\right\} \text{On Nov. 17th}$$

Hence

Nov 14–16	+0.256	+0.078	−0.015	+0.32
Nov 17	−0.256	−0.078	−0.015	−0.35
Feb. 2	−0.366	−0.078		−0.46

1861 Feb. 2d Cl. East

N. mark B .804
tremulous .791
.807 — .804

C .484
.508
.486 — .493

S mark .712
.743
.753
.768
.746
.744

Contin'd
184
256
191
259
190
252
Mean 220

Contin'd Cl. W. West Very tremulous

B .940
.962
.945 — .949

C .226
.259
.241 — .242

S. Mk. .024
.027
.040 — .030

Error of Coll.
By N. Mk. B 376
C 368
372

By S. mark 387
Mean 380

Coll. of Mer. W. + 0ˢ.160
− 0ˢ.160

W = + 0.366ˢ
E − 0.366

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Investigation of Mr Rogers' Personal Equation for Polar Stars, different for that for Equatoreal Stars

1864 Mch 16

	n + c. S corrd	R uncor.	Star	Corr. Ld and Rogers i − m	Rogers − Tr.S		
Mch 16	.288	.401	1 Drac H	−.113 x	−.080		
— 21	.456	.566	28 Camel H	−.110 x	−.083		
— 24	.568	.644	1 Drac H.	−.076 x	−.043		
Apr 26	.500	.521	39 Ceph H sp	+.021	+.018		
		.526	309 — B sp	+.026	+.008		
		.521	5 Ursae B	−.021 x	−.027	−.034	6
May 18	−.348	−.391	39 Ceph H sp	−.043	−.046		
		−.293	309 Ceph B sp	+.055	+.037		
		−.313	6 Urs. B	−.035 x	−.050		
″ 19	−.307	−.265	202 Camel	−.042 x	−.008		
		−.305	39 Ceph H sp	+.002	.000	−.013	5
June 2	+.244	+.270	42 Ceph H sp	+.026	+.017		
		+.262	Polaris sp	+.018	+.007		
		+.276	214 Cam B	−.032 x	−.005	—	
June 6	+.334	+.358	156 Cam B sp	+.024	+.029		
		+.437	1 Urs B sp	+.103	+.101		
		+.348	1 Drac H sp	+.014	+.017		
June 7	−.327	−.221	20 Urs B	−.106 x	−.087		
— 8	−.332	−.343	323 Ceph B sp	−.011	−.025		
— 14	−.335	−.286	51 Ceph H sp	+.049	+.056		
— 23	−.303	−.281	Polaris sp	+.022	+.011		
July 4	+.352	+.431	″	+.079	+.068	+.019	11

The column (n+c) S contains the value of n+c by Mr Safford's stars upon the evening in medio, correcting the places by the amounts already given (Prof Bond's report) for 1863 p 16. (n+c)R contains the value by Mr. Rogers, uncorrected. Hence the next col. R−S when Rd stars were below pole, S−R when above is the correction of AR x used for Mr. Rogers' stars, the instrument being corrected by the corrected places of Mr. Safford. The next column contains the difference between Mr Rogers' deduced R.A.s and the above cited of Mr. Safford

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Assuming Δα or δ for Polaris = x , 43 Ceph. H = y 214 Camel B = z we shall have

	43 Ceph
1862 Mch.	+95
	−4
Apr	−61
	−17
May	+63
	−14
	−18
~~Dec.~~	−39
Dec.	−11
	+12 +6
	+43
	+6
	−10
1863 Jan	0
	+27
1863 ~~May~~ June	+28
1863 Sept.	−108
Oct	−136
Nov	+40
	+47 −68
	+19
Dec.	+61
	+12
	−23
1864 Jan	−28
	−1
	−1
	−13
	−44
	−5 −73
	+55
	+35
	+32
Apr	+35
	+24
	−3
	+8
	−8
	−39
	+50 +190
	+43
	+33 +181 42

	214 Camel
1862 Mch	−134
Apr	102 H
	−62
	+13
	−147 H
May	+5
	−68
Dec.	−54
	−94
1863 Jan	−18
	−64
Apr	+5
May	+4
	−29
June	+51
Aug	−44
Oct	−34
	+89
Nov	+30
	−31
	+1
	+82
	−4
Dec	−59
	−54
	−43
	−44
	−8
1864 Jan	−14
	+77
	−11
	−83
	−36
	+53
	+41
Apr	−9
	−88
	−88
	−43
	+3
	+61

$y - x = \Delta(n+c)$ Polaris − 43 Ceph H, above — Autumn

43 Ceph H − Polaris, below — Spring

$z + x = \Delta(n+c)$ Polaris below − 214 Camel above — Spring

214 Camel below − Polaris above — Autumn

$y - x = -4$ by 27 obs. in 1862 Mch − 1864 Jan 11th omitting 2 in Dec. '63 not yet reduced

$z + x$ −12 " 31 obs.

