1976phae.proj.1886R

KG
11366
v.682

Equator Point from Observations of
α Ursae Minoris
λ Ursae Minoris
51 Cephei
ρ Ursae Minoris
from [illegible] 1876 to

Charles W. Sever, University [illegible], Cambridge.

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Equator Point from
Observations of
α Ursae Minoris
λ Ursae Minoris
51 Cephei
δ Ursae Minoris

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Constants for September.

λ Ursae Minoris

$\delta = 88^\circ\ 56'\ 15''$

log 15 =	1.17609	log sin δ	9.99993
log cos δ =	8.26818	log cos δ	8.26818
log tang i =	8.94408	log constant	= 6.73672
Red I = log 15 tang i cos δ =	8.38835	log reduction II	5.00483

δ Ursae Minoris

$\delta = 86^\circ\ 36'\ 39''$

log 15	1.17609	log sin δ	9.99924
log cos δ	8.77172	log cos δ	8.77172
log tang i	8.94408	log constant	6.73672
Red I = log 15 tang i cos δ	8.89189	log reduction II	5.50768

51 Cephei

$\delta = 87^\circ\ 13'\ 50''$

log 15	1.17609	log sin δ	9.99949
log cos δ	8.68410	log cos δ	8.68410
log tang i	8.94408	log constant	6.73672
Red I = log 15 tang i cos δ	8.80427	log reduction II	5.42031

$i = 5^\circ\ 1'\ 28''$

log 112.5″ =	2.05115
log sin 1″ =	4.68557
log 112.5 sin 1″ =	6.73672

Formula for reduction to Horizontal wire

$Red = 15^s \tau \tan i \cos \delta$

Formula for reduction Meridian

$Red = [\log \sin 1'' + \log 112.5] + 2 \log \tau + \log \sin \delta + \log \cos \delta$

Note. The formula for Red. to Meridian $Red = 112.5 \sin 1'' \tau^2 \sin \delta \cos \delta$ is equivalent to that given in Chauv. II, 292 $R = -\frac{2 \sin^2 \frac{1}{2}(\tau - m) \cos \delta \sin \delta}{\sin 1''}$, if m be neglected. For —

$\sin^2 \frac{1}{2} \tau = \frac{15^2 \tau^2 \sin^2 1''}{2^2}$, if sine and arc be taken equal and τ expressed in time

$\therefore \frac{2 \sin^2 \frac{1}{2}(\tau - m) \cos \delta \sin \delta}{\sin 1''} = 112.5 \sin 1'' \tau^2 \sin \delta \cos \delta$ as given in Int. to vol X Annals.

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September 2 1876 (See page 25 of this book)

	π_α	.	π_δ	.	T	log T	2 log T	Red I	Red II	Sum I+II	Circ. Read	Corr. Circ. Read.				
	h m	s	m	s	s			"	"	"	' "	"				
	δ Ursae Minoris															
5895	18 12	135	10	35.3	+ 133.1	2.12418	4.24836	+ 10.38	+ 0.57	+ 10.95 +49	50 47.95	50	58.90 +05		5895	+.13
5909	12	30.9	11	44.0	+ 64.4	1.80889	3.61778	+ 5.02	+ 0.13	+ 5.15 +63	53.92		59.07 +02	"	5909	+.27
5884	12	48.7	12	38.3	+ 10.1	1.00432	2.00864	+ 0.79	+ 0.03	+ 0.82 +38	58.02		58.84 +05	58.82	5884	+.02
5847	13	6.0	13	44.0	− 55.6	1.74507$_n$	3.49014$_n$	− 4.33	+ 0.10	− 4.23 +01	62.72		58.49 −.2	± 0.13	5847	−.35
5876	13	23.1	14	22.2	− 93.8	1.97220$_n$	3.94440$_n$	− 7.31	+ 0.28	− 7.03 +30	65.82		58.79 −.3		5876	−.06
	m	s													5882	
	12	48.44													±.15	±.18
															W. A. R.	
		15	11.3	− 142.9	2.15583$_n$	4.31006$_n$	− 11.14	+ 0.65	− 10.49 −.69	51 8.32			57.83 −.6	+ 57.63	5777	+.22
		16	53.2	− 244.8	2.38881$_n$	4.77762$_n$	− 19.09	+ 1.93	− 17.16 −1.2	14.60			57.44 −.15	+ 0.19	5734	−.21
									36.2/63 = ±.56				57.58 −.02		5758	±.37
											50		58.46		58.46	±.26
	51 Cephei L. C.															
	h m	s	m	s	s			"	"	"	' "	"				
	18 41	12.1	35	56.2	+ 356.8	2.55242	5.10484	− 22.72	− 3.35	− 26.07 −.90 42	5.77	41	39.70 −.12		3958	−2.01
	41	31.4	37	5.0	+ 288.0	2.45939	4.91878	− 18.35	− 2.18	− 20.53 −.89	1.20		40.67 −.08		4059	−1.00
	41	52.1	38	5.8	+ 227.2	2.35641	4.71282	− 14.48	− 1.36	− 15.84 +1.52 41	58.92		43.08 −.08		4300	+1.41
	42	14.0	39	23.2	+ 149.8	2.17551	4.35102	− 9.54	− 0.59	− 10.13 +.79	52.45		42.32 −.13	42.12	4227	+.68
	42	35.4	40	10.3	+ 102.7	2.01157	4.02314	− 6.54	− 0.28	− 6.82 +.04	48.37		41.55 −.05	± 0.36	4152	−.07
	m	s	41	9.6	+ 43.4	1.63749	3.27498	− 2.76	− 0.05	− 2.81 +.34	44.65		41.84 −.02		4182	+.23
	41	53.0	42	19.6	− 26.6	1.42488$_n$	2.84976$_n$	+ 1.69	− 0.02	+ 1.67 +.45	46.25		41.92 +.01		4193	+.34
			42	57.2	− 64.2	1.80754$_n$	3.61508$_n$	+ 4.09	− 0.11	+ 3.98 +.52	38.00		41.98 +.02		4200	+.41
													41.63		4159	±.82
													±0.67			±.69
			43	37.6	− 104.6	2.01953$_n$	4.03906$_n$	+ 6.66	− 0.29	+ 6.37 −.03 41	35.05		41.42 +.03	41.13	W. A. R.	
			44	47.8	− 174.8	2.24254$_n$	4.48508$_n$	+ 11.14	− 0.80	+ 10.34 +.27	31.35		41.69 +.08		4175	+.56
			45	52.2	− 239.2	2.37876$_n$	4.75752$_n$	+ 15.24	− 1.50	+ 13.74 −1.11	26.55		40.29 +.08	± 0.58	4037	−.82
													41.50 −.02		4149	±.68
										7.86/105 = ±.75						±.57
												41	41.48		41.48	±.64

Star constants for 1876

i = 2 3 5

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	m	s		log r	2 log r	Red I	Red II	Sum I+II	Circ. Read.	Corr Circ Read.

λ Ursae Minoris L.C.

A = 15

13	19	4.2	20	57.3	−462.7	2.66530$_n$	5.33060	+14.50	−2.74	+11.76
			22	0.7	−534.6	2.72803$_n$	5.45606	+16.75	−3.66	+13.09
			23	27.5	−628.4	2.79824$_n$	5.59648	+19.69	−5.06	+14.63
					−741.1	2.86986$_n$	5.73976	+23.23	−7.03	+16.20
18	13	14.55	25	35.7						

δ Ursae Minoris

h	m	s	m	s	s					
18	12	13.7	10	31.0	+ 137.1	2.13704	4.27408	+10.69	+0.60	+11.29
	12	30.8	12	3.8	+ 44.3	1.64640	3.29280	+ 3.46	+0.06	+ 3.52
	12	46.9	12	49.3	− 1.2	0.07918$_n$	0.15836$_n$	− 0.09	+0.00	− 0.09
	13	5.7	13	53.2	− 65.1	1.81358$_n$	3.62716$_n$	− 5.07	+0.13	− 4.94
	13	23.2	14	41.5	− 113.4	2.05461$_n$	4.10922$_n$	− 8.84	+0.41	− 8.43

51 Cephei L.C.

h	m	s	m	s	s					
18	41	16.7	36	24.0	+ 330.0	2.51851	5.03702	− 21.03	− 2.86	− 23.89
	41	32.0	37	57.0	+ 236.9	2.37457	4.74914	− 15.10	− 1.48	− 16.58
	41	55.0	39	4.3	+ 169.8	2.22994	4.45988	− 10.82	− 0.76	− 11.58
	42	15.4	40	5.7	+ 108.4	2.03503	4.07006	− 6.91	− 0.31	− 7.22
	42	37.5	41	28.0	+ 26.1	1.41664	2.83328	− 1.66	− 0.02	− 1.68
	m	s	43	4.9	− 70.8	1.85003$_n$	3.70006$_n$	+ 4.51	− 0.13	+ 4.38
	41	54.12								
			44	12.6	− 138.5	2.14145$_n$	4.28290$_n$	+ 8.82	− 0.50	+ 8.32
			45	25.2	− 211.1	2.32449$_n$	4.64898$_n$	+ 13.45	− 1.17	+ 12.28

λ Ursae Minoris

h	m	s	m	s	s					
19	49	19.3	50	27.4	+ 69.8	+ 1.84386$_n$	3.68872	− 1.70	+ 0.05	− 1.65
	49	17.0	51	33.8	+ 135.2	+ 2.13098$_n$	4.26196	− 3.30	+ 0.18	− 3.12
	49	16.6	52	41.2	+ 203.6	+ 2.30878$_n$	4.61756	− 4.98	+ 0.42	− 4.56
	49	17.5	53	46.0	+ 268.4	+ 2.42878$_n$	4.85756	− 6.56	+ 0.73	− 5.83
	m	s	54	54.0	+ 336.4	+ 2.52686$_n$	5.05372$_n$	− 8.23	+ 1.14	− 7.09
	49	17.60								
			55	54.0	+ 396.4	+ 2.59813$_n$	5.19626$_n$	− 9.69	+ 1.59	− 8.10
			57	36	+ 465.0	+ 2.66745$_n$	5.33490$_n$	− 11.37	+ 2.18	− 9.19
			0	25.3	+ 667.7	+ 2.82458$_n$	5.64916$_n$	− 16.33	+ 4.51	− 11.82
			1	32.9	+ 735.3	+ 2.86646$_n$	5.73292$_n$	− 17.98	+ 5.47	− 12.51
			2	44.2	+ 806.6	+ 2.90666$_n$	5.81332$_n$	− 19.72	+ 6.58	− 13.14

W. A. C.

6	29.75	6	41.51	+09	4169	−07				
	26.27		39.36	+11	3947	−120				
	25.68		40.31	+13	4044	−23				
	24.82		41.02	+15	4117	+50				
	24.22		40.55	+12	4067					
6,			40.67							

W. J. M.

+.25					5936	+20				
50	48.02	50	59.31	+05	5963	+47				
+52	56.10		59.62	+10	5926	+10				
+15	59.35		59.26	+02	5889	−27				
−22	63.85		58.91	−02	5868	−48				
−43	67.15		58.72	−04	5816					

W. A. K.

−37					5874	−31				
51	10.417		58.81	−07	5902	−03				
−09	14.77		59.12	−10	5925	+20				
+14	18.90		59.35	−10	5922	+17				
+11	22.90		59.36	−14	5907	−03				
−09	26.40		59.18	−16	5905					
			59.16	−06 50	59.10					

W. J. M.

42	29.02	41	45.73	+11	4410	+59				
+172	0.77		44.19	−09	4299	−52				
41	54.65		43.07	−08	4331	−20				
+01	50.55		43.33	−02	4298	−53				
−32	44.67		42.99	−01	4267	−84				
−63	38.27		42.65	+02	4351					
			43.56							
			40.68							

W. A. K.

41	34.10		42.42	+03	4247	+19				
−85	30.50		42.78	+06	4284	+20				
−46			42.60		42.64					

W. J. M.

31	32.90	31	31.25	−01	3124	+07				
+35	34.02		30.90	−02	3088	−29				
+63	35.72		31.16	−05	3114	−03				
+88	37.27		31.45	−02	3141	+24				
−76	36.90		29.81	+04	3137					

W. A. K.

31	38.75		30.65	+04	3061	+45				
+85	40.12		30.93	+05	3088	+72				
−107	41.35		29.53	−01	2946	−70				
−10	43.02		30.51	−04	3043	+27				
−110	42.65		29.81	+08	2943	−73				
			30.65	−05	3016					
31			30.60		3053					

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	π_α	π_δ	r	log r	2 log r	Red I	Red II	Sum Red I+II	Circ. Read	Corr. Circ Read.

δ Ursae Minoris

±.49	h m s	m s	s							+31					
	18 12 10.0	10 30.0	+ 135.0	2.13033	4.26066	+ 10.52	+ 0.58	+ 11.10	50	47.88	50	58.98 +05		5903 -.86
	12 26.6	11 45.7	+ 59.3	1.77305	3.54610	+ 4.62	+ 0.11	+ 4.73	+26	54.85		59.58 +02	59.86	6060 -.24
	12 44.8	12 30.4	− 5.4	0.73239$_m$	1.46478$_m$	− 0.42	+ 0.00	− 0.42	+169	61.45		61.03 .00	±.080	6103 ±.114
	13 3.7													59.89 ±.44
	13 26.0													±.37
	m s									+62				5886 -.83
	12 45.02	14 13.1	− 88.1	1.94498$_m$	3.88996$_m$	− 6.87	+ 0.25	− 6.62	51	6.22		60.00 -.04		N. A. K.
		15 18.3	− 153.3	2.18554	4.37108	− 11.95	+ 0.75	− 11.20	+.04	10.65		59.45 -.07		5938 +.25
±.34 ±.29		16 27.8	− 222.8	2.34792$_m$	4.69584	− 17.37	+ 1.60	− 15.77	-.25	14.95		59.18 -.05	59.34	5909 -.04
		17 33.0	− 288.0	2.45939$_m$	4.91878	− 22.45	+ 2.67	− 19.78	-.57	18.65		58.87 -.10	±.029	5877 -.36
		18 43.1	− 358.1	2.55400	5.10800	− 27.92	+ 4.13	− 23.79	-.30	22.97		59.18 -.14		5904 -.09
		19 53.2	− 428.2	2.63165$_m$	5.26330$_m$	− 33.38	+ 5.90	− 27.48	-.39	26.60		59.12 -.17		5895 -.18
		21 6.2	− 501.2	2.70000$_m$	5.40002$_m$	− 39.08	+ 8.08	− 31.00	-.39	30.15		59.15 -.20		5898 -.18
		~~23~~ 22 ~~30.0~~ 10.7	~~− 645.0~~ 565.7	2.80969$_m$	5.61938$_m$	~~− 60.30~~ − 44.10	~~+ 13.40~~ + 10.30	~~− 46.90~~ − 33.80	~~-.45~~ -.45	~~32.90~~ 32.90		~~59.40~~ 59.10 -.21		5889 -.24
±.16 ±.13				2.75259$_m$	5.50518							59.26		59.13 ±.29
												±.022		±.24
												59.42 -.09		59.34

51 Cephei LC.

	h m s	m s	s							-.22					
	18 41 12.9	35 22.0	+ 393.8	2.59528	5.19056	− 25.09	− 4.08	− 29.37	42	11.70	41	42.33 -.16		4229 -.36
	41 33.6	36 26.2	+ 329.6	2.51799	5.03598	− 21.00	− 2.86	− 23.86	+.29	6.70		42.83 -.12		J. F. M.
	41 66.4	37 42.8	+ 253.6	2.40415	4.80830	− 16.16	− 1.69	− 17.85	+1.25	1.60		43.75 -.08		4271 +.15
±.76 ±.64	42 17.0	38 32.7	+ 203.1	2.30771	4.61542	− 12.94	− 1.08	− 14.02	41 +.32	56.82		42.80 -.06		4367 +1.11
	42 38.3	39 39.1	+ 136.7	2.13577	4.27154	− 8.71	− 0.49	− 9.20	+.52	52.18		42.98 -.08	42.40	4274 +.18
	m s	40 44.0	+ 71.8	1.85612	3.71224	− 4.57	− 0.13	− 4.70	-.34	46.80		42.10 -.02	±.037	4294 +.38
	41 55.8	41 45.8	+ 10.8	1.03342	2.06684	− 0.69	− 0.00	− 0.69	-.21	42.90		42.21 -.00		4208 -.48
±.28 ±.24	55.64	42 44.4	− 48.6	1.68664$_m$	3.37328$_m$	+ 3.10	− 0.06	+ 3.04	-.50	38.87		41.91 +.01		4221 -.35
														4192 -.64
												42.53		4256 ±.47
												±.043		±.41
										-.60				4487 -.87
		43 40.7	− 104.9	2.02078	4.04156	+ 6.68	− 0.29	+ 6.39	41	35.40		41.79 +.03		N. A. K.
		44 42.8	− 167.0	2.22272$_m$	4.44544$_m$	+ 10.64	− 0.73	+ 9.91	-.62	32.15		41.76 +.00	41.50	4480 -.25
		45 45.2	− 229.4	2.36059$_m$	4.72118$_m$	+ 14.62	− 1.38	+ 13.24	+.08	29.20		42.44 +.02	±.031	4250 +.47
											41	42.54 -.02		4205
±.18 ±.15												42.52		±.30
												42.42		±.34

λ Ursae Minoris

										+38					
	h m s	m s	s												
	19 49 11.1	50 20.1	− 71.3	1.85309$_m$	3.70618$_m$	− 1.74	+ 0.05	− 1.69	31	33.37	31	31.68 -.01		3167 +.22
	49 5.8	51 21.5	− 132.7	2.12287$_m$	4.24574$_m$	− 3.24	+ 0.18	− 3.06	-.16	34.20		31.14 -.03	31.46	J. F. M.
	49 8.6	52 14.2	− 185.4	2.26811$_m$	4.53622	− 4.53	+ 0.34	− 4.19	+.26	35.75		31.56 +.02	±.022	3113 -.32
	49 9.8													3158 ±.10
														31.45 ±.26
	m s													±.22
±.64 ±.54	49 8.82									-.18				3141 -.03
		53 40	− 235.2	2.37144$_m$	4.74288	− 5.75	+ 0.56	− 5.19	31	36.32		31.13 -.02		N. A. K.
		54 12.1	− 303.3	2.48187$_m$	4.96374$_m$	− 7.42	+ 0.93	− 6.49	+.19	38.00		31.51 -.03	31.17	3148 +.34
		55 24.5	− 375.7	2.57484	5.14968$_m$	− 9.19	+ 1.43	− 7.76	-.47	38.62		30.86 -.01	±.024	3082 -.32
												31.31 -.02		31.14 ±.28
											31	31.29		±.24
														3129

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m	m	s	r	log r	2 log r	Red I	Red II	Sum I+II	Circ Read	Corr. Circ Read. with old value of constant	Corr Circ Read with new value of constant

A = 13.45. L.C. — 51 Cephei L.C.

h	m	s	m	s														
18	45	29.9	44	22.0														
	46	14.4	45	21.0	−	100.7	2.00303n	4.00606n	+ 6.42	− 0.27	+ 6.15	1	29.52	1	35.67	1	35.74	J.F.M.
	46	59.7	47	36.7	−	159.5	2.20276n	4.40552n	+ 10.17	− 0.67	+ 9.50		29.85		38.85		38.96	
			48	10.3	−	295.2	2.47012n	4.94024n	+ 18.81	− 2.29	+ 16.52		22.82		39.34		39.57	38.38
	m	s	—	—	−	338.8	2.51693n	5.03386n	+ 20.95	− 2.84	+ 18.11		20.90		39.01		39.25	± 1.31
	42	~~46~~	—	—	−	143.9	2.15806n	4.31612n	+ 9.28	− 0.54	+ 8.74		20.08	41		41	38.26 +07	
		~~4146~~	—	—	−	202.9	2.30728n	4.61456n	+ 13.08	− 1.08	+ 12.00		12.85		38.22		41.35 +10	
	H1	58.07			−	338.6	2.53969n	5.07938n	+ 22.34	− 3.16	+ 19.18		9.67		± 1.24		42.00 +14	
			U.C.		−	372.2	2.57078n	5.14156n	+ 23.99	− 3.65	+ 20.34						41.24 +15	

h	m	s	m	s	m	s													
6	41	50.1	38	5.3	+4	28.7	2.42927	4.85854	+ 17.12	+ 1.90	+ 19.02	13	33.87	13	52.89	13	53.09	W.A.H.	52.99
	42	13.6	40	3.7	+2	30.3	2.17696	4.35392	+ 9.58	+ 0.59	+ 10.17		41.65	13	51.82		51.93		51.86
	42	36.4	415	57.3	−3	28.3	2.30814n	4.61628n	− 12.95	+ 1.09	− 11.86	14	3.18		51.52		51.17		51.25
	42	54.5	47	53.3	−5	19.3	2.50420n	5.00840n	− 20.34	+ 2.68	− 17.66		8.85		51.19		50.95		51.07
	43	15.4	51	0.6	−8	26.6	2.70467n	5.40934n	− 32.28	+ 6.75	− 25.53		17.48		51.95		51.58		51.29
	43	37.0																	
	42	34.00													51.87		51.74		51.79
															± 51	13	± 0.58		

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S Ursae Minoris

h	m	s	m	s															
18	11	42.6	4	1.0	+	496.7	2.69609	5.39218	+ 38.72	+ 7.94	+ 46.66	50	11.40	50	58.06	60	58.52	J.F.M.	58.27
	11	59.7	5	4.3	+	432.4	2.63687	5.27378	+ 33.79	+ 6.05	+ 39.84		18.00		57.84		58.23		58.00
	12	18.9	6	16.8	+	360.9	2.55739	5.11478	+ 28.14	+ 4.19	+ 32.33		25.65		57.98		58.30		58.12
	12	35.0	7	14.4	+	303.3	2.48187	4.96374	+ 23.65	+ 2.96	+ 26.61		30.62		57.23		57.50		57.35
	12	52.2	8	22.9	+	234.8	2.37070	4.74140	+ 18.31	+ 1.77	+ 20.08		37.72		57.80		58.01		57.90
	m	s	9	40.0	+	157.7	2.19783	4.39566	+ 12.01	+ 0.80	+ 12.81		44.67		57.48		57.91		57.83
	12	17.7	10	40.4	+	97.3	1.98811	3.97622	+ 7.58	+ 0.30	+ 7.88		49.85		57.73		57.82	57.72	57.77
		1768	11	52.5	+	25.2	1.40140	2.80280	+ 1.96	+ 0.02	+ 1.98		55.92		57.90		57.93	0.18	57.89
			13	11.5	−	53.8	1.43078n	3.56156n	− 4.19	+ 0.12	− 4.07	51	1.62		57.55		57.50		57.53
			14	14.0	−	116.3	2.06558n	4.13116n	− 9.07	+ 0.43	− 8.64		6.65		58.01		57.91		57.97
			15	18.0	−	180.3	2.25600n	4.51200n	− 14.06	+ 1.05	− 13.01		10.97		57.76		57.60		57.69
			16	29.4	−	251.7	2.40088n	4.80176n	− 19.62	+ 2.04	− 17.58		15.15		57.57		57.34		57.47
			17	41.0	−	323.3	2.50961n	5.01922n	− 25.21	+ 3.36	− 21.85		19.50		57.45		57.36		57.52
			19	6.0	−	408.3	2.61098n	5.22196n	− 31.83	+ 5.36	− 26.47		24.87		58.40		58.03		58.23
			20	17.0	−	479.3	2.68061n	5.36122n	− 37.37	+ 7.39	− 29.98		27.52		57.64		57.11		57.34
			21	54.3	−	576.6	2.76087n	5.52174n	− 44.95	+ 10.70	− 34.25		31.65		57.40		56.87		57.16
			22	38.6	−	620.9	2.79302n	5.58604n	− 48.41	+ 12.41	− 36.00		33.22		57.22		56.66		56.97
															57.11		57.62		57.71
															± 21		± 36		
																	57.63		

51 Cephei

h	m	s	m	s															
6	42	32.4	43	50.8	−	77.9	1.89154n	3.78308n	− 4.96	+ 0.16	− 4.80	14	54.90	14	50.10	14	50.04	W.A.H.	50.07
		33.5	46	23.2	−	230.3	2.36229n	4.72458n	− 14.67	+ 1.40	− 13.27	15	3.18		49.91		49.73		49.82
	m	s	47	49.6	−	316.7	2.50065n	5.00130n	− 20.18	+ 2.64	− 17.54		8.20		50.66		50.43	49.80	50.55
	42	32.95	49	31.8	−	418.9	2.62211n	5.24422n	− 26.69	+ 4.62	− 22.07		12.00		49.93		49.63	10.33	49.78
			50	56.4	−	503.5	2.70200n	5.40400n	− 32.08	+ 6.67	− 25.41		14.95		49.54		49.16		49.37
			52	19.6	−	586.7	2.76842n	5.53684n	− 37.38	+ 9.06	− 28.32		16.82		48.50		48.06		48.21
			53	34.8	−	661.9	2.82079n	5.64148n	− 42.18	+ 11.53	− 30.65		20.92		50.27		49.78		50.06
			54	47.0	−	734.8	2.86617n	5.73234n	− 46.82	+ 14.21	− 32.61		19.35		(46.94)		46.19		
			55	38.5	−	785.6	2.89520n	5.79040n	− 50.06	+ 16.24	− 33.82		23.15		49.33		48.75		49.05
															49.48		49.08		49.63
															± .46		± 0.75		
																	49.45		
																	49.63		
																13			

This obs. noted? at the time when made.

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1876phae.proj.1686R

Constants for Oct.

$i = 5^\circ\ 4'\ 56''$

	λ Urs. Min	δ Urs. Min	α Urs. Min	51 Cephei
log 15	1.17609	1.17609	1.17609	1.17609
log cos δ	8.26784	8.77175	8.37092	8.68414
log tang i	8.94907	8.94907	8.94907	8.94907
log const I	8.39300	8.89691	8.49608	8.80930
log sin δ	999992	9.99924	9.99988	9.99949
log cos δ	8.26784	8.77175	8.37092	8.68414
log 112.5 sin i	6.73672	6.73672	6.73672	6.73672
log const II	5.00448	5.50771	5.10752	5.42035

Reduction to horizontal wire = log r + log constant I.

$i = 5^\circ\ 6'\ 31''$

Reduction to the meridian = 2 log r + log constant II.

Aor. 15.	δ = 88° 56′ 19″	δ = 86° 36′ 33″	δ = 88° 39′ 26″	δ = 89° 13′ 52″
log 15	1.17609	1.17609	1.17609	1.17609
log cos δ	8.26773	8.77193	8.36984	8.68401
log tang i	8.95133	8.95133	8.95133	8.95133
log const I	8.39515	8.89935	8.49726	8.81143
log sin δ	999993	9.99924	9.99988	999949
log cos δ	8.26773	8.77193	8.36984	8.68401
log 112.5 sin i	6.73672	6.73672	6.73672	6.73672
log const II	5.00438	5.50789	5.10644	5.42022

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m_0	r_0	r	log r	2 log r	Red I	Red II	Sum I+II	Circle Corr. Reading	Corr. Circ. Read.

λ Ursae Minoris

h	m	s	m	s	s												
18	11	40.1	4	35.6	+456.6	2.65954	5.31908	+35.58	+ 6.71	+42.29	50	18.02	50	60.31	-.23		
	11	53.4	5	32.6	+399.6	2.60163	5.20326	+31.14	+ 5.14	+36.28		24.27		60.55	-.20		
	12	10.8	6	18.7	+353.5	2.54839	5.09678	+27.57	+ 4.02	+31.59		28.12		59.71	-.18		
	12	30.9	6	56.2	+316.0	2.49969	4.99938	+24.63	+ 3.32	+27.95		31.55		59.50	-.16		
	12	46.0	8	2.0	+250.2	2.39828	4.79656	+19.50	+ 2.01	+21.51		37.90		59.41	-.12		
			8	52.2	+200.0	2.30163	4.60206	+15.59	+ 1.29	+16.88		42.52		59.40	-.10		
	m	s	9	54.8	+137.4	2.13799	4.27598	+10.91	+ 0.61	+11.32		47.30		58.62	-.07		
	12	12.24	10	50.9	+81.3	1.91009	3.82018	+ 6.34	+ 0.21	+ 6.55		53.67		60.22	-.04		
			12	15.6	- 3.24	0.53148	1.06296	- 0.26	+ 0.00	- 0.26		59.40		59.14	+.00	59.18	
			13	1.4	-49.2	1.69196	3.38392	- 3.83	+ 0.08	- 3.75	51	2.47		58.72	+.02	±0.32	
			14	28.8	-136.6	2.13545	4.27090	- 10.65	+ 0.60	- 10.05		9.57		59.52	+.07		
			15	33.3	-201.1	2.30341	4.60682	- 15.67	+ 1.30	- 14.37		13.05		58.68	+.10		
			16	29.2	-257.6	2.41095	4.82190	- 20.07	+ 2.13	- 17.94		16.97		59.03	+.13		
			17	38.6	-326.4	2.51375	5.02750	- 25.44	+ 3.43	- 22.01		21.12		59.11	+.16		
			18	43.5	-391.3	2.59261	5.18502	- 30.49	+ 4.93	- 25.56		25.20		59.64	+.20		
			19	51.3	-459.1	2.66191	5.32382	- 35.78	+ 6.79	- 28.99		28.37		59.38	+.23		
			21	20.8	-548.6	2.73926	5.47852	- 42.75	+ 9.69	- 33.06		31.95		58.89	+.27		
			22	29.7	-617.5	2.79064	5.58128	- 48.12	+ 12.28	- 35.84		34.90		59.10	+.31		
			23	10.2	-658.0	2.81823	5.63646	- 51.28	+ 13.94	- 37.34		36.17		58.83	+.33		
														59.36	+.04		
														±.38			
													50	59.40			

J. F. M.

60.08	+.69
60.35	+.96
59.53	+.14
59.34	-.05
59.29	-.10
59.30	-.09
58.55	-.84
60.18	+.79
59.14	-.25
58.74	-.65
59.59	+.20
58.78	-.61
59.16	-.23
59.27	-.12
59.84	+.45
59.61	+.22
59.16	-.23
59.41	+.02
59.16	-.23
59.39	
	±.37
	±.31

51 Cephei L. C.

h	m	s	m	s	s												
18	41	17.1	~~35~~	~~43.0~~	+												
	41	39.2	36	28.7	+ 331.5	2.52048	5.04096	- 21.37	- 2.89	- 24.26	+.42	6.77	42	42.51	+.12		
	42	0.8	37	30.5	+ 269.7	2.43088	4.86176	- 17.38	- 1.91	- 19.29	+.55	1.65		42.36	+.10		
	42	21.0	38	58.6	+ 181.6	2.25912	4.51824	- 11.71	- 0.87	- 12.58	+.27	54.67		42.09	+.03		
	42	42.0	40	35.3	+ 84.9	1.92891	3.85782	- 5.46	- 0.19	- 5.65	+.73	48.25		42.60	+.04		
	m	s	41	39.9	+ 20.3	1.30750	3.61580	- 1.31	- 0.01	- 1.32	-.72	42.50		41.18	+.01		
	42	0.20	43	1.3	- 61.1	1.78604	3.57208	+ 3.93	- 0.09	+ 3.84	-.78	37.32		41.16	-.03	41.64	
			44	6.3	-126.1	2.10041	4.20082	+ 8.12	- 0.42	+ 7.70	-.21	34.05		41.75	-.05	±0.38	
			45	21.8	-201.6	2.30449	4.60898	+ 13.00	- 1.07	+ 11.93	-.19	29.87		41.80	-.06		
			46	34.0	-273.8	2.43745	4.87486	+ 17.65	- 1.97	+ 15.68	-.34	26.00		41.68	-.11		
			47	45.0	-344.8	2.53757	5.07514	+ 22.23	- 3.13	+ 19.10	-.18	21.80		40.90	-.14		
			49	13.5	-433.3	2.63679	5.27358	+ 27.93	- 4.94	+ 22.99	+1.01	19.12		42.11	-.16		
			50	43.6	-523.4	2.71883	5.43766	+ 33.74	- 7.21	+ 26.53	+.73	15.35		41.88	-.21		
			51	48.3	-588.1	2.76945	5.53890	+ 37.91	- 9.11	+ 28.80	-.32	12.05		40.85	-.23		
			53	3.6	-663.4	2.82178	5.64356	+ 42.76	- 11.58	+ 31.18	-.68	9.32		40.50	-.24		
			54	33.7	-753.5	2.87708	5.75416	+ 48.57	- 14.95	+ 33.62	+.48	8.05		41.67	-.25		
			55	59.6	-839.4	2.92397	5.84794	+ 54.11	- 18.55	+ 35.56	-1.04	5.60		40.16	-.26		
											±.68			41.58	-.09		
											±.57			±.54			
														41.45			

J. F. M.

42.63	+1.14
42.46	+.97
42.18	+.69
42.64	+1.15
41.19	-.30
41.13	-.36
41.70	+.21
41.72	+.23
41.57	41.49 +.08
40.76	-.73
41.95	+.46
41.67	+.18
40.62	-.87
40.26	-1.23
41.42	-.07
39.90	40.94 -1.59
+1.49	

λ Ursae Minoris

h	m	s	m	s	s												
20	3	50.3	2	22.0	-311.5	2.49346	4.98692	- 17.10	+ 0.98	- 16.12	31	42.38	31	35.86			
	5	45.1	3	51.4	-399.9	2.60195	5.20390	- 22.88	+ 1.91	- 20.97		40.82		32.55			
	7	36.4	4	39.3	-448.8	2.65205	5.30410	- 12.10	+ 2.03	- 9.07		41.98		32.91		32.740	
			5	56.5	-526.0	2.72099	5.44198	- 13.00	+ 2.59	- 10.41		41.65		31.24		±.129	
19	57	10.5	7	9.7	-599.2	2.77757	5.55514	- 14.81	+ 3.63	- 11.18		41.70		30.52			
	47	14.2															
	47	14.4															
	m	s			-909.0	2.95856	5.91712	- 22.47	+ 8.35	- 14.12		42.38		28.26			
	47	13.03			-998.4	2.99930	5.99800	- 24.68	+ 10.06	- 14.62		40.82		26.20			
					-1046.3	3.01966	6.03932	- 25.86	+ 11.06	- 14.80		41.48		26.68			
4	50.3				-1123.5	3.05057	6.10114	- 27.77	+ 12.75	- 15.02		41.05		26.03			
	53.8				-1196.7	3.07798	6.15596	- 29.58	+ 14.47	- 15.11		41.70		26.59			
	53.9																
4	52.67				-857.0	2.93298	5.86596	- 21.18	+ 7.42	- 13.76	31	42.38		26.75	31		
-16	47.70				-946.4	2.97607	5.95214	- 23.39	+ 9.05	- 14.34		40.82		±.57			
48	4.97				-994.3	2.99752	5.99504	- 24.58	+ 9.99	- 14.59		41.48					
					-1071.5	3.02999	6.05998	- 26.48	+ 11.60	- 14.88		41.05					
					-1144.7	3.05849	6.11698	- 28.29	+ 13.24	- 15.05		41.70					

28.76	+1.64
26.63	-.49
27.05	-.07
26.33	-.79
26.82	-.30
27.12	±.73
	±.62
26.48	+.15
26.29	+.16
26.17	+.16
26.05	+.47

26.96 +.16

31 27.12

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Tα	Tδ	r	log r	2 log r	Red I	Red II	Sum I+II		Circle Reading		Corr. Circ Read			W. A. R.	
6 42 31.5	35 27.8	+ 423.7	2.62706	5.25412	+ 27.31	+ 4.72	+ 32.03	13 ~~53~~	20.37	13 ~~53~~	52.40	−16		52.24	+.34
	37 10.0	+ 321.5	2.50718	5.01436	+ 20.72	+ 2.72	+ 23.44		28.42		51.86	−13		51.73	−.17
	38 38.0	+ 233.5	2.36829	4.73658	+ 15.05	+ 1.43	+ 16.48		37.25		53.73	−10		53.63	+1.73
	40 7.5	+ 144.0	2.15836	4.31672	+ 9.28	+ 0.55	+ 9.83		41.58		51.31	−07		51.24	−.66
	43 24.6	− 53.1	1.72509n	3.45018n	− 3.42	+ 0.07	− 3.35		55.52		52.17	+02	51.92	52.19	+.29
	45 20.5	− 169.0	2.22789n	4.45578n	− 10.90	+ 0.75	− 10.15	54	2.40		52.25	+06	±0.27	52.31	+.41
	46 55.4	− 263.9	2.42144n	4.84288n	− 17.01	+ 1.83	− 15.18	14	7.12		51.94	+10		52.05	+.15
	48 45.6	− 374.1	2.57299n	5.14598n	− 24.12	+ 3.68	− 20.44		10.70		50.26	+15		50.41	−1.49
	50 14.0	− 462.5	2.66511n	5.33022n	− 29.81	+ 5.63	− 24.18		14.97		50.79	+20		50.99	−.91
	51 56.7	− 565.2	2.75220n	5.50440n	− 36.43	+ 8.41	− 28.02		20.30		52.28	+22		52.50	+.60
	53 20.9	− 649.4	2.81251n	5.62502n	− 41.86	+ 11.10	− 30.76		22.28		51.52	+24		51.76	−.14
	54 46.2	− 734.7	2.86611n	5.73222n	− 47.36	+ 14.21	− 33.15		24.58		51.43	+28		51.71	−.19
	55 37.4	− 785.9	2.89537n	5.79074n	− 50.66	+ 16.26	− 34.40		26.02		51.62	+29		51.91	+.01
														51.90	±.57
											51.81				±.48
											±54				
											51.81	+09			
										13 ~~53~~	51.90				

Oct. 10. 1876.

λ Ursae Minoris

	Tα	Tδ	r	log r	2 log r	Red I	Red II	Sum I+II		Circle Reading		Corr. Circ Read		J. F. M.	
1	19 48 2.8	35 42.9	+ 739.4	2.86888	5.73776	+ 18.28	+ 5.52	+ 23.80	31	2.22	31	26.02 ×	−10	25.92	−.53
2	~~3.5~~	~~37 54.2~~	~~+ 608.1~~	~~2.78398~~	~~5.56796~~	~~+ 15.03~~	~~+ 3.74~~	~~+ 18.77~~		~~4.30~~		~~23.07~~			
	~~0.6~~	~~39 14.3~~	~~+ 528.0~~	~~2.72263~~	~~5.44526~~	~~+ 13.05~~	~~+ 2.82~~	~~+ 15.87~~		~~7.72~~		~~23.59~~			
m	~~[illegible]~~	~~40 46.4~~	~~+ 435.9~~	~~2.63939~~	~~5.27878~~	~~+ 10.77~~	~~+ 1.92~~	~~+ 12.69~~		~~10.15~~		~~22.84~~			
✓	48 2.3	41 26.4	+ 395.9	2.59759	5.19518	+ 9.78	+ 1.58	+ 11.36		15.68		(27.04) ×	−05	26.99	+.54
		~~46 7.8~~	~~+ 115.5~~	~~2.06258~~	~~4.12516~~	~~+ 2.85~~	~~+ 0.[illegible]~~	~~+ [illegible]~~		~~20.45~~		~~25.11~~ ×	26.58	26.45	±.76
	48 25.5	~~46 58.0~~	~~+ 64.3~~	~~1.80821~~	~~3.61642~~	~~+ 1.59~~	~~+ 0.04~~	~~+ 1.63~~		~~21.58~~		~~23.21~~	±0.57		
		~~50 45.1~~	~~− 162.8~~	~~2.21165n~~	~~4.42330n~~	~~− 4.02~~	~~+ 0.26~~	~~− 3.76~~		~~23.17~~		~~19.41~~		26.53 −08	±.64
		~~52 12.6~~	~~− 250.3~~	~~2.39846n~~	~~4.79692n~~	~~− 6.19~~	~~+ 0.63~~	~~− 5.56~~		~~26.72~~		~~21.16~~	31	26.45	
		~~53 14.2~~	~~− 311.9~~	~~2.49402n~~	~~4.98804n~~	~~− 7.72~~	~~+ 0.98~~	~~− 6.74~~		~~27.05~~		~~20.31~~			
												23.321			

51 Cephei

Tα	Tδ	r	log r	2 log r	Red I	Red II	Sum I+II		Circle Reading		Corr. Circ Read			U. A. R.	
6 41 51.6	30 32.1	+ 722.1	2.85860	5.71720	+ 46.55	+ 13.73	+ 60.28	12	52.12	13	52.40	−29		52.11	+1.06
42 12.6	33 16.2	+ 558.0	2.74663	5.49326	+ 35.97	+ 8.19	+ 44.16	13	4.78		48.94	−22		48.72	−2.33
42 34.5	34 41.6	+ 472.6	2.67449	5.34898	+ 30.46	+ 5.88	+ 36.34		14.65		50.99	−20		50.79	−.26
42 53.9	38 51.6	+ 222.6	2.34753	4.69506	+ 14.35	+ 1.30	+ 15.65		35.78		51.43	−08		51.35	+.30
43 18.6	40 26.7	+ 127.5	2.10551	4.21102	+ 8.22	+ 0.43	+ 8.65		42.75		51.40	+04		51.44	+.39
m 21	43 29.1	− 54.9	1.73957n	3.47914n	− 3.54	+ 0.08	− 3.46		55.12		51.66	+02	51.28	51.68	+.63
42 34.24	44 58.0	− 143.8	2.15776n	4.31552n	− 9.27	+ 0.54	− 8.73	14	0.48		51.75	+07	± 0.35	51.82	+.77
	46 25.4	− 231.2	2.36399n	4.72798n	− 14.90	+ 1.41	− 13.49		4.08		50.59	+09		50.68	−.37
	48 15.9	− 341.7	2.53364n	5.06728n	− 22.03	+ 3.07	− 18.96		9.82		50.86	+14		51.00	−.05
	50 5.3	− 451.1	2.65427n	5.30854n	− 29.08	+ 5.36	− 23.72		14.28		50.56	+20		50.76	−.29
	51 40.3	− 546.1	2.73727n	5.47454n	− 35.20	+ 7.85	− 27.35		19.02		51.67	+24		51.91	+.86
	53 2.7	− 628.5	2.79831n	5.59662n	− 40.51	+ 10.40	− 30.11		20.35		50.24	+26		50.50	−.55
	54 33.1	− 718.9	2.85667n	5.71334n	− 46.34	+ 13.60	− 32.74		23.65		50.91	+28		51.19	+.14
	55 33.9	− 779.7	2.89193n	5.78386n	− 50.26	+ 16.00	− 34.26		24.78		50.52	+30		50.82	−.23
														51.05	±.61
											50.99				±.57
											±54				
											50.99	+06			
										13	51.05				

±73
±62

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α	Δα	p	log p	2 log p	Red I	Red II	Sum I+II	Circle Corr. Reading	Circ Read

δ Ursae Minoris

h	m	s	m	s	s											
18	14	29.9	7	48.6	+ 261.9	2.41814	4.83628	+ 22.66	+ 2.21	+ 22.81	1 50	37.82	50	60.63	-.13	60.50 J.F.M. +.45
	15	39.6	8	55.5	+ 196.0	2.29003	4.58006	+ 15.38	+ 1.22	+ 16.60		44.12		60.72	-.10	60.62 +.57
			10	12.0	+ 118.5	2.07372	4.14744	+ 9.35	+ 0.45	+ 9.80						
			13	37.0	- 86.5	1.93702n	3.87404	- 6.82	+ 0.24	- 6.58	51	6.37		59.79	+.04	59.83 -.22
18	12	10.5	14	26.4	- 135.9	2.13322n	4.26644	- 10.72	+ 0.59	- 10.13		9.97		59.84	+.07	59.91 -.14
	12	10.5	15	44.5	- 214.0	2.33041n	4.66082	- 16.88	+ 1.47	- 15.41		14.62		59.21	+.11	59.32 -.73
	m	s	16	43.1	- 272.6	2.43553n	4.87106	- 21.50	+ 2.39	- 19.11		20.15		61.04	+.14	61.18 +1.13
	12	10.80	17	40.2	- 329.7	2.51812n	5.03624	- 26.01	+ 3.50	- 22.51		21.77		59.22	+.16	59.38 -.67
			19	27.8	- 437.3	2.64078n	5.28156	- 34.49	+ 6.15	- 28.34		27.77		59.43	+.22	59.65 -.40
														59.98		60.05 ±.57
														60.11	+.06	±.48
														± 0.58		
														.48		
													51	0.04		

51 Cephei L.C.

h	m	s	m	s	s											
18	40	35.2	37	18.8	+ 279.7	2.44669	4.89338	- 18.03	- 2.06	- 20.09	42.1	62.95	42.1	42.86	+.11	42.97 J.F.M. +.55
	40	57.4	38	31.6	+ 206.9	2.31576	4.63152	- 13.34	- 1.13	- 14.47		57.42		42.95	+.09	43.04 +.62
	41	18.5	39	50.1	+ 128.4	2.10857	4.21714	- 8.28	- 0.43	- 8.71		51.22		42.51	+.05	42.56 +.14
	41	39.8	40	402	+ 78.3	1.89376	3.78752	- 5.05	- 0.16	- 5.21		47.57		42.36	+.03	42.39 -.03
	42	1.8	42	0.35	- 5.0	0.69897n	1.39794	+ 0.32	- 0.00	+ 0.32		41.97		42.29	-.00	42.29 -.13
	42	22.8	43	15.3	- 76.8	1.88536n	3.77072	+ 4.95	- 0.15	+ 4.80		37.60		42.40	-.04	42.36 -.06
	42	46.0	44	42.0	- 163.5	2.21352n	4.42704	+ 10.54	- 0.70	+ 9.84		32.82		42.66	-.07	42.59 +.17
	43	4.4	46	15.1	- 256.6	2.40926n	4.81852	+ 16.54	- 1.78	+ 14.81		27.42		42.23	-.11	42.12 -.30
	43	26.8	48	9.7	- 371.2	2.56961n	5.13922	+ 23.93	- 3.63	+ 20.30		22.05		42.35	-.15	42.20 -.22
	m	s	49	57.4	- 478.9	2.68024n	5.36048	+ 30.87	- 6.04	+ 24.83		17.05		41.88	-.19	41.69 -.73
	41	58.5														42.42
	42	1.41												42.46	-.03	±.47
														±0.21		.30
													42.1	42.42		±.25

λ Ursae Minoris

h	m	s	m	s	s											
19	47	1.4	35	34.1	+ 760.3	2.88098	5.76196	+ 18.79	+ 5.84	+ 24.63	32	3.42	32	28.05		J.F.M.
	47	55.6	36	34.8	+ 699.6	2.84485	5.68970	+ 17.29	+ 4.94	+ 22.23		5.22		27.45		
	48	52.1	37	35.1	+ 619.3	2.79190	5.58380	+ 15.31	+ 3.87	+ 19.18		8.90		28.08		
	49	49.7	38	42.0	+ 542.4	2.75770	5.51540	+ 14.15	+ 3.31	+ 17.46		10.22		27.68		
	50	40.6	47	6.0	+ 68.4	1.83516	3.67032	+ 1.69	+ 0.05	+ 1.74		25.65		27.39		
	51	43.1	48	57.1	- 42.7	1.63043n	3.26086	+ 1.05	+ 0.02	- 1.03		27.22		26.19		
	m	s	49	25.0	- 70.6	1.84880	3.69760	- 1.74	+ 0.05	- 1.69		28.97		26.28		
	48	40.4	50	31.0	- 136.6	2.13545	4.27090	- 3.38	+ 0.19	- 3.19		30.12		26.93		
	4		52	31.8	- 257.4	2.41066n	4.82122	- 6.36	+ 0.67	- 5.69		32.70		27.01		
			53	5.6	- 291.2	2.46419n	4.92838	- 7.20	+ 0.86	- 6.34		32.68		26.34		
														27.14		
														±0.52		

λ Ursae Minoris

h	m	s	m	s	s											
19	47	5.70	35	34.1	+ 743.0	2.87099	5.74198	+ 18.36	+ 5.58	+ 23.94	32.1	3.42	32.1	27.36	-.10	27.26 J.F.M. +.45
	47	55.6	36	34.8	+ 682.3	2.83398	5.66796	+ 16.86	+ 4.70	+ 21.56		5.22		26.78	-.10	26.68 -.10
	47	56.5	37	35.1	+ 602.1	2.77967	5.55934	+ 14.88	+ 3.66	+ 18.54		8.90		26.44	-.09	26.35 +.43
	47	58.6	38	42.0	+ 555.1	2.74437	5.48874	+ 13.72	+ 3.11	+ 16.83		10.22		27.05	-.08	26.97 +.19
	47	54.0	47	6.0	+ 111.1	2.04571	4.09142	+ 2.45	+ 0.12	+ 2.87		25.65		28.52	-.02	28.50 +1.72
	47	61.0	48	57.1	- 60.0	1.77815n	3.55630	- 1.48	+ 0.04	- 1.44		27.22		25.78	+.01	25.79 -.99
	m	s	49	25.0	- 87.9	1.94399n	3.88798	- 2.17	+ 0.08	- 2.09		28.97		26.88	+.01	26.89 +.11
	47	57.12	50	31.0	- 153.9	2.18724n	4.37448	- 3.80	+ 0.24	- 3.56		30.12		26.56	+.03	26.59 -.19
			52	31.8	- 274.7	2.43886n	4.87772	- 6.79	+ 0.76	- 6.03		32.70		26.67	+.04	26.71 -.07
			53	5.6	- 308.5	2.48926n	4.97852	- 7.62	+ 0.96	- 6.66		32.68		26.02	+.05	26.07 -.71
														26.78		±.53
														26.81	-.02	±.45
														±0.045		
													32.1	26.79		

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Δδ Δδ Δτ log r 2 log r Red I Red II Circle Reading Sum I+II Corr Circ Read.

λ Ursae Minoris

h	m	s	m	s	s												
19	46	44	32	34.0	+ 92.09	2.964 21	5.938 42	+ 22.76	+ 8.77	-44	30	56.08	+ 31.53	31	27.61	-.15	27.46	-.39
	47	0.0	33	46.3	+ 84.86	2.928 70	5.857 40	+ 20.97	+ 7.28	+00		54.78	+ 28.25		28.03	-.13	27.90	+.05
	47	52.8	35	7.7	+ 76.72	2.884 91	5.769 82	+ 18.96	+ 5.95	+45	31	3.85	+ 24.91		28.46	-.11	28.35	+.50
	48	50.3	36	10.6	+ 70.43	2.847 76	5.695 52	+ 17.41	+ 5.01			7.12	+ 22.42		29.54		29.90	—
	49	45.3							= 37			8.98					S. F. m.	
	50	41.7	37	43.0	+ 61.19	2.786 68	5.573 36	+ 15.12	+ 3.78	-70		8.32	+ 18.90		27.22	-.09	27.13	-.72
	51	38.3	38	44.6	+ 55.23	2.746 60	5.481 20	+ 13.60	+ 3.06	-07		11.18	+ 16.66		27.84	-.08	27.76	-.09
			45	44.0	+ 30.99	2.116 94	4.233 88	+ 3.23	+ 0.17	-48		23.97	+ 3.40		27.37	-.02	27.35	-.50
			46	39.0	+ 75.9	1.880 24	3.760 48	+ 1.88	+ 0.06	-22		25.68	+ 1.94		27.62	-.01	27.61	-.27
	47	56.5	46	18.0	- 23.1	1.363 61$_m$	2.727 22$_m$	- 0.57	+ 0.00	-32		28.08	- 0.57		27.51	+.00	27.51	+.34
	47	58.6	48	18.0	- 63.1	1.800 03$_m$	3.600 06$_m$	- 1.56	+ 0.04	-27		29.07	- 1.52		27.55	+.01	27.56	-.29
	47	52.8	49	47.2	- 112.3	2.050 38$_m$	4.100 76$_m$	- 2.77	+ 0.13	+07		30.52	- 1.64		28.88	+.02	28.90	+1.05
	47	54.7	51	29.0	- 214.1	2.330 62$_m$	4.661 24$_m$	- 5.29	+ 0.46	+69		33.32	- 4.83		28.49	+.03	28.52	+.67
	47	54.2	52	59.2	- 304.3	2.483 30$_m$	4.966 60$_m$	- 7.52	+ 0.94	+33		34.70	- 6.58		28.12	+.04	28.16	+.31
	47	55.1							± 49						"		27.85	-.83
	47	56.2							± 41						27.89	-.04		
	m	s													± 0.37			
	47	54.9																
		54.87																

31 27.85

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λ Ursae Minoris

h	m	s	m	s	s												
19	~~32~~	~~46.0~~	33	5.6	+ 88.48	2.946 85	5.893 70	+ 21.87	+ 7.91		30	69.12	+ 29.78	31	28.90	-.14	28.76	+.61
	—	—	34	34.0	+ 79.64	2.901 13	5.802 26	+ 19.68	+ 6.41		31	2.85	+ 26.09		28.94	-.13	28.81	+.64
	—	—	37	48.9	+ 60.15	2.779 24	5.558 48	+ 14.87	+ 3.65			9.87	+ 18.52		28.39	-.10	28.29	+.14
			47	11.0	+ 39.41	1.595 50	3.191 00	+ 0.97	+ 0.01			26.28	+ 0.98		27.26	-.01	27.25	+.90
	—	—	48	54.0	- 63.6	1.803 46	3.606 92$_m$	- 1.57	+ 0.04			29.87	- 1.63		28.34	+.01	28.35	+.20
	—	—	50	50.7	- 180.3	2.256 08$_m$	4.512 00$_m$	- 4.46	+ 0.33			33.00	- 4.13		28.87	+.03	28.90	+.75
	—	—	51	49.8	- 239.4	2.379 12$_m$	4.758 24$_m$	- 5.92	+ 0.58			32.30	- 5.34		26.96	+.03	26.99	+1.16
			56	3.3	- 492.9	2.692 76$_m$	5.385 52$_m$	- 12.18	+ 2.45			37.48	- 9.73		27.75	+.08	27.83	-.32
47	50.0		47	50.0											"		28.15	
	54.4		48	49.0											28.18	-.03		±.03
	47.9		—	—											±0.58			±.53
	51.9		50	34.0														
	48.8		—	—														
	49.5																	
m	s		55	13.1														
47	58.42		—	—														
			58	56.0														

31 28.15

λ Ursae Minoris Lo. C.

h	m	s	12 m	s	s												
13	10	48.8	48	18.8	+153.19	3.184 23	6.368 46	- 47.90	- 29.92		8	22.78	- 77.82	-51	7 4.96	+.31	5.27	-1.07
	11	35.7	49	32.7	+145.80	3.163 76	6.327 52	- 45.69	- 27.23			18.78	- 72.92	+37	6.86	+.29	6.15	-.14
	12	23.2	51	3.6	+136.71	3.135 80	6.271 60	- 42.84	- 28.94			11.85	- 66.78	-44	5.07	+.27	5.34	-1.00
	13	9.7	13 7	10.5	+ 40.02	2.602 28	5.204 56	- 12.54	- 2.05		7	20.85	- 14.59	+56	6.26	+.08	6.34	-.18
	13	56.3	9	2.6	+ 28.81	2.459 54	4.919 08	- 9.03	- 1.06			15.85	- 10.09	+04 ±43	5.76	+.06	5.82	-.18
	14	46.0	9	59.7	+ 23.10	2.363 61	4.727 22	- 7.24	- 0.68			14.95	- 7.92	-108 ±36	7.03	+.04	7.07	+.20
	15	28.9	11	19.2	+ 16.15	2.180 41	4.360 82	- 4.75	- 0.29			13.80	- 5.04	+64	8.76	+.03	8.79	-.13
	16	16.6	12	48.0	+ 6.27	1.797 27	3.594 54	- 1.96	- 0.05			11.92	- 2.01	+177	9.91	+.01	9.92	+.30
	17	3.1	14	56.0	- 6.53	1.814 91$_m$	3.629 82$_m$	+ 2.04	- 0.05			12.68	- 1.99				10.69	—
	17	52.5	16	0.6	- 12.99	2.113 61$_m$	4.227 22$_m$	+ 4.07	- 0.21			14.78	- 3.86	-132	6.70	+.13	6.83	
13	48	52.5												= 1.37			8.15	
		50.9												±.116	7	6.83		
		54.4																
		49.9																
		51.8																
		48.8																
		49.5																
	13	50.71																

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h	m	s	Δ	log r	2 log r	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ Read.

λ Ursae Minoris

J.F.M

h	m	s	Δ									
2 20	2.39.1	40	29.4	+ 442.9	2.64631	5.29262	+ 10.95	+ 1.98	+ 12.93	31	12.08	31	25.01
	43.1.7	41	10.2	+ 402.1	2.60433	5.20866	+ 9.94	+ 1.63	+ 11.57		13.25		24.82
3 49	6.24.0	42	28.8	+ 323.5	2.50987	5.01974	+ 8.00	+ 1.06	+ 9.06		15.78		24.84
	8.15.7	43	35.0	+ 257.3	2.41044	4.82088	+ 6.36	+ 0.67	+ 7.03		17.70		24.73
		2	43.2	− 890.9	2.94983n	5.89986	− 22.02	+ 8.02	− 14.00		38.45		24.45
19 47	53.7	3	20.8	− 928.5	2.96778n	5.93556	− 22.95	+ 8.71	− 14.24		38.60		24.16
	53.1	4	16.0	− 983.7	2.99286	5.98572	− 24.31	+ 9.78	− 14.53		37.95		23.42
	51.9	5	7.7	− 1035.4	3.01511n	6.03022	− 25.59	+ 10.83	− 14.76		38.35		23.59
	50.4	6	27.4	− 1115.1	3.04731n	6.09462	− 27.56	+ 12.28	− 15.28		38.40		23.12
m	s	7	57.5	− 1205.2	3.08106n	6.16212	− 29.79	+ 14.68	− 15.11		39.02		23.91
47	5.28	9	8.9	− 1276.6	3.10605n	6.21210n	− 31.55	+ 16.47	− 15.08		38.90		23.82
	57.28												

23.78 ±.28

4	30.4		+ 434.9	2.63839	5.27678	+ 10.75	+ 1.91	+ 12.66	31	12.08		24.17
	31.7		+ 394.1	2.59561	5.19122	+ 9.74	+ 1.57	+ 11.31		13.25		±.048
	32.7		+ 315.5	2.49900	4.99800	+ 7.80	+ 1.00	+ 8.80		15.78		
	33.2		+ 249.3	2.39672	4.79344	+ 6.16	+ .63	+ 6.79		17.70		
4	32.90		− 898.9	2.95371n	5.90742n	− 22.22	+ 8.16	− 14.06		38.45		
−16	47.20											
47	44.30											

24.74 − .06
24.56 − .06
24.58 − .05
24.49 − .03
24.39 + .14
24.55 − .01

31 24.54

2468 + .14
2450 − .04
2453 − .01
2446 − .08
2453 − .01
2454
±.06
±.05

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λ Ursae Minoris

J.F.M.

h	m	s	Δ									
19	—	34	45.0	+ 778.3	2.89115	5.78230	+ 19.24	+ 6.12	+ 25.36	31	1.48	31
	—	37	19.5	+ 623.8	2.79505	5.59010	+ 15.42	+ 3.93	+ 19.37		6.62	
	—	38	44.2	+ 539.1	2.73167	5.46334	+ 13.33	+ 2.94	+ 16.27		10.58	
46	46.9	42	33.4	+ 309.9	2.49122	4.98244	+ 7.66	+ 0.97	+ 8.63		19.02	
47	46.7	47	16.8	+ 26.5	1.42325	2.84650	+ 0.65	+ 0.00	+ 0.65		27.15	
48	36.7	48	2.6	− 14.3	1.15534	3.31068n	− 0.35	+ 0.02	− 0.33		27.58	
49	34.4	49	31.6	− 108.3	2.03463n	4.06926n	− 2.68	+ 0.12	− 2.56		29.67	
50	30.0	50	40.5	− 177.2	2.24846n	4.49692n	− 4.38	+ 0.32	− 4.06		31.72	
51	25.0	52	2.5	− 259.2	2.41363n	4.82726n	− 6.41	+ 0.68	− 5.73		32.92	
		53	1.5	− 318.2	2.50270n	5.00540n	− 7.86	+ 1.02	− 6.84		34.15	
47	42.5	55	48.4	− 485.1	2.68583n	5.37166n	− 11.99	+ 2.38	− 9.61		35.75	
	46.7	56	17.3	− 514.0	2.71096n	5.42192n	− 12.70	+ 2.67	− 10.03		36.35	
	41.1	57	19.0	− 575.7	2.76020n	5.52040n	− 14.23	+ 3.35	− 10.88		35.98	
	43.3	59	21.2	− 697.9	2.84379n	5.68758n	− 17.25	+ 4.92	− 12.33		38.35	
	43.4	59	43.0	− 719.7	2.85716n	5.71430n	− 17.79	+ 5.23	− 12.56		38.60	
	42.7	0	40.1	− 776.8	2.89031n	5.78062n	− 19.20	+ 6.10	− 13.10		38.60	

m	s
47	43.3
	43.28

27.03 ±.50

26.59 ±.60

2684	−.13												
25.99	−.10												
26.85	−.08												
27.65	−.05												
29.80	−.03												
27.25	+.03												
27.11	+.02												
27.66	+.03												
27.19	+.04												
27.31	+.05												
26.34	+.06												
26.32	+.08												
25.10	+.09												
24.02	+.11												
25.66	+.13												
25.50	+.13												

26.60
±.60
2666 + .02

31 2668

2671	+ .03
2689	− .79
2677	+ .09
2760	+ 1.02
2780	+ 1.12
2725	+ .57
2713	+ .45
2769	+ 1.01
2723	+ .55
2736	+ .68
2640	− .28
2640	− .28
2519	− 1.49
2613	− .55
2577	− .91
2563	− 1.05
2668	
	±.70
	±.59

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n_α	n_δ	r	log r	2 log r	Red I	Red II	Sum I+II	Circle Reading	Corr Circ Read			

α Ursae Minoris L. C.

h	m	s	t 12 m	s				"	'	"		'						
13	10	40.4	50	38.3	+1381.9	3.14048	6.38096	− 43.30	− 24.47	−1	7.77	8	13.75	7	6.98	+28	6.26	+.72
	11	23.8	51	53.4	+1302.8	3.11488	6.22976	− 40.83	− 21.74		2.57		8.35		5.78	+26	6.04	+.30
	12	8.0	53	12.4	+1223.8	3.08771	6.17542	− 38.35	− 19.18		57.53		2.95		5.42	+24	5.66	−.16
	12	67.6	54	52.8	+1123.4	3.05053	6.10106	− 35.21	− 16.16		54.37	7	56.70		5.33	+22	5.55	−.27
	13	36.0	56	36.1	+1020.1	3.00864	6.01728	− 31.97	− 13.33		45.30		50.67		5.37	+20	5.57	−.25
	14	18.0													5.67		5.82	±.30
	15	1.5													±.23			±.25
	15	48.8																
	16	33.1																

	m	s																
13	34.8		57	35.4	+960.8	2.98263	5.96526	− 30.11	− 11.82	−	41.93	7	48.05		6.12	+19	6.31	+.48
	35.9		58	38.9	+897.3	2.95294	5.90588	− 28.12	− 10.31		38.43		43.27		4.84	+18	5.02	−.81
			0	10.3	+805.9	2.90628	5.81256	− 25.26	− 8.32		33.58		39.37		5.79	+16	5.95	−.16
			1	9.8	+746.4	2.87297	5.74594	− 23.39	− 7.14		30.53		36.25		5.72	+15	5.87	+.04
			2	21.6	+674.6	2.82905	5.65810	− 21.14	− 5.83		26.97		32.52		5.58	+14	5.69	−.14
			3	15.8	+620.4	2.79267	5.58534	− 19.44	− 4.93		24.37		30.85		6.48	+12	6.60	+.71
			9	3.7	+272.5	2.43587	4.87074	− 8.54	− 0.95		9.49		14.82		5.33	+05	5.38	−.45
															5.19		5.83	±.43
															±.35			±.36

h																		
13																		
			10	59.7	+156.5	2.19451	4.38902	− 4.91	− 0.31	−	5.22	7	10.75		5.53	+03	5.56	+.37
			13	13.2	+23.0	1.36178	2.72356	− 0.72	− 0.01	−	0.73		6.05		6.32	+00	6.32	+.13
			16	13.9	−157.7	2.19783	4.39566	+ 4.93	− 9.32	+	4.61		0.42		5.02	−03	4.99	−.20
			18	25.1	−288.9	2.46075	2.92150	+ 9.06	− 1.02	+	8.04		56.92		4.96	−06	4.90	−.29
															5.21		5.19	±.28
															±.21			±.24

			27	23.6	−827.4	2.91772	5.83544	+ 25.93	− 8.77	+	17.16		46.30		3.46	−16	3.30	+.32
			28	26.7	−884.5	2.94670	5.89340	+ 27.72	− 10.52	+	17.20		45.30		3.00	−17	2.83	+.15
			29	6.5	−930.3	2.96862	5.93724	+ 29.15	− 11.09	+	18.06		45.15		3.21	−14	3.07	+.04
			29	52.8	−976.6	2.98972	5.97944	+ 30.61	− 12.22	+	18.39		44.60		2.99	−20	2.79	−.14
			30	47.2	−1031.0	3.01326	6.02652	+ 32.31	− 13.62	+	18.69		44.07		2.76	−21	2.55	+.5
			31	36.9	−1080.7	3.03371	6.06742	+ 33.87	− 14.96	+	18.91		44.75		3.66	−22	3.44	+.46
			32	42.9	−1146.7	3.05945	6.11890	+ 35.94	− 16.84	+	19.10		43.47		2.57	−23	2.34	+.64
			34	6.9	−1230.7	3.09015	6.18030	+ 38.57	− 19.40	+	19.17		44.67		3.78	−25	3.53	+.55
			35	7.5	−1291.3	3.11103	6.22206	+ 40.47	− 21.36	+	19.11		44.00		3.11	−26	2.85	−.13
			36	15.0	−1358.8	3.13316	6.26632	+ 42.68	− 23.65	+	19.03		44.30		3.33	−27	3.06	+.08
			37	4.1	−1407.9	3.14857	6.29714	+ 44.12	− 25.39	+	18.73		44.60		3.33	−28	3.05	+.07
															3.20		2.98	±.29
															±0.24			±.25

J. F. M.

6.26 +.72
6.04 +.30
5.66 +.12
5.55 −.01
5.57 −.23

5.56 +.02
5.32 −.22
4.99 −.35
4.90 −.64

5.54

N. A. R.

6.31 +.222
5.02 −.83
5.95 +1.26
5.84 +1.78
5.69 +1.40
6.60 +2.07
5.88 +1.29

3.80 −.79
2.83 −1.26
3.02 −1.07
2.99 −1.20
2.55 −1.34
3.44 −.65
3.34 −.75
3.03 −.86
2.85 −1.24
3.06 −1.03
3.06 −1.04

4.07

4.58 −.01

7 457

4.09

N. A. R.

J. F. M.

5.54

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h	m	s	T	P	log T	2 log r	Red I	Red II	Sum I+II	Circle Reading	Corr Circ Read

λ Ursae Minoris I.P.M.

h	m	s	m	s	P												
19	—		36	32.1	+ 64.68	2.81079	5.62154	+ 15.99	+ 4.23	+ 20.22	31	8.10	31	28.32	− .10	28.22	+ .44
	—		38	11.4	+ 56.75	2.75397	5.50794	+ 14.03	+ 3.25	+ 17.28		9.85		27.13	.08	27.05	− .73
	—		42	6.7	+ 332.2	2.52140	5.04280	+ 8.21	+ 1.11	+ 9.32		18.87		28.19	27.53 −.05	28.14	+ .36
46	48.8		47	3.0	+ 35.9	1.55509	3.11018	+ 0.89	+ 0.01	+ 0.90		26.55		27.45	+.40 −.00	27.45	− .33
47	35.1		47	52.3	− 13.4	1.12710	2.25420	− 0.33	+ 5.80	− 0.33		28.37		28.04	+.00	28.04	+ .26 +.47 +.40
48	35.1		49	5.7	− 86.8	1.93852	3.87704	− 2.14	+ 0.08	− 2.06		28.90		26.84	+.01	26.85	+ .20
49	26.2		50	50.8	− 191.9	2.28307	4.56614	− 4.74	+ 0.37	− 4.37		30.77		26.40	+.03	26.43	− .12
50	29.3		51	33.0	− 234.1	2.36940	4.73881	− 5.78	+ 0.55	− 5.23		31.62		26.39	+.03	26.42	− .13
51	22.0		52	22.3	− 283.4	2.45240	4.90480	− 7.00	+ 0.81	− 6.19		32.65		26.46	26.50 +.04	26.50	− .05
			54	13.5	− 389.6	2.59616	5.19232	− 9.75	+ 1.57	− 8.18		34.80		26.62	+.16 +.06	26.68	+ .13
47	41.4		54	33.0	− 414.1	2.61711	5.23423	− 10.24	+ 1.73	− 8.51		35.18		26.67	+.06	26.73	+ .18
	35.1		55	24.0	− 466.1	2.66755	5.33510	− 11.49	+ 2.19	− 9.30		35.45		26.15	+.07	26.22	− .33
	39.5															26.60	±.19
	35.1													2705	+.01	26.65	±.16
	42.7												31	2706			
	39.9																
	36.95																

m d 389 47

λ Ursae Minoris L.C. W.K.

h	m	s	m	s	P												
7	42	41.6	24	35.4	+ 1311.2	3.11767	6.23434	− 32.41	− 17.33	− 49.74	25	23.57	24	12.83	+ .21	13.04	+ .85
	—		40	29.1	+ 357.5	2.55328	5.10656	− 8.84	− 1.29	− 10.13	24	23.50		11.71	" + .05	11.76	− .43
44	35.2		42	35.8	+ 230.8	2.36324	4.72648	− 5.70	− 0.54	− 6.24		18.88		12.64	12.21 + .03	12.67	+ .48
	—		44	15.0	+ 131.6	2.11926	4.23852	− 3.25	− 0.17	− 3.42		15.07		11.65	+.01 + .02	11.67	− .52
46	33.6		46	54.4	− 27.8	1.44404	2.88808	+ 0.69	− 0.00	+ 0.69		11.82		12.07	− .00	12.51	+ .32
	—		48	25.6	− 119.0	2.07555	4.15110	+ 2.94	− 0.14	+ 2.80		9.85		12.65	− .02	12.63	+ .44
48	18.8		50	29.6	− 243.0	2.38561	4.67122	+ 6.01	− 0.47	+ 5.54		6.67		12.21	− .03	12.18	− .01
	—		52	11.8	− 345.2	2.53807	5.07614	+ 8.53	− 1.20	+ 7.33		5.42		12.75	12.21 −.05	12.70	+ .51
50	4.7		54	7.7	− 461.1	2.66380	5.32760	+ 11.40	− 2.15	+ 9.25		2.95		12.20	+.29 −.06	12.14	− .05
			56	52.5	− 623.9	2.79511	5.59022	+ 15.42	− 3.93	+ 11.49		0.57		12.08	− .09	11.97	− .22
m	d		58	35.2	− 728.6	2.86249	5.72498	+ 18.01	− 5.36	+ 12.65	23	59.12		11.77	− .11	11.66	− .53
46.	366		1	17.5	− 890.9	2.94982	5.89966	+ 22.02	− 8.02	+ 14.00							
	26.78		5	56.1	− 1170.1	3.06822	6.13644	+ 28.92	− 13.83	+ 15.09		56.42		11.51	− .18	11.33	− .86
														12.21	.00	12.19	±.45
													24	12.21			±.38

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Oct. 18 1876

Td	ns	p	log p	2 log p	Red I	Red II	Sum I+II	Circle Reading	Corr Circ Read

α Ursae Minoris L.C. W.A.K.

h	m	s	m	s	α													
12	10	37.7	51	4.50	+13.093	3.11704	6.23408	− 41.03	− 21.96	− 62.99	8′	10.47	7′	7.48	+.26	7.74		−.15
	11	22.9	52	3.74	+12.429	3.09444	6.18888	− 38.95	− 19.79	− 58.74		6.35		7.61	+.25	7.86		−.03
	12	7.7	53	4.78	+11.86.5	3.07427	6.14854	− 37.18	− 18.03	− 55.21		3.70		8.49	+.24	8.73		+.84
	12	48.3	54	55.1	+11.19.2	3.04891	6.09782	− 35.07	− 14.05	− 51.12	7	59.15		8.13	+.22	8.35		+.46
	13	33.5	55	42.6	+10.71.7	3.03007	6.06014	− 33.59	− 14.71	− 48.30		54.42		6.12	+.21	6.33		−1.56
	14	19.8	56	37.7	+10.16.6	3.00715	6.01430	− 31.86	− 13.24	− 45.10		51.10		6.10	+.20	6.30		−1.54
	15	1.8	57	24.9	+9694	2.98650	5.97300	− 30.38	− 12.04	− 42.42		49.92		7.50	+.19	7.69		−.20
	15	46.5	58	12.6	+9.21.7	2.96459	5.92918	− 28.88	− 10.88	− 39.76		48.72		8.96	+.18	9.14		+1.25
	16	30.4	59	18.8	+8.55.5	2.93223	5.86444	− 26.81	− 9.38	− 36.19		44.90		8.71	+.17	8.88		+.99
	m	s												7.68		7.89		±.83
	13	34.31												±.71				±.70
			27	23.3	−8.29.0	2.91855	5.83710	+ 25.98	− 8.80	+ 17.18		47.80		4.98	−.16	4.82		−.30
			28	31.4	−8.97.1	2.95284	5.90568	+ 28.11	− 10.31	+ 17.80		48.12		5.92	−.18	5.74		+.62
			29	19.4	−9.43.1	2.97548	5.95096	+ 29.62	− 11.44	+ 18.18		47.28		5.46	−.19	5.27		+.15
			30	10.7	−9.96.4	2.99843	5.99686	+ 31.23	− 12.72	+ 18.51		46.75		5.26	−.20	5.06		−.06
			31	1.8	−10.47.5	3.02020	6.04040	+ 32.83	− 14.06	+ 18.76		48.10		6.86	−.21	6.65		+1.53
			31	46.1	−10.91.8	3.03814	6.07628	+ 34.21	− 15.27	+ 18.94		46.58		5.52	−.22	5.30		+.18
			32	32.8	−11.38.5	3.05633	6.11266	+ 35.68	− 16.60	+ 19.08		46.12		5.20	−.23	4.97		−.15
			33	41.3	−12.07.0	3.08171	6.16342	+ 37.83	− 18.66	+ 19.17		45.85		5.02	−.24	4.78		−.34
			34	31.6	−12.57.3	3.09944	6.19888	+ 39.40	− 20.25	+ 19.15		45.52		4.67	−.25	4.42		−.70
			35	15.1	−13.00.8	3.11421	6.22842	+ 40.77	− 21.67	+ 19.10		45.32		4.42	−.26	4.16		−.96
														5.34		5.12		±.53
														±.44				±.45

J. Y. Dec.

0	59.7	+7.54.6	2.87772	5.75544	+	2.364	−	7.79	−	3.083	7	40.28		9.35				
1	58.0	+7.04.3	2.84776	5.69552	+	22.07	−	6.35	−	2.842		36.70		8.28	+.14	8.42		+.97
2	35.0	+6.59.3	2.81908	5.63816	+	20.66	−	5.56	−	2.622		34.07		7.85	+.13	7.98		+.53
3	44.4	+5.89.9	2.77078	5.54156	+	18.49	−	4.46	−	2.295		29.87		6.52	+.12	7.04		−.41
4	33.2	+5.51.1	2.74123	5.48246	+	17.27	−	3.89	−	2.116		27.17		8.01	+.11	8.12		+.67
5	44.9	+4.69.4	2.67154	5.34308	+	14.71	−	2.82	−	1.753		25.52		7.99	+.09	8.08		+.63
6	47.7	+4.06.6	2.60917	5.21834	+	12.74	−	2.12	−	1.486		21.70		6.84	+.08	6.92		−.53
8	4.2	+3.30.1	2.51865	5.03730	+	10.35	−	1.40	−	1.178		18.32		6.57	+.07	6.64		−.81
9	9.7	+2.64.6	2.42259	4.84518	+	8.29	−	0.90	−	0.919		15.85		6.66	+.05	6.71		−.66
9	31.9	+2.42.4	2.38483	4.76906	+	7.60	−	0.75	−	0.855		15.85		7.60	+.05	7.65		+.20
10	55.6	+2.18.7	2.33988	4.67970	+	6.85	−	0.61	−	0.746		11.05		3.89				
11	40.7	+1.03.6	2.01586	4.03072	+	3.25	−	0.14	−	0.388		11.20		7.98	+.02	8.01		+.56
13	10.6	+0.23.7	1.37475	2.74950	+	0.74	−	0.07	−	0.081		7.40		6.17	+.02	6.19		−.86
14	2.2	−0.27.9	1.44560	2.89120	+	0.87	−	0.01	+	0.086		6.25		7.11	.00	7.11		−.34
15	9.8	−0.95.5	1.98000	3.96000	+	2.99	−	0.12	+	2.87		4.70		3.57	.02	3.55		+.10
16	9.7	−1.55.4	2.19145	4.38290	+	4.87	−	0.30	+	4.56		1.25		5.81	.03	5.78		−.13
17	37.0	−2.42.7	2.38504	4.77004	+	7.61	−	0.75	+	6.86	6	54.30		6.16	−.05	6.11		+.26
18	51.6	−3.17.3	2.50147	5.00294	+	9.99	−	1.29	+	8.65		57.00		5.60	−.16	5.44		−.32
20	10.1	−3.95.8	2.59798	5.19496	+	12.40	−	2.01	+	10.39		56.25		6.64	−.08	6.56		+.65
22	0.7	−5.06.4	2.70449	5.40898	+	15.87	−	3.28	+	12.59		58.02		5.61	−.10	5.51		−.40
22	39.7	−5.45.4	2.73672	5.47344	+	17.09	−	3.81	+	13.28		53.22		6.80	−.11	6.69		+.48
23	28.0	−5.88.7	2.76989	5.53978	+	18.45	−	4.44	+	14.01		52.35		6.36	−.12	6.24		+.23
24	19.6	−6.45.3	2.80976	5.61952	+	20.22	−	5.33	+	14.89		51.72		4.61	−.13	4.48		+.57
25	16.2	−7.01.9	2.84628	5.69256	+	21.99	−	6.31	+	15.68		50.40		6.08	−.14	5.94		+.03
26	9.7	−7.53.4	2.87703	5.75406	+	22.61	−	7.27	+	16.34		48.35		4.69	−.15	4.54		−.37
														0.76		6.78		±.47
														±.63		5.91		±.40
														6.84				
														6.83	−.01			
											7	6.83						

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Oct. 19. 1876

h m s	m	s	s	log r	2 log r	Red I	Red II	Sum I+II	Circle Corr Reading Circ Read

α Ursae Minoris U. A. R.

h m s	m	s	s										
19 —	21	48.8	+ 15.09	3.18480	6.36960	+ 37.83	+ 23.66	+ 61.49	30	24.55	31	26.04	− .24
—	24	33.1	+ 13.61	3.13548	6.27096	+ 33.77	+ 18.86	+ 52.63		34.62		27.25	− .22
—	26	0.7	+ 12.85	3.10670	6.21340	+ 31.60	+ 16.51	+ 48.11		38.28		26.39	− .20
—	27	33.9	+ 11.85.3	3.07383	6.14766	+ 29.90	+ 14.20	+ 43.51		42.10		25.61	− .19
46	49.3	28	51.0	+ 11.02.2	3.04226	6.08452	+ 27.24	+ 12.28	+ 39.52		46.75		26.27	− .17
47	41.7	30	56.5	+ 9.82.7	2.99242	5.98484	+ 24.29	+ 9.76	+ 34.05		51.48		25.53	− .16
48	38.2	32	38.7	+ 8.80.5	2.94473	5.88946	+ 21.76	+ 7.83	+ 29.59		56.50		26.09	− .14
49	36.4	34	5.7	+ 7.93.6	2.89955	5.79910	+ 19.61	+ 6.36	+ 25.97		59.05		25.02	− .13
50	26.6	35	42.6	+ 6.96.6	2.84298	5.68596	+ 14.22	+ 4.90	+ 22.22		64.68		26.70	− .11
51	26.1	37	31.3	+ 5.87.9	2.76930	5.53860	+ 14.53	+ 3.49	+ 18.02		62.40		42	

47	44.9												
	41.7												
	42.6												
	45.3	59	36.4	− 7.37.2	2.86759 m	5.93518 m	− 18.22	+ 5.49	− 12.73	31	38.05	31	25.32
	40.0	0	56.1	− 8.16.9	2.91217 m	5.82434 m	− 20.19	+ 6.74	− 13.45		41.25		27.80
	44.7	4	21.8	− 10.22.6	3.00971 m	6.01942 m	− 25.28	+ 10.57	− 14.71		39.70		24.99
	44.7	5	34.2	− 10.95.0	3.03941 m	6.07882 m	− 27.07	+ 12.11	− 14.96		37.65		24.69
m	47.1	6	35.6	− 11.56.4	3.06211 m	6.12422 m	− 28.52	+ 13.39	− 15.13		39.40		24.27
	49.20	7	33.7	− 12.14.5	3.08440 m	6.16880 m	− 30.02	+ 14.90	− 15.12		40.20		25.08
		27	4.3	− 23.85.1	3.37749 m	6.75498 m	− 58.95	+ 57.47	− 1.48		26.28		24.80

j. J. M.

	47	17.9	+ 1.3	0.11394	0.22788	+ 0.03	+ 0.00	+ 0.03	31	25.60	31	25.63	− .03
	48	47.0	− 87.8	1.94349 m	3.88698 m	− 2.17	+ 0.08	− 2.09		28.15		25.96	+ .01
	50	0.3	− 161.1	2.20710 m	4.41420 m	− 4.04	+ 0.26	− 3.78		29.60		25.82	+ .02
	50	48.0	− 208.8	2.31973 m	4.63946 m	− 5.16	+ 0.44	− 4.72		29.95		25.23	+ .03
	52	13.5	− 294.3	2.46849 m	4.93758 m	− 7.27	+ 0.87	− 6.40		32.87		26.47	+ .05
	54	48.7	− 449.5	2.65273 m	5.30546 m	− 11.11	+ 2.04	− 9.07		34.15		25.08	+ .06
	55	40.9	− 501.7	2.70044 m	5.40088 m	− 12.40	+ 2.54	− 9.86		35.48		26.62	+ .08
	56	47.4	− 568.2	2.75450 m	5.50906 m	− 14.04	+ 3.26	− 10.78		36.18		25.40	+ .09
												25.90	− .17
											31	25.83	

New constant adopted from this date. 5° 6′ 31″

Oct 24 1876

α Ursae Minoris L. C. J. F. M.

h m s	m	s	s	log r	2 log r	Red I	Red II	Sum I+II	Circle Corr Reading Circ Read
13 —	0	44.0	+ 762.2	2.88207	5.76414	− 23.95	− 7.42	− 31.37	7 37.62 7 6.25 + .22
—	2	24.1	+ 662.1	2.82092	5.64184	− 20.81	− 5.60	− 26.41	34.17 7.76 + .20
—	6	42.0	+ 404.2	2.60660	5.21320	− 12.70	− 2.09	− 14.79	22.10 7.31 + .11
—	8	6.0	+ 320.2	2.50542	5.01084	− 10.06	− 1.31	− 11.37	18.22 6.85 + .08
—	16	9.6	− 163.4	2.21325 m	4.42650	+ 5.13	− 0.34	+ 4.79	1.67 6.46 − .06
—	17	18.9	− 232.7	2.36680 m	4.73360 m	+ 7.31	− 0.69	+ 6.62	0.10 6.72 − .07
—	18	32.8	− 306.6	2.48657 m	4.97314 m	+ 9.63	− 1.20	+ 8.43	6 59.77 6 6.20 − .08
—	19	40.6	− 370.4	2.56867 m	5.13734 m	+ 11.63	− 1.75	+ 9.88	56.40 6.28 − .10
16	22.0	20	55.0	− 448.8	2.65205 m	5.30410 m	+ 14.10	− 2.57	+ 11.53	55.45 6.98 − .12
		21	57.4	− 511.2	2.70859 m	5.41718 m	+ 16.06	− 3.34	+ 12.72	54.10 6.82 − .14
19	15.2	23	29.7	− 603.5	2.78068 m	5.56136 m	+ 18.96	− 4.65	+ 14.31	52.25 6.56 − .16
20	44.5									6.74 − .01
22	10.8									7 6.73

13	27.0												
	25.1												
	26.9												
	25.7												
m	s												
13.	26.2												
	26.18												

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Oct 28 1876

m δ	p S	p	log p	2 log p	Red I	Red II	Sum I+II	Circle Reading	Corr Circ Red.

α Ursae Minoris L.C.

h	m	s	m	s	α											
13	10	32.0	3	15.0	+ 61.42	2.78831	5.76662	− 19.30	− 7.46	− 26.76	7	35.95	7	9.19	+.22	941	− 1.93
	11	17.8	6	26.3	+ 42.29	2.62624	5.25248	− 13.29	− 2.28	− 15.57		28.00		12.43	+.15	12.58	+ 1.24
	12	3.3	8	17.0	+ 31.22	2.49443	4.98886	− 9.81	− 1.24	− 11.05		23.05		12.00	+.11	12.11	+ .77
	12	47.2	16	40.7	− 19.15	2.28217	4.56434	+ 6.02	− 0.47	+ 5.55		6.12		11.67	−.07	11.60	+ .26
	13	28.6	18	18.6	− 28.94	2.46150	4.92300	+ 9.09	− 1.07	+ 8.02		4.70		12.72	−.11	12.61	+ 1.27
	14	14.5	21	23.9	− 47.47	2.67642	5.35284	+ 14.92	− 2.88	+ 12.04	6	59.52		11.56	−.18	11.38	+ .04
	14	54.9	22	54.7	− 56.55	2.75243	5.50486	+ 17.77	− 4.09	+ 13.68		57.32		11.00	−.20	10.80	− .54
	15	40.7	24	36.5	− 66.73	2.82432	5.64864	+ 20.97	− 5.69	+ 15.28		55.95		11.23	−.24	10.99	− .35
	16	24.3	26	16.5	− 76.73	2.88497	5.76994	+ 24.11	− 7.52	+ 16.59		54.32		10.91	−.28	10.63	− .71
			27	40.1	− 85.09	2.92988	5.85976	+ 26.74	− 9.25	+ 17.49		54.15		11.64	−.31	11.33	− .01
	13	29.200												10.41	−.09	11.34	±.75
													7	11.35			±.63

Oct. 29 - 1876

λ Ursae Minoris.

h	m	s	m	s	α											
14	—		30	58.3	+ 98.09	2.99162	5.98324	+ 24.33	+ 9.72	+ 34.05	30	52.87	31	26.92	−.27	2665	+ 1.12
	—		34	39.8	+ 76.99	2.88047	5.76094	+ 18.86	+ 5.32	+ 24.18		59.05		23.73	−.20	2353	− 2.00
	—		35	13.4	+ 72.58	2.84082	5.72164	+ 18.03	+ 5.32	+ 23.35	31	2.22		25.57	−.19	2538	− .15
	—		36	43.4	+ 62.98	2.79920	5.59840	+ 15.64	+ 4.00	+ 19.64		6.40		26.04	−.17	2587	+ .34
	—		38	22.9	+ 53.63	2.72941	5.45882	+ 12.33	+ 2.90	+ 16.23		10.05		26.28	−.14	2614	+ .01
48	14.5		56	22.1	− 54.29	2.73472	5.46944	− 12.48	+ 2.98	− 10.50		36.12		25.62	+.15	2577	+ .24
49	9.5		57	48.9	− 62.97	2.79913	5.59826	− 15.64	+ 4.00	− 11.64		37.02		25.38	+.17	2555	+ .02
50	6.9		58	58.5	− 64.93	2.81466	5.62932	− 17.37	+ 4.94	− 12.43		37.45		25.02	+.20	2522	− .31
51	0.8		59	55.2	− 75.60	2.87852	5.75704	− 18.78	+ 5.77	− 13.01		38.55		25.54	+.21	2575	+ .22
			0	58.3	− 81.91	2.91334	5.82668	− 20.39	+ 6.78	− 13.61		38.87		25.26	+.22	2548	− .05
																2553	
47	18.9													2554	0.0		±.53
	18.8																±.45
	20.3												31	2554			
	18.7																
47	19.175																

Oct. 29. 1876. Morning

λ Ursae Minoris. L.C.

h	m	s	m	s	δ											
7	43	26.5	32	36.1	+ 810.6	2.90881	5.81762	−.2004	− .664	− 26.68	24	42.80	24	16.12	+.13	1625	+ 1.47
	43	22.1	35	41.9	+ 624.8	2.79574	5.59148	−15.44	− 3.94	− 19.38		34.07		14.69	+.10	1479	+ .01
	44	16.1	37	38.3	+ 508.4	2.70621	5.41242	−12.57	− 2.61	− 15.18		29.80		14.62	+.08	1470	− .68
	45	15.0	39	34.9	+ 391.8	2.59306	5.18612	− 9.68	− 1.55	− 11.23		25.37		14.14	+.06	1420	− .58
	46	5.4	41	14.7	+ 292.0	2.46538	4.93076	− 7.22	− 0.86	− 8.08		21.97		13.89	+.05	1394	− .84
	47	1.9	42	59.0												14.78	
	47	57.4	44	8.0										1469	+.04		±.66
	48	50.0	50	44.7									24	14.77			±.56
	49	45.6	52	19.9													
	46	6.667	53	56.0													
			55	43.0													
			59	18.1													
8			1	4.7													
			2	42.1													
			4	18.7													
			6	2.8													
			7	47.0													
			10	49.4													
			12	34.1													
			14	10.5													
			17	21.6													
			18	48.4													
			20	17.4													
			21	46.6													

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Td τ S τ log τ 2 log τ Red I Red II Sum I+II Circle Readings Corr. Circle Read

Oct. 30. 1876 λ Ursae Min. 19h 49m J. F. M. [Morning]

h m s	m	s	s'												
19 42 23.0	25	59.0	+ 1204.7	3.08088	6.16176	+ 29.93	+ 14.66	+ 44.59	30	41.07	31	25.66	− .33	25.33	− .105
43 16.5	26	3.6	+ 1200.1	3.07922	6.15844	+ 29.81	+ 14.55	+ 44.36		43.75		28.11	− .33	27.78	+ .140
44 10.2	28	45.7	+ 1038.0	3.01620	6.03240	+ 25.79	+ 10.88	+ 36.67		49.25		25.92	− .29	25.63	− .75
45 11.2	30	29.2	+ 934.5	2.97058	5.94116	+ 23.21	+ 8.82	+ 32.03		54.57		26.60	− .26	26.34	− .04
46 6.6	31	24.8	+ 876.9	2.94295	5.88590	+ 21.78	+ 7.77	+ 29.55		56.47		26.02	− .24	25.78	− .60
46 56.8	32	20.5	+ 823.2	2.91551	5.83102	+ 20.45	+ 6.85	+ 27.30		58.35		25.65	− .22	25.43	− .95
47 37.0	33	27.4	+ 756.3	2.87869	5.75738	+ 18.79	+ 5.78	+ 24.57	31	3.55		28.12	− .20	27.92	+ 1.54
48 52.8	34	36.7	+ 687.0	2.83696	5.67392	+ 17.07	+ 4.77	+ 21.84		4.10		25.94	− .18	25.76	− .62
49 45.7	36	23.9	+ 577.8	2.76178	5.52356	+ 14.35	+ 3.37	+ 17.72		8.25		25.97	− .16	25.81	− .57
	37	21.8	+ 522.9	2.71842	5.43684	+ 12.99	+ 2.76	+ 15.75		10.52		26.27	− .14	26.13	− .25
46 36.9	38	44.4	+ 442.3	2.64572	5.29144	+ 10.98	+ 1.98	+ 12.96		13.65		26.61	− .11	26.50	+ .12
	39	39.8	+ 383.9	2.58422	5.16844	+ 9.54	+ 1.49	+ 11.03		15.85		26.88	− .10	26.78	+ .40
	40	44.5	+ 319.2	2.50406	5.00812	+ 7.93	+ 1.03	+ 8.96		17.72		26.68	− .08	26.60	+ .22
	41	37.8	+ 251.9	2.40123	4.80246	+ 6.26	+ 0.64	+ 6.90		19.82		26.72	− .07	26.65	+ .27
	43	44.3	+ 139.4	2.14426	4.28852	+ 3.46	+ 0.20	+ 3.66		23.35		27.01	− .03	26.98	+ .60
	45	9.2	+ 54.5	1.73640	3.47280	+ 1.35	+ 0.03	+ 1.38		25.32		26.70	− .01	26.69	+ .31
	46	28.8	− 25.1	1.39967	2.79934	− 0.62	+ 0.01	− 0.61		27.27		26.66	+ .00	26.66	+ .28
	48	7.6	− 123.9	2.09307	4.18614	− 3.08	+ 0.15	− 2.93		28.97		26.04	+ .03	26.07	− .31
	49	18.0	− 194.3	2.28847	4.57694	− 4.83	+ 0.38	− 4.45		31.30		26.85	+ .06	26.91	+ .53
	50	44.5	− 280.8	2.44840	4.89680	− 6.97	+ 0.80	− 6.17		31.95		25.78	+ .08	25.86	− .52
	52	49.8	− 406.1	2.60863	5.21726	− 10.09	+ 1.67	− 8.42		34.65		24.23	+ .11	24.34	− .04
	54	8.9	− 485.2	2.68592	5.37184	− 12.05	+ 2.38	− 9.67		36.17		26.50	+ .13	26.63	+ .25
	56	1.0	− 597.3	2.77619	5.55238	− 14.84	+ 3.60	− 11.24		37.07		25.83	+ .15	25.98	− .40
	57	17.6	− 673.9	2.82860	5.65720	− 16.74	+ 4.59	− 12.15		38.60		26.45	+ .18	26.63	+ .25
	58	37.6	− 753.9	2.87731	5.75462	− 18.73	+ 5.74	− 12.99		39.00		26.01	+ .21	26.22	− .16
	0	16.1	− 852.4	2.93064	5.86128	− 21.17	+ 7.34	− 13.83		40.47		26.64	+ .24	26.88	− .17
	1	8.9	− 905.2	2.95674	5.91348	− 22.48	+ 8.28	− 14.20		40.82		26.62	+ .25	26.87	− .18
	5	22.2	− 1158.5	3.06390	6.12780	− 28.78	+ 13.56	− 15.22		41.73		26.50	+ .32	26.82	− .123
	6	34.8	− 1231.1	3.09029	6.18058	− 30.68	+ 15.31	− 15.37		42.22		26.85	+ .34	27.19	− .86
	7	44.1	− 1300.4	3.11408	6.22816	− 32.30	+ 17.08	− 15.22		41.22		26.00	+ .36	26.36	− .169
	9	2.3	− 1378.6	3.13944	6.27888	− 34.24	+ 19.20	− 15.04		42.17		27.13	+ .37	27.50	− .55
	13	16.2	− 1632.5	3.21285	6.42570	− 40.55	+ 26.92	− 13.63		41.65		28.02	+ .44	28.46	+ .41
	14	22.6	− 1698.9	3.23017	6.46034	− 42.20	+ 29.16	− 13.04		41.62		28.58	+ .48	29.06	+ 1.01
	15	41.0	− 1777.3	3.24976	6.49952	− 44.15	+ 31.91	− 12.24		40.67		28.43	+ .51	28.94	+ .89
	16	53.1	− 1849.4	3.26703	6.53406	− 45.94	+ 34.55	− 11.39		38.75		27.36	+ .52	27.88	− .17
	18	3.0	− 1979.3	3.29651	6.59302	− 49.17	+ 39.57	− 9.60		36.65		29.05	+ .54	29.59	+ 1.54
	19	10.1	− 1986.4	3.29807	6.59614	− 49.34	+ 39.86	− 9.48		37.70		28.22	+ .55	28.77	+ .72
	20	13.4	− 2049.7	3.31167	6.62338	− 50.91	+ 41.95	− 8.96		36.65		27.69	+ .56	28.25	+ .20
	20	37.5	− 2093.8	3.32094	6.64188	− 52.01	+ 44.28	− 7.73		35.90		28.17	+ .57	28.74	+ .69
	22	58.8	− 2215.1	3.34539	6.69078	− 55.02	+ 49.56	− 5.46		34.02		28.56	+ .60	29.16	+ .111
	23	31.0	− 2247.3	3.35166	6.70332	− 55.82	+ 51.01	− 4.81		32.50		27.69	+ .61	28.30	+ .25
												26.90	+ .13	27.03	± .88
											31	2703		28.05	± .74

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π_2 T' T log T 2 log T Red I Red II Sum I + II Circle Readings Corr. Circ. Red.

Nov. 1 - 1876 α Ursae Min. - Lo. Co. Morning J. F. M.

h	m	s	m	s	s			"	"	"	'	"	'	"		
13	10	21.0	8	38.8	+ 27.80	2.44404	4.88808	− 8.74	− 0.99	− 9.73	7	21.15	7	11.42 + .10	1152	+.93
	11	5.0	10	28.0	+ 16.88	2.22737	4.45474	− 5.30	− 0.36	− 5.66		15.98		10.32 + .07	1039	+.20
	11	51.2	10	[39.0]								~~14.45~~				
	12	33.3	10	50.0	+ 32.1	1.50650	3.01300	− 1.01	− 0.01	− 1.02		11.45		10.43 + .01	1044	−.15
	13	19.3	11	43.0	− 24.5	1.38917$_n$	2.77834	+ 0.77	− 0.01	+ 0.76		10.21		10.74 − .01	1075	+.16
	13	56.9	12	44.7	− 80.8	1.90741$_n$	3.81482	+ 2.54	− 0.08	+ 2.46		7.35		9.81 − .02	979	−.30
	14	43.6	13	41.3	− 156.6	2.19479$_n$	4.38958$_n$	+ 4.92	− 0.31	+ 4.61		5.52		10.13 − .05	1008	−.57
	15	26.1	14	37.6	− 213.9	2.32818$_n$	4.65636$_n$	+ 6.69	− 0.58	+ 6.11	6	5.15		11.26 − .07	1119	+.60
	16	14.8	15	53.4											1059	
			16	49.7										10.59		±.52
13	16	78											7	1059		±.44

Nov. 2 - 1876 λ Urs. Min. 19h 49m J. F. M.

h	m	s	m	s												
20	2	22.3	2	39.4	− 90.58	2.95703	5.91406	−22.39	+ 8.29	−14.10	31	38.55	31	24.45 + .25	2470	+.58
	4	15.4	[3	(23.3)]	− 100.80	3.00346	6.00692	−24.91	+ 10.27	−14.64		38.90		24.26 + .28	2454	+.42
	6	4.1	4	21.6	− 106.33	3.02666	6.05332	−26.28	+ 11.42	−14.86		37.70		22.84 + .30	2314	−.98
	7	34.0	5	16.9	− 113.34	3.05438	6.10876	−28.01	+ 12.98	−15.03		38.68		23.65 + .32	2397	−.15
			6	27.0	− 127.84	3.10667	6.21334	−31.60	+ 16.51	−15.09		40.18		25.09 + .34	2543	+.131
			8	52.0	− 128.98	3.11052	6.22104	−31.88	+ 16.81	−15.07		37.68		22.61 + .35	2296	−.116
19	47	33.6	9	3.4											24.12	±.84
		35.6												23.82 + .31		
		33.2											31	24.13		±.71
		32.0														
	47	33.60														

Nov. 4 - 1876 λ Ursae Min. 19h 49m J. F. M.

h	m	s	m	s												
20	~~3~~	~~54.4~~	3	5.96	− 99.35	2.99717$_n$	5.99434	− 24.68	+ 9.97	− 14.71	31	40.20	31	25.49 + .28	2577	−.17
	4	3.6	5	3.5	− 105.74	3.02424	6.04848	− 26.26	+ 11.29	− 14.97		40.80		25.83 + .30	2613	+.17
	5	57.7	6	22.7	− 113.66	3.05561	6.11122	− 28.23	+ 13.05	− 15.18		41.20		26.04 + .32	2634	+.40
	7	49.7	7	31.7	− 120.56	3.08120$_n$	6.16240$_n$	− 29.95	+ 14.68	− 15.27		40.62		25.35 + .34	2569	+.25
			8	39.6	− 129.35	3.10500$_n$	6.21000$_n$	− 31.63	+ 16.28	− 15.25		40.68		25.43 + .35	2578	−.16
															25.94	
	47	23.8												25.62 + .32		±.26
		26.8											31	25.94		±.22
		27.7														
	47	26.067														

Nov. 5 1876 λ Ursae Min. 19h 49m J. F. M.

h	m	s	m	s												
20	5	55.0	4	43.6	− 103.92	3.01670$_n$	6.03340	− 25.81	+ 10.91	− 14.90	31	43.12	31	28.22 + .30	2852	−.40
	7	46.8	5	48.8	− 110.44	3.04313$_n$	6.08626	− 27.43	+ 12.22	− 15.11		43.72		28.61 + .31	2892	+.00
			6	59.7	− 117.53	3.07015$_n$	6.14030	− 29.19	+ 13.95	− 15.24		44.40		29.16 + .33	2949	+.57
			8	17.8	− 145.34	3.09809$_n$	6.19618$_n$	− 31.14	+ 15.87	− 15.27		43.68		28.41 + .35	2876	−.16
															28.92	
24	47	24.1												28.60 + .32		±.32
		24.8											31	28.92		±.27
	47	24.450														

Nov. 12 1876 Polaris Lo. Co. Morning 18h 12m J. F. M.

h	m	s	m	s												
13	14	3.0	13	32.7	− 16.3	1.21219$_n$	2.42438	+ 0.51	− 0.00	+ 0.51	7	17.92	7	18.43 + .00	1843	+.77
	14	42.2	14	32.7	− 76.3	1.88252$_n$	3.76504$_n$	+ 2.40	− 0.07	+ 2.33		15.32		17.65 + .02	1763	−.03
	15	26.7	15	54.0	− 157.6	2.19756$_n$	4.39512$_n$	+ 4.95	− 0.32	+ 4.63		13.18		17.81 + .05	1776	+.10
	16	11.4	19	5.8	− 349.4	2.54332$_n$	5.08664$_n$	+ 10.98	− 1.56	+ 9.42		8.00		17.42 + .12	1730	−.36
			20	25	− 406.1	2.60863$_n$	5.21726$_n$	+ 12.76	− 2.11	+ 10.65		6.68		17.33 + .14	1719	−.47
															1766	
18	13	19.2												17.73 + .06		±.38
		14.7											7	17.67		±.22
		18.4														
		16.4														
13		16.425														

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	T	S	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Reading	Corr Circle Read.