Hence to get (n+c) from 43 Ceph H as it would be obtained by tabular place of Polaris add

+.004 in spring, Polaris below

−.004 in autumn, Polaris above

z ~~From~~ 10 214 Camel B,

Add 16

+.012 in autumn, Polaris below

−.012 in spring " above

98.

Double Transits of Polaris from 1862 Mch 26 – End of 1863

PE 1 double transit 1862, 63 $\pm 0.^{s}77$ which is but slightly less than the PE of both $\pm 0.^{s}90$ from Polaris and 43 Ceph H.

0.45

Spring	+.004	-.012		
~~Autumn~~	~~-.004~~	~~+.012~~		

P. above

-.004 ~~+.0~~ +.012

20.3 b−a

N+i	43 Ceph corr.	Polaris below	24 Cam corrected	Polaris above	Polaris below corr	Δα
				5	5	1
1862 Mch 26	.439	.340	.462	+0.452	+0.447	-0.10
Apr 7	.336	.336	—	0.331	0.336	+0.10
— 25	.299	.356	.406	0.347	0.354	+0.14
May 7	.264	.197	—	0.138	0.230	+1.47
Dec 10.	.348	.332			neglgd.	
— 28	.299	.289			negl wt.	
1863 Apr 9		.291	.274	.174	.282	+2.20
20				+.014	+.078	
21				+.075		
22				+.075	+.076	
Mean				+.055	+.102	+0.95
Apr 30-31		.111	.095	+.079	+.103	+0.49
1864 Jan 8	+.6m	+.611				

	43 Ceph corr	Polaris above	24 Cam corr	Polaris below	Polaris above corr	Δα	
						2	
Nov $\frac{10}{11}$	.387	.352		.371 corr.	.369	+0.03	
Dec $\frac{10}{11}$	.357	.350	.308	.340 corr.	.338	+0.04	
Dec 28	.170	.164		.244	.167	+1.56	
1863							
Sept 28	.696	.592		.736	.644	+1.87	
" 30		.586		.721		+2.74	
Oct 22		.484		.615		+2.66	
" 28		+.109	-.013	-.049	-.002	-0.95	
N. $\frac{3}{4}$		-.150 -.200	-.108 -.219	-.132	-.169	+0.55	1 1/3
24 double tr				~~—~~			
N. 26	-.136	-.090	+.009	-.031	-.032	+0.83	
" 30 Dec $\frac{1}{2}$	-.055	-.032	-.024	+.042	-.037	+1.60	
~~Dec~~ $\frac{8}{9}$	+.531	.534	.510	+.612	+.525	+1.77	
1864							
Jan $\frac{8}{9}$							

1864	309 Cephei	5 Urs B	6 Urs B below	43 Ceph H above	Polaris below	Polaris above	2H Cam B below	20 Urs B	Gr 527	32 C. B	57 Ursae B	Gr 750	62 Ursae B	
					Day tr.	Night tr.								
Jan 5								−142	−109	−58	+ 8			EAST.
6				+ 13		+41	−124							
	below		above	below										
8 morning	−88		−35	+37	+38									
			below	above										
9			+52	+38		+39	−75	+48	−73	−52	−42			
10							+40							
11				+64	~~above~~ ~~+51~~	+51	−10					+51	+188	
~~12~~ 14				−17 +22		+22 +27	+9 −19					+66		EAST
16				+56	−	+1	−39							
21				+35		0	−28			−108			+126	
25				0							−14			
27				+45		+12					−1			
Feb 5						Omitted for these 4 stars			−83		+07			
" 8									+124					WEST
" 18					above							+162	+018	
" 23					+21	~~+ 2X~~								
Mch 3					+37	~~+ 37~~								
" 8	below	above			+8									
" 24	−42	+ 7			+17									
Apr 6					+ 2									
7					−13									
27	+15	−10		+46		+11	−20		−55		+30	+16	+66	
27					+34									
28			+43	−9 ~~+43~~		−33								
29		−29		−23		−20	−68	−84	−23	+36				EAST
					+40 (+117)									
30	+14	+9				−8								
May 3			~~+44~~	−16		−24	−64	+4	−22					
4				− 5		+3	−46							
5					+104	+69	−66		−18					
6			+44	−19		+20								
9	R 0	R −1			s +45	sloppy −9		R −38						
10					−5				+5	+30				

91.