Dec. 4. 1876 ♌ Ursae Min. Lo. C. W. A. Ro.

h	m	s	m	s																
1	13	11	55.4	7	45.5	+ 337.1	2.52776	5.05552	− .1059	− .145	−.1204	7	43.82	7	31.78	+.11	38.9	+.85		
15147	12	32.0		9	50.5	+ 212.1	2.32654	4.65308	− .666	− 0.58	− 7.24		39.58		32.34	+.27	34.1	+.37		
14.06	13	23.5		10	53.0	+ 149.6	2.17493	4.34986	− .470	− 0.29	− 4.99		37.45		32.46	+.04	33.50	+.46		
51514	14	5.6		21	58.1	− 512.5	2.70969m	5.41938	+ .1610	− .336	+ 12.74		17.80		30.54	−.18	30.36	−.68		
14.02	14	54.0		24	16.9	− 654.3	2.81578m	5.63156	+.2056	− .547	+ 15.09		14.78		29.87	−.22	29.65	−.141		
14.26	16	17.3		25	32.6	− 730.1	2.86332m	5.72664	+.2294	− .681	+ 16.13		13.56		29.68	+.27	29.95	−.163		
51.74	17	38															31.04	±1.35		
5633	4	52.4													31.11	−.08		±1.14		
	14	50.52												7	31.03					
	13	27.56																		

Dec. 5. 1876 Polaris 1h 12m J. F. M.

h	m	s	m	s																
1	10	42.3	8	34.6	+ 303.6	2.48230	4.96460	+ .954	+ 1.18	+ 10.72	48	7.52	48	18.24	−.11	18.13	+.66		
	11	22.6	10	2.3	+ 215.9	2.33425	4.66850	+ .678	+ 0.59	+ 7.37		10.22		17.59	−.07	17.52	+.05		
	12	9.2	11	29.3	+ 68.9	1.83822	3.67644	+ .216	+ 0.06	+ 2.22		13.85		16.07	−.03	16.04	−.143		
	12	53.1	12	49.4	+ 48.8	1.68842	3.37684	+ .153	+ 0.03	+ 1.56		16.00		17.56	−.02	17.54	+.07		
	13	40.2	14	3.2	− 25.0	1.39794	2.79588	− .079	+ 0.01	− 0.78		18.75		17.97	+.01	17.98	+.51		
	14	21.0	14	51.6	− 73.4	1.86570m	3.73140m	− .231	+ 0.07	− 2.24		19.92		17.68	+.03	17.71	+.24		
	15	7.6	16	13.0	− 154.8	2.18977m	4.37954m	− .486	+ 0.31	− 4.55		21.87		17.32	+.05	17.37	−.10		
	15	50.3	17	54.3	− 256.1	2.40841m	4.81682m	− .805	+ 0.84	− 7.21		24.60		17.39	+.08	17.47	+.00		
	16	34.7															17.47	±.41		
															17.48	−.01		±.35		
13	38.56													48	17.47					

Dec. 5. 1876 ♌ Ursae Min. Lo. C. Morning W. A. Ro.

h	m	s	m	s																
13	10	35.7	7	49.5	+ 299.2	2.47596	4.95192	− .940	− 1.14	−.1054	7	38.95	7	28.41	+.11	28.52	+.19		
31.77	11	16.0		9	25.8	+ 202.9	2.30728	4.61456	− .638	− 0.53	− 6.91		35.52		28.61	+.07	28.68	+.35		
28.20																				
33.14	12	5.9		12	57.1	− 84	0.92428m	1.84856	+ .026	− .080	+ 0.26		28.10		28.36	−.00	28.36	+.03		
30.62	12	46.6		21	7.0	− 498.3	2.69749m	5.39498	+ .1566	− .317	+ 12.49		16.48		28.97	−.18	28.79	+.46		
34.10	13	34.1		22	19.0	− 570.3	2.75610m	5.51220	+.1792	− .415	+ 13.77		14.25		28.02	−.20	27.82	−.51		
34.36	14	18.0		23	33.8	− 645.1	2.80963m	5.61926	+.2027	− .532	+1495		13.08		28.03	−.23	27.80	−.53		
33.36	15	4.4															28.33	±.38		
33.84	15	45.5													28.40	−.07		±.32		
														7	28.33					
	13	32.84																		
	−	48.08																		
	12	48.76																		

Dec. 6. 1876 Polaris 1h 12m J. F. M.

h	m	s	m	s																
1	10	38.8	8	37.8	+ 298.7	2.47524	4.95048	+ .939	+ 1.14	+ 10.53	48	7.22	48	17.75	−.11	17.64	+.40		
	11	24.8	9	21.9	+ 254.6	2.40586	4.81172	+ .800	+ 0.83	+ 8.83		8.50		16.83	−.09	16.74	+.80		
	12	10.5	10	30.6	+ 185.9	2.26928	4.53856	+ .584	+ 0.44	+ 6.28		12.28		18.56	−.06	18.50	+.126		
	12	54.5	13	7.8	+ 28.7	1.45788	2.91576	+ .090	+ 0.01	+ 0.91		15.22		16.13	−.01	16.12	−.92		
	13	34.4	14	28.7	− 522	1.71767m	3.43534m	− .164	+ 0.03	− 1.61		19.02		17.41	+.02	17.43	+.19		
	14	21.9	15	47.2	− 130.7	2.11628m	4.23256m	− .411	+ 0.22	− 3.89		21.28		17.39	+.05	17.44	+.30		
	15	2.8	16	49.2	− 192.7	2.28488m	4.56976m	− .605	+ 0.47	− 5.58		22.32		16.74	+.07	16.81	−.73		
	15	45.9	17	57.0	− 260.5	2.41581m	4.83162m	− .819	+ 0.84	− 7.32		24.40		17.08	+.09	17.17	−.07		
	16	33.8															17.24	±.55		
															17.25	−.00		±.46		
13	36.89													48	17.25					

Dec. 7 1876 ♌ Ursae Min. Lo. C. Morning W. A. Ro.

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Td TS T log T 2 log T Red I Red II Sum I + II Circle Readings Corr. Red.

Dec. 9 1876 α Ursae Min. Lc. C. Mooring W.A.R.

	h	m	s	m	s
Md. No. X	13	12	21.4	12	9.0
		12	30.0	15	35.0
		13	32.0	22	1.0
		14	13.8	23	23.9
		14	49.9	24	52.0
		15	3.5		
		15	34.1		
		21	39.9		
		23	39.0		

13 29.42

Dec. 10-1876 Polaris - 1h 12m J.F.M.

h	m	s	m	s														
1	10	26.3	9	1.4	+ 262.1	2.41847	4.83694	+ 8.24	+ 0.88	+ 9.12	48	10.95	48	20.07	-.08	19.99	- 1.33	
	11	13.8	10	34.5	+ 169.0	2.22789	4.45578	+ 5.31	+ 0.36	+ 5.67		15.20		20.87	-.06	20.81	- .51	
	11	56.9	11	54.3	+ 89.2	1.95036	3.90072	+ 2.80	+ 0.10	+ 2.90		17.80		20.70	-.03	20.67	- .65	
	12	36.0	13	2.4	+ 21.1	1.32428	2.64856	+ 0.66	+ 0.00	+ 0.66		21.48		22.14	-.01	22.13	+ .81	
	13	24.9	14	23.3	- 59.8	1.77670$_n$	3.55340$_n$	- 1.88	+ 0.05	- 1.83		24.40		22.57	+.02	22.59	+ 1.27	
	14	5.7	15	23.6	- 130.1	2.11428$_n$	4.22856$_n$	+ 4.09	+ 0.22	- 3.87		25.65		21.68	+.04	21.72	+ .40	
	14	52.6												34		21.32		±.90
	15	36.7												21.01	-.02			±.76
	16	18.2											48	2099				
														21.32				

13 23.456

Dec. 13. 1876 α Ursae Min. W.A.R.

h	m	s	m	s														
1	10	21.8	9	4.0	+ 254.6	2.40586	4.81172	+ 8.00	+ 0.83	+ 8.83	48	6.88	48	15.71				
	11	3.3	12	29.9	+ 48.7	1.68753	3.37506	+ 1.53	+ 0.03	+ 1.56		13.18		18.21	-.08	15.63	- .71	
	11	49.8	18	57.9	- 339.3	2.53058$_n$	5.06116	- 14.46	+ 1.47	- 9.19		24.75		14.74	-.12	14.72	- .20	
	12	33.4	20	40	- 405.9	2.60788$_n$	5.21576	- 12.74	+ 2.10	- 10.64		25.22		15.56	+.11	15.67	+ .75	
	13	18.4	21	8.9	- 525.3	2.72041$_n$	5.44082	- 16.50	+ 3.53	- 12.97		26.62		14.58	+.14	14.72	- .20	
	14	6.7												13.65	+.19	13.84	- .108	
	14	47.8												14.85	+.07	14.92		±.65
	15	31.8											48	14.92				±.53
	16	16.3																

13 18.589

Dec. 14 1876 Polaris 1h 12m J.F.M.

h	m	s	m	s														
1		—	10	43.5	+ 154.6	2.18921	4.37842	+ 4.86	+ 0.30	+ 5.16	48	10.00	48	15.16	-.05	15.11	- .18	
18.06	11	6.0	13	49.8	- 31.7	1.50106$_n$	3.10212	- 1.00	+ 0.02	- 0.98		16.22		15.24	+.01	15.25	- .04	
17.14	11	49.1	14	41.1	- 83.0	1.91908$_n$	3.83816	- 2.61	+ 0.09	- 2.52		18.28		15.76	+.03	15.79	+ .50	
16.42	12	34.4	15	42.9	- 144.8	2.16077$_n$	4.32154	- 4.55	+ 0.27	- 4.28		19.25		14.97	+.04	15.01	- .28	
18.70	13	18.7														15.29		±.29
17.18	14	1.2												15.28	+.01			±.24
18.06	14	46.1											48	15.29				
19.54	15	31.6																
17.38	16	13.4																

13 18.052

Dec. 14 1876 Polaris Lc. C. W.A.R.

h	m	s	m	s														
13	9	34.2	0	30.7	+ 720.7	2.85775	5.71550	- 22.64	- 6.64	- 29.28	8/7	57.48	8/7	28.20	+.25	28.45	- .18	
	10	19.4	2	18.7	+ 612.7	2.78725	5.57450	- 19.25	- 4.80	- 24.05		51.95		27.70	+.22	28.12	- .51	
	11	2.6	3	33.7	+ 517.7	2.71408	5.42816	- 16.27	- 3.42	- 19.69		48.08		28.39	+.18	28.57	- .06	
	11	47.1	5	13.2	+ 436.2	2.63969	5.27938	- 13.71	- 2.43	- 16.14		44.90		28.20	+.15	28.41	- .22	
	12	31.4	6	39.9	+ 331.5	2.52048	5.04096	- 10.41	- 1.40	- 11.81		40.82		29.01	+.12	29.13	+ .50	
	13	15.5	8	0.2	+ 271.2	2.43329	4.86658	- 8.55	- 0.94	- 9.49		37.88		28.37	+.01	28.48	- .15	
	13	56.6	11	26.0	+ 65.4	1.81558	3.63116	- 2.05	- 0.05	- 2.10		36.85		28.75	+.03	28.78	+ .16	
	14	42.7	13	56.4	- 85.3	1.93095$_n$	3.86190	+ 2.68	- 0.09	+ 2.59		26.52		29.11	-.03	29.08	+ .46	
	15	28.1														28.63		±.80
														28.50	+.13			±.25
	12	31.400											8/7	28.63				

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T∆	T𝒮	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Reading	Corr. Circ. Read.

Dec. 19. 1876 Polaris $1^h\ 12^m$ J. F. Mo.

h	m	s	m	s														
	10	5.1	6	29.0 + 391.5	2.59273	5.18546	+ 12.20	+ 1.96	+ 14.26	48	2.38	48	16.84	-.14	16.50	- .11	1239
	10	48.0	7	53.8 + 304.7	2.48387	4.96774	+ 9.38	+ 1.19	+ 10.77		5.02		15.49	-.11	15.68	- .93	36
	11	30.4	9	30.1 + 210.4	2.32305	4.64610	+ 6.61	+ 0.56	+ 7.17		9.85		17.02	-.07	16.95	+ .34	39
	12	16.0	11	05 + 120.0	2.07918	4.15836	+ 3.78	+ 0.18	+ 3.96		12.22		16.18	-.04	16.14	- .47	36
	12	58.6	12	38.0 + 22.5	1.35218	2.70436	+ 0.71	+ 0.01	+ 0.72		17.05		17.77	-.01	17.76	+ .15	38
	18	45.0													16.61	±.67	43
	14	28.5											16.68	-.07		±.57	36
	15	14.5										48	16.61				
	15	58.2															
	13	04.78															

Dec. 19. 1876 Polaris Morning L. C. W. A. R.

h	m	s	m	s													
13	9	24.0	4	8.2 + 498.9	2.69801	5.39602	− 15.68	− 3.18	− 18.86	7	56.58	7	37.72	+.18	37.90	+ .20	
	10	10.1	6	39.0 + 343.1	2.53542	5.07084	− 10.78	− 1.50	− 12.28		46.85		34.57	+.12	34.69	− .21	
	10	56.5	8	13.8 + 248.3	2.39498	4.78996	− 7.80	− 0.79	− 8.59		43.60		35.01	+.09	35.10	− .80	
	11	34.9											35.80	+.13	35.90	±.67	
	12	22.3														±1.41	
	13	4.0										7	35.93				
	13	53.3															
	14	33.2															
	15	20.8															
	12	22.122															

Dec. 23 1876 Polaris $1^h\ 12^m$ J. F. M.

h	m	s	m	s													
1	9	57.9	6	57.8 + 350.6	2.54481	5.08962	+ 11.02	+ 1.37	+ 12.39	48	2.46	48	15.04	-.13	14.91	- .48	
	10	35.4	9	8.8 + 219.6	2.34163	4.68326	+ 6.90	+ 0.62	+ 7.52		8.45		15.77	-.07	15.90	+ .51	
	11	20.9	10	37.5 + 116.9	2.06781	4.13562	+ 3.67	+ 0.17	+ 3.84		11.22		15.06	-.04	15.02	- .37	
	12	48	12	22.7 + 25.7	1.40993	2.81986	+ 0.81	+ 0.01	+ 0.82	15.22	17.72	14.54		-.01	16.03	+ .64	
	12	47.7	13	40.3 − 51.9	1.71517$_n$	3.43034$_n$	− 1.63	+ 0.03	− 1.60		16.40		14.81	+.01	14.81	- .58	
	13	34.4	15	13.8 − 145.4	2.16256$_n$	4.32512$_n$	− 4.57	+ 0.27	− 4.30		19.92		15.72	+.05	15.67	+ .28	
	14	17.0													15.39	±.52	
	14	58.2											15.42	-.03		±.44	
	15	45.1										48	15.39				
	12	48.378															

Dec. 23 1876 α Ursae Min. L. C. Morning W. A. R.

h	m	s	m	s													
13	9	14.7	4	46.9 + 445.3	2.64865	5.29730	− 13.99	− 2.53	− 16.52	7	51.82	7	35.30				
	9	38.7	7	38.0 + 279.2	2.44592	4.89184	− 8.77	− 0.93	− 9.70		47.60		37.90	+.10	38.00	+ .71	
	10	40.6	10	16.4 + 115.8	2.06391	4.12742	− 3.64	− 0.17	− 3.81		40.85		37.04	+.04	37.08	− .21	
	11	29.1	13	23.3 − 71.1	1.85187$_n$	3.70374	+ 2.23	− 0.06	+ 2.17								
	12	19.2	20	35.8 − 503.6	2.70209$_n$	5.40418	+ 15.83	− 3.24	+ 12.59		24.32		36.91	-.18	36.73	- .56	
	12	53.6	22	33.8 − 621.6	2.79351$_n$	5.58702	+ 19.53	− 4.94	+ 14.59		22.70		37.29	-.22	37.07	- .22	
	13	40.7	24	11.4 − 729.2	2.86285$_n$	5.72570	+ 22.91	− 6.79	+ 16.12		21.70		37.82	-.25	37.57	+ .28	
	14	23.7											37.47	-.10	37.39	±.44	
	15	9.4										7	37.37			±.37	
	12	12.189															

Dec. 24. 1876 Polaris $1^h\ 12^m$ J. F. Mo.

h	m	s	m	s													
1	9	45.9	6	48.9 + 356.1	2.55157	5.10314	+ 11.19	+ 1.62	+ 12.81	48	4.20	48	17.01	-.13	16.88	- .76	12 24
	10	33.8	8	18.4 + 266.6	2.42586	4.85172	+ 8.38	+ 0.91	+ 9.29		7.85		17.14	-.09	17.05	- .59	25 2
	11	17.4	8	54.0 + 231.0	2.36361	4.72722	+ 7.26	+ 0.68	+ 7.94		11.32		19.26	-.07	19.19	+ .155	3
	12	4.0	9	56.0 + 169.0	2.22789	4.45578	+ 5.31	+ 0.36	+ 5.67		12.80		18.47	-.05	18.42	+ .78	3
	12	47.8	11	22.8 + 82.2	1.91487	3.82974	+ 2.58	+ 0.09	+ 2.67		14.60		17.27	-.03	17.24	- .40	27
	13	2.5	12	27.9 + 17.1	1.23350	2.46600	+ 0.54	+ 0.00	+ 0.54		16.35		17.09	-.01	17.08	- .86	25 2
	14	12.3	13	44.0 − 59.0	1.77085$_n$	3.54170	− 1.85	+ 0.04	− 1.81							±.84	13
	14	53.9											17.71	-.06	17.64	±.71	12 1
	15	42.7															5
	12	45.083										48	17.65				

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T₂ T S T Log T 2 Log T Red I Red II Sum I + II Circle Accdngs Corr Circle Red

Dec. 27-1876 α Ursae Min. N.A.R.

h	m	s	m	s												
12 39.68	10	27.5	2	26.1	+ 558.9	2.74733	5.49466	+ 17.56	+ 3.99	+ 21.55	47	51.48	48	13.03		+64
36.41	11	8.3	4	25.1	+ 439.9	2.64335	5.28670	+ 13.82	+ 2.47	+ 16.29		56.45		12.74		+35
39.66	11	53.6	6	2.6	+ 342.4	2.53453	5.06906	+ 10.76	+ 1.50	+ 12.26	48	0.32		12.58		+19
36.50	12	36.5	7	40.7	+ 244.3	2.38792	4.77584	+ 7.68	+ 0.76	+ 8.44		3.92		12.36		−03
38.34	13	22.4	9	18.9	+ 145.1	2.16167	4.32334	+ 4.56	+ 0.27	+ 4.83		6.75		11.58		−81
43.49	14	11.6	11	49.6	− 4.6	0.66276$_n$	1.32552	− 0.14	+ 0.00	− 0.14		12.18		12.04		−35
39.68	15	35.8												12.89		±43
																±36

12 39.091
−44.16
11 44.99

Dec. 27-1876 α Ursae Min. Morning N.A.R.

13 19 45.8	18	47.5	+	58.3	1.76567	3.53134	∓ 1.83	∓ 0.04	∓ 1.87	7	24.40	7	22.53		
	21	47.5	−	121.7	2.08529$_n$	4.17058	∓ 3.82	∓ 0.19	+ 3.63		20.90		24.53		α Und-mor-J
	23	20.0	−	214.2	2.33082$_n$	4.66164	∓ 6.73	∓ 0.59	+ 6.14		20.75		26.89		
	24	44.7	−	298.9	2.47558$_n$	4.95106	+ 9.39	∓ 1.14	+ 8.25		18.32		26.57		
	26	5.7	−	379.9	2.57967$_n$	5.15934	+ 11.94	∓ 1.84	+ 10.10		19.22		29.32		

Jan. 2-1877 Polaris 1h 12m J.F.M.

h	m	s	m	s												
1	9	25.8	4	46.0	+ 456.9	2.65982	5.31964	+ 14.36	+ 2.67	+ 17.03	48 7	57.15	48 8	14.18	−.16	1402	+ 91
	10	8.3	6	44.+	378.5	2.57807	5.15614	+ 11.89	+ 1.83	+ 13.72		57.32		13.84	−.14	1290	− 21
	10	53.5	7	10.5	+ 312.4	2.49471	4.98942	+ 9.82	+ 1.25	+ 11.07	49	1.85		12.72	−.11	1281	− 30
	11	39.2	8	17.9	+ 245.0	2.38917	4.77834	+ 7.70	+ 0.77	+ 8.47	8	4.55		13.02	−.08	1294	− 17
	12	23.2	9	45.5	+ 157.4	2.19700	4.39400	+ 4.95	+ 0.32	+ 5.27		8.10		13.27	−.06	1331	+ 20
	13	7.1	11	46. +	78.3	1.89376	3.78752	+ 2.46	+ 0.08	+ 2.54		10.85		13.39	−.03	1336	+ 25
	13	52.2	12	36.8	− 13.9	1.14301$_n$	2.28603	− 0.44	+ 0.00	− 0.44		12.92		12.48	+.00	1248	− 63
	14	38.2	13	58.3	− 95.4	1.97955$_n$	3.95910$_n$	− 3.00	+ 0.12	− 2.88		15.95		13.07	+.03	1310	− 01
	15	18.6														13.11	±36

12 22900
~~445.0~~
~~385.0~~

13.18 −.07
48 13.11

Jan. 2-1877 α Ursae Min. Le. C. Morning N.A.R.

Rej.

h	m	s	m	s		
12 43.82 13	9	47.3	8	41.0	7	44.10
46.06	10	33.9	11	31.5		37.25
50.81	11	22.4	14	18.7		32.47
51.76	12	7.7	21	2.0		22.55
46.19	14	14.3	23	26.6		22.18
50.14	15	2.3	25	24.2		19.35
47.58	15	42.8				
11.596						
12 2.1	12	~~48.009~~				
6.8	12	3.91				
7.7						
2.0						
6.9						
3.3						

Jan. 3 1877 α Ursae Min. Le. C. Morning N.A.R.

h	m	s	m	s												
12 24.96 13	19	45.5	20	9.0	− 468.1	2.67034$_n$	5.34068	+ 14.57	− 2.79	+ 11.78	7	23.55	7	35.33	−.10	3523	+ 116
25 28.22	22	32.0	25	43.1	− 802.2	2.90428$_n$	5.80856	+ 24.97	− 8.21	+ 16.76		17.10		33.86	−.19	3367	− 38
32.41	24	4.3	27	57.0	− 929.1	2.96806$_n$	5.93612	+ 28.72	− 11.01	+ 17.91		15.05		32.96	−.22	3274	− 131
31.10	25	31.0	29	19.7	− 1018.8	3.00509$_n$	6.01618	+ 31.72	− 13.24	+ 18.48		16.45		34.93	−.24	3469	+ 64
27.19	26	55.3	30	54.3	− 1118.4	3.04860$_n$	6.09720	+ 34.82	− 15.95	+ 18.87		15.30		34.17	−.26	3391	− 14
25 29.73																3405	±81
13 9.62	12	20.92												34.25	−.20		±68
12 19.91													7	34.05			
79.64																	
2.496																	
5 104.60																	

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23

T α T S T log T 2 log T Red I Red II Sum I + II Circle Corr Reading Circ. Red

Jan. 4. 1877 Polaris - 1h 12m J. F. Mc.

h	m	s	m	s
0	10	59.7	10	8.1
	11	18.2	11	43.2
	11	41.6	13	58.3
	12	0.1	14	15.3
	12	20.4	14	34.3
	12	40.1	15	38.7
	13	2.3	16	7.6
	13	20.8		
	13	50.7		
	14	22.3		
	15	2.9		
	15	37.3		
	16	2.2		

Jan. 4. 1877 Polaris L. C. Morning W. A. R.

h	m	s	m	s												
13	19	8.2	18	44.0	−4146	2.61763n	5.23526	+12.91	−2.19	+10.72	1	26.88	7	37.60	−.10	37.50	+.58
11	47.662											15.02		33.28		
	58.52	20.3	20	39.3	−9805	2.99145n	5.98290	+30.52	−12.26	+18.26		17.90		36.77	−.26	36.51	−.41
24	57.10	24	57.1	28	2.9	−11184	3.04860n	6.09720	+34.82	−15.95	+18.87		18.12		37.81	−.28	36.83	−.09
25	0.926	28.7	30	27.8	−12083	3.08217n	6.16434	+37.61	−18.62	+18.99		18.32		37.16	−.30	36.86	−.06
25	0.282	7.5	31	57.7	−13310	3.12418n	6.24836	+41.43	−22.59	+18.84						36.92	±.33
24	57.32		34	0.4										37.16	−.24		±.28
13	7.82	11 49.362											7	36.92			
11	49.50																
	148.50																
	98.31																
	246.81																
	49.362																

Jan. 4. 1877 Polaris 1h − 12m J. F. Mc.

	h	m	s	m	s												
1	9	10.0?	1	52.3	+379.1	2.57875	5.15750	+11.80	+1.83	+13.83	47	54.85	48	15.08	−.08	15.00	+.78
	9	59.7	7	17.4	+294.0	2.46835	4.93670	+9.15	+1.10	+10.25	48	1.25		13.60	−.07	13.53	−.69
	10	43.7	8	31.0	+220.4	2.34321	4.68642	+6.86	+0.62	+7.48		3.35		14.18	−.05	14.13	−.09
	11	27.0	9	0.8?								6.70				14.22	±.65
	12	8.6	9	20.0?								9.58					±.53
	12	56.0	10	3.0								13.20					
	13	41.6	11	32.5								16.15					
	14	23.4	11	34.8?								18.50					
	15	12.4	12	58.7													
			14	17.5?										14.29	−.07		
	12	11.378	14	18.8?									48	14.22			
			15	9.8?													

Jan 10 1877 Polaris L. C. Morning W. A. R.

13	20	52.0	20	47.9
	22	27.7	21	8.1
	23	35.3	22	53.9
	25	20.9	31	44.8
	26	53.8	33	22.8
	29	44.0	34	55.2

(No fundamental stars for this date).

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Oct. 21 Polaris

h	m	s
	12	46 538
		47 16.0
		58.0

h	m	s		
			48	6.4
13	10	28.6		33.6
	11	9.4		42.1
	11	53.4	49	13.3
	12	41.7		
	13	23.5	49	20.3
	14	7.0		48.0
	14	53.5	50	14.2
	15	36.3		
	16	19.0	50	20.4
				59.3
	B	23.856	51	35.4
			51	43.4
				27.0
				58.0
			53	23.4
			54	8.3
				40.4
				54.8
			55	30.8
			56	6.0
			56	19.8
				33.2
			57	50.0
			57	53.6
			58	57.2
			59	41.0
		13	0	22.8
			1	9.6
				54.0
			2	17.6
				59.2
			3	21.0
				53.5
			8	5.6
			9	12.5
			10	45.6
			10	58.0
			12	12.8
			12	56.9
			14	2.0
			15	11.7
			16	2.7
			17	10.6
			18	29.0
			21	2.0
			22	24.0
			23	14.0
			24	39.7
			25	41.7
			26	56.3
			28	31.8
			29	33
			33	9.7
			34	20.0
			35	34.0
			36	39.6
			37	55.5

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Having found that the provisional adopted values of i from Sept-2 1876 to Feb 27 1877. vary from those already used in the final reductions, the corrections for a change of 5ˢ.00 in Tm-Ts will be found with the final value of i for these dates and applied proportionately to the already computed values.

Star	Old value of i	New value of i	Corr. for +5ˢ.00
	From Sept. 2 to Sept. 6 1876		
S Ursæ Min	5° 1′ 28″	5° 2′ 59″	+.20
51 Cephei	5 1 28	5 2 59	+.16
χ Ursæ Min	5 1 28	5 2 59	+.06
	From Oct 2 to Oct. 24 1876		
α Ursæ Min	5 4 56	5 2 59	−.10
S Ursæ Min	5 4 56	5 2 59	−.25
51 Cephei	5 4 56	5 2 59	−.21
χ Ursæ Min	5 4 56	5 2 59	−.08
	From Oct-24 to Jan. 2 1877		
α Ursæ Min	5 6 31	5 2 59	−.18
χ Ursæ Min	5 6 31	5 2 59	−.14
	From Jan 3 1877 to Feb 27 1877		
α Ursæ Min	5 6 31	5 4 14	−.12
S Ursæ Min	5 6 31	5 4 14	−.29
51 Cephei	5 6 31	5 4 14	−.24

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T☌ T☍ T log T 2 log T Red I Red II Sum I + II Circle Reading Corr. Loss. Corr. Read.

Jan. 13. 1877 Polaris J. F. Mo.

h	m	s	m	s	s											
1	11	37.6	8	30.0	+ 337.5	2.52310	5.04620	+ 10.48	+ 1.42	+ 11.90	39	43.28	39	55.18	-.11	55.07	+.10
	11	50.1	10	9.6	+ 233.9	2.36903	4.73806	+ 7.25	+ 0.68	+ 8.03		47.40		55.43	-.07	55.36	+.39
	12	35.4	11	54.3	+ 129.2	2.11126	4.22252	+ 4.06	+ 0.21	+ 4.27		51.10		55.37	-.04	55.33	+.36
	13	18.0	12	50.2	+ 73.3	1.86510	3.73020	+ 2.30	+ 0.07	+ 2.37		57.28		54.65	-.02	54.63	-.14
	14	3.6	14	15.8	- 12.3	1.08990$_n$	2.17980	- 0.39	+ 0.00	- 0.39		55.32		54.93	+.00	54.93	-.04
	14	47.0	15	52.9	- 110.4	2.04297$_n$	4.08594$_n$	- 3.47	+ 0.15	- 3.32		57.78		54.46	+.04	54.50	-.47
	15	35.9												5500	-.03	5497	+.27
	16	17.0											39	54.97			±.23
	16	59.0															
	14	3.511															

Constants for 1877.

From Jan 13 — Mar 1 $i = 5^\circ\ 4'\ 14''$

	α Urs Min	δ Urs Min	λ Urs Min	51 Cephei
	$\delta = 88^\circ 39'\ 35''$	$\delta = 86^\circ\ 36'\ 7''$	$\delta = 88^\circ\ 56'\ 0''$	$\delta = 87^\circ\ 14'\ 16''$
log 15	1.17609	1.17609	1.17609	1.17609
log cos δ	8.36903	8.77285	8.26988	8.68297
log tang i	8.94807	8.94807	8.94807	8.94807
log const-I	8.49319	8.89701	8.39404	8.80713
log sin δ	9.99988	9.99924	9.99992	9.99950
log cos δ	8.36903	8.77285	8.26988	8.68297
log 112.5 sin 1"	6.73672	6.73672	6.73672	6.73672
log const-II	5.10563	5.50881	5.00652	5.41919

From Mar 1 — May 14 $i = 5^\circ\ 1'\ 4''$

	$\delta = 88^\circ\ 39'\ 18''$	$86^\circ\ 36'\ 4''$	$88^\circ\ 55'\ 46''$	$87^\circ\ 14'\ 2''$
log 15	1.17609	1.17609	1.17609	1.17609
log cos δ	8.37056	8.77296	8.27146	8.68275
log tan i	8.94439	8.94439	8.94439	8.94439
log const-I	8.49104	8.89344	8.39194	8.80323
log sin δ	9.99988	9.99923	9.99992	9.99950
log cos δ	8.37056	8.77296	8.27146	8.68275
log 112.5 sin 1"	6.73672	6.73672	6.73672	6.73672
log const-II	5.10716	5.50891	5.00810	5.41897

From May 16 — July 4 $i = 4^\circ\ 59'\ 45''$

	$\delta = 88^\circ\ 39'\ 8''$	$86^\circ\ 36'\ 18''$	$88^\circ\ 55'\ 52''$	$87^\circ\ 14'\ 9''$
log 15	1.17609	1.17609	1.17609	1.17609
log cos δ	8.37146	8.77246	8.27078	8.68327
log tan i	8.94159	8.94159	8.94159	8.94159
log const-I	8.48914	8.89014	8.38846	8.80095
log sin δ	9.99988	9.99924	9.99992	9.99949
log cos δ	8.37146	8.77246	8.27078	8.68327
log 112.5 sin 1"	6.73672	6.73672	6.73672	6.73672
log const-II	5.10806	5.50842	5.00742	5.41948

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T_a T_S T log T 2 log T Red I Red II Sum I+II Circle Corr. Readings Circle Corr. Red.

Jan. 30 1877 S Ursae Minoris L. C.

h	m	s	m	s	s														
10	37	8	6	29.2	+ 31.5	2.50174	5.00348	− 25.18	− 3.25	− 28.43	56	21.85	53	53.42	+.17	53.59	+.44		
10	54	4	7	32.5	+ 25.2	2.40518	4.81036	− 20.16	− 2.08	− 22.24		15.05		52.81	+.14	52.95	−.20		
11	13	0	8	52.4	+ 17.3	2.24130	4.48260	− 13.82	− 0.98	− 14.80		8.68		53.88	+.12	54.00	+.85		
11	29	3	10	31.7	+ 15.0	1.87506	3.75012	− 5.95	− 0.18	− 6.13		59.48		53.35	+.05	53.40	+.25		
11	47	6	14	57.0	− 40.1	1.60314	3.20628	+ 3.18	− 0.25	+ 3.13		49.42		52.55	−.03	52.52	−.63		
12	1	2	12	26.8	− 100.3	2.00130	4.00264	+ 17.95	− 0.32	+ 17.63		44.90		52.53	−.06	52.47	−.68		
	21	9	13	27.0												53.15		±.55	
	39	0												53.09	+.06			±.46	
12	57	0											55	53.15					
11	46	589																	

(12 18) Feb. 3 1877 S Ursae Minoris L. C.

h	m	s	m	s	s														
6			12	39.3	− 55.7	1.74586	3.49172	+4.39	− 0.10	+4.29	55	48.15	55	52.44	+.72				
			13	1.3	− 71.9	1.85673	3.71346	+5.67	− 0.17	+5.50		45.60		51.30	−.42				
			14	10.0	− 146.4	2.16554	4.33108	+11.55	− 0.69	+10.88		40.28		51.16	−.56				
			15	33.1	− 229.5	2.36078	4.72156	+18.10	− 1.70	+16.40		35.58		51.98	+.26				
															±.56				
													55	51.72	±.47				
11	42	65	12	57.4															
	43	88	12	36.0															
	44	20	13	53.7															
	43	70	14	37.6															
	42	95	14	36.1															
	44	30	15	12.8															
11	43	613																	

Feb. 4. 1877 51 H. Cephei

h	m	s	m	s	s														
6	41	47.1	34	23.7	+ 53.7	2.72485	5.44970	+ 34.38	+ 7.41	+ 41.79	4	32.52	5	14.21	−.25	14.06	+.20		
	42	8.4	35	26.8	+ 46.6	2.66987	5.33974	+ 30.29	+ 5.75	+ 36.04		38.30		14.34	−.22	14.12	+.26		
		31.9	36	43.0	+ 39.4	2.59262	5.18524	+ 25.35	+ 4.03	+ 29.38		45.32		14.70	−.19	14.51	+.65		
		53.6	37	47.6	+ 32.8	2.51428	5.02856	+ 21.17	+ 2.81	+ 23.98		49.98		13.96	−.14	13.82	−.04		
	43	15.1	39	30.4	+ 22.0	2.35025	4.70050	+ 14.51	+ 1.32	+ 15.83		58.30		14.13	−.11	14.02	+.16		
		36.8	40	6.6	+ 18.7.8	2.27870	4.54740	+ 12.16	+ 0.93	+ 13.09	5	05.05		13.14	−.09	13.05	−.81		
		57.8	41	53.5	+ 8.0.9	1.90795	3.81590	+ 5.24	+ 0.17	+ 5.41		8.40		13.81	−.03	13.78	−.08		
	44	18.7	42	43.7	+ 30.7	1.48714	2.97428	+ 1.99	+ 0.02	+ 2.01		11.50		13.51	−.01	13.50	−.36		
		41.6														13.86		±.34	
48	14,444													13.99	−.13			±.29	
													5	13.86					

Feb. 5 1877 S Ursae Minoris L. C.

h	m	s	m	s	s														
6	10	33.6	7	27.8	+ 25.6	2.40756	4.81512	− 20.27	− 2.10	− 22.37	56	13.22	55	50.85	+.15	51.00	+.36		
		51.7	9	6.0	+ 15.7.0	2.19590	4.39180	− 12.45	− 0.79	− 13.24		3.80		50.56	+.10	50.66	+.02		
	11	8.3	10	21.1	+ 7.8.3	1.89376	3.78752	− 6.21	− 0.20	− 6.41	55	56.88		50.47	+.05	50.52	−.12		
		25.7	12	18.3	− 2.9.9	1.47567	2.95134	+ 2.37	− 0.03	+ 2.34		48.72		51.06	−.02	51.04	+.40		
		48.0	13	34.8	− 111.4	2.04689	4.09378	+ 8.84	− 0.40	+ 8.44		41.65		50.09	−.06	50.03	−.61		
	12	1.4	15	1.6	− 198.2	2.29710	4.59420	+ 15.72	− 1.26	+ 14.46		36.22		50.68	−.11	50.57	−.07		
		19.0														50.64		±.29	
		36.0												50.62	+.02			±.24	
12		52.2											55	50.64					
11	43	433																	

Feb. 5 1877 51 H. Cephei.

h	m	s	m	s	s														
6	41	49.1	41	16.7	+ 12.2.2	2.08707	4.17414	+ 7.92	+ 0.39	+ 8.31	5	4.15		12.46	−.05	12.41	+.13		
	42	11.0	43	0.3	+ 14.6	1.16435	2.32870	+ 0.95	+ 0.01	+ 0.96		11.58		12.54	−.00	12.54	+.26		
		31.4	44	30.7	− 75.8	1.87967	3.75934	− 4.91	+ 0.15	− 4.76		16.98		12.22	+.03	12.25	−.03		
		52.5	45	38.1	− 143.2	2.18594	4.37188	− 9.28	+ 0.54	− 8.74		20.75		12.01	+.06	12.07	−.21		
	43	16.0	47	13.7	− 238.8	2.37803	4.75606	− 15.47	+ 1.50	− 13.97		26.60		12.03	+.11	12.14	−.14		
		36.9													5	12.28		±.17	
		57.3												12.27	+.03			±.14	
	44	19.8											5	12.28					
		38.7																	
43	14,856																		

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Ta	TS	T	logT	2logT	Red I	Red II	Sum I+II	Circle Reading	Corr Circ Red.

Feb. 6 1877 S Ursae Minoris L. C.

h	m	S	m	S														
6	10	34.0	7	57.0	+ 2272	2.35641	4.71282	− 18.02		− 1.67		− 19.69	56	10.22	55	50.53	+.14	50.67	−.01
		34.7	8	53.6	+ 1706	2.23198	4.46396	− 13.53		− 0.44		− 14.47		2.48		48.01	+.15	48.12	−2.56
	11	10.7	9	33.4	+ 1108	2.04454	4.08908	− 8.79		− 0.39		− 9.18		2.18		52.80	+.07	53.07	+2.39
		26.6	10	48.8	+ 554	1.74351	3.48702	− 4.39		− .10		− 4.49	55	54.98		50.49	+.03	50.52	+.16
		44.3	12	8.1	− 18.9	1.27646	2.55292$_n$	+ 1.50		− 0.01		+ 1.49		49.92		50.91	−.01	50.90	+.22
	12	2.5	13	22.6	− 984	1.99350$_n$	3.98600$_n$	+ 7.80		− 0.31		+ 7.49		43.38		50.87	−.06	50.81	+.13
		19.1																50.68	±.99
		36.2														50.64	+.05		±.84
		53.0													55	50.69			
	11	43233																	

Feb. 8. 1877 S Ursae Minoris. L. C.

h	m	S	m	S														
6	10	33.0	6	14.0	+ 3292	2.51759	5.03518	− 26.12		− 3.49		− 29.61	56	21.52	55	51.91	+.18	52.09	+.28
		50.0	7	32.7	+ 2506	2.39898	4.79796	− 19.87		− 2.02		− 21.89		13.58		51.69	+.14	51.83	+.02
	11	9.3	8	50.6	+ 1729	2.23729	4.47458	− 13.70		− 0.96		− 14.66		6.70		52.04	+.09	52.13	+.32
		26.6	10	14.0	+ 932	1.96988	3.93976	− 7.40		− 0.28		− 7.68		0.08		52.40	+.05	52.45	+.64
		43.4	11	32.3	+ 110	1.04139	2.08278	− 0.87		− 0.00		− 0.87		52.45		51.58	+.00	51.58	−.23
	12	0.6	12	55.0	− 66.7	1.82413$_n$	3.64826$_n$	+ 5.29		− 0.14		+ 5.15		45.65		50.80	−.03	50.77	−1.04
		17.4																51.81	±.46
		35.7														51.74	+.07		±.39
		53.6													55	51.81			
	11	43289																	

Feb. 8 1877 57 H. Cephei.

h	m	S	m	S														
6	41	46.0	34	49.3	+ 5035	2.70200	5.40400	+ 32.62	+	6.67	+	39.29	4	35.55	5	14.84	−.24	14.60	+.29
	42	8.0	35	56.1	+ 4367	2.64018	5.28036	+ 28.29	+	5.02	+	33.31		41.30		14.61	−.20	14.41	+.10
		29.4	37	32.7	+ 3401	2.53161	5.06322	+ 22.03	+	3.04	+	25.07		49.02		14.09	−.16	13.93	−.38
		51.6	43	05.0	+ 12.3	1.08990	2.17980	+ 0.80	+	0.00	+	0.80	5	4.55		~~14.89~~	~~−.80~~	14.51	±.32
	43	13.7	43	36.1	− 433	1.63649	3.27298$_n$	− 2.80	+	0.05	−	2.75		12.40		9.65	+.01	9.66	−.73 ±.27
		34.6	44	38.8	− 86.0	1.93450$_n$	3.86900$_n$	− 5.57	+	0.19	−	5.38		16.48		11.10	+.03	11.13	+.71
		53.7																10.39	
	44	17.7														14.51	−.20		±1.05
		38.8													5	14.31			±.89
	43	12.767																	

Feb. 11 1877 S Ursae Minoris L. C.

h	m	S	m	S														
6	10	34.1	7	43.3	+ 2397	2.37967	4.75934	− 19.01		− 1.85		− 20.86	56	11.72	55	50.86	+.13	50.99	+.28
		52.2	8	42.9	+ 1801	2.25551	4.51102	− 14.28		− 1.04		− 15.32		6.65		51.33	+.08	51.41	+.70
	11	9.0	10	7.3	+ 957	1.98091	3.96182	− 7.59		− 0.29		− 7.88	55	58.68		50.80	+.05	50.85	+.14
		28.9	11	15.4	+ 276	1.44091	2.88182	− 2.19		− 0.02		− 2.21		52.60		50.39	+.01	50.40	−.31
		48.0	12	29.0	− 46.0	1.66276	3.32552$_n$	+ 3.65		− 0.07		+ 3.58		46.55		50.13	−.03	50.10	−.61
	12	0.4	13	39.1	− 561	~~1.74896$_n$~~	~~3.49792$_n$~~	~~+ 4.46~~		~~− 0.10~~		~~+ 4.35~~		41.78	50.56	46.13	−.07	50.49	−.22
		18.1			116.1	2.06483$_n$	4.12966	+ 9.21		− .043		+ 8.78				+11		50.71	
		38.1														50.68	+.03		±.41
		58.8													55	50.71			±.35
	11	42.956																	

Feb. 11 1877 57 H. Cephei

h	m	S	m	S														
6	41	45.3	41	8.0	+ 1230	2.08990	4.17980	+ 7.97	+	0.40	+	8.37	5	3.42	5	11.79	−.07	11.72	−.26
	42	6.5	42	53.8	+ 1722	1.23553	2.47106	+ 1.11	+	0.01	+	1.12		10.80		11.92	−.01	11.91	−.07
		29.0	44	38.3	− 87.2	1.94052$_n$	3.88104$_n$	− 5.65	+	0.20	−	5.45		17.35		11.90	+.04	11.94	−.04
		50.0	47	13.0	− 242.0	2.38382$_n$	4.76764$_n$	− 15.67	+	1.54	−	14.13		26.20		12.07	+.11	12.18	+.20
	43	9.4	48	4.6	− 2936	2.46776$_n$	4.93552$_n$	− 19.02	+	2.27	−	16.75		28.90		12.15	+.14	12.29	+.31
		32.1	49	05.5	− 3495	2.54345$_n$	5.08690$_n$	− 22.64	+	3.21	−	19.43		31.08		11.65	+.17	11.82	−.16
		54.2																11.98	±.19
	44	15.6														11.91	+.06		±.16
		36.6													5	11.97			
	43	10.967																	

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No. TS T log T 2 log T Red I Red II Sum I+II Circle Readings Corr Circ Read.