	ε Ursae below	Cy Camel B. above	δ Ursae Below	51 Cephei above	25 Cam. above	4 Urs above	156 Cam above	λ Urs B below	14 Drac below	12 Drac H.	11 G Ceph B. Cephei	30 Camelopardi above	34 Cephei below	20 Cam above	39 Cephei below
Jan 11			+41	-109											
14			+56	-21	+51										
16			-27	+30									EAST		
25			-16	+12											
27			+16	-8											
Feb. 5				-34											
8				-9									WEST		
18	[+050]			twice											
23			+47	+51											
26			+22	+26				-22							
Mch 3		+54			+14		+14	+28	+126						
7							+38		+91	+19					
9						-26									
12	+41		-66						-9	+4	+4				
EAST 21					R -103								EAST		
24			+18						+59	R -63					
Apr 7										R -36					
9										S +11			-76		
15									+44	+47	-21			-53	
16															0
21															+10
22										-26	+76				-39
~~27~~										+11					
~~30~~													+6		
May 3												-30			
5												-32			
6												+32	+68	+16	+52
10													+129		
18															-65
19														-38	-2

	30 Ceph. B below	5 Urs. B	6 Urs. B above	43 Ceph. H. below	Polaris above	Polaris below	24 Camel. B above	20 Urs. B. above	δ 527 below	33 Ceph. B ~~above~~ below	57 Urs. B above	Gr 750 below	62 Urs. B above	
1864 May 18	+33		−13			+27	+34							
19				+56		+6			−67	+46		−5	+85	WEST
22	−26		−39	+26		−17				+131		−117		R. EAST
23					+36									S
—				+52		+19								"
27		−24			0 +27	+17	−19	−44	0	−17	0	+10	+137	
28						−12		−20	−10	+29				W.A.R
29			+10	−37		−8	−43	−56						
31				+21		+1	−36	0	−58	+21		−16	+102	
June 2				+22		+14	−28		−22	−33		+24	+47	
3					−39									
4				−15		−33					−38	+8	+130	
6					−54				−72	−55				~~W.A.R~~
7					+51 R	−16		−114 R			−22	+66	+32	WEST.
8					~~+51~~	+25	−18			−8 R				~~R~~
9						−33								
10				+20	~~+07~~	+38	+31					−57	−27	
12					+10									
13						+17	+48				+17	+44 R		
14				−29		+9					−40	−8		
16						−7		−8			−30	−37		
17						−23					−20	−15		
18											−27			R
19						−10 R								
21					+16			+062			−54	+15		
22 R									−98			−68		
23						+14 R								
27						−7					+1			

Relations between neighboring stars to date (May 10

	1862 a		1862 b *		1863 a		1863 b		1864 a		Δδ
43 Ceph H + Polaris	+.004	8	+.034	9	+.028	1	−.004	18	+.016	3	~~[illegible]~~
214 Camel B + Polaris	−.073	7	−.094	1	+.019	5	−.011	20	−.028	10	−.043
δ Ursae min + 51 Cephei	+.033 ~~[illegible]~~	2	~~−.036~~	~~11~~	+.001	4	−.025	14	+.007 §	8	
λ Ursae min + 156 Camel	−.020	1	+.043	4	−.001	3	+.026	6	+.042	1	
1 Draconis + 119 Cephei B	+.020	2	+.042	4	+.016	8	+.017	8	+.028	3	

* Includes a few data of 1863 and 1864 respectively

§ " one obs in 1863

Polaris minus −.009 − 0.75 Δα and δ wt 22.0 obs. when Δα and δ is for Polaris

This wt from all comps of either δ Ursae and 51 Cephei with 43 Ceph. Polaris (obs. 7) or 214 Camel B made within ~~12~~ 9 hours or within 24 if there are two obs of Polaris one within 12h.

	ε Ursae	Ce Camel B	δ Ursae	57 Cephei	25 Camel	4 Ursae B	15 Camel B	ι Ursae B	7 α Draco	1 Draco H.	11 Cephei	3 Camel H.	3 Cephei H.	2 a Camel B	3 σ Cephei H.
June 6th							R −.031	R −.086	1 min +.156 R	R −.041					
10	+58	−15													
14	−20	−9	0	−29 R											
16	+6	+21													
17	−37														
18 R	−38														
21		−38	−16	+4											
22 R	−31		+11												
23			−3	+19											
24	−58	+30													
28			+20	+64											
July 3	+53 R	−87 R	+105 R	−83 R											
4	+66	+19													
5			+39	−23											
9				−24											
12	−10	+6	−12												
13	−18	−42	+19	+2											
14	+16	+32	+16	−65											
15			−1	+21											
16			+43												
18	+4 R	−1 R	+1 R					+22 R							
19	−16 R	+6 R	+18 R												
20		+16	−13												

	5 UMa B	6 UMa B	43 Ceph	Day Pol below	Night Polaris above	21 Lam	20 UMi	Gr 527	32 Cep	51 UMi	Gr 750	62 UMi	
June 28				+34	−10 R.					+3			
29				+18						−30			
July 3				+69 R						+34 R	−18 R		EAST
4				+36 R						+19			
5				+49						−85			
6										[+75] R	[−49] R	+47 R	
8				+16						−38	+69	+42	
9				+3					+7		+14		
12				+40					+20		+11	+63	
13											+56		
14				+24					−14				WEST
15				−15						−39			
16											+19		
19				+11									

Faut

Approximate Personal Equatn. Pole-Stars being Same R

75.