Feb. 14 1877 S Ursae Minoris Lo. C.

h	m	s	m	s													
6	10	33.0	5	26.8	+ 37.8	2.57496	5.14992	− 29.81	− 4.55	− 34.36	56	24.42	55	50.06	+ .22	50.28	+ .26
		42.6	6	42.0	+ 300.6	2.47799	4.95598	− 23.84	− 2.91	− 26.75		16.68		49.93	+ .17	50.10	+ .08
	11	8.1	7	53.7	+ 228.9	2.35965	4.71930	− 18.16	− 1.69	− 19.85		9.85		50.00	+ .12	50.12	+ .10
		23.9	9	4.1	+ 158.5	2.20003	4.40006	− 12.57	− 0.81	− 13.38		3.42		50.04	+ .09	50.13	+ .11
		42.3	10	19.0	+ 83.6	1.92221	3.84442	− 6.63	− 0.22	− 6.85	55	56.48		49.62	+ .06	49.68	− .34
		57.5	11	45.2	− 2.6	2.41497$_n$	0.82994$_n$	+ 0.21	− 0.30	+ 0.21		49.62		49.83	− .00	49.83	− .19
	12	17.8														50.02	± .20
		34.7												49.92	+.11		± .17
		52.9											55	50.03			
	11	42.644															

Feb. 14 1877 57 H. Cephei

h	m	s	m	s												
6		—	42	30.0	+ 37.9	1.57864	3.15728	+ 2.43	+ .004	+ 2.47	5	9.88	5	12.35	+ .16	
		—	43	52.5	− 44.6	1.64933$_n$	3.29866	− 2.86	+ .005	− 2.81		15.20		12.39	+ .20	
		—	45	0.2	− 112.3	2.05038$_n$	4.10076	− 7.20	+ .033	− 6.87		18.70		11.83	− .36	
7.18	42	45.8	45	48.1	− 160.2	2.20466$_n$	4.40932	− 10.28	+ .067	− 9.61		21.65		12.04	− .15	
8.90	43	8.9	46	51.0	− 223.1	2.34850$_n$	4.69700	− 14.31	+ .131	− 13.80		25.22		12.22	+ .03	
7.42		28.8	48	27.2	− 319.3	2.50424$_n$	5.00840	− 20.48	+ .268	− 17.80		30.10		12.30	+ .11	
6.94		49.7													± .18	
8.77	44	12.9											5	12.19	± .15	
8.09		33.6														
	43	7.883														

Feb. 15 1877 S Ursae Minoris Lo. C.

h	m	s	m	s												
6		—	(12	57.2)	− 74.9	1.87448$_n$	3.74896	+ 5.91	− 0.17	+ 5.74	55	41.58	55	47.32	− .29	
		—	13	20.0	− 97.7	1.98989$_n$	3.97978	+ 7.71	− 0.31	+ 7.40		39.80		47.20	− .41	
		—	14	43.2	− 180.9	2.25744$_n$	4.51488	+ 14.27	− 1.06	+ 13.21		34.80		48.01	+ .40	
40.68	11	23.3	15	26.1	− 223.8	2.34986$_n$	4.69972	+ 17.66	− 1.62	+ 16.04		31.88		47.92	+ .31	
42.10		42.1													± .40	
42.92	12	0.3											55	47.61	± .34	
42.45		17.7														
43.08		35.2														
42.10		51.6														
	11	42.805														

Feb. 20 1877 S Ursae Minoris Lo. C.

h	m	s	m	s													
			3	57.0	+ 465.8	2.66820	5.33640	− 31.94	− 6.99	− 43.93	56	33.68	55	49.75	+ .27	50.02	+ .69
6	10	31.7	5	47.6	+ 355.2	2.55047	5.10094	− 28.17	− 4.06	− 32.23		21.65		49.42	+ .21	49.63	+ .30
		50.5	7	36.2	+ 246.6	2.39199	4.78398	− 19.56	− 1.96	− 21.52		11.92		50.40	+ .13	50.53	+ .20
	11	8.7	9	29.4	+ 133.4	2.12516	4.25032	− 10.58	− 0.57	− 11.15		58.98		47.83	+ .08	47.91	− .42
		26.0	12	57.0	− 74.2	1.87040$_n$	3.74080	+ 5.88	− 0.18	+ 5.70		43.80		49.50	− .04	49.46	+ .13
		43.0	14	57.5	− 194.7	2.28937$_n$	4.57874$_n$	+ 15.44	− 1.22	+ 14.22		34.35		48.57	− .11	48.46	− .87
		58.7														49.33	± .84
	12	18.0												49.24	+.09		± .71
		35.9											55	49.33			
		52.1															
	11	42.844															

Feb. 20 1877 57 H Cephei

h	m	s	m	s													
6	41	37.2	44	35.0	− 92.6	1.96664$_n$	3.93322$_n$	− 6.00	+ 0.23	− 5.77	5	17.18	5	11.41	+ .04	11.45	− .31
		58.3	45	46.9	− 166.5	2.22141$_n$	4.44282$_n$	− 10.78	+ 0.73	− 10.05		21.92		11.87	+ .08	11.95	+ .19
	42	20.0	47	10.2	− 247.8	2.39410$_n$	4.78820$_n$	− 16.05	+ 1.62	− 14.43		26.20		11.77	+ .11	11.88	+ .12
		39.7		57.3	− 294.9	2.46967$_n$	4.93934$_n$	− 19.10	+ 2.29	− 16.81		28.20		11.39	+ .13	11.53	− .23
	43	2.6	48	48.0	− 340.6	2.53224$_n$	5.06448$_n$	− 22.06	+ 3.05	− 19.01		30.65		11.64	+ .17	11.81	+ .05
		22.3	49	28.8	− 386.4	2.58704$_n$	5.17408$_n$	− 25.03	+ 3.93	− 21.10		32.88		11.78	+ .19	11.97	+ .21
		47.5															
	44	7.0												11.64	+.12	11.76	± .20
		27.8											5	11.76			± .17
	43	2.423															

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T+	T−	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.

Feb. 21 1877 S Ursae Minoris Le. 6.

h	m	s	m	s	s												
6	10	31.7	9	40.8	+ 121.7	2.08529	4.17058	− 9.65	− 0.48	− 10.13	55	57.10	53	48.97	+.06	4903	−.60
		50.3	11	43.7	− 1.2	0.07918$_n$	0.15836$_n$	+ 0.09	− 0.00	+ 0.09		50.05		50.14	−.09	5014	+.51
	11	8.3	13	2.0	− 79.5	1.90037$_n$	3.80074$_n$	+ 6.31	− 0.20	+ 6.11		43.68		49.79	−.04	4975	+.12
		25.6	13	53.4	− 132.9	2.12352$_n$	4.24704$_n$	+ 10.54	− 0.57	+ 9.97		40.02		49.99	−.07	4992	+.29
		42.9	15	4.9	− 202.4	2.30621$_n$	4.61242$_n$	+ 16.05	− 1.32	+ 14.73		34.98		49.71	−.12	4959	−.04
		59.3	16	8.7	− 266.2	2.42521$_n$	4.85042$_n$	+ 21.11	− 2.28	+ 18.83		30.70		49.53	−.16	4937	−.26
	12	16.6														4963	±.33
		35.2												4969	−.06		±.28
		52.8											55	49.63			
	11	42.522															

Feb. 21 1877 51 Ho. Cephei

h	m	s	m	s	s												
6	41	35.3	40	47.0	+ 134.6	2.12904	4.25808	+ 8.72	+ 0.48	+ 9.20	5	3.32	5	12.52	−.05	1247	.00
		55.9	42	28.2	+ 33.4	1.52375	3.04750	+ 2.16	+ 0.03	+ 2.19		10.10		12.29	−.01	1228	−.19
	42	19.3	44	13.0	− 71.4	1.85370$_n$	3.70740$_n$	− 4.62	+ 0.13	− 4.49		17.35		12.86	+.03	1289	+.42
		40.0	45	10.7	− 129.1	2.11093$_n$	4.22186$_n$	− 8.36	+ 0.44	− 7.92		20.30		12.38	+.05	1243	−.04
	43	2.1	46	15.2	− 193.6	2.28690$_n$	4.57380$_n$	− 12.54	+ 0.99	− 11.55		23.78		12.23	+.09	1232	−.15
		23.4	47	3.0	− 247.4	2.39340$_n$	4.78680$_n$	− 16.03	+ 1.61	− 14.42		26.75		12.33	+.12	1245	−.02
		44.8														1247	±.15
	44	5.7												12.44	+.04		±.13
		28.0											5	12.48			
	43	1.611															

Feb. 27 1877 S Ursae Min. Le. 6.

Cloud

6	10	32.0															

Feb. 27 1877 51 Ho. Cephei

h	m	s	m	s	s												
6	41	34.4	40	40.8	+ 52.2	2.71700	5.43400	+ 33.76	+ 7.15	+ 40.91	4	32.65	5	13.56	−.25	1331	+.58
		53.7	42	4.6	+ 139.0	2.14301	4.28602	+ 9.04	+ 0.51	+ 9.55	5	2.38		11.98	−.07	1189	−.84
	42	16.4	43	50.3	+ 55.2	1.74194	3.48388	+ 3.58	+ 0.08	+ 3.66		9.45		13.11	−.02	1309	+.36
		37.1	45	5.2	− 50.5	1.70329$_n$	3.40658	− 3.27	+ 0.07	− 3.20		16.40		13.20	+.02	1322	+.49
		59.3	46	28.1	− 125.4	2.09830$_n$	4.19660$_n$	− 8.12	+ 0.41	− 7.71		20.98		13.27	+.06	1333	+.60
	43	21.8			− 208.3	2.31869$_n$	4.63738$_n$	− 13.49	+ 1.14	− 12.35		23.80		11.45	+.10	1155	−1.18
		44.3														1273	±.74
	44	3.6												12.76	−.03		±.63
		26.5											5	12.73			
	42	59.833															

Feb. 28 1877 S Ursae Minoris Le. 6

			4	6.0													
			5	17.4													
h	m	s	6	9.1													
6	10	27.3	10	6.0	+ 451.7	2.65485	5.30970	− 35.63	− 6.58	− 42.21	56	30.27	55	48.06	−.06		
		46.0	11	25.3	+ 380.3	2.58013	5.16026	− 35.00	− 4.67	− 39.67		22.70		48.03	−.09		
	11	2.0	12	50.7	+ 328.6	2.51667	5.03334	− 25.92	− 3.48	− 29.40		18.10		48.70	+.58		
		21.0			+ 91.7	1.96237	3.92474	− 7.23	− 0.27	− 7.50		55.12		47.62	+.50		
		37.4			+ 12.4	1.09342	2.18684	− 0.98	− 0.00	− 0.98		49.10		48.12	.00		
		54.7			− 73.0	1.86332$_n$	2.72664$_n$	+ 5.76	− 0.17	+ 5.59		42.57		48.16	+.04		
	12	11.9															±.23
		31.0											55	48.12			±.19
		47.9															
	11	37.689															

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Th	Tc	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Reading	Corr Circ Red.

Feb. 28. 1877 57 H Cephei

h	m	s	m	s	δ									
6	41	31.7	41	1.0										
		51.9	41	43.6	+ 74.8	1.87390	3.74780	+4.80	+0.15	+4.95	5	6.25	5	11.20
	42	15.7	43	42.8	− 44.4	1.64738n	3.29476	−2.85	+0.05	−2.80		14.00		11.20
		38.0	44	33.6	− 95.2	1.97864n	3.95728	−6.11	+0.24	−5.87		17.30		11.13
		58.9	45	57.0	− 178.6	2.25188n	4.50376	−11.46	+0.84	−10.62		22.55		11.93
	43	20.0	46	59.0	− 248.6	2.38130n	4.76260	−15.43	+1.52	−13.91		25.35		11.44
		41.1	48	1.2	− 302.8	2.48116n	4.96232	−19.42	+2.41	−17.01		28.75		11.74
	44	3.0												
		24.9												
	42	58.356											5	11.44

−24	
−24	
−31	
+49	
00	
+30	
±29	
±25	

Mar. 1 1877 S Ursae Minoris L. C.

h	m	s	m	s										
6	10	29.7	3	6.0	+ 513.1	2.71020	5.42040	−40.15	−8.50	−48.65	56	38.45	55	49.80
		48.8	4	17.2	+ 441.9	2.64532	5.29064	−34.57	−6.30	−40.87		32.40		51.53
	11	4.2	5	20.7	+ 378.4	2.57795	5.15590	−29.61	−4.62	−34.23		25.18		50.95
		22.3	6	33.8	+ 303.3	2.48187	4.96374	−23.73	−2.97	−26.70		15.85		49.15
		39.3	9	29.8	+ 129.3	2.11160	4.22320	−10.12	−0.54	−10.66	55	57.98		49.32
		57.0	12	3.0	− 23.9	1.37840n	2.75680	+1.87	−0.02	+1.85		47.22		49.07
	12	14.6												
	12	32.0												
		49.8												
	11	39.11											55	49.97

−17	
+1.53	
+.92	
+8.2	
−6.5	
−.90	
±.42	
±.78	

Mar. 1 1877 57 H Cephei

h	m	s	m	s										
6	41	31.4	40	36.0	+ 140.5	2.14768	4.29536	+8.93	+0.52	+9.45	5	2.30	5	11.75
		54.0	42	23.0	+ 31.5	1.49831	2.99662	+2.00	+0.03	+2.03		10.20		12.23
	42	13.3	43	28.3	− 31.8	1.50243n	3.00486	−2.02	+0.03	−1.99		13.95		11.96
		35.2	44	29.5	− 93.0	1.96848n	3.93696	−5.91	+0.23	−5.68		17.85		12.17
		53.0	46	19.0	− 202.5	2.30643n	4.61286	−12.87	+1.08	−11.79		24.70		12.91
	43	16.8	47	13.2	− 256.7	2.40943n	4.81886	−16.32	+1.73	−14.59		26.42		11.83
		39.2												
	44	2.2												
		21.6												
	42	56.522											5	12.14

−.39	
+.09	
−.18	
+.03	
+.77	
−.31	
±.32	
±.27	

Mar. 4 1877 S Ursae Minoris L. C.

	h	m	s	m	s										
37.80	6	10	28.3	5	24.3	+373.3	2.57206	5.14412	−29.21	−4.50	−33.71	56	25.20	55	51.49
38.12			46.0	6	8.7	+327.9	2.51574	5.03148	−25.66	−3.47	−29.13		21.05		51.92
37.15		11	2.4	7	1.5	+276.1	2.44107	4.88214	−21.60	−2.46	−24.06		15.30		51.24
36.88			19.5	7	43.2	+234.4	2.36996	4.73992	−18.34	−1.77	−20.11		10.78		50.67
37.80			37.8	8	40.7	+176.9	2.24773	4.49546	−13.84	−1.01	−14.85		5.78		50.93
36.72			54.1	9	28.0	+128.6	2.10924	4.21848	−10.36	−0.63	−10.99		1.60		51.01
38.05		12	12.8	10	19.8	+ 77.8	1.89098	3.78196	−6.09	−0.19	−6.28				
38.88			30.5												
														55	51.21
	11	37.612													

+.28	
+.71	
+.03	
−.44	
−.28	
−.20	
±.37	
±.81	

Mar. 4 1877 57 H Cephei

	h	m	s	m	s										
	6	41	—	34	2.6	+531.9	2.72583	5.45166	+33.81	+7.42	+41.23	4	31.12	5	12.35
54.14		41	50.0	35	13.9	+460.6	2.66332	5.32664	+29.28	+5.57	+34.85		37.98		12.83
54.16		42	11.4	36	16.2	+398.3	2.60021	5.20042	+25.32	+4.16	+29.48		43.12		12.60
55.08			33.7	41	53.7	+ 60.8	1.78390	3.56780	+3.86	+0.10	+3.96	5	7.25		11.21
54.20			54.2	43	18.0	− 23.5	1.37107n	2.74214	−1.49	+0.01	−1.48		12.52		11.04
53.82		43	15.2	44	24.0	− 89.5	1.95182n	3.90364	−5.69	+0.21	−5.48				
53.93			36.7												
55.46			57.6												
55.07		44	20.6												
		42	54.482											5	12.20

+.34	
+.82	
+.59	
−.90	
−.87	
±.78	
±.66	

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						T₂	T₁	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ Read.			
Mar. 6 1877 S Ursae Minoris L.C.																		
	h	m	s	m	s						"	"	"	°	′	″		
37.30	6	10	27.8	4	37	+	453.3	2.65639	5.31278		−35.47	− 6.63	−42.10	56	36.05	55	53.95	+.81
37.32			45.2	5	32.0	+	365.0	2.56229	5.12458		−28.56	− 4.30	−32.86		26.52		53.66	+.02
36.55		11	1.8	6	48.0	+	294.0	2.46835	4.93670		−23.00	− 2.79	−25.79		19.80		54.01	+.37
35.18			17.8	7	46.7	+	231.3	2.36418	4.72836		−18.10	− 1.73	−19.83		13.22		53.39	−.25
37.00			37.0	8	44.8	+	172.2	2.23603	4.47206		−13.47	− 0.96	−14.43		7.85		53.42	−.22
37.02			54.4	9	38.0	+	119.0	2.07555	4.15110		− 9.31	− 0.46	− 9.77		3.18		53.41	−.23
38.75		12	13.3															±.25
36.88			29.0													55	53.64	±.21
			—															
		11	37.00															

						T₂	T₁	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ Read.			
Mar. 6. 1877 37 H Cephei																		
Ch. J.																		
	h	m	s	m	s													
	6	41		33	48.0													
				35	12.2													
				36	10.5													
				36	53.2													

						T₂	T₁	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ Read.			
Mar. 7. 1877 S Ursae Minoris L.C.																		
	h	m	s	m	s													
	6	10	28.0	6	39.2	+	298.7	2.47524	4.95048		−23.37	− 2.88	−26.25	56	18.10	55	51.85	+.48
			45.9	7	54.2	+	222.2	2.34674	4.69348		−17.39	− 1.59	−18.98		10.92		51.94	+.57
		11	3.4	9	15.3	+	142.6	2.15412	4.30824		−11.16	− 0.66	−11.82		2.95		51.13	−.24
			21.2	10	23.6	+	74.3	1.87099	3.74198		− 5.81	− 0.18	− 5.89	55	56.60		50.71	−.66
			37.4	11	24.8	+	13.1	1.11727	2.23454		− 1.02	− 0.00	− 1.02		52.42		51.40	+.03
			54.7	12	26.0	−	48.1	1.68215m	3.36430m		+ 3.76	− 0.07	+ 3.69		47.50		51.19	−.18
		12	12.9															±.39
			28.9													55	51.37	±.33
			48.6															
		11	37.878															

						T₂	T₁	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ Read.			
Mar. 7 1877 37 H Cephei																		
	h	m	s	m	s													
	6	41	26.0	41	4.3	+	101.7	2.02494	4.05388		+ 6.76	+ 0.30	+ 7.06	5	6.12	5	13.18	+.03
			45.6	42	20.7	+	30.0	1.47712	2.95424		+ 1.91	+ 0.02	+ 1.93		10.92		12.85	+.30
		42	8.3	43	19.4	−	28.1	1.45788m	2.91576m		− 1.82	+ 0.02	− 1.80		14.18		12.38	−.17
			29.4	44	49.3	−	118.6	2.07408m	4.14816m		− 7.54	+ 0.37	− 7.17		20.15		12.98	+.43
			50.8	47	0.2	−	249.5	2.39707m	4.79414m		− 15.86	+ 1.63	− 14.23		26.32		12.09	−.46
		43	11.4	47	47.5	−	296.8	2.47246m	4.94492m		− 18.87	+ 2.31	− 16.56		28.40		11.84	+.71
			32.8															±.49
			54.8													5	12.54	±.41
		44	15.8															
		42	50.689															

						T₂	T₁	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ Read.			
Mar. 11 1877 S Ursae Minoris L.C.																		
	h	m	s	m	s													
	6	10	24.2	4	42.9	+	413.2	2.61616	5.23232		−32.33	− 5.51	−37.84	56	30.55	55	52.71	+.30
			45.0	6	2.0	+	334.1	2.52388	5.04776		−26.14	− 3.60	−29.74		22.42		52.68	+.27
		11	0.3	7	8.0	+	268.1	2.42830	4.85660		−20.98	− 2.32	−23.30		15.50		52.20	−.21
			17.9	8	62	+	209.9	2.32201	4.64402		−16.42	− 1.42	−17.84		10.52		52.68	+.27
			36.7	9	7.8	+	148.3	2.17114	4.34228		−11.60	− 0.71	−12.31		5.10		52.79	+.38
			53.9	10	18.0	+	78.1	1.89265	3.78530		− 6.11	− 0.20	− 6.31	55	57.72		51.41	−1.00
		12	10.4															±.44
			30.0													55	52.41	±.37
			46.6															
		11	36.111															

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T8 TS T log T 2 log T Red I Red II Sum I + II Circle Reading Corr Circ Read

Mar. 11 1877 51 H Cephei

h	m	s	m	s	s						°	′	″	′	″	
6	41	20.3	40	49.1	+ 116.2	2.06521	4.13042	+ 7.38	+ 0.35	+ 7.73	5	6.38	5	14.11	-.46	
		42.2	42	16.4	+ 28.9	1.46090	2.92180	+ 1.84	+ 0.02	+ 1.86		12.15		14.01	-.56	
	42	1.3	43	54.6	− 69.3	1.84073$_n$	3.68146$_n$	− 4.40	+ 0.13	− 4.27		19.28		15.01	+.44	
		21.5	45	12.0	− 146.7	2.16643$_n$	4.33286$_n$	− 9.32	+ 0.56	− 8.76		23.85		15.09	+.52	
		43.0	46	13.2	− 207.9	2.31785$_n$	4.63570$_n$	− 13.22	+ 1.13	− 12.09		26.78		14.69	+.12	
	43	7.2	47	18.0	− 247.7	2.43569$_n$	4.87138$_n$	− 17.33	+ 1.95	− 15.38		29.90		14.52	-.05	
		27.8													±.39	
		49.7											5	14.57	±.33	
	44	13.0														
	42	45.333														

Mar. 11 1877 λ Ursae Minoris L. C.

h	m	s	m	s												
45 23.96 7	52	45.1	~~49~~	~~19.0~~	− 332.1	2.52127$_n$	5.04254	+ 8.19	− 1.12	+ 7.07	15	28.20	15	35.27	-.28	
24.78	54	36.2	50	56.5	− 390.8	2.59195$_n$	5.18390	+ 9.64	− 1.55	+ 8.09		26.68		34.77	-.78	
		—	51	53.2	− 461.4	2.66408$_n$	5.32816	+ 11.38	− 2.17	+ 9.21		27.10		36.31	+.76	
			53	5.8	− 525.6	2.72066$_n$	5.44132	+ 12.96	− 2.81	+ 10.15		24.70		34.85	-.70	
			54	10.0	− 576.2	2.76057$_n$	5.52114	+ 14.21	− 3.38	+ 10.83		25.35		36.18	+.63	
			55	0.6	− 661.7	2.82066$_n$	5.64132	+ 16.32	− 4.46	+ 11.86		24.05		35.91	+.36	
			56	26.1											±.64	
													15	35.55	±.54	
	45	24.370														

Mar 15 1877 51 H Cephei

h	m	s	m	s												
6	41	12.0	40	37.3	+ 12.21	2.08672	4.17344	+ 7.76	+ 0.39	+ 8.15	5	4.38	5	12.53	+.59	
		36.4	42	33.6	+ 5.8	0.76343	1.52686	+ 0.37	+ 0.00	+ 0.37		11.78 9.28		12.15	+.21	
		57.1	43	52.1	− 72.7	1.86153$_n$	3.76306$_n$	− 4.62	+ 0.15	− 4.47		15.98		11.51	-.43	
	42	16.8	45	15.0	− 155.6	2.19201$_n$	4.38402$_n$	− 9.89	+ 0.63	− 9.26		20.60		11.34	-.60	
		38.7	46	9.2	− 209.8	2.32181$_n$	4.64362$_n$	− 13.34	+ 1.15	− 12.19		24.58		12.39	+.45	
	43	1.8	47	3.5	− 264.1	2.42177$_n$	4.84354$_n$	− 16.79	+ 1.83	− 14.96		26.70		11.74	-.20	
		24.0													±.45	
		43.8											5	11.94	±.38	
	44	4.1														
	42	39.411														

Mar. 20 1877 51 H Cephei

h	m	s	m	s												
6	41	—	42	7.0	+ 23.9	1.37840	3.75680	+ 1.52	+ 0.15	+ 1.67	5	12.85	5	14.52	+.18	
31.98		27.8	43	13.9	− 43.0	1.63347$_n$	3.26694	− 2.73	+ 0.05	− 2.68		16.80		14.12	-.22	
30.58		47.8	44	17.5	− 106.6	2.02776$_n$	4.05552	− 6.78	+ 0.30	− 6.48		20.82		14.34	+.00	
30.49	42	9.1	45	27.2	− 176.3	2.24625$_n$	4.49250	− 11.21	+ 0.82	− 10.39		24.62		14.23	-.11	
31.10		31.1	46	54.4	− 263.5	2.42078$_n$	4.84156	− 16.75	+ 1.82	− 14.93		28.78		13.85	-.49	
31.51		52.9	47	42.1	− 311.2	2.49304$_n$	4.98608	− 19.78	+ 2.54	− 17.24		32.25		15.01	+.67	
30.32	43	13.1													±.50	
30.54		34.7											5	14.34	±.25	
30.95		56.5														
	42	30.932														

Mar. 20 1877 λ Ursae Minoris L. C.

h	m	s	m	s												
	—	—	58	46.8	− 504.9	2.70321$_n$	5.40642	+ 12.45	− 2.60	+ 9.85	15	22.12	15	32.07	+.26	
	—	—	55	6.6	− 584.7	2.76693$_n$	5.53386	+ 14.42	− 3.48	+ 10.94		20.45		31.59	-.22	
	—	—	56	48.0	− 686.1	2.83639$_n$	5.67278	+ 16.92	− 4.80	+ 12.12		19.85		31.97	+.16	
	—	—	58	1.8	− 759.9	2.88076$_n$	5.76152	+ 18.74	− 5.88	+ 12.86		18.75		31.61	-.20	
	—	—													±.24	
	—	—											15	31.81	±.20	
	—	—														
	[52]	—														
45 13.66 7	53	34.80														
30.18	54	41.60														
	45	21.920														

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Ta TS T logT 2logT Red I Red II Sum I+II Circle Reading Corr. Circ-Red

Apr. 9. 1877 λ Ursae Minoris Lo. C.

	h	m	s	m	s											
45	21.76	7	47	12.0	47	33.3	−1324	2.12189n	4.24378	+ 3.26	− 0.18	+ 3.08	15	15.70	15	18.78	−.34
	18.13		48	3.5	49	26.0	−243.1	2.38578n	4.77156	+ 5.99	− 0.60	+ 5.39		13.65		19.04	−.08
	22.20		49	2.7	50	53.1	−3322	2.52140n	5.04280	+ 8.19	− 1.12	+ 7.07		12.25		19.32	+.20
					53	0.6	−457.7	2.66058n	5.32116	+ 11.29	− 2.13	+ 9.16		10.92		20.08	+.96
				—	55	31.7	−608.8	2.78447n	5.56894	+ 15.01	− 3.78	+ 11.23		7.78		19.01	−.11
	25.81		52	46.8	56	56.2	−693.3	2.84092n	5.68184	+ 17.09	− 4.90	+ 12.19		6.28		18.47	−.65
	26.76		54	38.0													±.43
															15	19.12	±.36

45 22.932

Apr. 9–10 1877. Polaris

	h	m	s	m	s											
	1.	18	27.6	15	40.3	−183.9	2.26458n	4.52916	− 5.70	+ 0.43	− 5.27	40	12.55	40	7.28	−.80
				17	25.8	−289.4	2.46150n	4.92300	− 8.96	+ 1.07	− 7.89		15.87		7.98	−.10
				18	15.9	−339.5	2.53084n	5.06168	− 10.52	+ 1.47	− 9.05		17.45		8.40	+.32
				19	25.5	−409.1	2.61183n	5.22366	− 12.67	+ 2.14	− 10.53		19.18		8.65	+.57
																±.51
														40	8.08	±.43

12 36.40

Apr. 10–11 1877 Polaris

	h	m	s	m	s											
	1	9	40.7	3	53.4	+520.8	2.71667	5.43334	+ 16.13	+ 3.47	+ 19.60	39	50.42	40	10.02	+1.39
				5	43.6	+412.6	2.61553	5.23106	+ 12.78	+ 2.18	+ 14.96		53.88		8.84	+.21
			—	7	4.0	+332.2	2.52140	5.04280	+ 10.29	+ 1.41	+ 11.70		56.72		8.42	−.21
			—	7	46.6	+289.6	2.46180	4.92360	+ 8.97	+ 1.07	+ 10.04		58.25		8.29	−.34
			—	9	17.0	+199.2	2.29929	4.59858	+ 6.17	+ 0.51	+ 6.68	40	1.58		8.26	−.37
			—	14	6.3	−90.1	1.95472n	3.90944	− 2.79	+ 0.10	− 2.69		16.72		14.03	
			—	20	49.7	−493.5	2.69329n	5.38658	− 15.29	+ 3.12	− 12.17		20.15		7.98	−.65
	12	36.30		—	21	54.6	−558.4	2.74695n	5.49390	− 17.30	+ 3.99	− 13.31		21.92		8.61	−.02
	12	34.10	18	26.3													±.49
		38.00	19	57.0											40	8.63	±.41
		36.31	21	23.0													

12 36.178

Apr. 12 – 1877 Polaris

	h	m	s	m	s											
	1	9	36.7	6	16.0	+376.8	2.57611	5.15222	+ 11.67	+ 1.82	+ 13.49	39	51.98	40	5.47	−.23
		10	23.7	7	31.4	+301.4	2.47914	4.95828	+ 9.34	+ 1.16	+ 10.50		54.75		5.25	−.45
		11	7.0	10	19.4	+133.4	2.12516	4.25032	+ 4.13	+ 0.23	+ 4.36		1.48		5.84	+.14
		11	37.0	12	3.5	+29.3	1.46687	2.93374	+ 0.91	+ 0.01	+ 0.92		6.15		7.07	+1.37
		12	34.0	14	14.2	−101.4	2.00604n	4.01208	− 3.14	+ 0.13	− 3.01		8.42		5.41	−.29
		13	14.7	15	13.0	−160.2	2.20466n	4.40932	− 4.96	+ 0.33	− 4.63		9.78		5.15	−.55
		14	0.1													±.55
		14	41.1											40	5.70	±.46
		15	26.8													

12 32.789

Apr. 22 – 1877 Polaris

	h	m	s	m	s											
	1	9	27.8	8	22.5	+543.9	2.73552	5.47104	+ 16.85	+ 3.79	+ 20.64	39	46.05	40	6.69	−.48
		10	13.9	4	5.1	+501.3	2.70010	5.40020	+ 15.53	+ 3.22	+ 18.75		49.48		8.23	+1.06
		10	53.0	5	23.1	+423.3	2.62665	5.25330	+ 13.11	+ 2.29	+ 15.40		51.85		7.25	+.08
		11	42.3	6	21.4	+365.0	2.56229	5.12458	+ 11.31	+ 1.70	+ 13.01		54.42		7.43	+.26
		12	31.0	7	41.0	+285.4	2.45545	4.91090	+ 8.84	+ 1.04	+ 9.88		57.22		7.10	−.07
		13	10.2	8	56.5	+209.9	2.32201	4.64402	+ 6.50	+ 0.56	+ 7.06		59.55		6.61	−.56
		13	58.6	10	45.1	+101.3	2.00561	4.01122	+ 3.14	+ 0.13	+ 3.27					
		14	34.6	14	26.2	−119.8	2.07846n	4.15692	− 3.71	+ 0.18	− 3.53	40	10.42		6.89	−.28
		15	24.3													±.43
														40	7.17	±.36

12 26.411

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T2	TS	T	logT	2logT	Red I	Red II	Sum I+II Readings	Circle Corr Circ Read

Apr. 25 - 1877 Polaris

h	m	s	m	s	a				Circ. Read ′	″	Sum. ″	′	″	
1	9	42.4	5	12.7	+ 446.0	2.64933	5.29866	+ 13.82 + 2.55	49	57.60	+ 16.37	50	13.69	+ .13
	10	27.5	6	57.9	+ 346.8	2.54008	5.08016	+ 10.74 + 1.54	50	6.80	+ 12.28		13.08	- .48
	11	10.5	8	29.8	+ 248.9	2.39602	4.79264	+ 7.71 + 0.79		5.80	+ 8.50		14.30	+ .74
	11	53.8	9	47.6	+ 171.1	2.23325	4.46650	+ 5.30 + 0.37		7.08	+ 5.67		12.75	- .81
	12	39.6	11	24.3	+ 74.4	1.87157	3.74314	+ 2.30 + 0.07		11.45	+ 2.37		13.82	+ .26
	13	21.8	(12	5.1)										
	14	6.3	12	21.8	+ 16.9	1.22789	2.45578	+ 0.51 + 0.00		12.50	+ 0.51		13.01	- .55
	14	49.6	13	57.0	- 78.3	1.89376m	3.78752	- 2.43 + 0.08		16.55	- 2.35		14.20	+ .64
	15	36.5	15	48.9	- 190.2	2.27921m	4.55842	- 5.89 + 0.46		19.08	- 5.43		13.65	+ .09
														±.49
	12	38.667										50	13.56	±.41

May 12 - 1877 Polaris L.C.

13	8	26.4	5	10.0	+ 372.1	2.57066	5.14132	- 11.53 - 1.77	9	1.25	- 13.30	8	47.95	+ .16
	9	9.7	6	46.9	+ 296.2	2.44122	4.88244	- 8.56 - 0.98	8	57.67	- 9.54		48.13	+ .33
	9	54.6	8	5.0	+ 194.1	2.29469	4.58938	- 6.10 - 0.50		53.97	- 6.60		47.37	- .43
	10	36.8	9	21.3	+ 120.8	2.08207	4.16414	- 3.74 - 0.123		51.42	- 3.97		47.43	- .35
	11	23.5	10	38.2	+ 43.9	1.64246	3.28492	- 1.36 - 0.02		49.30	- 1.38		47.92	+ .12
	12	6.0	12	10.0	- 47.9	1.68034m	3.36068	+ 1.48 - 0.03		46.52	+ 1.45		47.97	+ .17
	12	49.8												±.28
	13	34.2										8	47.80	±.24
	14	18.3												
	11	22.144												

May 13 - 1877 Polaris L.C.

13	8	25.6	4	43.0	+ 480.7	2.60282	5.20564	- 12.41 - 2.05	9	1.72	- 14.46	8	47.26	+ .44
	9	12.0	6	42.4	+ 281.3	2.44917	4.89834	- 8.71 - 1.01	8	56.97	- 9.72		47.25	+ .43
	9	55.8	7	53.3	+ 210.4	2.32305	4.64610	- 6.52 - 0.57		54.03	- 7.09		46.94	+ .12
	10	40.0	9	23.9	+ 119.8	2.07846	4.15692	- 3.71 - 0.18		50.32	- 3.89		46.43	- .39
		—	10	48.3	+ 35.4	1.54900	3.09800	- 1.10 - 0.02		47.67	- 1.12		46.55	- .27
	12	7.8	12	16.7	- 53.0	1.72428m	3.44856	+ 1.64 - 0.04		44.90	+ 1.60		46.50	- .32
	12	53.7												±.36
	13	35.4										8	4682	±.30
	14	19.1												
	11	23.675												

May 16 - 1877 Polaris L.C.

h	m	s	m	s										
13	8	22.3	3	58.3	+ 444.6	2.64797	5.29594	- 13.71 - 2.53	9	2.15	- 16.21	8	45.91	+ .08
	9	3.7	4	39.0	+ 398.9	2.60056	5.20172	- 12.30 - 2.04		0.25	- 14.34		45.91	+ .08
	9	57.3	6	6.0	+ 311.9	2.49402	4.98804	- 9.62 - 1.25	8	56.85	- 10.87		45.98	+ .15
X	10	54.0	7	37.0	+ 220.9	2.34420	4.68840	- 6.81 - 0.63		53.52	- 7.44		46.08	+ .25
	11	12.7	9	21.0	+ 116.9	2.06781	4.13562	- 3.60 - 0.18		49.22	- 3.78		45.44	- .39
	12	3.0	10	23.4	+ 54.5	1.73640	3.47280	- 1.68 - 0.04		47.37	- 1.72		45.65	- .18
	12	45.4												±.21
	13	28.2										8	45.83	±.18
	14	13.4												
	11	17.889												

May 16 - 1877 Polaris. Morning.

Ex

h	m	s	m	s
1	8	41.6	9	17.7
	9	20.2	9	46.5
X	11	17.6	10	18.4
	(12	44.0)	12	3.0
	12	57.1	12	44.0
	14	47.8	14	55.8
	15	14.1	15	22.8
	16	5.8		
	17	44.6		

50	8.00	
	10.52	
	13.92	
	18.07	
	18.90	
	21.62	

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Tz TS T log T 2 log T Red I Red II Sum I + II Circle Readings Corr. Circle Corr. Read.

ref (22)?

May 23, 1877 Polaris. Morning.

h	m	S	m	S
1	15	45.5	15	20.5
	17	39.8	17	27.8
	18	42.3	18	23.0
	20	10.8	19	8.3
	21	38.8	20	34.8
			21	53.6

" " " 50 30.30
31.70
33.00
34.55

ref

May 28, 1877 Polaris. L.C.

h	m	S	m	S
13.		—	11	10.0
		—	13	5.0
		—	14	54.5
14 50.91	11	43.7	16	38.7
57.92	12	24.5		

8 45.05
31.72
27.42
26.90
25.15
23.92

May 28, 1877 Polaris. Morning

h	m	S	m	S
11 31.86	8	36.7	5	29.9
34.67	9	23.3	10	53.3
33.99	10	07.7	12	48.6
37.60	11	37.6	13	57.4
35.31	13	19.1	16	53.4
33.93	13	45.3		
	11	34.56		

(50 13.00)
21.30
24.52
27.07
30.67

May 29, 1877 Polaris. L.C.

h	m	S	m	S										
11 11.33	13	13	22.7	3	5.0	+486.6	2.68717	5.37434	−1501	−3.04	−1805	9	2.37	8 44.32 +36
11.84		14	7.0	4	6.4	+425.2	2.62859	5.25718	−1311	−2.32	−1543	8	38.82	43.39 −57
		Eccl 2 wires		5	2.4	+369.2	2.56726	5.13452	−1139	−1.75	−1314		57.25	44.11 +13
				6	12.7	+318.9	2.50365	5.00730	−983	−1.30	−1113		57.42	45.29 +133
				13	7.9	−116.3	2.06558	4.13116	+359	−0.17	+342		38.80	43.22 −74
	11	11.585	14	14.2	−182.6	2.26150	4.52300	+563	−0.43	+520			38.20	43.40 −56
														±67
												8	43.96	±57

May 30, 1877 Polaris. Morning

50 8.40
11.80
13.15
15.25
19.95
21.77

May 29 1877 Polaris Morning

ref

h	m	S
1	10	54.7
	11	43.0
	12	22.0
	13	8.2
	13	53.1
	14	36.3
	15	19.3
13 52.389	16	5.4

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Tx TS T log T 2 log T Red I Red II Sum I+II Circle Readings Corr Circle Read. Circle Read Sum.

May 30, 1877 Polaris L.C. J.F.M.

h	m	S	m	S	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr Circle Read.	Circle Read Sum.
11 12 49	10	28.9	12 55	17.8	+9535	2.97932	5.95864	−29.41	−11.66		9 26.07	−41.07	8 45.00 +.53
10.80	11	10.8	56	20.2	+8911	2.94993	5.89986	−27.48	−10.18		22.45	−37.66	44.89 +.42
12.73	—	—	57	16.3	+8350	2.92169	5.84338	−25.75	−8.94		19.25	−34.69	44.56 +.09
9.04	13	24.1	13 5	25.6	+3457	2.53870	5.07740	−10.66	−1.53		8 56.35	−12.19	44.16 −.31
	14	4.2	10	7.2	+14.1	1.14922	2.29844	−0.44	−0.00		45.20	−0.44	44.76 +.29
			14	14.5	−183.2	2.26293$_n$	4.52586	+5.65	−0.43		38.22	+5.22	43.44 −1.03
	[17	43.5]											±.49
													8 44.47 ±.41
	11	11.315											

May 31, 1877 Polaris L.C. J.F.M.

h	m	S	m	S	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr Circle Read.	Circle Read Sum.
13	8	14.4	5	24.7	+3465	2.53970	5.07940	−10.69	−1.54		8 56.97	−12.23	8 44.74 +.22
	9	0.3	6	16.8	+2964	2.47188	4.94376	−9.14	−1.13		53.72	−10.27	43.45 −.07
	9	41.7	7	47.4	+2058	2.31345	4.62690	−6.35	−0.64		50.85	−6.89	43.96 +.44
	10	29.5	9	21.0	+1122	2.04999	4.09998	−3.46	−0.16		46.60	−3.62	42.98 −.54
	11	9.8	10	35.8	+37.4	1.57287	3.14574	−1.15	−0.02		44.37	−1.17	43.20 −.32
	11	32.7	11	43.5	−30.3	1.48144$_n$	2.96288	+0.93	−0.01		41.87	+0.92	42.79 −.73
	12	38.0											±.60
	13	26.2											8 43.52 ±.50
	14	18.0											
	11	13.178											

June 2, 1877. Polaris L.C. J.F.M.

h	m	S	m	S	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr Circle Read.	Circle Read Sum.
13		—	12 55	23.0	+9464	2.97607	5.95214	−29.19	−11.49		9 26.50	−40.68	8 45.82 +1.50
		—	56	26.9	+8825	2.94571	5.89142	−27.22	−9.99		22.67	−37.21	45.46 +1.14
		—	57	27.9	+8215	2.91461	5.82922	−25.34	−8.65		18.75	−33.99	44.76 +.44
11 9.39	10	25.6	5	18.7	+3507	2.54494	5.08988	−10.82	−1.58		8 56.27	−12.40	43.87 −.45
9.10	11	9.1	8	47.6	+81.8	1.91275	3.82550	−2.52	−0.09		45.57	−2.61	42.96 −1.36
9.83	—	—	13	24.0	−134.6	2.12905$_n$	4.25810	+4.15	−0.23		39.10	+3.92	43.02 −1.30
9.44	—	—											±1.13
	13	21.2											8 44.32 ±.95
	14	4.6											
	11	9.440											

June 4, 1877 Polaris L.C. J.F.M.

h	m	S	m	S	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr Circle Read.	Circle Read Sum.
13		—	1	22.6	+585.1	2.76723	5.53446	−18.05	−4.39		9 6.87	−22.44	8 44.43 +.35
		—	2	18.0	+530.7	2.72485	5.44970	−16.37	−3.61		3686.17	−19.98	43.70 −.38
		—	4	10.6	+418.1	2.62128	5.24256	−12.90	−2.24		8 59.22	−15.14	44.08 +.00
		—	5	7.0	+361.7	2.55835	5.11670	−11.16	−1.68		57.60	−12.84	44.76 +.65
		—	5	57.5	+311.2	2.49304	4.98608	−9.60	−1.24		54.75	−10.84	43.91 −.17
		—	6	47.1	+261.6	2.41764	4.83528	−8.07	−0.88		52.55	−8.95	43.60 −.48
		—	7	...									±.37
11 8.83	13	20.2											8 44.08 ±.31
8.64	14	3.8											
	11	8.735											

June 17, 1877 Polaris L.C. J.F.M.

h	m	S	m	S	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr Circle Read.	Circle Read Sum.
13	8	24.8	4	21.8	+4193	2.62252	5.24504	−12.93	−2.25		8 59.85	−15.18	8 44.67 +.44
	9	8.2	6	14.2	+304.9	2.48416	4.96832	−9.40	−1.19		54.70	−10.59	44.11 −.12
	10	39.6	7	57.2	+203.9	2.30942	4.61884	−6.29	−0.53		51.42	−6.82	44.60 +.37
	11	21.2	9	22.1	+119.6	2.07555	4.15110	−3.67	−0.18		47.50	−3.85	43.65 −.58
	12	4.2	10	44.5	+36.6	1.56348	3.12696	−1.13	−0.02		45.05	−1.15	43.90 −.33
	13	55.9	11	55.1	−34.0	1.53148$_n$	3.06296	+1.05	−0.01		42.70	+1.04	43.74 −.49
	14	16.6	13	45.9	−144.8	2.16077$_n$	4.32154	+4.47	−0.27		40.77	+4.20	44.97 +.74
													±.47
	11	21.056											8 44.23 ±.40

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	T2	TS	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Reading	Corr Circ. Read.			

June 18, 1877 Polaris L.C. J.F.M.

h	m	s	m	s											
11 24.28	13	18	42.1	18	49.1	−444.1	2.64748	5.29496	+13.70	−2.53	+11.17	8	31.38	8	42.55	−.39
25.71		20	11.1	19	24.9	−481.9	2.68296	5.36592	+14.86	−2.98	+11.88		30.40		42.28	−.16
				20	16.8	−531.8	2.72575	5.45150	+16.40	−3.63	+12.77		30.47		43.24	+.80
	A_+	1	42	21	25.4	−600.4	2.77844	5.55688	+18.32	−4.62	+13.90		29.12		43.02	+.08
				22	3.1	−640.1	2.80625	5.61250	+19.74	−5.25	+14.49		29.10		43.59	+.65
				22	50.2	−685.2	2.83582	5.67164	+21.13	−6.02	+15.11		27.32		42.43	−.51
																±.38
	11	24.995												8	42.94	±.32

June 19, 1877. Polaris L.C. J.F.M.

h	m	s	m	s											
	13	8	30.3	6	47.3	+278.8	2.44529	4.89058	−8.60	−1.00	−9.60	8	52.75	8	43.15	+.91
11	25.43	—	—	7	37.1	+215.0	2.33244	4.66488	−6.63	−0.59	−7.22		50.50		43.28	+1.04
	26.06	9	38.5	9	48.1	+103.0	2.01284	4.02568	−3.18	−0.14	−3.32		45.52		42.20	−.04
	26.18	10	42.4	11	0.2	+25.9	1.41330	2.82660	−0.80	−0.01	−0.81	42	28 54.77		41.47	−.77
	25.60	11	25.6	13	8.4	−102.3	2.00988	4.01976	+3.15	−0.13	+3.02	39	58 49.57		42.60	+.36
	24.82	12	8.6	14	13.2	−167.1	2.22298	4.44596	+5.18	−0.36	+4.79		35.95		40.74	−1.50
	26.34	12	53.8													±.84
	26.95	13	38.0											8	42.24	±.71
	27.37	14	22.7													
	11	26.081														

June 20, 1877 Polaris L.C. J.F.M.

h	m	s	m	s											
11 23.78	13	18	41.6	17	52.0	−387.2	2.58794	5.17588	+11.94	−1.92	+10.02	8	33.67	8	43.69	+.15
21.91		20	7.3	18	33.2	−452.4	2.65552	5.31104	+13.95	−2.62	+11.33		31.77		43.10	−.44
				20	24.8	−544.0	2.73560	5.47120	+16.78	−3.80	+12.98		30.30		43.28	−.26
	A_+	1	52	21	58.0	−627.2	2.79741	5.59482	+19.34	−5.04	+14.30		29.95		44.25	+.71
				22	54.1	−691.3	2.83962	5.67934	+21.32	−6.13	+15.19		28.35		43.54	+.00
				25	0.0	−817.2	2.91233	5.82466	+25.20	−8.56	+16.64		26.77		43.41	−.13
																±.31
	11	22.845												8	43.54	±.26

June 24, 1877 Polaris L.C. J.F.M.

h	m	s	m	s											
11 32.91	13	20	18.3	19	23.4	−470.7	2.67274	5.34548	+14.52	−2.84	+11.68	8	30.05	8	41.73	+.30
		A_+	1	20	42.0	−549.3	2.73981	5.47962	+16.94	−3.87	+13.07		28.05		41.12	−.31
				21	53.3	−626.6	2.79699	5.59398	+19.33	−5.03	+14.30		26.95		41.25	−.18
				23	29.4	−716.7	2.85534	5.71068	+22.10	−6.59	+15.51		26.10		41.61	+.18
			24	41.5	24	38.5	−785.8	2.89531	5.79062	+24.23	−7.92	+16.31		25.17		41.48	+.05
		A_+	26	12.7	25	39.2	−846.5	2.92763	5.85526	+26.11	−9.19	+16.92		24.47		41.39	−.04
			27	39.7												±.14
	26 12.63													8	41.43	±.16
	13 12.47															
	13 0.16															
	11 32.60	11	32.678													
	180															
	21															
	271															

June 25, 1877 Polaris L.C. J.F.M.

h	m	s	m	s											
	13	—	—	12	29.0	−56.7	1.75358	3.50716	+1.75	−0.04	+1.71	8	38.55	8	40.26	−.03
		—	—	13	52.6	−138.5	2.14145	4.28290	+4.27	−0.25	+4.02		36.90		40.92	+.63
11	33.96	10	6.4	15	0.3	−208.0	2.31806	4.63612	+6.41	−0.56	+5.85		35.05		40.90	+.61
	31.98	10	48.2	16	25.3	−293.0	2.46687	4.93374	+9.04	−1.10	+7.04		32.12		39.16	−1.13
	32.60	11	32.6	19	9.6	−458.3	2.66020	5.32040	+13.78	−2.68	+11.10		29.20		40.30	+.01
	31.42	12	15.2	19	22.0	−469.7	2.67182	5.34364	+14.49	−2.83	+11.66		28.52		40.18	−.11
	32.44	13	0.0													±.46
	31.65	13	43.0											8	40.29	±.39
	32.27	14	27.4													
		11	32.331													

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June 27, 1877 Polaris L.C. J.F.M.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read.		
											′	″		
11	13	21	21.7	21	45.0	−611.0	2.78604	5.57208	+18.85	−4.79	8	30.34	+14.06	8 44.40 +1.79
12	36.31	24	23.3	25	53.6	−859.6	2.93430	5.86860	+26.51	−9.48		24.62	+17.03	41.65 −.96
		25	44.0	27	16.7	−942.7	2.97437	5.94874	+29.07	−11.40		24.27	+17.67	41.94 −.67
Δ_{+2}	1.235	27	14.0	28	46.8	−1032.8	3.01402	6.02804	+31.85	−13.68		25.15	+18.17	43.32 +.71
25	50.86	28	37.6	29	52.8	−1096.8	3.04013	6.08026	+33.83	−15.43		23.35	+18.40	41.75 −.86
13	44.00			31	12.6	−1178.6	3.07137	6.14274	+36.35	−17.82		24.05	+18.53	42.58 −.03
13	46.44	11												+.91
	42.47	12	34.048											8 42.61 ±.77
25	45.94													
12	33.47													
	13.88													
	6.31													
	20.19													

July 24, 1877 S Ursae Min. W.A.R.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read.		
											′	″		
32.55	18	11	39.8	6	20.3	+372.6	2.57124	5.14248	+29.21	+4.47	51	57.05	+33.68	52 30.73 +.69
32.53		11	57.7	8	40.8	+232.1	2.36568	4.73136	+18.20	+1.73	52	9.82	+19.93	29.75 −.29
33.22		12	13.8	10	21.0	+131.9	2.12024	4.24048	+10.34	+0.56		18.67	+10.90	29.57 −.47
33.10		12	32.1	13	52.0	−49.1	1.89818	3.79636	−6.20	+0.20		36.20	−6.00	30.20 +.16
32.48		12	48.9	15	24.0	−171.1	2.23325	4.46650	−13.41	+0.94		42.40	−12.47	29.93 −.11
32.97		13	7.8											±.38
33.55		13	23.8											52 30.04 ±.32
32.94		13	42.6											
		12	32.855											

July 25, 1877 51 Cephei L.C. W.A.R.

m	s	m	s										
											′	″	
40	23.0	36	24.9	+323.5	2.60987	1.31795	+−20.79	−2.75	−2.354	43	34.62	43 11.08	−.01
40	43.5	38	42.2	+182	2.26998	1.07806	+−11.87	−0.91	−13.88		24.37	11.49	+.40
41	5.1	43	27.6	−99.2	1.99651	0.80459	+ 6.38	−0.26	+6.12		487	10.78	−.11
41	26.4	45	42.3	−233.9	2.36903	1.17711	+ 15.83	−1.44	+13.55	42	57.67	11.26	+.17
41	48.3	47	15.0	−326.6	2.51402	1.32210	+ 20.99	−2.80	+18.19		52.45	10.64	−.45
42	10.6												±.25
42	30.5											43 10.92	
42	53.7											11.09	±.21
43	14.8												
m	s												
41	48.433												

July 29 1877 S Ursae Min. J.F.M.

m	s	m	s										
											′	″	
11	24.4	4	40.0	+474.2	2.67596	1.57204	+ 37.33	+ 7.25	+44.58	51	45.25	52 29.83	−.20
11	41.8	5	46.0	+408.2	2.61087	1.50695	+ 32.13	+ 5.38	+37.51		52.67	30.18	+.15
12	0.3	6	47.0	+347.2	2.54058	1.43666	+ 27.33	+ 3.89	+ 31.22		58.77	29.99	−.04
12	17.2	8	17.8	+256.4	2.40892	1.30500	+ 20.18	+ 2.12	+ 22.30	52	8.05	30.35	+.32
12	34.6	9	27.0	+187.2	2.27230	1.16838	+ 14.34	+ 1.43	+ 15.87		13.90	29.77	−.26
12	51.6	10	49.0	+105.2	2.02202	1.91810	+ 8.28	+ 0.36	+ 8.64		21.40	30.04	+.01
13	8.2												±.18
13	26.8											52 30.03	±.15
13	43.1												
12	34.22												

Aug. 6 1877 S Ursae Min. J.F.M.

m	s	m	s										
											′	″	
11	29.4	7	8.7	+328.2	2.51614	1.41222	+20.83	+ 3.47	+ 29.30	51	56.95	52 26.25	+.11
11	46.6	8	34.8	+242.1	2.38399	1.28007	+ 17.05	+ 1.89	+ 20.94	52	5.27	26.21	+.07
12	3.6	9	57.1	+158.2	2.20358	1.09966	+ 12.58	+ 0.82	+ 13.40		13.20	26.60	+.46
12	20.7	11	23.5	+73.4	1.86578	0.76178	+ 5.78	+ 0.17	+ 5.95		20.10	26.05	−.09
12	38.8	12	34.4	+2.5	0.39794	9.29402	+ 0.20	+ 0.00	+ 0.20		25.55	25.75	−.39
12	39.4	13	59.0	−82.1	1.91431	0.81039	− 6.46	+ 0.22	− 6.24		32.20	25.96	−.18
12	55.6												±.24
13	13.6											52 26.14	±.20
13	29.8												
12	36.44												

$\upsilon = 86°\,36'\,33''$ cos 8.77197 log 6 = 88608 Cor^{n} 5.50765

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T2 TS T log T 2 log T Rad I Rad II Sum Circle Corr
I+II Readings Circ. Read.

log II = 5.42022
log coord = 8.80508

cos δ 8.68397
δ = 87 13 5-3

Aug. 6, 1877 51 Cephei L.C.

J.F.M.

Cloud in Rad sunny

m	s	m	s											
40	34.6	35	39.1	+3820	2.58206	1.39014	+24.56	− 3.84	− 28.40	43	37.12	48	8.72	+.78
40	56.9	36	49.4	+3117	2.49374	1.30182	+20.04	− 2.56	− 22.60		30.15		7.55	−.39
41	19.8	38	24.0	+2171	2.33666	1.14474	+13.96	− 1.23	− 15.19		24.27		9.08	+1.14
		39	48.1	+1330	2.12385	1.93173	+ 8.58	− 0.46	− 9.01		17.00		7.59	+.05
42	1.2	41	9.0	+ 521	1.71684	1.52482	+ 3.32	− .07	− 3.39		10.85		7.46	−.48
		43	18.2	− 741	1.86982	0.67790m	+ 4.76	− 1.45	+ 3.31		3.50		6.81	−1.13
42	42.6													±.72
43	4.1									43	7.94			±.61
43	28.5													

42 1.100

Aug. 8, 1877 S Ursae Min.

Does new value of Tm alter anything?

J.F.M.

L	m	s	m	s										
18	11	29.7	8	44.8	+2349	2.37088	1.26696	+ 18.49	+1.78	+20.27	52	6.15	52 26.37	+.39
39.36	11	47.7	9	43.4	+1763	2.24625	1.14233	+ 13.88	+1.00	+14.88		11.05	25.93	−.05
39.95	12	6.6	10	46.3	+1134	2.08461	0.95069	+ 8.93	+0.01	+ 9.34		17.20	26.54	+.56
40.43	12	22.4	12	12.8	+ 269	1.42975	0.32583	+ 2.12	+0.02	+ 2.14		24.10	26.24	+.26
39.82	12	39.5	13	7.2	− 275	1.43933	0.33541	− 2.17	+0.02	− 2.15		26.95	24.80	−1.18
39.50	12	57.3												±.54
39.88											52	25.98		±.46

12 39.823
~~12 39.7~~

Aug. 11, 1877 51 Cephei L.C.

J.F.M.

m	s	m	s											
40	47.2	35	41.3	+3504	2.59151	1.39955	− 25.10	− 4.01	− 29.11	43	33.80	43	4.69	−.66
41	7.7	37	0.6	+3111	2.49290	1.30098	− 20.00	− 2.55	− 22.55		28.87		6.32	+.97
41	28.8	38	18.0	+2337	2.26866	1.17674	− 15.02	− 1.44	− 16.46		21.72		5.26	−.09
41	50.7	39	48.3	+1434	2.15653	0.96463	− 9.22	− 0.54	− 9.76		15.17		5.41	+.06
42	11.0	41	8.4	+ 623	1.80740	0.60948	− 4.07	− 0.10	− 4.17		9.60		5.43	+.08
42	31.2	42	12.0	− 0.3	9.47712	8.28520m	+ 0.62	− 0.00	+ 0.02		4.95		4.97	−.38
42	54.6													±.41
43	16.4									43	5.35			±.35
43	37.3													

42 11.656

Aug. 12, 1877 51 Cephei L.C.

J.F.M.

m	s	m	s											
40	45.3	35	9.1	+4234	2.62675	1.43483	− 27.22	− 4.71	− 31.93	43	37.40	43	5.47	+.27
41	9.0	35	55.3	+3772	2.57657	1.38465	− 24.25	− 3.74	− 27.99		33.72		8.73	+.53
41	30.0	36	39.5	+3339	2.52244	1.33052	− 21.41	− 2.92	− 24.33		29.05		6.72	−.48
41	52.2	38	6.6	+2459	2.39076	1.19884	− 15.77	− 1.59	− 17.36		22.47		5.11	−.09
42	12.3	38	52.8	+1997	2.30038	1.10846	− 12.84	− 1.05	− 13.89		18.85		4.96	−.24
42	33.5	39	47.7	+1548	2.18977	0.99785	− 9.95	− 0.63	− 10.58		13.87		3.29	±.36
42	54.8											43	~~4.88~~ 5.20	±.30
43	17.0													
43	38.2													

42 12.478

Aug. 11, 1877 S Ursae Min.

J.F.M.

L	m	s	m	s										
18	11	28.8	10	3.70	+1223	2.08743	0.98351	+ 9.63	+ 0.05	+9.68	52	15.37	52 25.05	+.29
	11	47.1	11	22.18	+ 772	1.88762	0.78370	+ 6.08	+ 0.02	+6.10		18.80	[27.90]	
	12	3.9	12	47.0	− 77	0.88649m	9.78257m	− 0.61	+ 0.00	−0.61		25.45	24.84	+.08
	12	22.6	13	39.0	− 697	1.84323m	0.73831m	− 5.48	+ 0.02	−5.46		30.90	25.42	+.66
	12	39.1	14	58.0	−1387	2.14208m	1.03816m	− 10.92	+ 0.06	−10.86		35.35	24.49	−.27
	12	55.8	16	0.8	−2007	~~2.14208m~~ 2.30255m	1.19863m	− 15.80	+ 0.13	−15.67		39.65	23.98	−.78
	13	14.6												±.46
	13	32.3									52	24.76		±.39
	13	49.1												

12 39.256

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Aug 16, 1877 S Ursae Minoris

J. F.M.

	τα	τδ	τ	log τ	2 log τ	Red I	Red II	Sum	Circle Readings	Corr. Circ. Read.	
	h m s	m s									
	18 11 34.7	11 24.5	+ 139.9	2.14582	4.29164	+ 10.97	+0.63	+ 11.60	52' 10.52	52' 22.12	+45
	11 52.3	11 42.2	+ 102.2	2.00945	4.01890	+ 8.02	.33	+ 8.35	13.20	21.55	−.12
	12 9.7	12 5.7	+ 62.5	1.79588	3.58176	+ 4.90	.12	+ 5.02	16.88	21.90	+23
	12 27.1	12 24.8	− 11.0	1.04139n	2.08278	− .86	.00	− .86	22.18	21.32	−.30
	12 45.8	12 44.4	− 40.1	1.60314n	3.20628	− 3.14	.05	− 3.09	24.70	21.61	−.06
	13 2.0	13 1.4	− 83.7	1.92273n	3.84546	− 6.56	+ .23	− 6.33	27.88	21.55	−.12
	13 18.4										±.24
	13 37.2									52 21.875	
	13 54.8									.67	±.20
	2820										
	4020										
	12 44.67										

Aug 16, 1877 37 Cephei L. C.

J. F.M.

	h m s	m s									
	18 38 20.0	35 0.7	+ 436.9	2.64038	5.28076	− 27.99	− 5.02	−33.01	43 38.53	43 2.54	+.46
Δ+	24.1 38 44.7	35 17.8	+ 419.8	2.62304	5.24608	− 26.89	− 4.63	−31.52	33.35	1.83	−.25
1×Δ9	40 52.2	36 3.6	+ 372.0	2.57054	5.14108	− 23.83	− 3.64	−27.47	29.48	2.01	−.07
		36 46.2	+ 331.4	2.52035	5.04070	− 21.23	− 2.89	−24.12	26.18	2.06	−.02
		37 30.4	+ 287.2	2.45818	4.91636	− 18.40	− 2.17	−20.57	22.72	2.15	+.07
	39 27.1	38 8.6	+ 249.0	2.39620	4.79240	− 16.95	− 1.63	−17.58	19.45	1.87	−.21
	273										±.20
	42 17.7 175									43 2.08	±.17
	42 17.8 176										
	42 17.4 173										
	42 17.47										

Aug 16, 1877 χ Ursae Minoris

J. F.M.

	h m s	h m s									
	18 52 38.2	19 37 9.8	−137.8	2.13925n	4.27850	− 3.39	+ 0.19	− 3.20	32 48.58	32 45.38	−.24
Δ48	53 33.2	52 35.7	−191.5	2.28217n	4.56434	− 4.71	+ 0.37	− 4.34	50.45	46.11	+.49
	53 —	53 18.7	−267.7	2.42765n	4.85530	− 6.58	+ 0.72	− 5.86	52.20	46.34	+.72
	54 —	54 17.0	− 325.0	2.51188n	5.02376	− 7.99	+ 1.07	− 6.92	52.60	45.68	+.06
	56 17.8	55 24.9	− 392.9	2.59425n	5.18856	− 9.65	+ 1.56	− 8.09	53.50	45.41	−.21
Δ52	58 9.6	56 34.1	− 462.1	2.66474n	5.32948	− 11.35	+ 2.16	− 9.19	54.42	45.23	−.39
	59 36.0	57 14.0	− 502.0	2.70070n	5.40140	− 12.33	+ 2.55	− 9.78	55.15	45.37	−.25
		58 29.3	− 573.3	2.75838n	5.51676	− 14.09	+ 3.32	− 10.77	56.22	45.45	−.17
	48 528										±.34
	515									32 45.62	±.29
	47.1 53.2										
	49.9 52.8										
	48.2 49.1										
	48 52.80										

Aug. 22, 1877 S Ursae Minoris

J. F.M.

	h m s	m s									
	18 11 41.0	9 53.3	+ 177.2	2.24846	4.49692	+ 13.89	+ 1.01	+14.90	52 7.65	52 22.55	−.25
	11 57.2	10 52.3	+ 118.2	2.07262	4.14524	+ 9.27	.45	+ 9.72	13.82	23.54	+.74
	12 15.2	11 33.0	+ 75.5	1.87795	3.75590	+ 5.92	.18	+ 6.10	17.42	23.52	+.72
	12 34.0	12 28.2	+ 12.3	1.08991	2.17982	+ .96	.00	+ .96	21.50	22.46	−.34
	12 49.8	13 27.7	− 37.2	1.57054n	3.14108	− 2.91	.04	− 2.87	25.65	22.78	−.02
	13 8.0	14 12.1	− 91.6	1.91169n	3.82338	− 6.40	+ .21	− 6.19	28.12	21.93	−.87
	13 26.2										±.53
	13 42.5									52 22.80	±.45
	14 1.0										
	2749										
	4545										
	12 5054										

Aug 22, 1877 37 Cephei L. C.

J. F.M.

	h m s	m s									
	18 38 12.6	34 53.4	+ 455.7	2.65868	5.31736	−29.19	− 5.47	−34.66	43 37.85	43 3.19	+.07
	41 29.2	35 46.8	+ 402.3	2.60455	5.20910	25.77	4.26	30.03	33.12	3.09	−.03
Δ−2	41 24.7	36 23.6	+ 365.5	2.56289	5.12578	23.41	3.52	26.93	30.00	3.07	−.05
Δ 9.87	41 47.7	37 3.6	+ 325.5	2.51255	5.02510	20.85	2.79	23.64	26.70	3.06	−.06
		37 53.5	+ 273.6	2.43712	4.87424	17.53	1.97	19.50	22.78	3.28	+.16
		40 49.0	+ 100.1	2.00043	4.00086	− 6.41	− 0.26	− 6.67	9.74	3.03	−.09
	42 28.3 3										±.08
	42 29.8									43 3.12	±.07
	2856										
	303										
	12 29.07										
	29.08										

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Tz	TS	T	log T	2 log T	Red I	Red II	Sum	Circle Reading	Corr. Circ Read	

Aug 22. 1877 - λ Ursae Minoris — J. F. M.

h	m	s	m	s												
					s			"	"	"	′	″	′	″		
19	52	27.8	50	56.0	− 120.5	2.08099n	4.16198	− 2.96	+ 0.15	− 2.81	32	49.35	32	46.54	+.88	
			52	2.9	− 188.4	2.27508n	4.55016	− 4.63	.36	− 4.27		49.65		45.38	−.28	
cirster			52	37.84	− 236.3	2.37346n	4.74692	− 5.81	.56	− 5.25		51.55		46.30	+.64	
d 8=9			53	86.0	− 280.5	2.44793n	4.89586	− 6.89	.80	− 6.09		51.45		45.36	−.30	
			54	33.4	− 337.9	2.52879n	5.05758	− 8.30	1.15	− 7.15		51.98		44.83	−.83	
			55	39.9	− 395.4	2.59704n	5.19408	− 9.72	+ 1.58	− 8.14		53.70		45.56	−.10	
															±.55	
19	48	5~~0~~.											32	45.66	±.46	

Aug. 23. 1877 - S Ursae Minoris — J. F. M.

h	m	s	m	s												
18	11	42.3	10	57.0												
	11	57.7	11	30.0	+ 81.6	1.91164	3.82338	+ 6.40	+ 0.21	+ 6.61	52	16.20	52	22.81	+.50	
	12	17.0	12	23.0	+ 28.6	1.45637	2.91274	+ 2.24	.03	+ 2.27		20.90		23.17	+.86	
	12	34.2	12	48	− 13.2	1.12057n	2.24114	− 1.03	.01	− 1.02		23.05		22.03	−.28	
	12	57.8	13	47.3	− 55.7	1.74586n	3.49172	− 4.37	.10	− 4.27		26.02		21.75	−.56	
	13	2.0	14	38.1	− 106.5	2.02735n	4.05470	− 8.35	.37	− 7.98		30.08		22.10	−.21	
	13	26.2	15	6.2	− 134.6	2.12905n	4.25810	−10.55	+ .58	− 9.97		31.95		21.98	−.33	
	13	44.3													±.50	
	14	1.3											52	22.31	±.42	
		2848														
		464.8														
	12	51.64														

Aug. 23. 1877 - 57 Eschai L. C. — J. F. M.

h	m	s	m	s												
			~~24~~	~~17.7~~												
		—	35	19.0	+ 430.4	2.63387	5.26774	−27.57	− 4.88	−32.45	43	34.92	43	2.47	+.27	
		—	35	58.7	+ 390.7	2.59184	5.18368	25.03	4.02	29.05		30.80		1.75	−.45	
		—	36	24.2	+ 365.2	2.56253	5.12506	23.39	3.51	26.90		29.38		2.48	+.28	
29.3	42	8.0	37	6.5	+ 322.9	2.50907	5.01814	20.68	2.74	23.42		25.82		2.40	+.20	
29.3	42	29.3	38	7.1	+ 202.3	2.30660	4.61200	− 12.96	1.08	− 11.04		15.92		1.88	−.32	
29.4	42	30.7	42	41.0	− 11.6	1.06446n	2.12892	+ 0.74	− .00	+ 0.74		1.50		2.24	+.04	
29.4	43	12.0													±.28	
29.7	43	38.6											43	2.20	±.24	
29.5	43	54.7														
	42	29.43														

Aug. 27. 1877 - 57 Eschai L. C. — J. F. M.

h	m	s	m	s												
	38	21.5	~~36~~	~~14.1~~												
A−1	3.2	38	37	7.0	+ 330.0	2.51851	5.03702	−21.14	− 2.87	−24.01	43	30.50	43			
			38	17.9	+ 259.1	2.41347	4.82694	16.00	1.77	18.37		26.62		2.61	+.07	
			40	14.0	+ 143.0	2.15534	4.31068	9.16	.54	9.70		21.20		2.83	+.29	
	42	37.2	41	0.2	+ 96.8	1.98588	3.97176	6.20	.25	6.45		11.88		2.18	−.36	
		36.8	41	44.5	+ 52.5	1.72016	3.44032	− 3.36	− .07	− 3.43		9.25		2.80	+.26	
												5.70		2.27	−.27	
	42	37.0											43	2.521	±.28	
															±.24	

Aug. 27. 1877. λ Ursae Minoris — J. F. M.

h	m	s	m	s												
19	52	26.7	54	11.9	− 309.8	2.49108n	4.98216	− 7.61	+ 0.97	− 6.64	32	~~57.40~~ ~~55.75~~ 57.19	32	44.76	−.26	
A−1			54	13.7	− 353.6	2.54851n	5.09702	− 8.69	+ 1.26	− 7.43		52.32		44.89	−.13	
			56	48.7	− 466.6	2.66894n	5.33788	− 11.46	+ 2.20	− 9.26		54.68		45.42	+.40	
															±.33	
	49	2.10											32	45.023	±.28	

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Tα Tδ T log T 2 log T Red I Red II Sum I+II Circle Readings Corr. Circle Read.

Aug. 28. 1877. S Ursae Minoris. J. F. M.

	h	m	s	m	s											
1	18	6	31.7	4	36.0	+	509.8	2.69966	5.39932	+39.26	+ 8.07	+47.33	51′	33.40	52′	20.73 −.41
		7	6.5	5	24.1	+	452.7	2.65581	5.31162	35.49	6.60	42.09		39.22		21.31 +.17
A−2	1.3			6	9.7	+	407.1	2.60970	5.21940	31.91	5.34	37.25		43.80		21.05 −.09
				6	39.2	+	377.6	2.57703	5.15406	29.60	4.59	34.19		47.35		21.54 +.40
		12	56.8	7	27.7	+	329.1	2.51733	5.03466	+25.80	+ 3.49	+29.29		51.78		21.07 −.07
			56.7													±.25
		12	56.75												52	21.140 ±.21

10.6
10.8
10.3

Aug 28. 1877. 57 Orphei S. C. J. F. M.

	h	m	s	m	s											
A−2	2.1	37	44.7	24	52.3	+	469.1	2.67127	5.34254	−30.05	− 5.79	−35.84	43′	36.95	43	1.11 +.45
A−1	3	38	24.7	25	38.9	+	422.5	2.62583	5.25166	27.06	4.70	31.76		32.22		0.46 −.20
36	20.4			26	17.1	+	384.3	2.58467	5.16934	24.62	3.89	28.51		28.85		0.34 −.32
	19.5			26	55.2	+	349.2	2.54307	5.08614	22.37	3.21	25.58		26.68		1.10 +.44
	19.95			27	35.7	+	305.7	2.48530	4.97060	−19.58	− 2.46	−22.04		22.35		0.31 −.35
42	48.98	42.04														±.39
	8396	42	41.45												43	0.664 +.33
	40.38															
	124.54															

36

Aug 30 - 1877 S Ursae Minoris. J. F. M.

	h	m	s	m	s											
15	14.0	18	18 (23.7)	8	10.8	+	530.8	2.72493	5.44986	+41.61	+ 9.07	+50.68	51′	30.65	52	21.33 +.15
5	12.42		Add 1m to all	8	47.2	+	494.4	2.69408	5.38816	38.76	7.87	46.63		34.10		20.73 −.45
				9	31.0	+	450.6	2.65379	5.30758	35.32	6.54	41.86		39.55		21.41 +.23
				9	12.2	+	409.4	2.61215	5.22430	32.09	5.40	37.49		43.72		21.21 +.03
				9	44.8	+	376.8	2.57611	5.15222	+29.54	+ 4.57	+34.11		47.12		21.23 +.05
		13	1.58													±.20
															52	21.182 ±.17

12.3
11.4
12.9

Aug. 30. 1877. 57 Orphei S. C. J. F. M.

	h	m	s	m	s											
21.2																
20.7																
19.8																
20.1																
20.45	−(36.7)	35	38.6	31	42.2	+	700.3	2.84528	5.69056	− 44.86	−12.91	−57.77	43′	59.52	43	1.75 +.32
A−2	4.3.2.1	36	20.7	31	25.3	+	677.2	2.83072	5.66144	43.38	12.07	55.45		57.22		1.77 +.34
		37	2.4	34	43.8	+	478.7	2.68006	5.36012	30.66	6.03	36.69		38.32		1.63 +.20
A−1	3.2.1	37	41.3	35	21.8	+	440.7	2.64414	5.28828	28.23	5.11	33.34		35.00		1.66 +.23
42	42.3	38	26.6	36	15.8	+	386.7	2.58787	5.17474	24.77	3.94	28.71		29.80		1.09 −.34
	42.3	39	9.2	37	12.0	+	330.5	2.51917	5.03834	− 21.17	− 2.88	−24.05		24.75		0.70 −.73
	43.3	39	52.8													±.39
	169.9														43	1.433 ±.33
	29.78	42	42.54													

62.2
52.3
52.4

36

Sept. 11. 1877 57 Orphei S. C. J. F. M.

	h	m	s	m	s											
		35	24.8	35	19.6	+	473.2	2.67504	5.35008	−30.31	− 5.89	−36.20	43′	35.82	42	59.62 +.32
A−2		36	8.4	36	3.0	+	402.8	2.60509	5.21018	25.80	4.27	30.07		29.60		59.53 +.23
		37	32.9	36	48.8	+	384.0	2.58433	5.16866	24.60	3.88	28.48		27.30		58.82 −.48
		38	16.9	37	28.7	+	344.1	2.53668	5.07336	22.04	3.12	25.16		24.20		59.04 −.26
				37	56.2	+	316.2	2.49996	4.99992	20.26	2.63	22.89		22.42		59.53 +.23
36	50.75			38	38.4	+	274.4	2.43838	4.87676	−17.58	− 1.98	−19.56		18.82		59.26 −.04
		43	1284													±.28
															42	59.300 ±.24

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Tα Tδ T log T 2 log T Red I Red II Sum I & II Circle Reading Corr. Circle Red.

Sept. 12-1877 S Ursae Minoris

J. F. M.

h	m	s	m	s	α							′	″	′	″	
10.6	18	15	20.0	9	44.1											
10.8		16	5.0													
10.3	A-1	16	39.4	14	58.4	− 107.8	2.03262n	4.06524	− 8.45	+ 3.74 (0.37)	− 8.08	52	27.48	52	19.40	+.31
				15	42.7	− 182.1	2.18213n	4.36426	11.92	0.74	11.18		30.60		19.42	+.33
				16	18.0	− 187.4	2.27277n	4.54554	14.69	1.13	13.56		32.05		18.49	−.60
				17	3.8	− 233.2	2.36773n	4.73546	18.28	1.75	16.53		36.08		19.55	+.46
				17	42.6	− 272.0	2.43457n	4.86914	21.32	2.38	18.94		38.08		19.14	+.05
				18	24.8	− 314.2	2.49721n	4.99442	−24.63	+ 3.18	−21.45		40.00		18.55	−.54
																±.42
		13	10.57											52	19.092	±.35

Sept. 12. 1877. 57 Cephei L. C.

J. F. M.

	m	s	m	s											
	35	26.4	35	1.4	+ 492.7	2.69258	5.38516	−31.56	− 6.39	−37.95	43	36.60	42	58.65	−.02
	36	9.0	35	43.0	+ 451.1	2.65427	5.30854	28.90	5.36	34.26		32.85		58.59	−.08
A-2	37	35.2	36	20.3	+ 413.8	2.61679	5.23358	26.57	4.37	31.02		29.92		58.90	+.23
	38	17.3	36	48.0	+ 386.1	2.58670	5.17340	24.73	3.92	28.65		27.38		58.73	+.06
			37	34.0	+ 340.1	2.53161	5.06322	−21.79	− 3.04	−24.83		23.32		58.49	−.18
												(21.22)		58.7	±.13
36	57.98												42	58.672	±.11
		43	14.08	43	14.01										

Sept. 13. 1877 S Ursae Minoris

J. F. M.

h	m	s	m	s											
12.3	18	15	31.7	14	33.4	− 101.2	2.00518n	4.01036	− 7.93	+ 0.33	− 7.60	52	25.82	52	18.22	−.01
11.4		16	5.6	15	14.9	− 122.7	2.08884n	4.17768	9.62	.48	9.14		31.42		{22.28}	
12.9	A-1	16	42.0	16	37.2	− 219.0	2.34044n	4.68088	17.17	1.54	15.63		33.98		18.35	+.12
				17	19.2	− 247.0	2.39270n	4.78540	19.36	1.96	17.40		35.48		18.08	−.15
				17	48.7	− 276.5	2.44170n	4.88340	−21.68	+ 2.46	− 19.22		37.50		18.28	+.05
																±.09
		13	12.20											52	18.232	±.08

Sept. 13. 1877 57 Cephei L. C.

J. F. M.

h	m	s	m	s											
52.2	35	27.0	35	10.7	+ 483.7	2.68458	5.36916	−30.99	− 6.16	−37.15	43	34.85	42	57.70	−.45
52.3	36	9.7	35	49.8	+ 456.7	2.65963	5.31926	29.26	5.49	34.75		33.60		58.85	+.70
52.4	36	32.4	36	20.4	+ 415.2	2.61826	5.23652	26.60	4.54	31.14		29.55		58.41	+.26
			36	50.4	+ 384.0	2.58433	5.16866	24.60	3.88	28.48		26.80		58.32	+.17
			37	12.7	+ 356.7	2.55230	5.10460	22.85	3.35	26.20		23.88		57.68	−.47
36	52.30		38	0.7	+ 313.7	2.49651	4.99302	−20.10	− 2.59	−22.69		20.60		57.91	−.24
															±.42
		43	14.339										42	58.145	±.35

Sept. 15. 1877 S Ursae Minoris

J. F. M.

h	m	s	m	s											
18	11	5.7	11	1.0	+ 73.6	1.86688	3.73376	+ 5.77	+ 0.17	+ 5.94	52	13.65	52	19.59	−.08
	11	22.9	11	32.6	+ 42.0	1.62325	3.24650	+ 3.29	.06	+ 3.35		16.48		19.83	+.16
	11	39.3	12	3.7	− 20.1	1.30320n	2.60640	− 1.58	.01	− 1.57		21.88		20.31	+.64
add 1m	11	57.4	12	58.0	− 44.4	1.64738n	3.29476	− 3.48	.06	− 3.42		22.95		19.53	−.14
	12	15.3	13	4.0	− 91.4	1.96095n	3.92190	− 7.16	.27	− 6.89		26.95		19.16	−.51
	12	32.2	14	26.9	− 132.3	2.12156n	4.24312	− 10.37	+ .56	− 9.81		29.38		19.57	−.10
	12	49.3													±.30
	13	6.0											52	19.665	±.25
	13	24.4													
	13	14.62													

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Tα	Tδ	T	log T	2 log T	Red I	Red II	Sum Circle Readings I + II	Corr. Circle Read.			

Sept. 15-1877. 51 Cephei L. C.

J. F. M.

h	m	s	m	s											
					s			"	"	"		"		"	
12.3	18	42	12.4	35	33.0	+ 463.8	2.66633	5.33266	−29.71	− 5.66	− 35.37	43	34.50	42	59.13 −.17
16.5		42	32.9	36	6.0	+ 430.8	2.63428	5.26856	27.60	4.89	32.49		31.85		59.36 +.06
16.7		43	16.7	36	32.7	+ 404.1	2.60649	5.21298	25.89	4.80	30.19		29.42		59.23 −.07
17.4		43	38.7	37	21.2	+ 355.6	2.55096	5.10192	22.78	3.33	26.11		25.45		59.34 +.04
15.8		43	58.4	41	25.6	+ 111.3	2.04650	4.09300	7.13	.33	7.46		6.78		59.32 +.02
17.9		44	43.1	41	56.8	+ 50.0	1.90309	3.80618	− 5.12	− .17	− 5.29		4.70		59.41 +.11
		[45	21.5]												±.09
		43	16.77											42	59.298 ±.08

Sept. 16-1877. 51 Cephei L. C.

J. F. M.

h	m	s	m	s											
18.5	18	41	53.3	35	47.2	+ 451.6	2.65475	5.30950	−28.93	− 5.37	− 34.30	43	32.22	42	57.92 −.16
18.8		42	14.9	36	28.0	+ 410.8	2.61363	5.22726	26.32	4.44	30.76		29.28		58.52 +.44
18.7		43	18.4	37	19.7	+ 359.1	2.55522	5.11044	23.00	3.39	26.39		25.22		58.83 +.75
19.1		44	1.7	40	46	+ 194.2	2.28825	4.57650	12.44	0.99	13.43		11.42		57.99 −.09
18.7		44	43.9	40	41.7	+ 157.1	2.19618	4.39236	10.06	0.65	10.71		8.15		57.44 −.64
				41	23.0	+ 115.8	2.06371	4.12742	− 7.42	− 0.35	− 7.77		5.52		57.75 −.33
															±.44
		43	18.76											42	58.075 ±.87

Sept. 18-1877. 51 Cephei L. C.

J. F. M.

h	m	s	m	s											
43 23.0	18	41	37.8	38	33.4	+ 269.9	2.43120	4.86240	−17.29	− 1.92	− 19.21	43	20.15	43	0.94 +.59
23.3		42	12.4	39	44.0	+ 219.3	2.34104	4.68208	14.05	1.27	15.32		15.28	42	59.96 −.39
23.3		42	40.7	40	28.6	+ 174.7	2.24229	4.48458	11.19	.80	11.99		12.22	43	0.23 −.12
24.0		43	2.7	41	21.0	+ 112.3	2.05038	4.10076	7.14	.33	7.52		7.50	42	59.98 −.37
		—	=	42	58.0	+ 25.3	1.40312	2.80624	− 1.62	.02	− 1.64		0.90	42	59.26 −1.09
23.1		44	3.7	43	42.7	− 19.4	1.28780 n	2.57560	+ 1.24	− .01	+ 1.23		0.50	43	1.73 +1.38
24.1		44	28.0												±.72
22.4		44	47.6											43	0.850 ±.61
		43	23.31												

Sept. 19. 1877. 51 Cephei L. C.

J. F. M.

h	m	s	m	s											
27.5	18	42	23	37	30.8	+ 356.5	2.55206	5.10412	−22.84	− 3.35	− 26.19	43	26.45	42	60.26 −.13
		—	—	38	24.0	+ 303.3	2.48187	4.96374	19.43	2.42	21.85		24.70		62.85 +2.46
27.6		42	45.0	39	43.9	+ 221.4	2.34518	4.69036	14.18	1.29	15.47		16.55		60.08 −.31
28.9		43	7.6	40	39.1	+ 168.2	2.22583	4.45166	10.79	.74	11.51		11.85		59.84 −.55
27.3		43	27.3	41	11.2	+ 136.1	2.13386	4.26772	8.72	.49	9.21		8.80		59.59 −.80
27.0		43	48.3	41	51.0	+ 96.3	1.98363	3.96726	− 6.17	− .24	− 6.41		6.15		59.74 −.65
27.3		44	9.9												±.89
27.3		44	31.2											43	0.398 ±.75
25.5		44	50.4												
		43	27.30												

Sept. 22-1877. 51 Cephei L. C.

J. F. M.

h	m	s	m	s											
	18	42	10.2	41	18.7	+ 136.8	2.13609	4.27218	− 8.76	− 0.49	− 9.25	43	9.52	43	0.27 −.13
		42	31.7	41	37.2	+ 118.3	2.07298	4.14596	7.58	.37	7.95		8.28		0.33 −.07
		42	52.7	42	27.9	+ 67.6	1.82995	3.65990	4.33	.12	4.45		5.05		0.60 +.20
		43	14.3	43	16.6	+ 18.9	1.27646	2.55292	− 1.22	− .01	− 1.23		1.62		0.39 −.01
		43	34.0	43	34.0										
		43	53.8	44	52.0	− 76.5	1.88366 n	3.76732	+ 4.90	− .15	+ 4.75		55.62		0.37 −.03
		44	15.2	45	18.9	− 103.4	2.01452 n	4.02904	+ 6.62	− .28	+ 6.34		54.10		0.44 +.04
		44	40.0												±.09
		45	1.0											43	0.408 ±.08
		43	35.48												

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1876phae.proj.1686R

Reviewed the order of R.A. & Series to conform to the other books.

Sept. 23. 1877. 51 Cephei L. C.

J.F.M.

τδ h m s	τα m s	τ	log τ	2 log τ	Red I	Red II	Sum	circle Reading ′ ″	corr. Circ. Red. ′ ″	
		ρ			″	″	″			
39 6.0	42 13.7	+ 274.4	2.43838	4.87676	−17.58	− 1.98	−19.56	43 17.85	42 58.29	+.02
39 34.8	42 33.6	+ 243.6	2.38668	4.77336	15.60	1.56	17.16	15.92	58.76	+.49
40 17.2	42 58.2	+ 203.2	2.30792	4.61584	13.02	1.09	14.11	12.00	57.89	−.38
41 0.7	43 19.3	+ 159.7	2.20330	4.40660	10.23	0.67	10.90	9.35	58.45	+.18
41 54.0	43 40.0	+ 166.4	2.02694	4.05388	6.82	.30	7.12	5.01	57.88	−.39
42 56.9	44 1.8	+ 43.5	1.63849	3.27698	− 2.79	− .05	− 2.84	1.18	58.34	+.07
	44 22.7									±.28
	44 44.2								42 58.268	±.24
	45 6.0									
	43 40.39									

Sept. 24. 1877. S Ursae Minoris

W.A.R.

h m s	m s								
18 14 39.4	—	− 75.9	1.88024 n	3.76048	− 5.95	+ 0.19	− 5.76	52 26.02	52 20.26	+.69
18 21.8	—	− 298.3	2.47465 n	4.94930	23.38	2.86	20.52	39.80	19.28	−.29
19 38.0	—	− 386.5	2.58715 n	5.17430	30.30	4.81	25.49	45.05	19.56	−.01
21 24.0	—	− 480.5	2.68169 n	5.36338	37.67	7.43	30.24	49.80	19.56	−.01
22 17.7	—	− 534.2	2.72770 n	5.45540	−41.88	+ 9.19	−32.69	51.88	19.19	−.38
23.6	13 41.0									±.31
23.5	13 58.3								52 19.570	±.26
23.4	14 15.7									
23.3	14 33.0									
	13 23.45									

Sept. 25. 1877. 51 Cephei L. C.

J.F.M.

h m s	m s								
18 40 4.3	42 —	+ 216.3	2.33506	4.67012	−13.86	− 1.23	− 15.09	43 14.45	42 59.36	+.43
40.4 41 14.4	42 36.5	+ 146.2	2.16495	4.32990	9.36	.54	9.90	10.80	60.90	+1.97
41.6 41 43.1	— —	+ 115.5	2.06258	4.12516	7.40	.35	7.75	6.15	58.40	−.53
42 27.8	43 20.3	+ 72.8	1.86213	3.72426	4.66	.14	4.80	3.60	58.80	−.13
39.8 43 28.0	43 39.2	+ 11.6	1.06446	2.12892	− 0.74	00	− .74	42 58.70	57.96	−.97
39.9 44 20.5	44 1.2	− 39.9	1.60097 n	3.20194	+ 2.56	− .04	+ 2.52	55.62	58.14	−.79
40.6	44 23.2									±.88
41.4	44 45.3								42 58.927	±.74
40.8	45 6.0									
	43 40.64									

Sept. 26. 1877. 51 Cephei L. C.

J.F.M.

h m s	m s								
41.6 18 43 38.2	45 68.49	− 111.0	2.04532 n	4.09064	+ 7.11	− 0.32	+ 6.79	42 51.12	42 57.91	+.57
42.0 46 18.6	46 32.5	− 156.4	2.19424 n	4.38848	10.02	.64	9.38	48.00	57.38	+.04
42.6 47 11.8	47 13.7	− 209.6	2.32139 n	4.64278	13.43	1.16	12.27	45.20	57.47	+.13
42.7 47 43.8	47 38.4	− 241.6	2.38316 n	4.76620	15.48	1.54	13.94	43.42	57.36	+.02
49 9.9		− 327.7	2.51548 n	5.03096	20.99	2.83	18.16	38.88	57.04	−.30
49 37.7		− 355.5	2.55084 n	5.10168	+22.77	− 3.33	+ 19.44	37.45	56.89	−.45
	43 42.22								42 57.342	±.27 ±.23

Sept. 27. 1877. 51 Cephei L. C.

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Δs	Δα	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Red.

Oct. 6 - 1877 - λ Ursae Minoris — J. F. M.

h	m	s	m	s												
19	38	39.1	38	32.7	− 518.7	2.71492n	5.42984	− 12.70	+ 2.71	− 9.99	32	50.45	32	40.46	+.46
	59	33.2	39	20.7	− 572.8	2.75800n	5.51600	14.03	3.31	10.72		51.35		40.63	+.63
	1	4.1	1	9.0	− 663.7	2.82197n	5.64394	16.26	4.44	11.82		52.35		40.63	+.53
	1	47.0	2	50.0	− 706.6	2.84917n	5.69834	17.31	5.03	12.28		51.82		39.54	−.46
	5	40.3	6	37.2	− 939.9	2.97308n	5.94616	23.02	6.90	14.12		53.78		39.66	−.34
	6	54.6			− 1014.2	3.00612n	6.01224	− 24.84	+ 10.36	− 14.48		53.65		39.17	−.83
															±.59
			49	03.8									32	39.998	±.50

Oct. 7 - 1877 - λ Ursae Minoris — J. F. M.

m	s	m	s												
43	40.7	45	13.2	+ 317.6	2.50188	500376	+ 7.78	+ 1.02	+ 8.80	32	32.15	32	40.95	+.26
44	16.3	—	—	+ 282.0	2.45025	4.90050	+ 6.91	0.80	+ 7.71		32.82		40.53	−.16
45	0.0	—	—	+ 238.3	2.37712	4.75424	+ 5.84	0.57	+ 6.41		33.75		40.16	−.53
48	1.8	48	5.5	+ 56.5	1.75205	3.50410	+ 1.38	0.03	+ 1.41		40.98		42.39	+1.70
49	18.6	48	57.7	− 21.3	1.32838n	2.65676	− 0.52	000	− 0.52		40.50		39.98	−.71
53	48.0	49	57.7	− 289.7	2.46195n	4.92390	− 7.10	+ 0.85	− 6.25		46.49		40.15	−.54
		—	—											±.71
		—	—									32	40.693	±.60
		52	43.3											
		48	58.28											

Oct. 13. 1877 λ Ursae Minoris — J. F. M.

h	m	s	m	s												
19	49	46.7	49	32.0	− 51.5	1.71181n	3.42362	− 1.26	+ 0.03	− 1.23	32	39.48	32	38.25	−.28
	52	37.3	50	40.2	− 236.1	2.37310n	4.74620	5.78	0.56	5.22		42.92		37.70	−.83
	53	33.0	52	38.8	− 279.8	2.44685n	4.89370	6.85	0.79	6.06		44.95		38.89	+.86
	54	22.0			− 326.8	2.51425n	5.02856	8.00	1.08	6.92		44.98		38.06	−.47
	55	16.8			− 381.6	2.58161n	5.16322	9.35	1.46	7.89		46.10		38.21	−.32
	56	4.3	56	23.0	− 429.1	2.63256n	5.26512	− 10.51	+ 1.86	− 8.65		48.72		40.07	+1.54
			58	16.0											±.69
			48	55.24									32	38.530	±.88

m	s
44	18.0
43	

Oct. 17. 1877 λ Ursae Minoris — J. F. M.

		m	s	m	s											
		44	19.0	~~48~~	~~55.8~~	+ 278.1	2.44420	4.88840	+ 6.81	+ 0.78	+ 7.59	32	29.12	32	36.71	−.42
		43	12.8	~~49~~	~~50.0~~	+ 224.3	2.35083	4.70166	+ 5.49	0.51	+ 6.00		31.50		37.50	+.37
49	0.00	~~46~~	~~11.7~~	45	17.0											
	3.0	48	36.3	46	15.7	+ 20.8	1.31806	2.63612	+ 0.51	000	+ 0.51		36.65		37.16	+.03
		80	47.8	—	—	− 110.7	2.04415n	4.08830	− 2.71	0.12	− 2.59		40.05		37.46	+.33
		~~52~~	~~38.0~~	—	—											
48	55.8	52	50.0	48	33.8	− 232.9	2.36717n	4.73434	− 5.70	0.55	− 5.15		42.85		37.70	+.87
	54.2	54	6.0	49	50.0	− 308.9	2.48982n	4.97964	− 7.56	+ 0.96	− 7.60		43.88		36.28	−.85
	55.0			50	46.5											±.47
	54.8			52	37.8									32	37.135	±.40
				48	57.13											

Oct. 18. 1877 λ Ursae Minoris

39	23.4	45	9.5	+ 571.5	2.75702	5.51404	+ 14.00	+ 3.29	+ 17.29	32	21.18	32	38.47	+.22
41	2.0	—	—	+ 472.9	2.67477	5.34954	+ 11.58	2.25	+ 13.83		24.72		38.55	+.30
44	14.6	—	—	+ 281.3	2.44762	4.89524	+ 6.87	0.79	+ 7.66		31.55		39.21	+.96
45	20.0	47	59.3	+ 214.9	2.33224	4.66448	+ 5.26	0.47	+ 5.73		32.85		38.58	+.33
48	14.0	48	55.9	+ 40.9	1.61172	3.22344	+ 1.00	0.02	+ 1.02		36.00		37.02	−1.23
50	13.0	49	52.4	− 78.1	1.89265n	3.78530	− 1.91	+ 0.06	− 1.85		39.52		37.67	−.58
		—	—											
		—	—											
		52	37.2									32	38.250	
		48	54.86											

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Constants.

$i = 5^\circ\ 3'\ 4''$

	Aug.		Sept.	Oct.
λ Ursae Minoris				
	$\delta = 88^\circ\ 56'\ 17''$		$88^\circ\ 56'\ 25''$	$88^\circ\ 56'\ 29''$
log cos δ	8.26795	log sin δ	9.99992	8.26704 9.99992	8.26659 9.99992
" 15 tan i	0.12248	" cos δ	8.26795	0.12248 8.26704	0.12248 8.26659
Σ	8.39043	" Csin δ cos δ	5.00459	8.38951 5.00368	8.38907 5.00323
δ Ursae Minoris					
	$\delta = 86^\circ\ 36'\ 37''$		$86^\circ\ 36'\ 41''$	$86^\circ\ 36'\ 41''$
log cos δ	8.77179	log sin δ	9.99924	8.77165 9.99924	
" 15 tan i	0.12248	" cos δ	8.77179	0.12248 8.77165	
Σ	8.89427	" Csin δ cos δ	5.50775	8.89413 5.50761	
51 Cephei.					
	$\delta = 87^\circ\ 13'\ 50''$		$87^\circ\ 13'\ 45''$	$87^\circ\ 13'\ 44''$
log cos δ	8.68410 n	log sin δ	9.99949	8.68432 n 9.99949	8.68436 n 9.99949
" 15 tan i	0.12248	" cos δ	8.68410 n	0.12248 8.68432 n	0.12248 8.68436 n
Σ	8.80658 n	" Csin δ cos δ	5.42031 n	8.80680 n 5.42053 n	8.80684 n 5.42057 n

Constants for Alt. & Hor.

$i = 5^\circ\ 3'\ 9''$

	α Ursae Minoris		λ Ursae Minoris
	$\delta = 88^\circ\ 39'\ 34''$		$88^\circ\ 56'\ 29''$
log 15	1.17609		1.17609
log cos δ	8.36912		8.26659
log tang i	8.94651		8.94651
log const-I	8.49172		8.38919
log sin δ	9.99988		9.99992
log cos δ	8.36912		8.26659
log 112.5 sin 1"	6.73672		6.73672
log const-II	5.10572		5.00323

Constants for Dec.

	$\delta = 88^\circ\ 39'\ 54''$		$\delta = 88^\circ\ 56'\ 24''$
log 15	1.17609		1.17609
log cos δ	8.36732		8.26716
log tang i	8.94651		8.94651
log const-I	8.48992		8.38976
log sin δ	9.99988		9.99992
log cos δ	8.36732		8.26716
log 112.5 sin 1"	6.73672		6.73672
log const-II	5.10392		5.00380

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	T2	T8	T	log T	2·log T	Red I	Red II	Sum I + II	Circle Reading	Corr. Circ. Read.

Oct 27, 1877. λ Ursae Minoris

A 6 — λ 12.8.h

48	52.0	19	45	85	38	48.8	+603.4	2.78061	5.56122	+14.78	+3.67	+18.45	32	21.32	32	39.77	+.22
	55.5		48	55.5	44	12.0	+280.2	2.44747	4.89494	+6.86	+0.79	+7.65		32.57		40.22	+.67
	50.9		49	46.7	49	33.3	−41.1	1.61384$_n$	3.22768	−1.01	+0.02	−0.99		46.27		39.28	−.27
	57.2		56	23.5	55	9.0	−376.8	2.57611$_n$	5.15222	−9.23	+1.43	−7.80		47.37		39.57	+.02
	47.5		58	8.4	55	37.3	−405.1	2.60756$_n$	5.21512	−9.92	+1.65	−8.27		44.55		39.28	−.27
	56.1		69	59.6	56	33.7	−461.5	2.66417$_n$	5.32834	−11.31	+2.15	−9.16		48.35		39.19	−.36
																	±.33
			48	52.20				1.16980	0.56445						32	39.55	±.28
								0.83666	9.89827								
								0.00303$_n$	3.23091								
								0.96530$_n$	0.15545								
								0.99675$_n$	0.21835								
								1.05336$_n$	0.33157								

Oct. 28, 1877. λ Ursae Minoris

A 1.4.5.6.9

46	51.1	19	43	7.9	44	58.0	+113.3	2.05423	4.10846	+2.78	+0.13	+2.65	32	32.42	32	35.07	−1.44
	49.8		45	54.0	48	15.5	−84.2	1.92531$_n$	3.85062	−2.06	+0.07	−1.99		37.42		35.43	−1.08
	53.4		46	53.4	49	32.9	−161.6	2.20844$_n$	4.41688	−3.96	+0.26	−3.70		39.87		36.17	−.34
	51.4		47	47.2	53	9.6	−378.3	2.57784$_n$	5.15568	−9.27	+1.44	−7.83		45.15		37.32	+.81
	50.8		50	34.0	53	35.9	−404.6	2.60703$_n$	5.21406	−9.91	+1.65	−8.26		46.00		37.74	+1.23
					54	15.5	−444.2	2.64758$_n$	5.29516	−10.88	+1.99	−8.89		46.22		37.33	+.82
																	±1.04
			46	51.30				0.44342	9.11169						32	36.51	±.88
								0.31450$_n$	8.85385								
								0.59763$_n$	9.42011								
								0.96703$_n$	0.15891								
								0.99622$_n$	0.21729								
								1.03677$_n$	0.29839								

Oct. 30, 1877. λ Ursae Minoris

A 1.5.8 — ε 2.3

		19	43	12.2													
	46.0		46	58.6	52	13.8	+282.8	2.45148	4.90296	+6.93	+0.81	+7.74	32	31.92	32	39.66	
46	55.4		49	45.1	51	36.9	−280.3	2.44762$_n$	4.89524	−6.87	+0.79	−6.08		43.70		37.62	+.35
	56.6		56	14.6	52	34.2	−337.6	2.52840$_n$	5.05680	−8.27	+1.15	−7.12		43.87		36.75	−.52
	57.7		57	4.3	56	19.3	−562.7	2.75028$_n$	5.50056	−13.79	+3.19	−10.60		47.92		37.32	+.05
	56.7				56	49.2	−592.6	2.77276$_n$	5.54552	−14.52	+3.54	−10.98		48.32		37.34	+.07
	54.8				59	42.0	−765.4	2.88389$_n$	5.76778	−18.75	+5.90	−12.85		50.18		37.33	+.06
																	±.23
			46	56.64				0.84067	9.90619						32	37.27	±.19
								0.83681$_n$	9.89847								
								0.91759$_n$	0.06003								
								1.13947$_n$	0.50379								
								1.16195$_n$	0.54875								
								1.27308$_n$	0.77101								

Oct. 30, 1877. λ Ursae Minoris

A+1

15	37.3	1	6	48.0	5	30.1	+609.7	2.78512	5.57024	+18.92	+4.74	+23.66	49	6.40	49	30.06	+.33
	40.8		8	19.7	6	8.0	+573.8	2.75876	5.51752	+17.80	+4.20	+22.00		7.12		29.12	−.61
	41.4		9	48.5	7	7.4	+512.4	2.70961	5.41922	+15.90	+3.35	+19.25		10.58		29.83	+.10
					7	29.2	+490.6	2.69073	5.38146	+15.22	+3.07	+18.29		11.32		29.61	−.12
					8	9.2	+450.6	2.65379	5.30758	+13.98	+2.59	+16.57		13.63		30.20	+.47
					8	49.0	+410.8	2.61363	5.22726	+12.75	+2.15	+14.90		14.65		29.55	−.18
																	±.33
			15	39.83				1.27684	0.67596						49	29.73	±.28
								1.25048	0.62324								
								1.20133	0.52494								
								1.18245	0.48718								
								1.14551	0.41336								
								1.10535	0.33298								

Nov. 3, 1877. λ Ursae Minoris

A−1

39	1		20	21.8	20	27.1	−286.7	2.45743$_n$	4.91486	−8.89	+1.05	−7.84	49	34.47	49	26.63	−.53
15	41.5		21	32.1	21	53.0	−372.6	2.57124$_n$	5.14248	−11.56	+1.77	−9.79		36.55		26.76	−.40
	39.2		23	2.6	22	24.0	−403.6	2.60595$_n$	5.21190	−12.52	+2.08	−10.44		37.47		27.03	−.13
					22	44.0	−423.6	2.62696$_n$	5.25392	−13.14	+2.29	−10.85		39.35		28.50	+1.34
					24	9.4	−509.0	2.70672$_n$	5.41344	−15.79	+3.30	−12.49		38.42		25.93	−1.23
					24	28.1	−527.7	2.72239$_n$	5.44478	−16.37	+3.55	−12.82		40.90		28.08	+.92
																	±.83
			15	40.35				0.94915$_n$	0.02058						49	27.16	±.70
								1.06296$_n$	0.24820								
								1.09769$_n$	0.31762								
								1.11868$_n$	0.35964								
								1.19844$_n$	0.51916								
								1.21411$_n$	0.55050								

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	Tα	Tδ	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circle Read.