For Personal Equation between S and R

Clock Errors = − dt − m

		h m	s		S reduced	S – R
Mch	19	6.19	+ 11.44 S			+0.22
		8 58	11.47 R	=	+11.69	
	21	6 46	− 27.24 S			
		7 06	27.25		+27.17	+0.08
		9 46	− 27.06 S			
	24	7.28	− 21.35	R 9 11 − 21.25	21.21	+ 0.04
		11 43	21.00			
Apr	21	8 29	− 22.38	12.4 − 22.13	22.07	+ 0.060
		14 7	21.89			
May	18	12 34		+ 24.212 R	+ 24.278	+ 0.066
		14 5.	+ 24.386			
	19	11 54	24.982			+ 0.016
		14 24	24.186			

+ 0.08
+ 0.052 excluding the first night's work.

June	2	+ 0,13
"	7	+ 0.07
"	9	+ 0.09
		+0.069 (8)
"	13	+ 0.015
"	14	+ 0.05
"	21	~~+ 0.04~~
"	23	+ 0.11
"	30	+ 0.07
July	4	+ 0.10
−	12	+ 0.05
		+0.061 (7)
−	19	0.04
		+ 0.06

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100.

Level of W Transit

	Mic	Lev
	35.5	17.0
	36.0	151.
Up	7.2	122.
	7.8	45.5
	58.0	~~40.0~~ 54.5
	57.5	113.

4"4	48.4 N end 107.5 S. end
15.4	97.0 S end 59.0 N "
23.9	68.5 N end 87.5 S. end
34.5	57.5 S end 98. N end

Level of W. Transit.

N.	~~[illegible]~~ seconds	S
26.2	42"3	132
125.5	49.1	33.
52.8	7.7	106.
79.4	33.2	80.
103.2	56.4	56.9
42.0	13.3	118.4

Back

83.3	38.1	76.6	
91.8	22.8	67.4	
28.5	47.8	139.4	129.4 I suppose

Run of Mic

296"8
297.2
298.5 twice
298.7

297.8

a			No			r	
47"3	-52.9	A	1.	1-2	6"8	6.65	6"4
47.8	-50.45	B	9	2-3	18.6	20.05	18.2
49.1	-46.25		2	3.4	25.5	26.5	25.1
7.7	-26.2		3	4.5	27.2	22.85	22.8
22.8	-12.2		8	5.6	16.05	15.05	16.5
33.2	+0.3		4	6.7	35.2	34.8	35.6
38.1	+3.35		7	7.8	15.7	15.55	15.7
56.4	+23.15		5	8.9	35.0	38.25	35.4
13.3	+38.2		6			179.6	175.7
							0"978

Result for Level = Division 0"978

1864 May 21st.

0"973 [±0"0084 P.E] by least squa

Ext. Thr. 81°

Level Results 1865
and Approximate Clock Errors

Date		Level	EC	Dif	Daily Rate
1865 March	6	$-0^s.32$			
	20	−0.24			
April	3	−0.40			
	13	−0.32			
	19	−0.30			
	24	−0.43			
May	8	−0.16			
	15	−0.37			
	23	−0.15			
	26	−0.23			
June	20	−0.05			
	27	−0.09			
July	8	−0.03			
	17.28	0.00	$-31^s.9$	$+2^s.9$	$+0^s.41$
	24.22	+0.03	−29.0	+ 2.8	+0.40
	31.20	+0.22	−26.2	+ 3.0	+0.37
Aug	8.30	+0.03	−23.2	+ 3.6	+0.61
	14.16	+0.10	−19.6	+ 3.6	+0.51
	21.18	+0.03	−16.0	+6.1	+0.86
	28.28	+0.16	− 9.9	+4.2	+0.60
Sept	4.27	+0.24	− 5.7	+9.1	+0.61
	19.22	+ 0.08	+3.4	+7.3	+1.21
	25.26	+ 0.11	−49.3	+8.6	+1.09
Oct	3.19	+ 0.08	−40.7	+5.3	+0.88
	9.23	+0.21	−35.4	+4.3	+0.61
	16.35	+0.12	−31.1		
	20.	+0.04		+4.3	+0.62
	23.20	−0.03	−26.8		