Nov. 4, 1877. α Ursae Minoris

	h	m	s	m	s	s												
A-1	1	2.1	~~19~~	~~184~~	19	59.2	−258.0	2.41162	4.82324	−8.00	+0.85	−7.15	49	36.78	49	29.63	+.54	
	15	39.7	21	32.6	21	8.2	−327.0	2.51455	5.02910	−10.14	+1.36	−8.78		37.36		28.52	−.57	
		42.7	23	3.8	22	2.0	−360.8	2.58070	5.16140	−11.81	+1.85	−9.96		39.75		29.79	+.70	
					23	17.0	−455.8	2.65877	5.31754	−14.14	+2.65	−11.49		40.75		29.26	+.17	
					24	58.9	−557.7	2.74640	5.49280	−17.30	+3.97	−13.33		41.97		28.64	−.45	
					25	39.7	−598.5	2.77706	5.55412	−18.57	+4.57	−14.00		42.68		28.68	−.41	
																	±.52	
		15	41.20												49	29.09	±.44	
								0.90334	9.92896									
								1.00627	0.18482									
								1.07292	0.26412									
								1.15049	0.42326									
								1.23812	0.59852									
								1.26878	0.65984									

Nov. 4, 1877. α Ursae Minoris

	A-1																	
46	51.2	19	54	17.5														
	53.6		56	11.5	54	54.8	−481.5	2.68260	5.36520	−11.80	+2.34	−9.46	32	49.82	32	40.36	−.03	
	55.2		58	4.7	55	53.5	−540.2	2.73255	5.46510	−13.24	+2.94	−10.30		51.03		40.73	+.34	
					56	51.9	−598.6	2.77714	5.55428	−14.67	+3.61	−11.06		50.52		40.46	+.07	
					57	38.2	−644.9	2.80949	5.61898	−15.80	+4.19	−11.61		52.28		40.67	+.28	
					0	23.1	−809.8	2.90838	5.81676	−19.84	+6.61	−13.23		52.87		39.65	−.74	
					1	32.6	−879.3	2.94414	5.88828	−21.54	+7.79	−13.75		54.25		40.50	+.11	
																	±.29	
		46	53.33												32	40.39	±.24	
								1.07179	0.36843									
								1.12174	0.46833									
								1.16633	0.55751									
								1.19868	0.62221									
								1.29757	0.81999									
								1.33333	0.89161									

Nov. 6, 1877. α Ursae Minoris

	1	~~11~~	~~55.0~~	8	32.7	+435.7	2.63919	5.27838	+13.52	+2.42	+15.94	49	16.22	49	32.16		
15	48.1	13	35.8	9	56.3	+352.1	2.54667	5.09334	+10.92	+1.58	+12.50		18.93		31.43	+1.62	
	46.2	14	18.0	11	6.8	+281.6	2.44963	4.89926	+8.74	+1.01	+9.75		21.12		30.87	+1.06	
	50.3	15	6.2	12	36.3	+192.1	2.28353	4.56706	+5.96	+0.47	+6.43		22.97		29.40	−.41	
	48.4	15	48.4	13	48.8	+127.6	2.10585	4.21170	+3.96	+0.21	+4.17		24.36		28.47	−1.34	
	48.9	16	33.0	14	27.0	+81.4	1.91062	3.82124	+2.53	+0.08	+2.61		26.27		28.88	−.93	
	49.0	17	17.2													±.19	
														49	29.81	±1.00	
		15	48.48															
							1.13091	0.38410										
							1.03839	0.19906										
							0.94135	0.00498										
							0.77525	9.67278										
							0.59757	9.31742										
							0.40234	8.92696										

Nov 7, 1877. α Ursae Minoris

15	43.1	1	12	46.6	9	55.7	+347.0	2.54033	5.08066	+10.77	+1.59	+12.36	49	15.37	49	27.73	+.48	
	40.8		13	28.5	11	4.5	+278.2	2.44436	4.88872	+8.63	+0.99	+9.62		17.85		27.47	+.22	
	43.9		14	15.7	12	46.3	+236.4	2.37365	4.74730	+7.33	+0.71	+8.04		18.65		26.69	−.56	
	43.9		14	59.8	13	0.6	+162.1	2.20978	4.41956	+5.03	+0.33	+5.36		21.77		27.13	−.12	
	42.0		15	42.0	13	47.8	+115.3	2.06183	4.12366	+3.58	+0.17	+3.75		23.58		27.33	+.08	
	42.8		~~15~~	~~56.6~~	14	44.5	+58.2	1.76492	3.52984	+1.81	+0.04	+1.85		25.30		27.15	−.10	
	42.3		16	26.9													±.28	
			17	10.5											49	27.25	±.24	
								1.03205	0.18638									
								0.93608	9.99444									
								0.86537	9.85302									
								0.70150	9.52528									
								0.55355	9.22938									
		15	42.69					0.25664	8.63556									

Nov. 13, 1877 α Ursae Minoris

	1	13	3.2	9	52.6	+363.1	2.56003	5.12006	+11.27	+1.68	+12.95	49	13.05	49	26.00	−1.74	
		13	37.7	10	46.0	+309.7	2.49094	4.98188	+9.61	+1.22	+10.83		17.80		28.63	+.89	
		14	29.7	11	28.2	+267.5	2.42732	4.85464	+8.30	+0.91	+9.21		19.12		28.33	+.59	
		15	13.6	12	3.6	+229.1	2.36003	4.72006	+7.11	+0.67	+7.78		20.60		28.38	+.64	
		15	53.8	12	42.2	+193.5	2.28668	4.57336	+6.00	+0.48	+6.48		21.15		27.63	−.11	
		16	47.8	13	32.0	+143.7	2.15746	4.31492	+4.96	+0.26	+4.72		22.75		27.47	−.27	
		17	47.7													±.77	
		18	10.2											49	27.74	±.65	
		18	47.4														
		15	65.68					1.05175	0.22578									
								0.98266	0.08760									
								0.91904	9.96036									
								0.85175	9.82578									
								0.77840	9.67908									
								0.64918	9.42064									

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	TL	TS	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.
	h m s	m s	s						′ ″	′ ″
Nov. 14, 1877. ζ Ursae Minoris										
	1 12 51.3	9 56.9	+353.0	2.54777	5.09554	+10.95	+1.59	+12.54	49 12.07	49 24.61 −.14
	13 37.5	11 2.4	+287.5	2.45864	4.91728	+8.92	+1.05	+9.97	14.23	24.26 −.55
	14 30.8	11 53.9	+236.0	2.37291	4.74582	+7.32	+0.71	+8.03	16.72	24.75 .00
	15 5.1	12 37.8	+192.1	2.28353	4.56706	+5.96	+0.47	+6.43	18.50	24.93 +.18
	15 48.5	13 17.9	+152.0	2.18184	4.36368	+4.72	+0.29	+5.01	20.22	25.23 +.48
	16 33.7	14 2.4	+107.5	2.03141	4.06282	+3.33	+0.15	+3.48	21.30	24.78 +.03
	17 16.7									±.25
	18 0.6			1.03949	0.20126					49 24.66 ±.21
	18 45.2			0.95036	0.02300					75
				0.86463	9.83154					
	15 49.93			0.77525	9.67278					
				0.67356	9.46940					
				0.52313	9.16854					
Dec. 1, 1877. ζ Ursae Minoris										
15 10.91	16 39.4	16 34.4	−88.9	1.94890	3.89780	−2.75	+0.10	−2.65	49 24.67	49 22.02 −.44
15 3.4	17 16.0	17 5.5	−120.0	2.07918	4.15836	−3.71	+0.18	−3.53	25.90	22.37 −.09
15 21	17 59.0	17 48.8	−163.3	2.21299	4.42598	−5.05	+0.34	−4.71	27.67	22.96 +.50
		18 36.0	−204.5	2.31069	4.62138	−6.32	+0.53	−5.79	28.28	22.49 +.03
										±.30
	15 54.7			0.43882	9.00172					49 22.46 ±.25
				0.56910	9.26228					
				0.70291	9.52990					
				0.80061	9.72530					
Dec. 2, 1877. ζ Ursae Minoris										
A. 7. 8. 9									49 21.0	
14 57.0 1	16 25.5	16 15.6	−79.9	1.90255	3.80510	−2.47	+0.08	−2.39	49 24.40	49 22.01 −1.25
54.4	17 7.0	17 19.5	−143.8	2.15776	4.31552	−4.44	+0.26	−4.18	27.50	23.32 +.06
55.6	17 52.5	18 3.9	−188.2	2.27462	4.54924	−5.81	+0.45	−5.36	29.52	24.16 +.90
		18 22.2	−206.5	2.31492	4.62984	−6.38	+0.54	−5.84	29.40	23.56 +.30
										±.72
	14 55.67			0.39247	8.90902					49 23.26 ±.61
				0.64768	9.41944					
				0.76454	9.65316					
				0.80484	9.73376					
Dec. 3, 1877. ζ Ursae Minoris										
1	—									
14 48.5	13 25.0	14 7.8	+40.9	1.61172	3.22344	+1.26	+0.02	+1.28	49 18.20	49 19.48 +.01
49.2	14 5.0	14 38.4	+10.3	1.01284	2.02568	+0.32	+0.00	+0.32	19.37	19.69 +.22
47.9	14 47.9	15 21.4	−32.7	1.51455	3.02910	−1.01	+0.01	−1.00	20.63	19.63 +.16
48.3	15 32.5	15 53.0	−64.3	1.80821	3.61642	−1.99	+0.05	−1.94	20.97	19.03 −.44
49.7	16 18.2	16 53.1	−124.4	2.09482	4.18964	−3.84	+0.20	−3.64	23.25	19.61 +.14
47.9	17 0.5	17 48.7	−180.0	2.25527	4.51054	−5.56	+0.41	−5.15	24.52	19.37 −.10
49.1	17 46.0									±.19
				0.10164	8.32736					49 19.47 ±.16
	14 48.66			9.50276	7.12960					
				0.00447	8.13302					
				0.29813	8.72034					
				0.58474	9.29356					
				0.94519	9.61446					
Dec. 9, 1877. ζ Ursae Minoris										
1	—	13 48.5	+58.1	1.76418	3.52836	+1.79	+0.04	+1.83	49 16.35	49 18.18 −.71
14 49.7	13 27.2	14 33.0	+13.6	1.13354	2.26708	+0.42	+0.00	+0.42	17.90	18.32 −.57
49.3	14 5.1	15 32.7	−46.1	1.66370	3.32740	−1.42	+0.03	−1.39	20.35	18.96 +.07
47.8	14 47.8	15 56.4	−69.8	1.84386	3.68772	−2.16	+0.06	−2.10	21.27	19.17 +.28
47.9	15 27.1	17 7.5	−140.9	2.14891	4.29782	−4.35	+0.25	−4.10	23.90	19.80 +1.09
47.5	16 7.0									±.60
43.0	16 55.6			0.25410	8.63228					49 18.89 ±.50
46.1	17 43.0			9.62346	7.37100					
				0.15362	8.43132					
	14 46.61			0.33378	8.79164					
				0.63883	9.40174					

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	Tα	Tδ	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ Read.
									′ ″	′ ″
	h m s	m s	s							
	1 —	14 9.4	+ 31.9	1.50379	3.00758	+0.99	+0.01	+1.00	49 17.72	49 18.72 +.26
	—	15 4.0	− 22.7	1.35603	2.71206	−0.70	+0.01	−0.69	1960	18.91 +.45
	—	15 32.6	− 51.3	1.71012	3.42024	−1.58	+0.03	−1.55	2025	18.70 +.24
	—	16 15.7	− 94.4	1.97497	3.94994	−2.92	+0.11	−2.81	2135	18.54 +.08
14	41.7 14 41.7	17 21.7	− 160.4	2.20520	4.41040	−4.96	+0.33	−4.63	2272	18.09 −.37
	39.4 15 23.6	17 40.6	− 179.3	2.25358	4.50716	−5.54	+0.41	−5.13	2290	17.77 −.69
	42.3 16 10.8									49 18.46 ±.38
	41.3 16 53.9									±.32
	41.8 17 38.7									
	14 41.30			9.99371	8.11150					
				9.84595	7.81598					
				0.20004	8.52416					
				0.46489	9.05386					
				0.69512	9.51432					
				0.74350	9.61108					

Dec. 13, 1877. α Ursae Minoris

	1 —	14 14.4	+ 21.3	1.32838	2.65676	+0.66	+0.01	+0.67	49 12.97	49 13.64	−.23	
	—	14 55.5	− 19.8	1.29667	2.59334	−0.61	+0.00	−0.61	1445	13.84	−.03	
	—	15 49.2	− 73.5	1.86629	3.73258	−2.27	+0.07	−2.20	1640	14.20	+.33	
14	38.3 13 54.1	16 36.6	− 120.9	2.08243	4.16486	−3.74	+0.19	−3.55	1775	14.20	+.33	
	35.0 14 35.0	17 34.0	− 178.3	2.25115	4.50230	−5.61	+0.40	−5.11	1850	13.39	−.48	
	35.5 15 19.7	17 50.8	− 195.1	2.29026	4.58052	−6.03	+0.48	−5.55	1948	13.93	+.06	
	35.1 16 3.6										±.27	
	34.6 16 47.2									49 13.87	±.23	
	35.9 17 32.8											
	14 35.73			9.81830	7.76068							
				9.78659	7.69726							
				0.35621	8.83650							
				0.57235	9.26878							
				0.74107	9.60622							
				0.78018	9.68444							

Dec. 15, 1877. α Ursae Minoris

	A+1											
14	28.4 1 5 38.0	4 13.0	+ 616.2	2.79972	5.59944	+19.48	+5.05	+24.53	48 50.72	49 15.25	+.14	
	29.7 7 7.7	5 8.1	+ 561.1	2.74904	5.49808	+17.34	+4.80	+21.34	5428	15.62	+.51	
	29.6 8 46.0	5 54.6	+ 514.6	2.71147	5.42294	+16.90	+3.36	+19.26	5540	14.66	−.45	
		6 23.0	+ 486.2	2.68681	5.37362	+15.02	+3.00	+18.02	5718	15.20	+.09	
		7 56.7	+ 392.5	2.59384	5.18768	+12.13	+1.96	+14.09	49 0.97	15.06	−.05	
		8 28.7	+ 360.5	2.55691	5.11382	+11.14	+1.65	+12.79	2.10	14.89	−.22	
											±.27	
	14 29.23									49 15.11	±.23	
				1.28964	0.70336							
				1.23896	0.60200							
				1.20139	0.52686							
				1.17673	0.47754							
				1.08376	0.29160							
				1.04683	0.21774							

Dec. 16, 1877. α Ursae Minoris

	A+1											
14	37.8 1 5 46.8	4 7.0	+ 629.1	2.79872	5.59744	+19.44	+5.03	+24.47	48 52.32	49 16.79	−.11	
	36.8 7 14.3	5 9.0	+ 567.1	2.75366	5.50732	+17.52	+4.09	+21.61	5570	17.31	+.41	
	33.8 8 39.8	5 55.5	+ 520.6	2.71650	5.43300	+16.08	+3.36	+19.44	5745	16.89	−.01	
		7 0.3	+ 455.8	2.65877	5.31754	+14.08	+2.64	+16.72	49 0.37	17.09	+.19	
		7 40.6	+ 415.5	2.61857	5.23714	+12.84	+2.19	+15.03	1.95	16.98	+.08	
		8 46.5	+ 349.6	2.54357	5.08714	+10.80	+1.55	+12.35	4.00	16.35	−.55	
											±.25	
	14 36.13									49 16.90	±.21	
				1.28864	0.70136							
				1.24358	0.61124							
				1.20642	0.53692							
				1.14869	0.42146							
				1.10849	0.34106							
				1.03349	0.19106							

Dec. 17, 1877, α Ursae Minoris

14	32.1 1 11 35.0	9 20.0	+ 311.0	2.49276	4.98552	+9.61	+1.23	+10.84	49 1.75	49 12.59	−.05	
	30.2 12 17.4	10 3.4	+ 267.6	2.42749	4.85498	+8.27	+0.91	+9.18	385	13.03	+.39	
	32.6 13 4.0	10 50.5	+ 220.5	2.34341	4.68682	+6.81	+0.62	+7.43	5.02	12.45	−.19	
	—	11 26.9	+ 184.1	2.26505	4.53010	+5.69	+0.43	+6.12	6.38	12.50	−.14	
	—	12 33.7	+ 117.3	2.06930	4.13860	+3.62	+0.17	+3.79	8.82	12.61	−.03	
	—										±.18	
	—									49 12.64	±.15	
	—											
	—											
	14 30.97			0.98268	0.08944							
				0.91741	9.95890							
				0.83333	0.79074							
				0.75497	9.63402							
				0.55922	9.24252							

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Tα	Tδ	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circle. Read.

Dec. 18, 1877. α Ursae Minoris

h	m	s	m	s												
1	11	40.7	8	14.5	+3807	2.58058	5.16116	+11.76	+1.84	+13.60	49	4.72	49	18.32	−.79	
	12	23.4	9	5.2	+3300	2.51851	5.03702	+10.20	+1.38	+11.58		8.33		19.91	+.80	
	13	7.7	9	38.4	+296.8	2.47246	4.94492	+9.17	+1.12	+10.29		7.62		17.91	−1.20	
	13	52.6	10	35.7	+239.5	2.37931	4.75862	+7.40	+0.73	+8.13		11.23		19.36	+.25	
	14	31.0	10	57.0	+218.2	2.33885	4.67770	+6.74	+0.60	+7.34		11.52		18.86	−.25	
	15	22.2	11	49.0	+166.2	2.22063	4.44126	+5.13	+0.35	+5.48		14.83		20.31	+1.20	
	16	3.2													±.82	
	16	45.7											49	19.44	±.69	
	17	30.2														
						1.07050	0.26508									
						1.00843	0.14094									
						0.96238	0.04884									
	14	35.19				0.86927	9.86254									
						0.82877	9.78162									
						0.71055	9.54518									

Dec. 20, 1877. α Ursae Minoris

1		—	13	41.0	+485	1.68574	3.37148	+1.50	+0.03	+1.53	49	13.60	49	15.13	−.21	
		—	15	6.1	−36.6	1.56348	3.12696	−1.13	+0.02	−1.11		16.60		15.49	+.15	
		—	15	37.0	−67.5	1.82930	3.65860	−2.09	+0.06	−2.03		17.58		15.55	+.21	
14	30.1	13	45.9	16	25.2	−115.7	2.06333	4.12666	−3.57	+0.17	−3.40		18.60		15.20	−.14
	28.3	14	28.3												±.20	
	29.8	15	14.0										49	15.34	±.17	
	28.1	15	56.7													
	31.1	16	43.9													
			—													
		14	29.48													
							0.17566	8.47540								
							0.05340	8.23088								
							0.31922	8.76252								
							0.55325	9.23058								

Dec. 25, 1877. α Ursae Minoris

1		—	12	59.4	+76.7	1.88480	3.76960	+2.37	+0.07	+2.44	49	12.90	49	15.34	+.32	
		—	13	54.2	+21.9	1.34044	2.68088	+0.68	+0.01	+0.69		14.30		14.99	−.03	
14	17.3	12	48.7	14	50.2	−34.1	1.53275	3.06550	−1.05	+0.01	−1.04		16.30		15.26	+.24
	15.5	13	31.3	15	52.2	−96.1	1.98272	3.96544	−2.97	+0.12	−2.85		17.35		14.50	−.52
	12.6	14	12.6	16	13.5	−117.4	2.06967	4.13934	−3.63	+0.17	−3.46		18.45		14.99	−.03
	18.3	15	2.5												±.25	
	17.0	15	45.6											49	15.02	±.21
	15.9	16	28.7													
			—													
		14	16.10													
							0.37472	8.87352								
							9.83036	7.78480								
							0.02267	8.16942								
							0.47264	9.06936								
							0.55959	9.29326								

A 1.45
A−1 1.3

Dec. 26, 1877. α Ursae Minoris

14	8.6	1	11	11.5	9	35.5	+275.6	2.44028	4.88056	+8.52	+0.96	+9.48	49	4.70	49	14.18	+.46	
	14.1			—	10	23.0	+228.1	2.35813	4.71626	+7.05	+0.66	+7.71		6.33		14.09	+.32	
	10.5		13	31.0	19	1.7	+40.1	1.60314	3.20628	+1.24	+0.02	+1.26		12.18		13.44	−.28	
	15.7		13	29.9	19	1.7	−290.6	2.46330	4.92660	−8.98	+1.07	−7.91		21.37		13.46	−.26	
	6.5		14	10.5	19	45.8	−334.7	2.52466	5.04932	−10.34	+1.42	−8.92		22.40		13.48	−.24	
				—	24	53.2	−642.1	2.80760	5.61520	−19.84	+5.24	−14.60		23.17		8.57	±.35	
			20	9.7											49	13.74	±.30	
				—														
			22	57.5														
							0.93020	9.98448										
							0.84805	9.82018										
							0.09306	8.31020										
			14	11.08				0.95322	0.03052									
							1.01458	0.15324										
							1.29752	0.71912										

A 1
A−1 1.3

Dec. 27, 1877. α Ursae Minoris

14	9.1	11	12.0	9	33.3	+279.3	2.44607	4.89214	+8.63	+0.99	+9.62	49	3.43	49	13.05	−.67	
	14.0	20	8.0	10	35.8	+216.8	2.33606	4.67212	+6.70	+0.60	+7.30		6.90		14.20	+.48	
	14.7	23	5.7	19	16.1	−303.5	2.48216	4.96432	−9.38	+1.17	−8.21		21.90		13.69	−.03	
				20	27.0	−374.4	2.57334	5.14668	−11.57	+1.78	−9.79		23.80		14.01	+.29	
				22	46.1	−513.5	2.71054	5.42108	−15.87	+3.35	−12.52		26.18		13.66	−.06	
																±.34	
			14	12.60										49	13.72	±.29	
							0.93599	9.99606									
							0.82598	9.77664									
							0.97208	0.06824									
							1.06326	0.25060									
							1.20046	0.52500									

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1876phae.proj.1686R

	T_δ	T_α	τ	log τ	2 log τ	Red I	Red II	Sum	bricle Readings	Corr. bric. Read.			
	A_{+1} 1	T_α	T_δ										
	A_{+2}												
	A_{-1} 1												

Dec. 31, 1877. α Ursae Minoris

	h	m	s	m	s													
14	3.6	1	5	12.6	4	30.7	+576.2	2.76057	5.52114	+17.80	+4.22	+22.02		′ 48	″ 53.55	′ 49	″ 15.57	+.15
	7.4		11	10.3	5	22.9	+524.0	2.41933	5.43866	+16.19	+3.49	+19.68			55.98		15.66	+.24
	8.1		11	55.3	5	56.8	+490.1	2.69028	5.38056	+15.14	+3.05	+18.19			57.82		16.01	+.59
	8.5		20	2.5	10	21.9	+225.0	2.35218	4.70436	+6.95	+0.64	+7.59		49	7.55		15.14	−.28
					11	29.4	+157.5	2.19728	4.39456	+4.87	+0.31	+5.18			9.78		14.96	−.46
					18	4.0	−237.1	2.37493	4.74986	−7.33	+0.71	−6.62			21.82		15.20	−.22
																		±.35
			14	6.90				1.25049	0.62506							49	15.42	±.30
								1.20925	0.54258									
								1.18020	0.48448									
								0.84210	9.80828									
								0.68720	9.49848									
								0.86485	9.85378									

Jan. 1, 1878. α Urs. Min.

A_{+1}	1,2	1	4	32.0	5	12.1	+ 570.8	2.75648	5.51296	+17.71	+4.13	+21.84		48	54.12	49	15.96	15.94	−.02 +.91
A	1,2		5	31.2	6	40.9	+ 511.6	2.70893	5.41786	+15.87	+3.32	+19.19			56.08		15.27	15.26	−.01 +.23
A_{-1}			7	8.7	11	5.6	+ 414.1	2.61711	5.23422	+12.86	+2.18	+15.03		49	0.15		15.18	15.19	+.01 +.16
			10	59.2	11	48.7	+ 183.6	2.26387	4.52774	+5.70	+0.43	+6.13			7.65		13.78	13.98	+.20 −1.05
14	3.1		18	11.0	19	57.5	− 248.2	2.39480	4.78960	+4.70	+0.78	+6.92			21.68		14.76	14.88	+.12 −.15
	3.4		19	6.7			− 303.9	2.48273	4.96546	−6.43	+1.17	−8.26			23.10		14.84	14.96	+.12 −.07
	2.6																	15.03	±.47
	1.4							1.24822	0.61648							49	14.96		+.07 ±.40
	3.5				14	2.80		1.20067	0.52138										
								1.10885	0.33774										
								0.75561	9.63126										
								0.88654	9.89312										
								0.97447	0.06898										

Jan. 5, 1878. α Urs. Min.

A	12356	7	9	48.7	10	57.4	+ 245.3	2.38970	4.77940	+ 7.61	+0.78	+ 8.37		49	4.82	49	13.19	13.32	+.13 +.08
k_{-1}	123		18	26.0	11	42.5	− 27.20	2.43457	4.86914	− 8.44	+0.94	− 7.50			20.45		12.93	13.11	+.16 −.13
			20	18.5	12	26.0	− 381.5	2.58147	5.16298	−11.84	+1.85	− 9.99			23.52		13.53	13.66	+.13 +.42
13	54.4		20	46.5	13	55.8	− 412.5	2.61542	5.23084	−12.80	+2.16	−10.64			23.98		13.34	13.46	+.12 +.22
	55.2		22	29.3	14	36.2	− 516.3	2.71206	5.42412	−15.99	+3.37	−12.62			25.68		13.06	13.17	+.11 −.07
	54.5		23	23.5	15	20.0	− 569.5	2.75549	5.51098	−17.67	+4.12	−13.55			26.18		12.63	12.75	+.12 −.49
	55.8				19	48.5												13.24	±.26
	52.0				21	16.3		0.88144	9.88292							49	13.12		+.13 ±.22
	51.5				22	45.5		0.92631	9.96726										
	54.5							1.07323	0.26650										
	53.8							1.10416	0.33436										
	54.5				13	54.02		1.20380	0.52764										
	86.2							1.24723	0.61450										

Jan. 7, 1878. α Urs. Min.

A	12345	1	6	6.5	10	53.9	+1162.5	2.66511	5.33022	+14.35	+ 2.72	+17.07		49	54.2	49	22.49	22.57	+.08 +.86
13	50.9		8	0.2	11	34.6	+ 348.8	2.54258	5.08516	+10.82	+ 1.54	+12.36			9.16		21.46	21.64	+.18 −.07
	47.3		8	16.6	12	19.8	+ 232.4	2.52166	5.04332	+10.31	+ 1.40	+11.71			9.70		21.41	21.60	+.19 −.11
	48.8		9	23.1	13	5.3	+ 265.9	2.42472	4.84944	+ 8.25	+ .90	+ 9.15			12.10		21.25	21.47	+.22 −.24
	49.5		10	22.7	13	49.0	+ 206.3	2.31450	4.62900	+ 6.40	+ .54	+ 6.94			14.52		21.46	21.68	+.22 −.03
	49.0		11	54.0			+ 115.0	2.06070	4.12140	+ 3.57	+ .17	+ 3.74			17.32		21.06	21.29	+.23 −.42
																		21.71	±.31
	46.0				13	49.00		1.15685	0.43374							49	21.52		+.19 ±.26
								1.03432	0.18868										
								1.01340	0.14684										
								0.91646	9.95296										
								0.80624	9.73252										
								0.55244	9.22492										

Jan. 12, 1878. δ Urs. Min. L. b.

A_{-1}	6	+ neg. 5.6	6	54.2										5	57.52			
A	957	7	16.4	7	30.5	+185.9	2.26928	4.53856	−14.68	− 1.11	−15.79			54.28	5	41.73	41.83	+.10 +.53
		7	57.6	8	6.1	+146.7	2.16643	4.33286	−11.58	− .69	−12.27			45.18		41.01	42.11	+.10 +.81
		9	37.2	9	44.1	+ 47.1	1.67302	3.34604	− 3.72	− .07	− 3.79			10.45		41.39	41.59	+.20 +.29
10	22.8	18	14.3	9	32.6	−470.0	2.67210	5.34420	+37.11	− 7.12	+29.99			7.15		40.44	40.56	+.12 −.14
	24.3	19	12.7	9	50.4	−538.4	2.73111	5.46222	+42.51	− 9.35	+33.16					40.31	40.42	+.11 −.88
	25.2																41.30	
	28.6							1.16700	0.04716							5	41.18	+.13 ±.72
	24.8				10	24.32		1.06385	9.84146									±.61
	25.2							0.57044	8.85464									
								1.56952	0.85280									
	25.9							1.62853	0.94082									

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	Td	Tα	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read.			

Jan. 12, 1878. 51 Cephei.

	h	m	s	m	s												
	6	32	38.2	38	42.5	+620.0	2.79239	5.58478	+39.88	+10.10	+49.98	14h	15.95	15	593	+.19	612	+.06
A+1		33	44.7	39	24.4	+553.5	2.74312	5.48624	+35.60	+ 8.05	+43.65		22.12		577	+.12	589	-.17
A 6489		34	29.8	40	48.0	+508.4	2.70621	5.41242	+32.70	+ 6.79	+39.49		26.70		619	+.11	630	+.24
A-1		37	56.2	43	19.7	+202.6	2.48087	4.96174	+19.46	+ 2.41	+21.87		44.28		615	+.10	625	+.19
	42 58.6	38	52.9	43	40.1	+245.3	2.38970	4.77940	+15.78	+ 1.58	+17.36		49.00		636	-.01	635	+.29
	57.8	43	38.4	44	2.3	- 40.2	1.60423n	3.20846	- 2.58	+ .04	- 2.54		7.88		534	+.11	545	-.61
	58.8			44	22.8												626	=.28
	58.4			45	48.9		1.60041	1.00453						15	594	+.10		±.24
	57.4			46	31.9		1.55144	0.90599										
	58.8			47	14.5		1.51453	0.83217										
	57.4						1.28919	0.38149										
	58.1						1.19802	0.19915										
	58.5			42	58.17		0.41255n	8.62821										
	58.4																	

Jan. 16, 1878. α Urs. Min.

	m																
A-1 1	4	18.6	4	35.6	+548.5	2.73918	5.47836	+17.02	+ 3.82	+20.84	48	57.12	49	1796	+.02	1798	-.09
A56	5	2.4	6	2.7	+504.7	2.70303	5.40606	+15.66	+ 3.23	+18.89		58.92		1781	+.03	1784	-.23
13 26.6	5	52.1	7	35.5	+455.0	2.65801	5.31602	+14.12	+ 2.63	+16.75	49	0.48		1723	+.04	1727	-.80
25.2	6	55.6	13	25.1	+391.5	2.59273	5.18546	+12.15	+ 1.94	+14.09		4.38		1847	+.10	1857	+.50
29.5	13	35.4	14	13.5	- 8.3	0.91908n	1.83816	- .26	+ .01	- .25		18.00		1775	+.20	1795	-.12
25.1	23	3.3			-576.2	2.76057n	5.52114	-17.88	+ 4.21	-13.67		32.35		1868	+.12	1880	+.73
29.3																1807	±.45
			13	27.14		1.23092	0.58188						49	1798	+.09		±.38
357						1.19477	0.50958										
						1.14975	0.41954										
						1.08447	0.28898										
						9.41082n	6.94168										
						1.25231n	0.62466										

Jan. 17, 1878. α Urs. Min.

1	12	57.9	12	53.6	+ 30.6	1.48572	2.97144	+ .95	+ .01	+ .96	49	16.60	49	1756	+.13	1769	-.08
A456	22	48.0	13	27.6	-322.2	2.50813n	5.01626	- 9.99	+ 1.32	- 8.67		25.08		1641	+.21	1662	-1.15
A-1 13	23	7.2	14	8.6	-559.5	2.74780n	5.49560	-17.26	+ 3.97	-13.29		31.80		1841	+.18	1856	+.79
	24	19.1	19	21.9	-578.7	2.76245n	5.52490	-17.96	+ 4.25	-13.71		32.20		1849	+.13	1862	+.85
13 37.8	24	54.2	22	15.7	-650.6	2.81331n	5.62662	-20.19	+ 5.37	-14.82		32.70		1788	+.12	1800	+.23
27.6	18	58.7			-685.7	2.83613n	5.67226	-21.28	+ 5.97	-15.31		32.30		1699	+.13	1712	-.65
24.4																1777	±.68
27.9																	±.57
24.7			13	28.48		9.97446	8.07496						49	17.62	+.15		
424						0.99987n	0.11978										
						1.23954n	0.59912										
						1.25119n	0.62842										
						1.30505n	0.73014										
						1.32787n	0.77578										

Jan. 19, 1878. α Urs. Min.

1	7	14.2	7	25.0	+365.9	2.56336	5.12672	+11.35	+ 1.70	+13.05	49	0.10	49	13.15	+.19	1334	-.25
A+1 3	8	2.0	10	23.2	+318.1	2.50256	5.00512	+ 9.87	+ 1.28	+11.15		2.20		13.36	+.17	1352	+.07
A 123	8	38.0	11	8.3	+282.1	2.45040	4.90080	+ 8.75	+ 1.01	+ 9.76		3.35		13.11	+.16	1327	-.32
A-1	9	25.0	11	51.8	+235.1	2.37125	4.74250	+ 7.30	+ .70	+ 8.00		5.62		13.62	+.13	1375	+.16
13 19.0	10	10.8		—	+189.3	2.27715	4.55430	+ 5.87	+ .46	+ 6.33		7.52		13.85	+.12	1398	+.39
20.2	10	38.2			+161.9	2.20925	4.41850	+ 5.02	+ .33	+ 5.35		8.20		13.55	+.12	1367	+.08
21.0																1389	±2.3
26.3			13	20.12		1.05510	0.23024						49	13.45	+.15		±.17
						0.99430	0.10864										
						0.94214	0.00432										
						0.86299	9.84602										
						0.76889	9.65782										
						0.70099	9.52202										

Jan. 22, 1878. α Urs. Min.

1	17	44.0	19	7.5	-271.0	2.43297n	4.86594	- 8.11	+ .93	- 7.18	49	20.00	49	1252	+.18	1270	+.65
A+1 2	18	46.4	20	35.1	-333.7	2.52336n	5.04672	-10.35	+ 1.41	- 8.94		21.75		1281	+.20	1301	+.86
	19	18.5			-365.5	2.56289n	5.12578	-11.34	+ 1.70	- 9.64		21.88		1224	+.20	1244	+.39
13 13.5	22	45.8			-572.8	2.75806n	5.51600	-17.77	+ 4.16	-13.61		24.75		1114	+.21	1135	-.70
12.6	24	29.2			-676.2	2.83008n	5.66016	-20.48	+ 5.80	-15.18		26.45		1127	+.21	1148	-.57
	25	19.0			-726.0	2.86094n	5.72188	-22.53	+ 6.69	-15.84		26.95		1111	+.21	1132	-.73
			13	13.05												1205	±.73
						0.92471n	9.96946						49	11.85	+.20		±.62
						1.01510n	0.15024										
						1.05463n	0.22930										
						1.24974n	0.61952										
						1.32182n	0.76368										
						1.35268n	0.82540										

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TS h	m	s	Tα m	s	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings ′	″	Corr. Circ. Read.			

Jan. 24, 1878. δ Urs. Min. L.C.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I + II	′	″	′	″		
6	5	51.5	9	3.5	+261.9	2.41814	4.83628	−20.68	−2.21	−22.89	6	6.15	5	43.26 +.26	4352	+15
	6	17.6	9	21.7	+235.8	2.37254	4.74508	−18.62	−1.79	−20.41		3.98		43.57 +.24	4381	+44
	6	56.5	9	37.4	+196.9	2.29425	4.58850	−15.55	−1.25	−16.80		0.10		43.30 +.21	4351	+14
	7	42.2	9	55.5	+151.2	2.17955	4.35910	−11.94	−.74	−12.68	5	55.78		43.10 +.19	4329	−08
	8	23.4	10	13.0	+110.0	2.04139	4.08278	−8.69	−.39	−9.08		52.18		43.10 +.11	4321	−16
	8	45.4	10	32.1	+88.0	1.94448	3.88896	−6.95	−.25	−7.20		50.00		42.80 +.09	4289	−48
			10	48.3											4337	±26
			11	5.3		1.31556 n	0.34488 n						5	43.36 +.18		±.22
			11	23.9		1.26996 n	0.25368 n									
						1.19167 n	0.09710 n									
				2407		1.07697 n	9.86770 n									
				1207		0.93881 n	9.59138 n									
			10	13.41		0.84190 n	9.39756 n									

Jan. 28, 1878. α Urs. Min.

	h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I + II	′	″	′	″		
	0	57	20.6	1	23.5	+773.7	2.88857	5.77714	+24.01	+7.60	+31.61	48	43.98	49	15.59 +.08	1567	−16
A+1		58	33.7	2	49.3	+700.6	2.84547	5.69094	+21.74	+6.23	+27.97		48.00		15.97 +.09	1606	+23
		59	13.8	4	22.7	+660.5	2.81987	5.63974	+20.49	+5.54	+26.03		50.02		16.05 +.10	1615	+32
		59	52.8			+621.5	2.79344	5.58688	+19.28	+4.90	+24.18		51.58		15.76 +.12	1588	+05
90 14.5	1	0	37.0			+577.3	2.76140	5.52280	+17.91	+4.23	+22.14		53.40		15.54 +.15	1569	−14
11.8		1	22.8			+520.5	2.71642	5.43284	+16.15	+3.44	+19.59		55.75		15.34 +.18	1552	−31
16.7																1583	±22
				10	14.33		1.38031	0.88066						49	15.71 +.12		±.18
							1.33721	0.79446									
							1.31161	0.74326									
							1.28518	0.69040									
							1.25314	0.62632									
							1.20816	0.53636									

Jan. 30, 1878. δ Urs. Min. L.C.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I + II	′	″	′	″		
											6	4.32				
6	6	2.8	8	54.0	+243.0	2.38561	4.77122	−19.19	−1.90	−21.09	6	4.32	5	43.23 +.25	4348	−13
	6	35.2	9	11.6	+210.6	2.32346	4.64692	−16.63	−1.43	−18.06	5	1.45		43.39 +.21	4360	−01
	7	22.4		28.4	+163.4	2.21325	4.42650	−12.90	−.86	−13.76	5	57.25		43.49 +.21	4370	+09
	7	59.6		47.1	+126.2	2.10106	4.20212	−9.96	−.51	−10.47		53.50		43.03 +.16	4319	−42
	8	34.0	10	4.8	+91.8	1.96284	3.92568	−7.25	−.27	−7.52		51.12		43.60 +.11	4371	+10
	9	87.3		23.4	+28.5	1.45484	2.90968	−2.25	−.03	−2.28		46.18		43.90 +.08	4398	+37
				38.7											4361	±20
				58.6		1.28303 n	0.27982 n						5	43.44 +.17		±17
			11	15.3		1.22088 n	0.15552 n									
						1.11067 n	9.93510 n									
				2919		0.99848 n	9.71070 n									
				519		0.86026 n	9.43428 n									
			10	5.767		0.35226 n	8.41828 n									

Feb. 2, 1878. δ Urs. Min. L.C.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I + II	′	″	′	″		
6	5	25.9	8	50.0	+275.2	2.43965	4.87930	−21.73	−2.44	−24.17	6	5.82	5	41.65 +.25	4190	+55
	6	5.5	9	6.8	+235.6	2.37218	4.74436	−18.60	−1.79	−20.39		1.32		40.93 +.22	4115	−20
	6	44.7		25.1	+196.4	2.29314	4.58628	−15.51	−1.24	−16.75	5	57.38		40.63 +.21	4084	−51
	7	26.4		45.8	+154.7	2.18949	4.37898	−12.22	−.77	−12.99		55.10		42.11 +.18	4229	+94
	8	4.0	10	0.6	+117.1	2.06856	4.13712	−9.25	−.44	−9.69		50.85		41.16 +.11	4127	−08
	9	28.3		19.0	+32.8	1.51587	3.03174	−2.59	−.03	−2.62		43.22		40.60 +.07	4067	−68
				35.5											4135	±54
				54.2		1.33707 n	0.38790 n						5	41.18 +.17		±46
			11	12.7		1.26960 n	0.25296 n									
						1.19056 n	0.09488 n									
				2497		1.08691 n	9.88758 n									
				97		0.96598 n	9.64572 n									
			10	1.078		0.41329 n	8.54034 n									

Feb. 3, 1878. δ Urs. Min. L.C.

h	m	s	m	s	T	log T	2 log T	Red I	Red II	Sum I + II	′	″	′	″		
6	5	24.4	8	53.8	+278.6	2.44498	4.88996	−22.00	−2.50	−24.50	6	3.12	5	38.62 +.23	3885	+08
	5	55.8	9	11.9	+247.2	2.39305	4.78610	−19.52	−1.97	−21.49	5	59.62		38.13 +.22	3835	−42
	6	43.2		28.7	+199.8	2.30060	4.60120	−15.78	−1.29	−17.07		56.02		38.95 +.21	3916	+39
	7	22.0		46.3	+161.0	2.20683	4.41366	−12.71	−.84	−13.55		52.58		39.03 +.17	3920	+43
	8	8.9	10	4.3	+114.1	2.05729	4.11458	−9.01	−.42	−9.43		47.78		38.35 +.09	3844	−33
	8	43.3		18.9	+79.7	1.90146	3.80292	−6.29	−.20	−6.49		45.05		38.56 +.08	3864	−13
				36.3											3877	±32
				54.3		1.34240 n	0.39856 n						5	38.61 +.17		±27
			11	12.5		1.29047 n	0.29470 n									
						1.19802 n	0.10980 n									
				2670		1.10425 n	9.92226 n									
				270		0.95471 n	9.62318 n									
			10	3.000		0.79888 n	9.31152 n									

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Tδ	Tα	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Red.

Feb. 4, 1878. δ Ursæ Min. L.C.

h	m	s	h	m	s											
6	5	3.9	8	51.0	+296.2	2.47159	4.94318	−23.39	−2.83	−26.22	6	38.2	5	37.60	+.23	37.83	−.16
	5	50.9	9	8.6	+249.2	2.39655	4.79310	−19.68	−2.00	−21.68	5	59.82		38.14	+.23	38.37	+.38
	6	29.7		25.2	+210.4	2.32305	4.64610	−16.61	−1.43	−18.04		56.18		38.14	+.22	38.36	+.37
	7	12.0		40.7	+168.1	2.22557	4.45114	−13.27	−.91	−14.18		51.88		37.70	+.16	37.86	−.13
	7	52.0		44.2	+128.1	2.10755	4.21510	−10.12	−.53	−10.65		48.30		37.65	+.10	37.75	−.24
	8	30.5	10	0.2	+89.6	1.95231	3.90462	−7.08	−.26	−7.34		45.05		37.71	+.08	37.79	−.20
				17.7												37.99	±.27
				33.1		1.36901 n	0.45178 n						5	37.82	±.17		±.23
			51.6	50.0		1.29397 n	0.30170 n										
				53.2		1.22049 n	0.15470 n										
			11	10.7		1.12299 n	9.95974 n										
				2405		1.00497 n	9.92370 n										
				0.5		0.84978 n	9.41322 n										
			10	0.056													

Feb. 5, 1878. δ Ursæ Min. L.C.

6	9	49.0	8	49.5	+10.5	1.02119	2.04238	−.83	−.00	−.83	5	41.22	5	40.39	+.08	40.47	+1.40
	10	45.0	9	7.1	−45.5	1.65801 n	3.31602	+3.59	−.07	+3.52		36.45		39.97	+.12	40.09	+1.02
	11	30.5		25.9	−91.0	1.95904 n	3.91808	+7.19	−.27	+6.92		31.70		38.62	+.18	38.80	−.27
	12	11.9		41.9	−132.4	2.12189 n	4.24378	+10.45	−.57	+9.88		28.40		38.28	+.22	38.50	−.57
	12	37.0		59.6	−157.5	2.19728 n	4.39456	+12.44	−.80	+11.64		25.82		37.46	+.23	37.69	−1.88
	13	16.6	10	16.9	−197.1	2.29469 n	4.58938	+15.56	−1.25	+14.31		24.32		38.63	+.22	38.85	−.22
				33.5												39.07	±.88
				50.8		9.91861 n	7.55098 n						5	38.89	±.17		±.74
			11	9.9		0.55543	8.82462 n										
						0.85646	9.42668 n										
				29.51		1.01931	9.75238 n										
				5351		1.09470	9.90316 n										
			9	59.456		1.14211	0.09798 n										

Feb. 6, 1878. δ Ursæ Min. L.C.

6	6	50.9	9	52.0	+250.4	2.39863	4.79726	−19.77	−2.02	−21.79	5	56.00	5	34.21	+.25	34.46	+.56
	7	58.4	10	7.8	+192.9	2.28533	4.57066	−15.23	−1.20	−16.43		49.10		32.67	+.17	32.84	−1.06
	8	45.0		26.0	+136.3	2.13450	4.26900	−10.76	−.60	−11.36		44.90		33.54	+.09	33.63	−.21
	9	32.4		44.3	+88.9	1.94890	3.89780	−7.18 22	−.26	−7.44 28		41.68		34.48	+.07	34.47	+.67
	10	34.6	11	2.8	+26.7	1.42651	2.85302	−2.11	−.02	−2.13		36.00		33.87	+.11	33.98	+.08
	11	48.0		18.0	−46.7	1.66932 n	3.33864	+3.69	−.07	+3.62		30.20		33.82	+.18	34.00	+.10
				37.1												33.90	±.48
				53.8									5	33.70	+.13		±.40
			12	9.5		1.29605 n	0.30586 n										
						1.18275 n	0.07926 n										
				2513		1.03192 n	9.97760 n										
				113		0.84632 n	9.40640 n										
						0.32393 n	8.36162 n										
			11	1256		0.56674	8.84724 n										

Feb. 7, 1878. δ Ursæ Min. L.C.

	10	36.9	10	10.5	+25.4	1.40483	2.80966	+1.92	−.02	+1.90	4	15.08	4	16.98	+.12	17.10	−.01
c₂ Hfeld	11	25.0	2.7	27.5	−22.7	1.35603 n	2.71206	+1.72	−.02	+1.74		19.25		17.51	+.18	17.69	+.58
	12	45.1	2.3	44.6	−102.8	2.01199 n	4.02398	+7.77	−.34	+7.43		25.22		17.11	+.21	17.32	+.21
B	13	50.6	2.0	1.8	−168.3	2.22608 n	4.45216	+12.72	−.91	+12.63		29.70		16.07	+.15	16.22	−.89
	15	8.3	1.8	18.6	−246.0	2.39094 n	4.78188	+18.59	−1.95	+20.54		37.92		17.38	+.01	17.39	+.28
	15	52.8	1.2	36.9	−290.5	2.46315 n	4.92630	+21.96	−2.72	+24.68		41.62		16.94	−.01	16.95	−.16
			2.1	55.3												17.11	±.39
			3.1	12.0									4	17.00	±.11		±.33
			2.4			0.28322	8.31851 n										
	11	220				0.23442 n	8.22091 n										
			13	5.0		0.89038 n	9.53283 n										
				21.8		1.10447 n	9.96101 n										
				40.3		1.26933 n	0.29073 n										
				55.5		1.34154 n	0.43515 n										
			14	14.5													
				30.9													
				49.4													
			15	7.0													
				22.7													
				2471													
				1271													
			14	14.122													
			3	11.69													
			11	2.43													
				2.20													
			11	2.315													

51 Cephei.

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TS	TL	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.

Feb. 7, 1878. 51 bephei.

h	m	s	m	s	m	s												
	38	46.5	38	39	48.1	+282.2	2.45056	4.90112	−17.34	+ 2.04	−15.25	13	57.98	13	42.73 +.21	42.94	−.08	
	40	2.4	39	39	11.5	+206.3	2.31450	4.62900	−12.68	+ 1.12	−11.56		54.20		42.64 +.20	42.84	−.18	
	43	37.0		38	32.6	− 8.3	0.91908 n	1.83816	+ .51	+ 00	+ .51		42.75		43.26 +.08	43.34	+.32	
	44	55.0		39	54.3	− 86.3	1.93601 n	3.87202	+ 5.30	+ .20	+ 5.50		37.58		46.18 +.12	43.20	+.18	
	46	8.8	45	38	37.1	− 160.1	2.20439 n	4.40878	+ 0.84	+ 67	+ 10.51		32.35		42.86 +.20	43.06	+.04	
	47	7.0		37	59.7	− 218.3	2.33905 n	4.67810	+ 13.42	+ 1.25	+ 14.67		27.80		42.47 +.27	42.74	−.28	
			26.443		28.4									13	42.84 +.18	43.02	±.20	
			28.2		49.6		1.23907 n	0.32035									±.17	
			29.0		11.8		1.10301 n	0.04823										
	39	33.04	29.4	44	32.6		9.70759	9.25739										
	43	28.60		44	54.6		0.92452	9.29125										
	47	24.478		45	57.3		0.99290	9.82801										
		8		46	20.0		1.12756	0.09733										
		56.12			42.0													
				47	4.1													
					24.5													
					46.1													
				48	6.6													
					26.3													
			2803	48	57.4													
				43	28.707													

Feb. 11, 1878. δ Ursae Min. L. b

	6	2	17.4	6	4.23	+52.64	2.72132	5.44264	+39.78	− 8.94	+30.84	3	50.62	4	21.46 +.09	21.55	+.86	
		3	20.2		33.8	+46.36	2.66614	5.33228	+35.04	− 6.94	+28.10		51.92		20.02 +.11	20.13	−.56	
A1		4	14.3	7	16.3	+40.95	2.61225	5.22450	+30.95	− 5.41	+25.54		53.58		21.12 +.15	21.27	+.58	
		5	38.1		36.7	+32.57	2.51282	5.02564	+24.62	− 3.42	+21.20		58.90		20.10 +.16	20.26	−.43	
		6	29.2		52.1	+27.46	2.43870	4.87740	+20.75	− 2.43	+18.32	4	1.42		19.74 +.16	19.90	−.79	
		7	47.3	8	10.1	+19.65	2.29336	4.58672	+14.85	− 1.25	+13.60		7.30		20.90 +.16	21.06	+.37	
					27.3											20.69	±.65	
					44.1									4	20.56 +.14		±.53	
				9	2.0		1.59971	0.95149 n										
							1.54453	0.84113 n										
							1.49064	0.73335 n										
					28.41		1.39121	0.53449 n										
					46.91		1.31709	0.38625 n										
				7	52.122		1.17175	0.09557 n										
				13	11.69													
				11	3.812													

Feb. 11, 1878. 51 bephei.

adj. 6	41	21.5	48	34.0	+ 131.3	2.11826	4.23652	− 8.04	+ .45	− 7.62	13	45.18	13	rej 43.06 +.06			
	49	5.7		32.7	− 332.9	2.52231 n	6.04462	+20.46	+ 2.91	+23.37		40.48	14	38.5 +.11	38.61	39.6	
	50	19.7	29.8		− 406.9	2.60949 n	5.21898	+25.061	+ 4.35	+29.411		33.42		28.3 +.23	28.53	30.6	
			27.1							36		25.72		+.29			
												25.72		+.29			
			47	28.45								22.78	13	46.15 +.26	46.41	+.13	
			3	55.65			0.90677 n	9.65575				16.60		45.96 +.19	46.15	−.13	
							1.31082	0.46385							46.28	±.14	
							1.39800	0.63821					13	46.06 +.16	+.22	±.16	
			43	32.80									14	34	17		

Feb. 13, 1878. 51 bephei.

	6	36	36.5	38	11.4	43 31.5	10.1	46	2.1 + 41.50	2.61805	5.23610	−25.50	+ 4.52	14	3.70	13 14	43.72 +.17	42.89	−.82
		37	37.0		32.3	31.2	31.2		23.7 + 34.05	2.53212	5.06424	−20.92	+ 3.04		0.80		42.92 +.18	43.10	−.31
A1		38	37.5		63.6	30.7	52.1		44.4 + 27.40	2.43775	4.87550	−16.84	+ 1.97	13	58.78		43.91 +.19	44.10	+.69
A1+A2+B1		40	14.0	39	15.5	44 31.4	42.4	47	48.4 + 19.75	2.29557	4.59114	−12.14	+ 1.02		54.50	13	43.38 +.14	43.55	+.14	
A1		43	17.2		35.5	31.4	35.6		26.0 + 14.3	1.15534	2.31068	− .88	+ .00		43.78		42.90 +.08	42.98	−.43	
		44	40.2		58.4	30.3	53.9		48.8 − 68.7	1.83696 n	3.67392	+ 4.22	+ .12		39.42		43.76 +.11	43.87	+.46	
				40	19.0	65		48	10.0									43.41	±.46	
					40.5				31.4							13	43.26 +.15		±.39	
				41	1.7	43	31.08		57.8	1.40656 n	0.65533	−20.98							
							36.43			1.32063 n	0.48347	−17.88							
							27.03		43.3	1.22626 n	0.29443	−14.87							
					26.79					1.08408 n	0.01037	−11.12							
					32.79		45.4			9.94385 n	9.72991	− .88							
				39	36.483	43	31.573	47	27.083	0.62547	9.09315	+ 4.34							

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TS	TZ	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circle. Red

Feb. 13, 1878. λ Urs. Min. L.C.

m	p	m	p	m	p																
40	24.3	40	12.5			+ 211.2	2.32469	4.64938	+ 5.01	− .45	+ 4.56	24	7.58	24	12.14	+.16	1230	+.05			
41	39.0	41	10.3			+ 136.5	2.13513	4.27026	+ 3.24	− .19	+ 3.05		9.08		12.13	+.15	1228	+.03			
42	41.7	42	4.3			+ 73.8	1.86806	3.73612	+ 1.75	− .05	+ 1.70		10.82		12.52	+.13	1265	+40			
44	4.2	44	57.1			− 8.7	0.93952 n	1.87904	− .21	− .00	− .21		11.70		11.49	+.13	1162	−.63			
45	6.9	43	56.0			− 71.4	1.85370 n	3.70740	− 1.69	− .05	− 1.74		14.12		12.38	+.12	1250	+25			
46	24.9	44	53.4			− 149.4	2.17435 n	4.34870	− 3.54	− .23	− 3.77		15.78		12.01	+.12	1213	−12			
		45	43.7														12.25	±.27			
		46	42.0											24	12.11	+.14		±.23			
		47	40.0																		
			31.93				0.69962	9.65545 n													
			49.93				0.51006	9.27633 n													
		43	55.478				0.24299	8.74219 n													
							9.31445 n	6.88511 n													
							0.22863 n	8.71347 n													
							0.54928 n	9.35477 n													

Feb. 14, 1878, δ Urs. Min. L.C.

6	1	53.5	6	41.5			+548.7	2.73933	5.47866	+ 41.47	− 9.72	+ 31.75	3	49.25	4	21.00	+.11	2111	+.09		
3	2.0	7	0.5				+482.2	2.68323	5.36646	+ 36.44	− 7.50	+ 28.94		51.48		20.42	+.12	2054	−.48		
4	13.1		17.7				+409.1	2.61183	5.22366	+ 30.92	− 5.40	+ 25.52		56.02		21.54	+.16	2170	+.68		
5	24.0		35.6				+340.2	2.53173	5.06346	+ 25.71	− 3.74	+ 21.97		58.62		20.59	+.16	2075	−.27		
6	19.5		57.8				+284.7	2.45439	4.90878	+ 21.52	− 2.62	+ 18.90	4	1.82		20.72	+.15	2087	−.15		
7	26.6	8	10.2				+217.6	2.33766	4.67532	+ 16.45	− 1.53	+ 14.92		6.05		20.97	+.16	2113	+.11		
			28.2															2102	±.32		
			48.3												4	20.87	+.14		±.27		
		9	1.8																		
			23.26				1.61772	0.98751 n	+	−											
			47.26				1.56162	0.87531 n	+	−											
							1.49022	0.73251 n	+	−											
							1.41012	0.57231 n	+	−											
							1.33278	0.41763 n	+	−											
		7	52.571				1.21605	0.18417 n	+												
		13	11.68																		
		11	4.190																		

Feb. 14, 1878. 51 Cephei.

6	42	7.0	42	9.7	46	4.3	+ 88.2	1.94547	3.89094	− 5.42	+ .20	− 5.22	13	50.78	13	45.56	+.08	4564	−.57		
43	42.9		31.0		27.6		− 7.7	0.88649 n	1.77298	+ .47	+ .00	+ .47		46.25		46.72	+.07	4679	+.58		
44	45.0		52.3		49.1		− 69.8	1.84386 n	3.68772	+ 4.29	+ .13	+ 4.42		41.52		45.94	+.09	4603	−.18		
45	37.7	43	13.5	47	8.0		− 122.5	2.08814 n	4.17628	+ 7.53	+ .39	+ 7.92		38.65		45.57	+.13	4570	+.49		
47	9.6		34.0		32.0		− 214.4	2.33122 n	4.66244	+ 13.17	+ 1.21	+ 14.38		31.55		45.93	+.26	4619	−.02		
48	3.8		54.4		52.6		− 268.6	2.42911 n	4.85822	+ 16.51	+ 1.89	+ 18.40		27.20		45.60	+.29	4589	−.32		
		44	18.7	48	14.0													4621	±.39		
			40.0		36.3										13	46.05	+.15		±.33		
		45	1.0		56.5																
			25.46		27.94			0.73398 n	9.31017												
			31.46					9.67500 n	9.19221												
								0.63237	9.10695												
		43	34.956	47	31.044			0.87665	9.59561												
			35.384	3	55.66			1.11973	0.08167												
		43	35.170					1.24762	0.27745												

Feb. 16, 1878. δ Urs. Min. L.C.

6	2	28.3	5446	45.0	9	4.7	+ 519.1	2.71525	5.43050	+ 39.23	− 8.70	+ 30.53	3	48.50	4	19.03	+.11	1914	+.38		
3	41.0	5637	41	9	37.7		+ 446.4	2.64972	5.29944	+ 33.74	− 6.43	+ 27.31		51.05		18.36	+.13	1849	−.27		
4	37.2	5411	193	10	15.3		+ 390.2	2.59129	5.18258	+ 29.49	− 4.91	+ 24.58		53.50		18.08	+.17	1825	−.01		
5	32.0	5643	39.0		30.2		+ 334.4	2.52427	5.04854	+ 25.27	− 3.61	+ 21.66		57.22		18.88	+.16	1904	+.28		
6	25.6	5700	37.0		48.7		+ 281.8	2.44994	4.89988	+ 21.76 30	− 2.56	+ 19.23 18.74		59.82		18.58	+.16	1872	−.04		
9	25.2	5511	—	11	5.8		+ 102.2	2.00945	4.01890	+ 7.72	− .34	+ 7.38		11.45		18.83	+.11	1894	+.18		
		335	—		25.1													18.76	±.30		
A-1	1234	29	—		4.28											18.62	+.14		±.25		
		9	4.7	12	2.0																
					19.7																
		7	55.58					1.59364	0.93935 n												
		3	11.67		2483			1.52811	0.80829 n												
		11	7.25		683			1.46968	0.69143 n												
			7.58					1.40266	0.55739 n												
		11	7.420	11	7.589			1.32833	0.40873 n												
								0.88884	9.52775 n												

Feb. 18, 1878. δ Urs. Min. L.C.

6	0	27.3	0	47.9		+ 640.2	2.80632	5.61264	+ 48.38	− 13.23	+ 35.15	3	45.15	3	20.30	+.08	2038	+.16		
	1	37.5	7	4.1		+ 570.0	2.75587	5.51174	+ 43.08	− 10.49	+ 32.59		47.75	4	20.34	+.09	2043	+.21		
	3	28.4		20.6		+ 459.1	2.66191	5.32382	+ 34.70	− 6.80	+ 27.90		52.38		20.28	+.11	2039	+.17		
A-1	3	47.2		38.7		+ 440.3	2.64376	5.28750	+ 33.28	− 6.26	+ 27.02		53.28		20.30	+.13	2043	+.21		
	4	53.7		54.7		+ 373.8	2.57264	5.14528	+ 28.25	− 4.51	+ 23.74		56.22		19.96	+.15	2011	−.11		
	6	12.8	8	13.8		+ 294.7	2.46938	4.93876	+ 22.27	− 2.80	+ 19.47		59.95		19.42	+.16	1958	−.64		
				29.6													2022	±.27		
				48.1										3	20.10	+.12		±.23		
			9	4.8				1.68471	1.12149 n					4							
				26.23				1.63426	1.02059 n												
				50.23				1.54030	0.83267 n												
		7	55.871					1.52214	0.79635 n												
		13	11.669					1.45103	0.65413 n												
		11	7.480					1.34777	0.44761 n												

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1876phae.proj.10066R

	Td	Tα	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read.		

Feb. 18, 1878. 51 Cephei

	h	m	s	m	s	m	s														
	6	38	5.0	38	9.8	44	18.7	+329.8	2.51825	503650	−20.27	+2.86	−17.41	−33	14	1.82	13	4441	+.13	4454
		39	46.0		35.3		35.1	+228.8	2.35946	471892	−14.06	+1.37	−12.69	+08		57.52		4483	+.12	4495
$A_{1,1234567}$		42	13.0	39	19.2		57.0	+81.8	1.91275	382550	−5.03	+.18	−4.85	+64		50.32		45.47	+.04	4551
$A_{2345689}$		43	44.7		41.7	46	3.4	−9.9	0.99564 n	1.99128	+.60	+.00	+.60	−21		44.00		44.60	+.06	4466
A_1		45	11.6	40	1.9		28.4	−96.8	1.98588 n	3.97176	+5.95	+.25	+6.20	−10		38.45		44.65	+.12	4477
		46	4.9		25.0		46.2	−150.1	2.17638 n	4.35276	+9.22	+.59	+9.81	−07		34.80		4461	+.19	4480
						47	9.6							±26						44.87
							32.0							±22			13	4476	+.11	
				35.2	31.0		52.3													
				34.4	51.6	48	12.9													
				35.5	14.1		34.7		1.30676 n	0.45573										
				35.2	35.2		56.0		1.14797 n	0.13815										
				33.9	55.3		27.55		0.70126 n	9.24473										
				35.9		47	30.611		9.78415	9.74105										
				30.4	44	43	34.05		0.77439	9.39099										
				31.4		39	39.66		0.96489	9.77199										
				324			1432													
				ch. f.	ch. f.	43	34.773													

Feb. 18, 1878. λ Urs. Min. L.b.

																24	8.40		+.16		
																	9.92		+.15		
																	12.12		+.14		
																	12.30		+.14		
																	14.28		+.13		
																	15.50		+.13		
																			+.14		

Feb. 19, 1878. δ Urs. Min. L.b.

	6	1	15.0	6	48.8			+597.6	2.77495	5.54890	+45.01	−11.45	+33.56	−56	3	4.568	4	19.24	+.09	1933
		2	42.0	7	5.8			+508.6	2.70638	5.41276	+38.44	−8.35	+30.09	+21		49.92		20.01	+.09	2010
		3	38.0		25.7			+452.6	2.65571	5.31142	+34.21	−6.61	+27.60	+38		52.55		20.15	+.12	2027
A_1		4	44.8		40.7			+385.7	2.58625	5.17250	+29.15	−4.80	+24.35	−26		55.12		19.47	+.16	1963
		5	52.0		59.5			+318.6	2.50325	5.00650	+24.08	−3.28	+20.80	+19		57.12		19.92	+.16	2008
		6	59.1	8	16.7			+251.5	2.40054	4.80108	+19.01	−2.02	+17.01	+064	4	2.82		19.83	+.16	1995
					33.9								+16.97	19						
					49.8									±30						
				9	8.9									±25			4	19.76	+.13	1989
					28.98				1.65334	1.05875 n										
					52.98				1.58477	0.92161 n										
				7	58.867				1.53410	0.82027 n										
				8	11.66				1.46464	0.68135 n										
				11	10.527				1.38164	0.51535 n										
									1.27893	0.30993 n										

Feb. 19, 1878. 51 Cephei

		38	39.2	38	13.7	44	12.9														
				38	34.2		34.1	+292.1	2.46503	493106	−17.95	+2.24	−15.71	+91	14	1.40	13	4569	+.13	4582
$A_{1,1234567}$		39	53.9	34	51.3		57.6	+217.4	2.33726	467452	−13.36	+1.24	−12.12	+05	13	56.95		44.83	+.13	4496
$A_{2345679}$		42	39.4	39	15.2	46	3.2	+67.9	1.71517	393034	−3.19	+.07	−3.12	−90		47.08		43.96	+.05	4401
A_1		44	2.4	36	36.3		22.0	−31.1	1.49276 n	298552	+1.91	+.02	+1.93	+53		43.45		45.38	+.06	4544
		45	15.2	36	57.7		43.0	−103.9	2.01662 n	4.03324	+6.38	+.28	+6.66	−67		37.45		44.11	+.13	4424
		47	40.7	40	37.1	47	3.6	−249.4	2.39690 n	4.79380	+15.33	+1.63	+16.96	+06		27.72		44.68	+.29	4497
				43	3		26.6							±57						
							49.4		1.25404 n	0.35029				±48			13	4477	+.13	4491
						48	7.0		1.12577 n	0.09375										
				42	29 25.6		30.9		0.50368 n	8.84957										
				30	6 7.8		53.5		0.28127	9.40475										
				43	30 5 9.1		23 9 2		0.80513	9.45247										
				31	2 31.2	47	26.678		1.18541	0.21303										
				33	1	43	30.90													
				30	54.5	39	36.47													
				29	9															
				32	0															
	7	40	32.0	40	19.0			+208.1	2.31827	4.63654	+4.93	−.44	+4.49	−024		8.48	24	12.97	+.17	1314
		41	33.6	41	10.8			+146.5	2.16584	4.33168	+3.47	−.22	+3.25	+31		10.15		13.40	+.15	1355
		42	43.8	42	9.9	43	31.317	+76.3	1.88252	3.76504	+1.81	−.06	+1.75	+17		11.52		13.27	+.14	1341
	A	43	35.4	43	3.0			+24.7	1.39270	2.78540	+.59	−.01	+.58	−27		12.25		12.83	+.14	1297
		44	22.8	44	0.0			−22.7	1.35603 n	2.71206	−.54	−.00	−.54	+26		13.90		13.36	+.14	1350
		45	11.7	44	54.5			−71.6	1.85491 n	3.70982	−1.70	−.05	−1.75	−35		14.50		12.75	+.14	1289
				45	57.7									±27						1324
				46	58.0				0.69320	9.64261 n				±23			24	13.10	+.15	
				47	42.2				0.54077	9.33775 n										
									0.25745	8.77111 n										
					2409				9.76763	7.79147 n										
				44	0.100				0.43096 n	1.71813 n										
									0.22984 n	8.41589 n										

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1876phae.proj.1686R

TS	TL			log T	log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read.

Feb. 24, 1878. S Urs. Min. L.C.

h	m	p	m	p	m	p												
6	1	13.7	6	51.2			+598.7	2.777721	5.55442	+45.25	−11.57	+33.68						
	2	23.0	7	8.0			+529.4	2.72378	5.44756	+40.01	−9.05	+30.96	3	43.32	4	1700	+.09	1709
	3	14.5		26.1			+477.9	2.67934	5.35868	+36.12	−7.50	+28.62		45.70		1666	+.10	1676
A4	3	57.6		43.8			+434.8	2.62829	5.25658	+32.86	−6.10	+26.76		47.70		1632	+.11	1643
	4	42.4	8	0.0			+390.0	2.59106	5.18212	+29.47	−4.91	+24.56		48.40		1516	+.12	1528
	5	38.5		18.2			+333.9	2.52362	5.04724	+25.24	−3.60	+21.64		50.45		1501	+.16	1517
				36.0										53.52		1816	+.19	1835
				52.7														1603
			9	10.8				1.65560	1.06327 n						4	1591	+18	±84
				2468				1.60217	0.95641 n									±71
			8	0.756				1.55773	0.86755 n									
			3	11.650				1.51668	0.78543 n									
			11	12.406				1.46945	0.69097 n									
								1.40201	0.58609 n									

Feb. 24, 1878. 51 Cephei.

6	39	40.9	38	54.6	37.4	46	2.0	+232.3	2.36605	4.73210	−14.27	+1.12	−12.85	13	54.00	13	4185	+.19
	40	35.4	39	18.4	39.8		23.1	+177.8	2.24993	4.47986	−10.92	+.83	−10.09		50.95		4086	+.16
A1, 3456789	43	41.2	39	38.4	38.4		45.4	− 8.0	0.90309 n	1.80618	+.49	+.00	+.49		41.12		4161	+.09
A 56789	45	8.9	39	57.9	36.5	47	7.2	− 95.7	1.98091 n	3.96182	+5.88	+.24	+6.12		34.85		4097	+.17
A−1	46	13.9	40	20.9	38.1		29.9	− 160.7	2.20602 n	4.41204	+9.87	+.68	+10.55		29.32		3987	+.12
	47	52.6	40	41.7	37.5		49.0	− 259.4	2.41397 n	4.82794	+15.94	+1.77	+17.71		21.98		3999	+.27
			41	1.8	36.2	48	10.9											
				1468 − 37.7			34.0		1.15456 n	0.15133						13	4069	+17
				7 = 2574			55.9		1.03844 n	9.91909								±54
				=					9.69160	9.22541								
					39		37.70											
		333	43	33.3	40		20.50		0.76942	9.38105								
		31.4		52.8	43		33.38		0.99453	9.83127								
		35.0	44	17.8	47		28.60		1.20248	0.24717								
		32.1		36.3			33.227											
		35.1	45	0.7	43		31.493											
		169																

Feb. 24, 1878. λ Urs. Min. L.C.

7	41	2.0		—			+ 177.5	2.24920	4.49840	+ 4.21	− .32	+ 3.89	24	3.15	24	704	+.17	721
A2345789	42	18.6	41	10.8	52.7	57.3	+ 102.9	2.00389	4.00778	+ 2.39	− .10	+ 2.29		4.90		719	+.14	733
	43	14.5	42	10.1	56.5	61.1	+ 45.0	1.65331	3.30642	+ 1.07	− .02	+ 1.05		7.08		813	+.13	826
	44	15.0	43	5.6	56.6	61.1	− 15.5	1.19033 n	2.38066	− .37	− .00	− .37		8.10		773	+.12	785
	45	18.7	43	56.6	56.6		− 79.2	1.89873 n	3.79746	− 1.88	− .06	− 1.94		9.38		744	+.11	755
	46	7.9	44	54.0	58.5		− 128.4	2.10857 n	4.21714	− 3.04	− .17	− 3.21		10.80		709	+.10	719
			45	52.2	61.2													750
			46	47.9	61.5			0.62413	9.50447 n						24	744	+.13	±35
			47	40.6	58.7			0.37882	9.01385 n									±30
					523	760		0.02814	8.31249 n									
			43	59.50				9.56526 n	7.38673 n									
								0.27366 n	8.80353 n									
								0.48350 n	9.23321 n									

Feb. 26, 1878. δ Urs. Min. L.C.

6	1	28.2	6	54.0			+ 587.7	2.76916	5.53832	+44.12	− 11.15	+33.27	3	41.88	4	1515	+.09	1524
	2	39.9	7	10.4			+ 515.0	2.71181	5.42362	+38.92	− 8.56	+30.36		44.38		1474	+.08	1482
	3	30.9		28.3			+ 464.0	2.66652	5.33304	+35.07	− 6.95	+28.12		45.85		1397	+.09	1406
A−1	4	35.1		45.7			+ 399.8	2.60184	5.20368	+30.22	− 5.16	+25.06		49.25		1431	+.11	1442
	5	21.6	8	3.0			+ 353.3	2.54814	5.09628	+26.70	− 4.03	+22.67		51.85		1452	+.15	1467
	6	18.0		20.0			+ 296.9	2.47261	4.94522	+22.44	− 2.85	+19.59		54.68		1427	+.17	1444
				38.2														1461
				56.2				1.64755	1.04717 n	+					4	1449	+12	±33
			9	12.8				1.59020	0.93247 n	+								±28
				2691				1.54491	0.84189 n	+								
				291				1.48023	0.71253 n	+								
			8	3.233				1.42653	0.60513 n	+								
			3	11.65				1.35100	0.45407 n	+								
			11	14.883														

Feb. 26, 1878. 51 Cephei.

6	43	45.0	43	33.6	33.6		− 11.6	1.06446 n	2.12892	+ .71	+ .00	+ .71	13	40.02	13	4073	+.10	4083
	45	15.0		54.4	33.0		− 101.6	2.00689 n	4.01378	+ 6.24	+ .27	+ 6.51		33.88		4039	+.20	4059
A56789	46	26.5	44	16.8	34.0		− 173.1	2.23830 n	4.47660	+ 10.64	+ .79	+ 11.43		28.82		4025	+.28	4053
A−1	47	42.8		38.7	34.5		− 244.4	2.39690 n	4.79380	+ 15.33	+ 1.63	+ 16.96		22.72		3968	+.27	3995
	49	0.6		58.5	32.9		− 327.2	2.51481 n	5.02962	+ 20.11	+ 2.81	+ 22.92		16.48		3990	+.19	4009
	50	6.0	46	3.2			− 392.6	2.59395 n	5.18790	+ 24.12	+ 4.05	+ 28.17		11.60		3977	+.17	3994
				24.0														4083
				45.7				9.85297	7.54815						13	4012	+.20	±36
	43	23.60	47	7.0				0.79540	9.43301									±30
		33.11		29.6				1.02681	9.89583									
				50.8				1.18541	0.21303									
	43	33.355	48	12.0				1.30332	0.44885									
			2593	23.0				1.38246	0.60713									
			47	28.811	54.0													
			3	58.70														

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TS	Td	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read					

Feb. 26, 1878. λ Urs. Min. L. b.

h	m	s	m	s	m	s															
7	40	39.9	40	27.8	+		+209.0	2.32015	464030	+4.33	−.44	+3.89 +23	24	2.18	24	6.17+.17	687
	41	46.0	41	24.1			+142.2	2.15290	430580	+3.37	−.20	+3.17 +20		3.50		6.67+.17	684
	43	30.5	42	17.9			+38.4	1.58433	316866	+.91	−.02	+.89 +20		5.80		6.69+.15	684
	43	51.6	43	13.1			+16.3	1.21219	242438	+.39	−.00	+.39 +16		6.25		6.64+.16	680
	45	13.5	44	8.9			−6.46	1.81023n	362046	−1.53	−.04	−1.57 −53		7.52		5.95+.14	609
	46	26.9	45	45			−13.80	2.13988n	427976	−3.27	−.19	−3.46 −22		9.75		6.29+.13	642
			45	57.0								±.28					664
			46	55.5								±.24			24	6.49+.15	
			47	51.4													
				2602				0.69508	9.64637n								
				502				0.52783	9.31187n								
			44	8.911				0.95926	8.17473n								
								0.58712	7.43045n								
								0.18516n	8.62653n								
								0.57481n	9.28583n								

Feb. 27, 1878. δ Urs. Min. Lb

6	1	33.5	6	52.2			+581.3	2.76440	5.52880	+43.93	−10.90	+33.03 −513		40.83	4	1388+.09	1397
	2	27.9	7	11.1			+526.9	2.72173	5.44346	+39.82	−8.96	+30.86 +19		43.72		1458+.09	1467
	3	13.0		27.0			+481.8	2.68287	536544	+36.41	−7.49	+28.92 +14		45.60		1452+.10	1462
	3	57.4		45.8			+437.4	2.64088	528176	+33.06	−6.17	+26.89 +29		47.75		1464+.13	1477
	4	42.2	8	4.0			+392.6	2.59395	518790	+29.67	−4.98	+24.69 +07		49.70		1439+.16	1455
	5	38.1		20.8			+336.7	2.52724	505448	+25.45	−3.66	+21.79 −17		52.38		1417+.14	1431
				38.7								±.25					1448
				55.0								±.21			4	1436+.12	
			9	13.7				1.64279n	1.03765n								
				2683				1.60012n	095231n								
				283				1.56126n	0.87459n								
								1.51927n	0.79061n								
			8	3.144				1.47234n	0.69675n								
			3	11.66				1.40563n	0.56333n								
			11	14.784													

Feb. 27, 1878. 51 Cephei

	39	8.0	38	54.9	37.744	16.2	+265.0	2.42325	4.84650	−16.29	+1.84	−14.45 +23	13	54.48	13	4003+.20	4023
	41	14.0	39	16.5	37.9	37.1	+139.0	2.14301	4.28602	−8.54	+.51	−8.03 −35		47.58		3955+.10	3965
	42	28.0		37.8	37.8	58.6	+65.0	1.81291	362582	−3.99	+.41	−3.58 +30		44.10		4022+.08	4030
	43	21.5		59.4	38.046	2.4	+11.5	1.06070	212140	−.71	+.00	−.71 +72		41.35		4064+.08	4072
	44	26.3	40	20.8	38.0	24.7	−53.3	1.72673n	345346	+3.28	+.07	+3.35 −31		36.20		3955+.14	3969
	45	32.2		42.0	37.8	45.6	−119.2	2.07628n	415256	+7.32	+.37	+7.69 −57		31.52		3921+.22	3943
			41	3.5	37.947	7.1						±.45					4000
	39	37.678	42	7.7		28.1		1.21176n	0.26573			±.38			13	3987+.14	
	43	32.989		29.0		49.4		0.93152n	9.70525								
	47	28.400		50.0	48	11.6		0.60142n	9.04505								
		9067	43	11.0		31.9		9.84921n	754063								
	43	33.022		32.7	2556	54.8		0.51524	8.87269								
			2469	54.6				0.86479	957179								

Feb. 27, 1878. λ Urs. Min. L. b.

	40	55.0	41	19.5	6.0		+191.5	2.28217	4.56434	+4.54	−.37	+4.17 +37	24	2.22	24	6.39+.18	657
	42	24.8	42	17.1	8.1		+101.7	2.00732	401464	+2.41	−.10	+2.31 −15		3.58		5.89+.16	605
	44	18.9	43	13.0	8.5		−12.4	1.09342n	218684	−.29	−.00	−.29 −10		6.28		5.99+.11	610
	45	44.2	44	9.2	9.2		−97.7	1.98989n	397978	−2.32	−.10	−2.42 −19		8.32		5.90+.11	601
	46	33.6	45	2.1	6.6		−147.1	2.16761n	433522	−3.49	−.22	−3.71 +44		10.25		6.54+.10	664
	47	49.5		56.6	5.6		−223.0	2.34830n	469660	−5.29	−.50	−5.79 −37		11.52		5.73+.10	583
			46	58.7	4.2							±.29					620
			47	46.0	4.0							±.24			24	6.07+.13	
					522			0.65710	9.57041n								
			44	6.525				0.38225	902071n								
								9.46835n	719291n								
								0.36482n	8.98585n								
								0.54254n	9.34129n								
								0.72323n	970267n								

Feb. 28, 1878. δ Urs. Min. L. b.

6	1	1.8	6	53.9			+613.7	2.78796	557592	+46.38	−12.16	+34.22 −21	3	40.00	4	1422+.09	1431
	1	0.2	7	11.5			+555.3	2.74453	548906	+41.97	−9.95	+32.02 +21		42.62		1464+.09	1473
	2	53.2		29.0			+502.3	2.70096	540192	+37.97	−8.14	+29.83 +33		44.92		1475+.10	1485
	3	39.0		46.3			+456.5	2.65944	531888	+34.50	−6.72	+27.78 −19		46.45		1423+.10	1438
	4	24.9	8	4.8			+410.6	2.61342	522684	+31.03	−5.44	+25.59 −44		48.35		1394+.14	1408
	5	12.0		21.9			+363.5	2.56058	512100	+27.48	−4.27	+23.21 +31		51.42		1463+.20	1483
				38.6				62	24								1452
				55.7								±.31					
			9	13.2				1.66635	1.08477n			±.26			4	1474+.12	
				2749				1.62292	0.99791n							40	
				349				1.57935	0.91077n								
			8	3.878				1.53783	0.82773n								
			11	15.578				1.49181	0.73569n								
								1.43901	0.63009n								

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TS	TA	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.

Feb. 28, 1878. 51 Cephei.

h	m	p	m		m	p												
			38	34.0	38.2	m	p											
6	38	26.5	38	56.0	38.8	44	16.8	+ 30.5	2.48785	4.97570	−18.90	+ 2.48	−16.42	13	56.02	13	39.60+.20	3980 +.08
	39	45.1	39	17.0	38.4		38.2	+ 22.9	2.35965	4.71930	−11.07	+ 1.37	−12.70		52.65		39.95+.19	4014 +.42
	40	58.7		39.1	39.1		59.2	+ 15.5	2.19117	4.38234	− 9.54	+ .63	− 8.91		48.98		40.07+.12	4011 +.47
	42	31.7	40	0.4	39.0	46	3.6	+ 6.23	1.79449	3.58898	− 3.83	+ .10	− 3.73		43.08		39.35+.07	3942 +.20
	43	38.0		21.6	38.8		26.6	− 4.0	0.60206m	1.20412	+ .25	+ .00	+ .25		39.15		39.40+.10	3956 +.22
	45	16.0		42.0	37.8		46.4	− 10.20	2.00860m	4.01720	+ 6.27	+ .27	+ 6.54		32.55		39.09+.20	3932 +.43
			41	3.8	36.2	47	8.0											3972
	39	38.538	42	7.2			29.5		1.27636m	0.39493						13	39.58+.15	±.30
	43	33.889		29.7			50.8		1.14816m	0.13853								±.30
	47	29.589		51.3		48	12.6		0.97968m	9.80157								A
		h.016	43	13.7			34.0		0.58300m	9.00821								
				34.2	26.3		54.8		9.39057	6.62335								
	43	34.005	30	50	54.7				0.79711	9.43643								

Feb. 28, 1878. 2 Urs. Min. L.C.

	40	43.4	41	18.7	5.1			+ 20.2	2.30363	4.60726	+ 4.77	− .01	+ 4.36	24	1.22	24	5.58+.19	5772 −.65
	42	13.4	42	12.5	3.5			+ 11.2	2.04610	4.09220	+ 2.64	− .12	+ 2.52		3.62		6.14+.16	6301 −.12
A last 4 min	43	33.9	43	10.4	5.9			+ 3.07	1.48714	2.97428	+ .73	− .00	+ .72		5.68		6.40+.13	6554 +.14 (1234)
	44	28.0	44	5.2	5.2			− 3.34	1.52375m	3.04750	− .79	− .01	− .80		6.70		5.90+.11	6011 −.41
	46	6.1	44	56.4	0.9			− 12.15	2.08458m	4.16916	− 2.88	− .165	− 3.043		9.88		6.84+.10	6954 −.53
	47	11.2	45	56.0	5.0			− 18.66	2.27091m	4.54182	− 4.41	− .35	− 4.76		11.62		6.86+.09	6982 −.52
			46	57.7	5.3													6942
			47	47.6	5.7												6.29+.13	±.43
					366													±.36
			44	4.575					0.67856	9.61333m								
									0.42103	9.09827m								
									9.86207	9.98035m								
									9.89868m	8.05357m								
									0.45951m	9.17523m								
									0.64584m	9.29789m								

Mar. 4, 1878. 8 Urs. Min. L.C.

			A-2															
	0	47.3	6	56.0	8	4.1		+ 62.94	2.79893	5.59786	+ 47.57	− 12.79	+ 34.78	3	39.75	4	14.53+.10	1463 −.67
A2 to A-2	1	39.9	7	12.7		56.4		+ 57.68	2.76103	5.52206	+ 43.59	− 10.74	+ 32.85		42.95		15.80+.08	1588 −.58
	2	39.3		31.0	9	10.5		+ 51.74	2.71383	5.42766	+ 39.10	− 8.64	+ 30.46		44.95		15.41+.08	1549 +.19
	3	38.5		47.7				+ 45.82	2.66106	5.32212	+ 34.63	− 6.78	+ 27.85		47.50		15.35+.11	1548 +.16 A-1
	4	28.2	8	4.9				+ 40.85	2.61119	5.22238	+ 30.87	− 5.38	+ 25.49		49.85		15.34+.11	1545 +.15
	5	33.7		23.0				+ 34.30	2.53529	5.07058	+ 25.92	− 3.80	+ 22.12		52.60		14.72+.16	1485 −.42
				40.1														1530
				56.4					1.67732	1.10671m						4	15.19+.11	±.39
			9	13.5					1.63942	1.03041m								±.33
									1.59222	0.93651m								
				2853					1.53945	0.83097m								
				453					1.48958	0.73123m								
			8	5.033					1.41368	0.57943m								
			3	11.637														
			11	16.670														

Mar. 4, 1878. 51 Cephei

														13	44.05			
	42	40.1		−				+ 53.3	1.72673	3.45346	− 3.28	+ .07	− 3.21	13	44.05	13	40.84+.07	4097 +.33
	44	4.3		=				− 30.9	1.48996m	2.97992	+ 1.990	+ .02	+ 2.01 192		38.32		40.38+.12	4083 −.22
	45	30.5	43	13.3	34.7			− 11.71	2.06856m	4.13712	+ 7.20	+ .36	+ 7.56		32.68		40.24+.22	4046 −.12 ±
				31.8	31.8													4058 A-1 to A-2
A 3 4 5 6 7 8 9				53.7	32.3				0.51524m	8.87269						13	40.44+.14	
			44	17.7	34.9				0.27847	8.39914								
				36.5	32.3				0.85707	9.55635								
			45	0.2	34.6													
			43	33.433														

Mar. 5, 1878. 8 Urs. Min. L.C.

	1	33.0	3	43.9	6	5.85		+ 58.69	2.76856	5.53712	+ 44.36	− 11.12	+ 33.24	3	42.08	4	15.32+.08	1547 −.01
	2	31.9	4	23.0	7	1.70		52.80	2.72263	5.44526	+ 39.90	− 9.00	+ 30.90		44.95		15.85+.09	1594 +.53
A-2 to A-1	3	24.1		53.5		33.6		47.58	2.67742	5.35484	+ 35.96	− 7.31	+ 28.65		46.60		15.25+.10	1535 +.06
	4	37.0	5	33.3		32.0		40.29	2.60520	5.21040	+ 30.45	− 5.24	+ 25.21		50.18		15.39+.15	1554 +.13
	5	44.2	6	7.4	8	10.7		33.57	2.52595	5.05190	+ 25.37	− 3.64	+ 21.73		53.18		14.91+.18	1501 −.32 A-1
	7	0.3				26.7		25.96	2.41430	4.82860	+ 19.62	− 2.17	+ 17.45		57.48		14.93+.19	1514 −.29
				1651		44.9												1541
				26	9	0.7			1.64695m	1.84597m						4	15.28+.13	±.24
			4	57.02		15.6			1.60102m	0.95411m								±.20
			9	22.27					1.55581m	0.86369m								
			11	19.29		2607			1.48359m	0.71925m								
				20.60		807			1.40434m	0.56075m								
			11	19.945	8	8.967			1.29269m	0.33745m								
						11.635												
						20.602												

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Ts	Td	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Corr. Readings Circle Read.

Mar. 5, 1878. Cephei.

h	m	p	m	p	m	p												
6	42	16.0	42	6.6	46	1.0	+ 75.1	1.87564	5.75128	−46.15	+14.81	−4.47 −31.34	+19	13	45.85	13	1451 ± .08	41.46
	43	28.5		27.9		19.8	+ 26	0.41497	0.82994	− 16	+ .00	− 16	−32		41.02		40.86 ± .09	40.95
	44	48.3		49.3		45.6	− 77.2	1.88762n	3.77524	+ 4.74	+ .16	+ 4.90	−53		35.68		4058 ± .16	4074
	46	8.4	43	9.3	47	5.1	− 157.3	2.19673n	4.39346	+ 9.66	+ .65	+ 10.31	−40		30.30		4061 ± .26	4087
	47	20.5		32.7		24.1	− 229.4	2.36069n	4.72118	+ 14.10	+ 1.38	+ 15.48	+40		25.90		4138 ± .29	4167
	48	42.8		48.7		48.3	− 311.7	2.49374n	4.98748	+ 19.15	+ 2.55	+ 21.70	+65		19.48		4068 ± .24	4192
			44	14.8	48	9.2							±45					4127
				37.8		31.7							±38			13	41.08 ± .19	
				36.0		32.7												
				2831		2367												
			43	31.456	47	26411		0X66415n	9X17057									
				30.671		5574		9.20348n	6.24917									
			43	31.064				0.67613	9.19447									
								0.98524	9.81269									
								1.14910	0.14041									
								1.28225	0.40671									

Mar. 5, 1878. λ Ursæ Min. L. 6.

7	40	47.3	40	40.1	22.0	+ 213.6	2.32960	4.65920	+ 5.07	− .46	+ 4.61	−34	24	2.65	24	7.26 ± .17	7.43
	41	53.0	42	25.5	16.5	+ 147.9	2.16997	4.33994	+ 3.51	− .22	+ 3.29	−31		4.00		7.29 ± .17	7.46
	42	59.0	43	25.1	20.6	+ 81.9	1.91328	3.82656	+ 1.94	− .07	+ 1.87	−13		5.62		7.49 ± .15	7.64
	44	7.1	44	23.2	23.2	+ 13.8	1.13988	2.27976	+ .33	− .00	+ .33	+22		7.52		7.85 ± .14	7.99
	44	57.0	45	18.4	22.9	− 30.1	1.47857n	2.95714	− .71	− .01	− .72	+61		8.98		8.26 ± .12	8.38
	45	59.0	46	11.4	20.4	− 98.1	1.99167n	3.98334	− 2.33	− .10	− 2.43	−07		10.02		7.59 ± .11	7.70
				−	−							±31						
					56							±26				7.62 ± .14	7.77
			44					0.70498	9.66572n									
			43		20.933			0.54535	9.34646n									
								0.28866	8.83308n									
								9.51526	7.28628n									
								9.85395n	9.96366n									
								0.36705n	9.98984n									

Mar. 6, 1878. ~~δ~~ Ursæ Min. L. 6

7	3.9	7	0.6		+ 257.2	2.41027	4.82054	+ 19.44	− 2.14	+ 17.30	+183		56.80	4	14.10 ± .18	14.28
8	4.4		17.1		+ 196.7	2.29380	4.58760	+ 14.87	− 1.25	+ 13.62	+404		0.70		14.31 ± .18	14.50
8	43.1		34.5		+ 156.0	2.19312	4.38624	+ 11.79	− .78	+ 11.01	−57		2.38		13.39 ± .14	13.53
			52.1								±48						14.10
		8	7.8			1.28866	0.32939n				±40			4	13.94 ± .17	
			26.6			1.17219	0.09645n									
			44.1			1.07151	9.89509n									
		9	2.3													
			18.3													
			2054													
			854													
		8	9.489													
			11.638													
		11	21.124													

Mar. 6, 1878. λ Ursæ Min. L. 6.

4.7	40	35.4	17.3		+ 253.9	2.40466	4.80932	+ 6.03	− .65	+ 5.38	−35	23	57.62	24	5.80 ± .19	5.19
4.1	41	33.0	19.4		+ 157.5	2.19728	4.39456	+ 3.74	− .25	+ 3.49	+42	24	2.30		5.79 ± .17	5.96
50.4	42	27.4	16.4		+ 88.2	1.94547	3.89094	+ 2.09	− .08	+ 2.01	−04		3.32		5.33 ± .17	5.50
57.0	43	24.6	26.1		+ 21.6	1.33445	2.66890	+ .51	− .00	+ .51	−68		4.20		4.71 ± .15	4.86
47.0	44	17.3	17.3		− 28.4	1.45332n	2.90664	− 0.67	− .01	− .68	+53		6.62		5.94 ± .13	6.07
47.8	45	12.7	17.2		− 89.2	1.95036n	3.90072	− 2.12	− .08	− 2.20	+10		7.72		5.52 ± .12	5.64
	46	10.4	19.4								±39					5.54
	47	5.8	19.4			0.78004	9.81584n				±33			24	5.38 ± .15	
		−	−			0.57266	9.40108n									
			685			0.32085	8.89746n									
	44	18.562				9.70983	9.76542n									
						9.82870n	9.91316n									
						0.32574n	8.40424n									

Mar. 16, 1878. δ Ursæ Min. L. 6.

2	45.9	#	#		+ 519.7	2.71575	5.43150	+ 30.28	− 8.72	+ 30.56	−10	03	45.42	4	1598 ± .10	16.08
5	8.7	7	4.7		+ 376.9	2.57623	5.15246	+ 28.46	− 4.58	+ 23.91	+29		52.35		1626 ± .21	16.47
6	1.7		20.9		+ 323.9	2.51041	5.02082	+ 24.48	− 3.39	+ 21.09	+72		55.60		1669 ± .21	16.90
6	57.0		39.0		+ 268.6	2.42911	4.85822	+ 20.30	− 2.33	+ 17.97	−93		57.08		1405 ± .20	15.25
8	1.0		55.6		+ 195.6	2.29137	4.58274	+ 14.79	− 1.23	+ 13.56	−084		2.38		1594 ± .16	16.10
9	17.0	8	13.9		+ 128.6	2.10924	4.21848	+ 9.72	− .53	+ 9.19	+09		7.00		1619 ± .08	16.27
			32.3								±40					16.18
			50.0			1.59414	0.94035n				±34			4	16.02 ± .16	
		9	2.3			1.45462	0.66131n									
			22.0			1.38880	0.52967n									
						1.30760	0.36407n									
			2457			1.16976	0.09159n									
			1257			0.98763	9.92733n									
11	25.592	8	13.967													

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	TS	TL	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.			
	h m s	m s	m s										
	6 40 34.0	42 10.3		+ 181.4	2.25864	4.51728	− 11.15	+ .86	− 10.29	13 50.78	13	40.49 + .20	4.068 +.48
	41 32.0	31.1		+ 123.4	2.09132	4.18264	− 7.58	+ .40	− 7.18	47.88		40.20 + .14	4.034 +.13 but
	42 24.0	32.1		+ 71.4	1.85370	3.70740	− 4.39	+ .13	− 4.26	44.05		39.79 + .09	3.998 −.33 ut
A	43 22.2	43 14.0		+ 33.2	1.52114	3.04228	− 2.01	+ .03	− 2.01	41.92		39.91 + .08	3.990 −.22
	43 47.3	36.1		− 11.9	1.07555n	2.15110	+ .73	+ .00	+ .73	39.60		40.33 + .09	4.042 +.21
	44 24.0	37.0		− 48.6	1.68664n	3.37328	+ 2.99	+ .06	+ 3.05	36.78		39.83 + .12	3.995 −.26
		44 17.7											4.021
		39.0											± .30
		45 1.0				1.04715n	993651				13	40.09 + .12	+ .25
						0.87983n	9.60187						
		2583				0.64221n	9.12663						
		3183				0.30965n	8.46151						
		43 35.367				9.86406	7.57033						
						0.47515	8.79251						

Mar. 16, 1878 λ Urs. Min Lo. C.

	40 20.0	40 33.4		+ 240.4	2.38093	4.76186	+ 5.71	− .59	+ 5.12	23 59.50	24	4.62 + .22	4.84 −.07
	41 48.3	41 39.2		+ 152.1	2.18213	4.36426	+ 3.61	− .24	+ 3.37	24 3.18		6.55 + .15	6.70 +.79
A	42 34.3	42 31.0		+ 86.1	1.93500	3.87000	+ 2.04	− .08	+ 1.96	5.22		7.18 + .12	7.30 +1.39
	44 23.3	43 25.7		− 2.9	0.46240n	0.92480	− .07	− .00	− .07	4.82		4.75 + .12	4.87 −1.04 Ur
	45 37.0	44 17.8		− 76.6	1.88423n	3.76846	− 1.82	− .06	− 1.88	7.25		5.37 + .08	5.45 −.46
	46 39.0	45 17.0		− 138.6	2.14176n	4.28352	− 3.29	− .20	− 3.49	9.68		6.19 + .08	6.27 +.36
		46 8.7											5.91
		47 6.7				0.75631	976838n						± .93
		48 1.7				0.55751	9.37078n				24	5.78 + .13	± .78
		1832				0.31038	8.87652n						
		44 20.356				8.83778n	5.93132n						
						0.25961n	8.77498n						
						0.51714n	9.29004n						

Mar. 17, 1878 S Urs. Min - Lo. C.

	4 24.1	— —	7 8.7	+ 426.8	2.63022	5.26044	+ 32.26	− 5.88	+ 26.38	3 47.88	4	14.26 + .14	14.40 +.07
A2 4321	5 45.2	4 32.6 7.4	26.9	+ 345.7	2.53870	5.07740	+ 26.13	− 3.86	+ 22.27	52.28		14.61 + .21	14.82 +.33
A1	7 1.0	5 8.3 8.3	45.0	+ 269.9	2.43120	4.86240	+ 20.40	− 2.35	+ 18.05	55.58		13.63 + .19	13.82 −.81 A12
	8 17.7	41.9 7.1.8	1.8	+ 193.2	2.28601	4.57202	+ 14.60	− 1.20	+ 13.40	4 0.70		14.10 + .21	14.31 −.02 m 7
	9 28.3	6 18.2 8.6	19.0	+ 142.6	2.15412	4.30824	+ 10.78	− .66	+ 10.12	4.12		14.24 + .13	14.37 +.04
			37.2										14.38
		5 7.85	34.7			1.50861	0.76929n				4	14.16 + .18	± .24
		6 23.34 9 11.1	28.2			1.41709	0.58625n						± .20
		11 31.09				1.30959	0.37125n						
		30.80	2326			1.16440	0.08087n						
			1726			1.03251	9.81709n						
		11 30.945	8 19.178										
			3 11.62										

Mar. 18. 1878 51 Ho. Cephei

6	40 29.0	—		+ 186.0	2.26951	4.53902	− 11.43	+ .91	− 10.52	13 49.75	13	39.23 + .14	39.37 −.10
	43 6.2	—		+ 28.8	1.45939	2.91878	− 1.77	+ .02	− 1.75	40.62		38.87 + .09	38.96 −.51
	43 49.3	42 32.3 35.1		− 14.3	1.15534n	2.31068	+ .88	+ .00	+ .88	35.00		38.88 + .11	38.99 +.48
	44 28.5	43 13.7 35.1		− 53.5	1.72835n	3.45670	+ 3.29	+ .08	+ 3.37	36.22		39.59	39.73 +.26
	44 54.0	—		− 79.0	1.89763n	3.79526	+ 4.85	+ .16	+ 4.66	35.12		40.13 39.81 + .16	40.29 +.82
		36.0 34.6							8.01				39.47
		44 18.0 35.2				1.05802n	995825						± .48
		39.5 35.3				0.24790n	8.33801				13	39.34 + .13	± .41
		45 0.0 34.4				9.94385	7.72991						
			297			0.51686	8.87593						
		43 34.950				0.68614	9.21449						

Mar. 19, 1878 2 Urs. Min Lo. C.

	40 26.0	40 48.3		+ 246.9	2.39252	4.78504	+ 5.86	− .62	+ 5.24	23 58.85	24	4.09 + .19	4.28 +.24
	41 24.1	41 45.6		+ 178.8	2.25237	4.50474	+ 4.25	− .32	+ 3.93	59.98		3.91 + .20	4.11 +.07
	42 33.1	42 43.4		+ 97.8	1.99034	3.98068	+ 2.32	− .10	+ 2.22	24 1.55		3.77 + .19	3.96 −.08
A	43 58.7	43 38.3		+ 33.2	1.52114	3.04228	+ .79	− .01	+ .78	2.70		3.48 + .16	3.64 −.40 Lut
	46 20.5	44 33.2		− 47.6	1.67761n	3.35522	− 1.13	− .02	− 1.15	4.80		3.65 + .14	3.79 −.25
	46 38.2	45 26.7		− 122.3	2.08743n	4.17486	− 2.90	− .15	− 3.05	7.38		4.33 + .12	4.45 +.41
		46 23.2											4.04
		47 19.8				0.76813	9.79179n						± .26
		48 18.4				0.62498	9.51149n				24	3.87 + .17	± .22
		2959				0.36595	8.98743n						
						9.89675	8.04903n						
		44 32.878				0.05322n	8.36197n						
						0.46304n	9.18161n						

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TS	Tα		T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	

Mar. 20, 1878 51 H. Cephei

Margin: 20 4063 +48; 4 4034 +13; 9 3988 −33; 8 3999 −22; 9 4041 +21; 2 3995 −26; 4021 ±30; ±25

TS m s	Tα m s	m s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
38 31.4	— —		+305.9	2.48558	4.97116	−18.80	+2.46	−16.34 +.33 13	58.28 13	41.94 +.20	42.14
40 2.7	38 37.4	41.6	+214.6	2.33163	4.66326	−13.19	+1.21	−11.98 +.08	53.68	41.70 +.19	41.89
41 0.2	57.7	40.5	+157.1	2.19618	4.39236	−9.65	+.65	−9.00 +.15	50.80	41.80 +.16	41.96
(40.0)	39 20.0	41.4	+117.3	2.06930	4.13860	−7.21	+.36	−6.85 −.57	47.98	41.13 +.11	41.24
	41.6	41.6						±.32	44.30	+.08	41.81
	40 3.8	42.4						±.27	39.68	+.10	
	24.8	42.0									
	45.9	41.7								13 41.64 +.14 +.16	
	41 6.7	41.1									
	39 41.54	12.3									
	3 55.78										
	43 37.32										

0.86096n 9.97768; 0.70701n 9.66978; 0.57156n 9.39888; 0.44468n 9.14512
1.27409n 0.39039; 1.12014n 0.68249; 0.98469n 9.81159; 0.85781n 9.55783

Mar 20, 1878 λ Urs. Min. Lo. C.

Margin: 2 484 −107; 5 670 +79; 2 730 +139; 2 487 −104; 8 545 −46; 8 627 +36; 591 ±93; 3 ±78

TS m s	Tα m s	m s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
40 25.5?											
41 48.0	40 45.1	26.7	+241.4	2.38274	4.76548	+5.73	−.59	+5.14 −.29 24	1.22	24 6.36 +.19	6.55
42 47.2	41 41.5	27.7	+158.9	2.20112	4.40224	+3.77	−.26	+3.51 +.36	3.52	7.03 +.17	7.20
43 41.7	42 35.6	26.4	+99.7	1.99870	3.99740	+2.37	−.10	+2.27 +.30	4.72	6.99 +.15	7.14
44 30.3	43 32.2	27.6	+45.2	1.65514	3.31028	+1.07	−.02	+1.05 +.05	5.72	6.77 +.12	6.89
45 36.0	44 26.0	26.0	−3.4	0.53148n	1.06296	−0.08	−.00	−.08 −.07	6.72	6.64 +.13	6.77
	45 22.0	26.6	−69.1	1.83948n	3.67896	−1.64	−.05	−1.69 −.33	8.08	6.39 +.12	6.51
	46 19.0	28.2						±.25			6.84
	47 12.2	26.0						±.21		24 6.70 +.15	
		552									
	44 26.900										

0.75835 9.77223n; 0.57673 9.40899n; 0.37431 9.00415n; 0.03075 8.31703n; 8.90709n 6.06971n; 0.21509n 8.68571n

Mar. 21, 1878 δ Urs. Min. Lo. C.

Margin: 4 1440 +07; 1 1476 +133; 9 1382 −51; 1 1431 −02; 3 1437 +04; 1433 ±24; 8 ±20

TS m s	Tα m s	m s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
7 (40.0)	* —	10 31.9 22.3	+231.0	2.36361	4.72722	+17.46	−1.72	+15.74 −.24 4	1.58	4 17.32 +.16	17.48
8 59.8		30.5 38.3	+151.2	2.17955	4.35910	+11.43	−.74	+10.69 +.46	7.38	18.07 +.11	18.18
10 20.5	7 19.3 44.5	31.4 56.6	+70.5	1.84819	3.69638	+5.33	−.16	+5.17 −.14	12.30	17.47 +.11	17.58
57.2	8 19.1 1.7	11 30.9 13.5	+33.8	1.52892	3.05784	+2.55	−.04	+2.51 +.03	15.12	17.63 +.12	17.75
11 45.6	19.5 19.5	31.8 31.8	−14.6	1.16435n	2.32870	−1.10	−.06	−1.11 +.53	36.70	18.20 +.05	18.25
15 14.5	19.4 36.8	A−2	−223.5	2.34928n	4.69856	−18.89	−1.61	−18.50 −.61	40.92	17.13 −.02	17.11
16 12.0	19.3 54.1	15 42.4 17.2	−281.0	2.44871n	4.89742	−21.24	−2.55	−23.79 ±.37			17.72
	9 19.8 12.0	42.8 35.0						±.31		4 17.97 +.09 (.64)	
	19.6 29.2	42.1 51.7									
	8 19.43										
	11 31.30										
	14 42.43										
	11 31.053										

1.24200 0.23607n; 1.05794 9.86795n; 0.72658 9.20523n; 0.40731 8.56669n; 0.04274n 7.83755n; 1.22767n 0.20741n; 1.32710n 0.40627n

Mar. 21, 1878 51. H. Cephei

Margin: 4 3937 −10; 9 3896 −51; 1 3896 −48; 4 3973 +26; 6 4029 +82; 3 3947 ±48; ±41

TS m s	Tα m s	m s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
39 17.2	38 41.1 36.9	+ +	+259.6	2.41430	4.82860	−15.95	+1.65 (1.77)	−14.30 (14.18) .02 13	56.62 (44)	13 42.32 +.18	42.50
52.6	40.5 37.6	42 11.0	+224.2	2.35064	4.70128	−13.78	+1.32	−12.46 +.01	54.82	42.36 +.17	42.53
40 52.3	39 38.0 16.6	33.1	+164.5	2.21617	4.43234	−10.18	+.71	−9.47 −.85	51.92	41.45 +.15	41.67
42 5.6	40.7 40.7	34.6	+91.2	1.95999	3.91998	−5.60	+.22	−5.38 −.33	47.48	42.10 +.09	42.19
43 5.5	40 40.9 2.3	43 14.0	+31.3	1.49554	2.99108	−1.92	+.03	−1.89 −.12	44.22	42.33 +.07	42.40
47.9	42.9 25.7	36.3	−11.1	1.04532n	2.09064	+.68	+.00	+.68 +1.32	43.08	43.76 +.08	43.84
	42.0 46.2	58.6						±.48			42.52
	41 40.0 5.7	44 19.9						±.41		13 42.40 +.12	
		41.4									
	61 39 40.76	45 4.9									
	3 55.78										
	43 36.54	27.38									
	37.09	33.38									
	43 36.815	43 37.089									

1.20281n 0.21783; 1.13915n 0.12051; 1.00468n 9.85157; 0.74850n 9.33921; 0.28405n 8.41031; 9.83383 7.50987

Mar 21 - 1878 λ Urs. Min. Lo. C.

Margin: 9 428 +24; 0 411 +07; 9 396 −08; 6 364 −40; 4 379 −25; 2 445 +41; 404 ±26; 7 ±22

TS m s	Tα m s	m s	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
41 23.0	40 55.8	37.4	+186.7	2.27114	4.54228	+4.43	−.35	+4.08 −.49 24	2.42	24 6.50 +.18	6.68
42 50.0	41 42.3	28.5	+99.7	1.99870	3.99740	+2.37	−.10	+2.27 +.85	5.60	7.87 +.15	8.02
43 43.8	42 37.2	28.0	+45.9	1.66181	3.32362	+1.09	−.02	+1.07 +.07	6.02	7.09 +.15	7.24
44 41.2	43 34.6	30.0	−11.5	1.06070n	2.12140	−.27	−.00	−.27 −.57	6.78	6.51 +.15	6.66
45 36.7	44 26.4	26.4	−67.0	1.82607n	3.65214	−1.59	−.04	−1.63 +.46	9.12	7.49 +.14	7.63
46 37.5	45 25.7	30.3	−127.8	2.10653n	4.21306	−3.03	−.17	−3.20 −.40	9.85	6.65 +.12	6.77
	46 20.0	29.2						±.51			7.17
	47 14.0	27.8						±.43		24 7.02 +.15	
		776									
	44 29.700										

0.64675 9.54903n; 0.37431 9.00415n; 0.03742 8.33037n; 9.43631n 7.12815n; 0.20168n 8.65889n; 0.48214n 9.21981n

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Δδ	Δt	T	log T	2 log T	Red I	Red II	Sum I+II	Circles Readings	Corr. Circ. Red.

Mar. 26, 1878. 2 Urs. Min. L.C.

L	m	s	m	s	m	s													
	7	40	21.7	40	38	53.8	+ 2583	2.411212	4.82424	+ 6.13	− .68	+ 5.45	−.72	23	58.52	24	3.97	+.18	415
		42	5.8	41	42	55.9	+ 1542	2.18808	4.37616	+ 3.66	− .24	+ 3.42	+.23	24	1.50		4.92	+.18	510
A		42	57.6	42	45	51.7	+ 1024	2.00173	4.00346	+ 2.38	− .10	+ 2.28	+.33		2.75		5.03	+.17	520
Last bisection		44	57.5	43	40	46.7	+ 345	1.53782	3.07564	+ .82	− .01	+ .81	−.25		3.65		4.46	+.16	462
		46	16.0	44	40	42.7	− 960	1.98227 n	3.96454	− 2.28	− .09	− 2.37	+.51		7.62		5.25	+.13	538
		46	49.0	45	37	32.7	− 1290	2.11059 n	4.22118	− 3.06	− .17	− 3.23	−.10		7.88		4.65	+.12	477
				46	40	31.7							±.39						487
				47	39	25.3							±.33			24	4.71	+.16	
					32	01		0.78743	9.83099 n										
								0.56369	9.38281 n										
								0.37784	9.01021 n										
								9.91343	8.08239 n										
				44	40	012		0.35788 n	8.99129 n										
								0.48620 n	9.22793 n										

Mar. 30, 1878. 2 Urs. Min. L.C.

A	7	40	14.0	40	57.8	+ 271.7	2.43409	4.86818	+ 6.45	− .75	+ 5.70	−.25	23	58.18	24	3.88	+.21	409	
		42	6.5	41	58.4	+ 159.2	2.20194	4.40388	+ 3.78	− .26	+ 3.52	+.77	24	1.40		4.92	+.19	511	
		42	59.0	42	52.3	+ 106.7	2.02816	4.05632	+ 2.53	− .12	+ 2.41	−.13		1.62		4.03	+.18	421	
		44	39.3	43	50.5	+ 6.4	0.80618	1.61236	+ .15	− .00	+ .15	−.07		3.98		4.13	+.14	427	
		45	52.4	44	49.1	− 66.7	1.82413 n	3.64826	− 1.58	− .04	− 1.62	−.46		5.38		3.76	+.12	388	
		47	0.3	45	44.2	− 134.6	2.12905 n	4.25810	− 3.20	− .18	− 3.38	+.13		7.75		4.37	+.10	447	
				46	37.0							±.33							484
				47	31.0							±.28			24	4.18	+.16		
				48	25.8			0.80981	9.87504 n										
								0.57766	9.41074 n										
					411			0.40388	9.06318 n										
				44	45.678			9.18190	6.61922 n										
								0.19985 n	8.65512 n										
								0.50477 n	9.26496 n										

Mar. 31, 1878. 2 Urs. Min. L.C.

A	7	40	56.0	41	3.0	+ 2284	2.35870	4.71740	+ 5.42	− .53	+ 4.89	+.81	24	0.52	24	5.41	+.19	560	
		42	3.6	41	56.9	+ 160.8	2.20629	4.41258	+ 3.82	− .26	+ 3.56	+.28		1.32		4.88	+.19	507	
		43	7.0	42	51.1	+ 97.4	1.98856	3.97712	+ 2.31	− .10	+ 2.21	+.36		2.78		4.99	+.16	515	
		44	11.4	43	51.4	+ 33.0	1.51851	3.03702	+ .78	− .01	+ .77	+.62		4.52		5.29	+.12	541	
		45	10.4	44	43.0	− 26.0	1.41497 n	2.82994	− .62	− .01	− .63	−.81		4.48		3.85	+.13	398	
		46	5.8	45	42.7	− 81.4	1.91062 n	3.82124	− 1.93	− .07	− 2.00	−.25		5.42		3.42	+.12	354	
				46	36.7							±.75							479
				47	31.0							±.63			24	4.64	+.15		
				48	23.7			0.73442	9.72426 n										
								0.58201	9.41744 n										
					3395			0.36428	8.98398 n										
					3995			9.89423	8.04388 n										
				44	44.389			9.79069 n	7.83680 n										
								0.28634 n	8.88810 n										

Apr. 3, 1878. 2 Urs. Min. L.C.

	8	3	1.8	3	46	13.8	− 1096.0	3.03981 n	6.07962	−26.03	−12.20	−38.23	+.15	24	38.95	24	0.72	.00	072
A+2 4,3,2,1		4	26.1	5	37	3.7	− 1180.3	3.07199 n	6.14398	−28.04	−14.15	−42.19	+.51		43.30		1.11	−.03	108
		5	25.8	6	44	57.7	− 1240.0	3.09342 n	6.18684	−29.45	−15.62	−45.07	+2.33		47.95		2.88	+.02	290
		6	37.1	8	8	349.9	− 1311.3	3.11770 n	6.23540	−31.15	−17.47	−48.62	+.77		49.90		1.28	+.06	134
		9	17.7		25		− 1471.9	3.16788 n	6.33576	−34.96	−22.01	−56.97	−2.70		54.75	23	57.78	+.09	5787
		9	44.0	5		5.88	− 1498.2	3.17557 n	6.35114	−35.59	−22.80	−58.39	+.05		57.82		59.43	+.09	5952
				20		18.51 +1.59							±1.37						0.57
				44		47.37							±1.16			24	0.53	+.04	
						−1.59	44	45.78	1.41553 n	1.08648 n									
									1.44771 n	1.15084 n									
									1.46914 n	1.19370 n									
									1.49342 n	1.24226 n									
									1.54360 n	1.34262 n									
									1.55129 n	1.35800 n									

May 1, 1878. 2 Urs. Min. L.C.

		13	4.9	12	55.2	12	55.2	− 10.0	1.00000 n	2.00000	− .30	− .00	− 30	+.78	7	42.10	7	41.80	+.11	4191
		14	30.9	13	43.6		59.3	− 96.0	1.98227 n	3.96454	− 2.86	− .12	− 2.98	−.42		43.68		40.70	+.11	4071
A+3 2,1		16	6.5	14	22.7		54.0	− 190.6	2.28012 n	4.56024	− 5.56	− .46	− 6.02	+.67		46.45		40.43	+.15	4046
A+4 3,2,1		17	52.4	15	15.2		62.2	− 297.8	2.47392 n	4.94784	− 8.88	− 1.13	−10.01	+.15		52.05		42.04	+.24	4228
		22	38.5	15	52.9		55.6	− 583.6	2.76612 n	6.53224	−17.41	− 4.34	−21.75	+.32	8	3.00		41.25	+.20	4145
		24	15.8	22	25.8		54.9	− 680.9	2.83308 n	5.66616	−20.31	− 5.91	−26.22	−.13	8	6.08		39.86	+.14	4000
				23	13.7		48.3							±.81					4113
				23	58.8		52.7		9.47462 n	9.10572 n				±.68			7	40.98	+.16
							51.5		0.45689 n	9.07026 n									.16
									0.75474 n	9.66596 n									
							187		0.94854 n	0.05856 n									
									1.24074 n	0.63796 n									
						12	54.86		1.30770 n	0.77188 n									

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TS	TA	T	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circle Read.			

May 2, 1878. α Ursae Minoris L.C.

h	m	s	m	s	m	s											
	5	57.2	6	16.5	12	58.8	+4142	2.61721	5.23442	+12.35	−2.19	+10.16 +.71	7	28.87	7	39.03 +.24	39.27
	7	10.9	6	58.0		53.0	+3405	2.53212	5.06424	+10.16	−1.48	+8.68 +.74		30.40		39.08 +.22	39.30
	8	6.2	7	43.7		54.4	+2852	2.45515	4.91030	+8.51	−1.04	+7.47 +2.05		32.95		40.42 +.19	40.61
A−1 321	24	45.0	26	8.4		50.5	−7136	2.85345 m	5.70690	−21.28	−6.50	−27.78 −1.28		4.90		37.12 +.16	37.28
A+2 5432	26	9.0	27	35.7		49.2	−7976	2.90179 m	5.80358	−23.79	−8.12	−31.91 −1.05		9.30		37.39 +.12	37.51
	27	15.0	29	4.9		49.7	−8636	2.93631 m	5.87262	−25.76	−9.51	−35.27 −1.15		12.53		37.26 +.15	37.41
			30	34.3		50.4						±1.27					38.56
								1.09183	0.34014 m			±1.07			7	36.72 +.18	
						130		1.00674	0.16996 m							38.38	
								0.92977	0.01602 m								
					12	51.86		1.32807 m	0.81262 m								
						−.43		1.37641 m	0.90930 m								
						51.43		1.41093 m	0.97834 m								

May 5, 1878. α Ursae Minoris L.C.

A−1 5432	.20	59.8	20	51.7	12	43.7	−4434	2.69346 m	5.38692	−14.73	−3.11	−17.84 −1.17	7	55.62	7	37.78 +.26	38.04
	22	8.7	21	37.2		44.9	−5604	2.74850 m	5.49700	−16.72	−4.01	−20.73 +.78		0.48		37.75 +.23	39.98
A−2 5432 adj. 123	23	20.1	22	22.1		45.4	−6348	2.80264 m	5.60528	−18.94	−5.14	24.08 +.93		4.05		39.97 +.17	40.14
	24	12.3	23	7.3		46.3	−6870	2.83696 m	5.67392	−20.46	−6.02	−26.51 +.18		6.75		39.24 +.15	39.39
51.7		59.8	23	51.9		46.6	−7345	2.86599 m	5.73198	−21.91	−6.88	−28.79 −.23		7.85		38.86 +.12	38.98
52.9	25	42.0	26	4.0		46.1	−7767	2.89025 m	5.78050	−23.17	−7.70	−30.87 −.51		9.45		38.58 +.12	38.70
54.4	27	48.2	27	31.6		45.1	−9029	2.95564 m	5.91128	−26.93	−10.40	−37.33 ±.69		4.45		32.42 +.12	39.21
54.3			29	1.9		46.7						±.58					
54.6	1.3							1.16808 m	0.49264 m						7	36.82 +.18	
2.0 53.38	0.3					448	1.27726	1.22312 m	0.60272 m	0.71102						39.03	
8 8.00	1.7		12	45.38				1.31158 m	0.77964 m								
29 1.17				48.97	12	45.60		1.34061 m	0.83770 m								
1.6 16.20						−.30		1.36487 m	0.88622 m								
			12	45.675		45.3		1.43026 m	1.01700 m								

May 6, 1878. α Ursae Minoris L.C.

A−1 321	6	36	6	8.7	12	48.0	+4042	2.60660	5.21320	+12.06	−2.08	+9.98 +.91	7	30.83	7	42.81 +.21	41.02
A 95432	7	22.9		58.8		50.8	+3249	2.51175	5.02350	+9.69	−1.35	+8.34 +1.44		33.02		41.36 +.19	41.55
	13	6.3	7	38.1		48.8	+2948	2.46953	4.93906	+8.79	−1.11	+7.68 +.07		32.30		39.98 +.20	40.18
	14	37.0					−185	1.26717 m	2.53434	−.55	−.00	−.55 −2.70		37.82		37.27 +.14	37.41
40.6			9	50.8		48.1	−1892	2.03822 m	4.07644	−3.26	−.15	−3.41 +.28		43.68		40.27 +.12	40.39
42.8			12	49.3		49.3						±1.20					40.11
40.8	48.1		13	34.5		47.2		1.08122	0.31892 m			±1.01			7	39.94 +.17	
4 41.20	49.3		14	13.9		45.2		0.98637	0.18922 m								
8 8.00	47.2		14	57.8		44.8		0.94415	0.04478 m								
	45.2							9.74179 m	9.64006 m								
	44.8		12	49.20		622		0.51284 m	9.18216 m								
12 46.92				46.92													
			12	48.06	12	47.78											

May 7, 1878. α Ursae Minoris L.C.

	2	56.4	3	15.7	12	52.4	+5961	2.77532	5.55064	+17.78	−4.53	+13.25 −1.33	7	25.48	7	38.73 +.30	39.03
	4	1.1	4	0.1		52.4	+5314	2.72542	5.45084	+15.85	−3.60	+12.25 +.81		28.67		40.92 +.25	41.17
A+1 7−1	5	16.6	4	47.4		55.4	+4559	2.65887	5.31774	+13.61	−2.65	+10.96 +.37		29.53		40.49 +.24	40.73
	6	32.3	5	32.5		56.2	+3802	2.58801	5.16002	+11.34	−1.84	+9.50 +.43		31.07		40.57 +.22	40.79
A+1 6548	7	57.4	6	18.2		57.5	+2951	2.46997	4.93994	+8.80	−1.11	+7.69 −.31		32.15		39.84 +.21	40.05
	8	51.1	6	54.4		49.4	+2414	2.38274	4.76548	+7.20	−.74	+6.46 +.03		33.75		40.21 +.18	40.39
			7	45.0		55.7						±.60					40.36
			20	11.2		47.5		1.24994	0.65636 m			±.57			7	40.13 +.23	
			21	2.9		54.9		1.20004	0.55656 m								
			21	40.8		48.5		1.13349	0.42346 m								
			22	24.5	12	47.8		1.05463	0.26574 m								
						277		0.94459	0.04566 m								
					12	52.52		0.85736	9.87120 m								

May 8, 1878. α Ursae Minoris L.C.

	2																
	13 75	59.3	3	19.2	12	55.9	+5929	2.77298	5.54596	+17.68	−4.48	+13.20 −.53	7	26.80	7	40.00 +.14	40.14
	4	18.4	4	6.5		58.8	+5138	2.71079	5.42158	+15.33	−3.37	+11.96 +.24		28.70		40.66 +.25	40.91
	5	8.7		44.8		52.8	+4635	2.66605	5.33210	+13.83	−2.74	+11.09 +.02		29.35		40.44 +.25	40.69
7−1	6	24.0	5	29.3		53.0	+3882	2.58906	5.17812	+11.58	−1.92	+9.66 −.03		30.75		40.41 +.23	40.64
A+1 8−3	7	12.5	6	14.2		53.5	+3397	2.53110	5.06220	+10.13	−1.47	+8.66 −.14		31.65		40.31 +.22	40.53
	8	34.3		55.4		50.4	+2579	2.41145	4.82290	+7.69	−.85	+6.84 +.45		34.10		40.94 +.18	41.12
			7	40.8		51.5						±.26					40.67
						53.8		1.24760	0.65168 m			±.22			7	40.46 +.21	
			18	48.8		50.6		1.18541	0.52730 m								
			19	29.0		51.4		1.14067	0.43782 m								
			20	15.1	12	48.3		1.06368	0.28384 m								
				56.3		47.3		1.00572	0.16792 m								
			21	37.6		51.6		0.88607	9.92862 m								
			22	25.3	12	52.22											

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	L	m	δ	m	δ	m	Δδ	log Δδ	log T	2 log T	Red I	Red II	Sum I+II	Circle Reading	Corr. Circ. Read	
									June 3, 1878. d Ura. Min. L.C.							
		3	49.8	4	6.9	18	5 39.9 35.0	+589.1	2.77019	5.54038	+17.58	−4.43	+13.15 +.44	7 22.63	7	3578 +.30 3608
		5	28.0		46.8		35.7 30.8	+490.9	2.69099	5.38198	+14.65	−3.08	+11.57 +.65	24.42		35.49 +.30 3629
A+1	3-9	6	30.3	5	32.0		36.9 32.0	+428.6	2.63205	5.26410	+12.80	−2.35	+10.45 +.33	25.23		35.68 +.29 3597
A+1	321	8	3.7	6	18.0		38.9 34.0	+335.2	2.52530	5.05060	+10.01	−1.44	+8.57 −.12	26.67		35.24 +.28 3552
		9	23.1	7	6.0		42.8 37.9	+255.8	2.40790	4.81580	+7.64	−.84	+6.80 +.21	28.80		35.60 +.25 3585
		23	21.9		45.9		38.6 33.7	−583.0	2.76567n	5.53134	−17.41	−4.34	−~~13.07~~ −.51	5862		~~42.55~~ +.26 3413
				8	31.7		40.4 35.5						21.75 ±.59			~~33.87~~ 3564
					~~27.7~~		38.1		1.24635	0.64664n			±.50		7	35.36 +.28
				23	11.1		38.3		1.16615	0.48824n						
				23	55.3		~~39.6~~		1.10721	0.37036n						
				24	40.7		892		1.00046	0.15686n						
						13	38.92		0.88306	9.92206n						
									1.24083n	0.63760n						
									June 5, 1878. d Ura. Min. L.C.							
		3	26.0	3	24.3	5	36.5	+614.5	2.78852	5.57704	+18.35	−4.82	+13.53 +.10	7 21.53	7	3506 +.30 3536
		5	10.4	4	6.8		34.9	+510.1	2.70766	5.41532	+15.23	−3.32	+11.91 +.11	23.15		3506 +.31 3537
		5	58.3		49.8		33.8	+462.2	2.66483	5.32966	+13.80	−2.73	+~~12.07~~ −.45	24.93		3450 +.31 3481
		7	17.5	5	33.5		33.5	+383.0	2.58320	5.16640	+11.44	−1.87	+9.57 +.08	26.30		35.04 +.30 3534
A+1		7	57.7	6	20.5		36.5	+342.8	2.53504	5.07008	+10.24	−1.50	+8.74 −.19	27.48		34.79 +.28 3507
		9	2.7	7	6.7		38.6	+277.8	2.44373	4.88746	+8.30	−.99	+7.31 +.06	29.67		35.37 +.25 3562
		10	11.0	7	46.0		33.8	+209.5	2.32118	4.64236	+6.26	−.75	+5.51 ±.23			3538
				8	32.9		36.7		1.26368	0.68330n		.56	.70 ±.19		7	34.97 +.29
									1.18282	0.52168n						
							44.3		1.13999	0.43592n						
									1.05836	0.27246n						
						5	36.54		1.01020	0.17634n						
						8	4.88 +.10		0.91889	9.99372n						
						13	40.42		0.79634	9.74862n						
							.57									
									June 6, 1878. d Ura. Min. L.C.							
		3	36.2	3	27.0	5	39.2	+609.8	2.78519	5.57038	+18.24	−4.75	+13.49 −.10	7 19.37	7	3286 +.26 3312
		5	16.4	4	12.0		40.1	+509.6	2.70723	5.41446	+15.24	−3.32	+11.92 +.70	21.70		3362 +.30 3392
		5	52.0		57.3		41.3	+440	2.67578	5.35156	+14.18	−2.87	+11.31 −.02	21.60		32.91 +.29 3320
A+1		7	17.9	5	39.1		39.1	+388.1	2.58894	5.17788	+11.61	−1.92	+9.69 +.06	23.28		32.97 +.31 3328
		8	57.8	6	24.6		40.6	+288.2	2.45969	4.91938	+8.62	−1.06	+7.56 −.11	25.25		32.81 +.30 3311
		10	1.6	7	17.0		48.9	+224.4	2.35102	4.70204	+6.71	−.64	+6.07 −.50	26.35		32.42 +.30 3272
		10	55.8		52.0		39.8	+170.2	2.23096	4.46192	+5.09	−.37	+4.72 ±.27			3322
				8	25.0		38.8		1.26101	0.67673n			±.23			32.93 +.29
									1.18305	0.52081n						
							78		1.15160	0.45791n						
									1.06476	0.28423n						
						5	40.98		0.93551	0.02573n						
						8	4.88 +.10		0.82684	9.80839n						
						13	45.86		0.70678	9.56827n						
							.96									
									June 9, 1878. d Ura. Min. L.C.							
		1	32.4	2	51.5			+457.9	2.87558	5.75116	+22.46	−7.20	+15.26 −.83	7 16.78	7	3204 +.23 3227
		2	32.0	3	34.0			+681.3	2.83334	5.66668	+20.38	−5.93	+14.45 +.26	18.65		3310 +.26 3336
		3	53.4	4	23.0			+599.9	2.77808	5.55616	+17.94	−4.60	+13.34 +.33	19.82		3316 +.27 3343
		5	39.5	5	6.6			+493.8	2.69355	5.38710	+14.77	−3.11	+11.66 +.27	21.42		33.08 +.29 3337
A+1		6	39.4	5	48.0			+433.9	2.63739	5.27478	+12.98	−2.40	+10.58 −.19	22.03		32.61 +.30 3291
		8	26.5	6	31.8			+326.8	2.51428	5.02856	+9.78	−1.36	+8.42 +.17	24.55		32.97 +.30 3327
				7	15.5								±.37			3310
				8	0.5				1.35140	0.85751n			±.31		7	32.83 +.28
				8	43.8				1.30916	0.77303n						
					43.4				1.25390	0.66251n						
					~~55.7~~				1.16937	0.49345n						
				5	48.30				1.11321	0.38113n						
				8	4.88 +.10	13	53.18		0.99010	0.13491n						
							.25									
									June 13, 1878. d Ura. Min. L.C.							
			ch. ℓ										7			
		22	38.4	22	58.4	22	14.4	−508.9	2.70663n	5.41326	−15.22	−3.31	−18.53 +.82	7 ~~36.62~~		+.14
A+1		24	23.0	23	42.7		14.6	−613.5	2.78781n	5.57562	−18.35	−4.81	−23.16 −.18	38.98		+.12
		25	34.0	24	25.7		13.5	−684.5	2.83537n	5.67074	−20.47	−5.99	−26.46 −.65	40.65		+.11
				25	11.5		15.3						±.69			~~+.20~~
									1.18245n	0.51961n			±.58	48.95	7	30.42 +.20 3062
						22	14.45		1.26363n	0.68197n				52.53		29.37 +.25 2962
						8	4.88 +.10		1.31119n	0.77709n				55.35		28.89 +.26 2915
						14	9.57									29.80
							.47									~~+.18~~
															7	29.56 +.24

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Tδ	Tα	T	log T	2 log T	Rad I	Rad II	Sum I+II	Circle Reading	Corr Circ. Read.

June 19, 1878. α Ursæ Min. L.6

h	m	s	m	s	m	s										
0.3608		14	47.7	15	1.0	14	17.0	− 23.3	1.50920 n	3.01840	− .97	− .01	− 9.8	+03	7 30.35	7 29.37 +.22 2959
0.3629		16	45.7	15	43.9		15.8	− 150.2	2.17667 n	4.35334	− 4.49	− .29	− 4.78	+54	34.72	29.94 +.16 3010
9.3597	t+4.31	17	43.5	17	12.8		16.6	− 208.1	2.31827 n	4.63654	− 6.22	− .55	− 6.77	−45	35.73	28.96 +.15 2911
8.3552		20	0.2	20	8.2		15.5	− 344.8	2.53757 n	5.07514	− 10.31	− 1.52	− 11.83	+20	41.48	29.65 +.11 2976
5.3585	A+1.87654321	21	5.2	20	49.8		13.0	− 409.8	2.61255 n	5.22514	− 12.26	− 2.15	− 14.41	−39	43.47	29.06 +.11 2917
6.3413		22	8.0	21	54.3		13.4	− 472.6	2.67449 n	5.34898	− 14.14	− 2.85	− 16.99	+09	46.18	29.19 +.16 2965
3564				22	20.7		15.8							±31		2956
8				23	4.7		15.8		9.98502 n	8.12475 n				±.26		7 29.41 +.15
				23	47.4		14.4		0.65249 n	9.45969 n						
				24	33.2		16.1		0.79409 n	9.74289 n						
				25	17.4		16.3		1.01339 n	0.18149 n						
							59.7		1.08839 n	0.33149 n						
						14	15.43 −.07		1.15031 n	0.45533 n						
							.36									

June 20, 1878. α Ursæ Min. L.6

0.3536		11	32.0	12	8.5	14	20.7	+ 166.4	2.22115	4.44230	+ 4.98	− .35	+ 4.63	+59	7 25.05	7 29.68 +.29 2997
1.3537	A	12	35.0	12	48.8		16.9	+ 103.4	2.01452	4.02904	+ 3.09	− .14	+ 2.95	+07	26.22	29.17 +.28 2945
1.3481		14	4.3	13	36.0		20.0	+ 14.1	1.14922	2.29844	+ .42	− .00	+ .42	+70	29.43	29.85 +.23 3008
0.3534		15	27.0	14	16.9		16.9	− 68.6	1.83632 n	3.67264	− 2.05	− .06	− 2.11	−70	30.57	28.46 +.22 2868
8.3507		17	5.1	15	2.4		18.4	− 166.7	2.22194 n	4.44388	− 4.99	− .36	− 5.35	−28	34.28	28.93 +.17 2910
5.3562		18	4.6	15	47.5		19.4	− 226.2	2.35449 n	4.70898	− 6.77	− .65	− 7.43	−36	36.30	28.87 +.15 2902
3536				16	28.8		16.6							±49		2938
9				17	15.5		19.3		0.69697	9.54865 n				±41		7 29.16 +.22
				23	52.8		14.8		0.49034	9.13539 n						
				24	34.8		17.8		9.62504	7.40479 n						
				25	17.3		16.2		0.31214 n	8.77899 n						
						14	92.0		0.69776 n	9.55023 n						
						14	18.36		0.83031 n	9.81533 n						

July 23, 1878. δ Ursæ Min.

6.3312	9.14.4	9	37.6	8	4.6	12	44.0	+ 168.5	2.22660	4.45320	− 12.72	+ .91	− 11.81	51	+31 33.17	51 21.36 +.19 2155
0.3392	14.3	10	6.1		21.9	13	2.7	+ 144.0	2.14613	4.29226	− 10.57	+ .63	− 9.94		27.58 +.39	21.36 +.26 2163
9.3320	14.2	11	0.7		39.3		18.6	+ 85.4	1.93146	3.86292	− 6.45	+ .24	− 6.21		22.60 −.58	20.35 +.31 2066
1.3328	14.14	11	56.0		57.0	2381	38.7	+ 30.1	1.47857	2.95714	− 2.28	+ .03	− 2.25		18.90 +.13	21.09 +.28 2137
0.3311	13.4	12	54.7	9	13.4	14	27.7	− 28.6	1.45637 n	2.91274	+ 2.16	+ .03	+ 2.19		12.23 −.48	20.59 +.17 2076
0.3272	13.6	14	12.0		31.0		46.8	− 105.9	2.02490 n	4.04980	+ 8.00	+ .36	+ 8.36		9.25 +.22	21.31 +.15 2146
3322	14.1	14	56.2		49.0	15	3.4	− 150.1	2.17638 n	4.35276	+ 11.33	+ .73	+ 12.06		±.38	2124
9	15.1				—		19.7		1.10453 n	9.96102					51	21.01 +.23
	9 14.19			10	24.9		39.4		1.02406 n	9.80008					±.32	+.23
	12 26.46			11	16.6		55.5		0.80939 n	9.37074						
	15 37.59				35.3	16	10.5		0.35650 n	8.46496						
					51.3		30.1		0.53430	8.42056						
				12	7.9	3383	45.2		0.90283	9.65702						
					26.0	12	26.08		1.05437	9.80858						

July 24, 1878. δ Ursæ Min.

3.3227		9	21.2		—	12	45.6	+ 186.7	2.27114	4.54228	− 14.10	+ 1.12	− 12.98	51	+19 33.53	51 20.55 +.19 2074
6.3334	9 16.0	10	21.5	8	23.6	13	2.3	+ 126.4	2.10175	4.20350	− 9.54	+ .51	− 9.03		29.20 −.14	20.17 +.24 2041
7.3348	16.1	11	19.2		41.2		19.6	+ 68.7	1.83696	3.67392	− 5.19	+ .52	− 4.67		25.58 +.31	20.91 +.29 2086
9.3337	14.6	12	18.7		57.2	2573	37.8	+ 9.2	0.96374	1.92758	− .69	+ .00	− .69		20.73 −.21	2004 +.30 2034
0.3291	16.0	13	21.1	9	16.0	14	31.0	− 53.2	1.72591 n	3.45182	+ 4.02	+ .09	+ 4.11		16.00 −.20	20.11 +.24 2035
0.3527	15.3	14	36.3		32.7		48.1	− 128.4	2.10857 n	4.21714	+ 9.69	+ .53	+ 10.22		10.25 +.07	20.47 +.15 2062
3310	15.4				50.3	15	5.3								±.20	2056
8	16.6			10	9.0		22.0		1.14907 n	0.05010					51	20.62 +.24
	16.3				26.1		40.3		0.97968 n	9.71132					±.17	
	9 15.78			11	18.7		56.7		0.71489 n	9.18174						
	12 27.92				35.1	16	14.9		9.84172 n	7.43540						
	15 40.12				54.4		32.8		0.60384	8.95964						
				12	10.1	3611	50.0		0.98650	9.72496						
					27.7	12	27.94									

July 28, 1878. δ Ursæ Min.

	9 17.9	7	6.7	8	25.5	11	27.0	+ 329.1	2.51733	5.03466	− 24.85	+ 3.49	− 21.36	+22 51	41.68	51 20.32 +.13 2045
	23.9	9	32.4		—		43.8	+ 183.4	2.26340	4.52680	− 13.85	+ 1.08	− 12.77	−26	32.55	19.78 +.19 1997
4	24.6	10	23.1		—	12	2.5	+ 132.7	2.12287	4.24574	− 10.02	+ .57	− 9.45	−43	29.00	19.55 +.25 1980
2	24.3	11	45.8		—		19.0	+ 58.0	1.69897	3.39794	− 3.78	+ .08	− 3.70	+25	23.88	20.18 +.30 2048
1	24.2	12	41.0		—		37.0	− 5.2	0.71600 n	1.43200	+ .39	+ .00	+ .39	+25	19.80	20.19 +.29 2048
0		13	53.8	9	41.3		53.7	− 78.0	1.89209 n	3.78418	+ 5.89	+ .20	+ 6.09	−06	13.88	19.97 +.20 2017
0.3062	9 22.98				59.5	13	11.6							±27		2028
5.2962	3 12.10			10	16.7		28.8		1.39526 n	0.54248				±.23	51	20.00 +.23
6.2915					84.0	32.87	4.53		1.14133 n	0.03462						
2910	12 35.08								1.00080 n	9.75356						
4	36.52					12	35.80		0.57690 n	8.90546						
4									9.59393	6.93982						
									0.77002	9.29200						

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Tδ	Tα	τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.

Aug. 12, 1878. δ Ursae Min.

h m s 8 m s 11 m s 54.7
18 7 57.9 9 1.1 12 11.4
14 30.0 53.5 17.3 29.3
17 18.5 52.2 34.0 48.1
51.5 57.0 13 4.9
51.0 10 9.7 21.0
52.2 25.4 37.8
50.5 45.4 55.9
53.0 11 3.0 14 14.7
53.2 2778
71
9 52.14
3 12.19 (9) 13 4.20
(8) 4.33
13 4.26

τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
+ 304.4	2.48344	4.96688	−22.97	+ 2.98 +.99	−19.99	51 36.25	51 16.26 +.14	16.40
− 85.7	1.93298 n	3.86596	+ 6.47	+ .24 −.72	+ 6.23 .71	51 7.83	14.86 +.15	14.69
− 254.2	2.40518 n	4.81036	+ 19.18	+ 2.08 −.28	+ 17.10 21.26	51 53.60	10.70 +.27 14.86	15.13
	1.36116 n	0.47449		±.83			51 15.22 +.19	15.41
	0.81070	9.37357		±.70				
	1.28290	0.31797						

Aug. 13, 1878. δ Ursae Min.

18 9 30.3 8 — 11 54.8 —
12 25.3 55.9 31 12 14.7 —
16 50.7 54.7 19.8 31.7 —
55.4 37.9 49.8 —
56.1 56.1 13 6.3 —
54.2 10 11.7 23.7 —
53.9 28.8 42.0 —
54.3 46.7 58.2 —
56.1 11 5.9 14 14.8 —
402 2960
9 55.02 (9) 13 6.22
3 12.19 (8) 7.21
6.69 13 6.69

τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
+ 216.4	2.33526	4.67052	−16.33	+ 1.51 −.06	− 14.82	51 28.28	51 13.46 +.23	13.69
+ 41.4	1.61700	3.23400	− 3.12	+ .06 +.63	− 3.06	17.18	14.12 +.26	14.38
− ~~164.0~~ 224.0	~~2.21484~~ n 35025	~~4.42968~~ 70050	+ ~~12.38~~ 16.90	+ ~~.87~~ 1.61 −.58	+ ~~13.25~~ 18.51	54.40	52 5.91 +.26 12.91	13.17
	1.21298 n	0.17813		±.53			51 13.50 +.25	13.75
	0.49472 n	8.74161		±.45				
	~~1.09256~~ 1.22797	~~9.93729~~ 0.20811						

Aug. 14, 1878. δ Ursae Min.

13 49.1 — — 21.9 15 29.5
15 37.7 — — 20.8 45.9
— — 19.9 16 2.4
— 9.6 13 44.5 —
— 9.2 14 1.6 —
— 10.1 19.9 16 20.87
3 12.19
9.63 13 8.68
9.63
9.16

τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
− 40.9	1.61172 n	3.22344	+ 3.09	+ .05 −.25	+ 3.14	51 10.35	51 13.49 +.15	13.64
− 148.5	2.17173 n	4.34346	+ 11.21	+ .71 +.25	+ 11.92	2.00	13.92 +.22	14.14
	0.48944	8.73105		±.36			13.70 +.18	13.89
	1.04945	9.85107		±.30				

Aug. ~~19~~ 18 1878. δ Ursae Min.

8 38.0 8 52.9 12 5.0 —
14 11.0 9 11.0 23.5 —
15 46.0 27.8 40.5 —
45.5 57.6 —
10 1.7 13 14.3 —
19.8 33.3 —
37.7 57.5 —
49.1 14 7.7 —
11 12.2 24.6 —
2577 2580
10 1.97 13 15.33
12.19 14.16 13 14.74

τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
+ 276.7	2.44201	4.88402	−20.88	+ 2.46 −.82	− 18.42	51 31.40	51 12.98 +.20	13.18
− 56.4	1.75128 n	3.50256	+ 4.26	+ .10 +.14	+ 4.36	9.63	13.99 +.15	14.14
− 151.3	2.17984 n	4.35968	+ 11.42	+ .74 +.67	+ 12.16	2.30	14.46 +.21	14.67
	1.31973 n	0.39163		±.68			13.81 +.19	14.00
	0.62960	9.01017		±.57				
	1.05756	9.86729						

Aug. 20, 1878. δ Ursae Min.

(10 12.0) — — 15 20.6
14 23.1 — — 88.2
19 10.0 — — 56.0
— — 16 13.0
— — 31.2
— — 48.7
— — 17 7.0
21.2 — 14 13.6 23.1
17.6 — 27.4 41.4
2792
(2) 13 19.40 16 31.02
(9) 18.83 3 12.19
13 18.93

τ	log τ	2 log τ	Red I	Red II	Sum I+II	Circle Readings	Corr. Circ. Read.	
+ 185.9	2.26928	4.53856	−14.03	+ 1.11 −.06	[− 12.92]	51 6.33	51 11.31 +.15	11.46
− 64.2	1.80754 n	3.61508	+ 4.85	+ .13 +.07	+ 4.98	40.98	11.44 +.15	11.59
− 351.1	2.54543 n	5.09086	+ 26.49	+ 3.97	+ 30.46		51 11.37 +.15	11.52
	1.14700 n	0.04617		±.09				
	0.68526	9.12269		±.08				
	1.42315	0.59847						

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TS	TL				T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circle Read.

Aug. 20, 1878. 51 Cephei, L. B.

1647	47 56.6	–	–	–	–	2516	2.40071 m	4.80142	−15.53	−1.67	+19	−17.20	41/2	5.75	40	48.55 ± .15	4870
1469	50 25.1	–	–	–	–	4501	2.60217 m	5.20434	−24.70	−4.22	−18	−28.92		17.00		48.08 ± .25	4833
1513		–	–	–	–						±26						4851
1541		–	–	–	–		1.19130 m	0.22216 m			±22				40	48.31 ± .20	
		–	–	32.9	46 28.9		1.39276 m	0.62508 m									
		–	–	41.8	47 41.8												
		–	–	43.1	48 25.8												
		–	–	41.7	49 7.1												
		–	–														
0					47 39.88												
					3 54.93												
					43 44.95												

Aug. 20, 1878. λ Ursæ Min.

1369	50 38.9	–				1149	2.06032 m	4.12064	+ 2.71	+ .13	−26	+ 2.84	31	24.60	31	27.44 ± .30	2774
1438	53 37.3	–				2983	2.46731 m	4.93462	+ 6.91	+ .87	±25	+ 7.78		20.18		27.96 ± .29	2825
1317		–									±36						2800
1375		–					0.43287	9.12376			±30				31	27.70 ± .29	
	A	–					0.83986	9.93774									
	50 36.3	48 44.6															
	51 30.7		43.1														
	52 27.7		44.2	48 43.97													

Aug. 22, 1878. δ Ursæ Min.

1364	13 37.8	– –	–	–	–	12.2	1.08636 m	2.17272	+ 92	+ .00	+03	+ 92	51	12.25	51	13.17 ± .17	1334
1414	15 57.4	–	•	–	–	151.8	2.18127 m	4.36254	+11.45	+ .74	−02	+12.19		0.85		13.04 ± .25	1329
1389		–		–	–						±04						1331
		–	13 6.1	23.6	–		9.96408	768033			±03					13.11 ± .21	
		–	25.5	25.5	–		1.05899	9.87015									
		–	44.5	27.0	–												
		–	14 0.4	25.5	–												
		–	17.1	24.7	–												
		–	37.1	27.3	–												
					13 25.60												

Aug. 22, 1878. λ Ursæ Min.

1318	52 55.1	A-1 55 23.2				2419	2.38364 m	4.76728	+ 5.70	+ .59	−13	+ 6.29	31	22.95	31	29.24 ± .30	2954
1414	54 14.0	56 19.5				3208	2.51623 m	5.01246	+ 7.56	+ 1.04	+26	+ 8.60		21.03		29.63 ± .30	2993
1467	(54 57.1)	57 17.1				3639	2.56098 m	5.12196	+ 8.58	+ 1.33	−13	[+ 9.91]		1.65		±56 ± .23	2954
1400	3 11.6	58 8.0				8584	2.93369 m	5.86738	+20.24	+ 7.42	—	+27.66				29.31	
		59 12.4									±22				31	29.39 ± .28	2967
		0 4.7					0.75613	9.77034			±18						
		1 1.3					0.87872	0.01552									
		1 56.5					0.93347	0.12502									
		2 58.0					1.30618	0.87044									
		1967															
		59 ~~15.3~~ 8.5															
		10 15.12 +.21			48 53.40												
					−.21												
					48 53.19												

Aug. 25, 1878. δ Ursæ Min.

1146	9 14.3	9 8.0	12 –		–	+2561	2.40841	4.81682	−19.33	−.42	+ 2.11	−17.22	51	28.78	51	11.56 ± .24	1180
1159	13 7.0	26.9	30.3	87.7	42.5 15 50.1	+ 234	2.36922	4.73844	−17.66	+.42	+ 1.76	−15.90		14.18		12.44 ± .20	1264
1152	(16 24.3)	43.3	31.2	56.3	42.6 16 7.7	− 1739	2.24030 m	4.48060	+13.12	—	+ .97	+14.09					1222
		10 0.3	30.8	13.3	41.1 23.6						±60				51	12.00 ± .22	
		18.3	30.7	30.7	42.4 42.4		1.28613 m	0.32443			±51						
		35.7	30.4	47.9	42.9 17 04		1.24694 m	8.24605									
		51.7	29.9	4.8	–		1.11802	9.98821									
		11 11.0	31.1	23.5	–												
		28.0	30.8	40.6	–												
9	13 30.2	22.26			16 42.30												
8	.65	10 18.07	13 30.65		3 12.17												
5	.13	3 12.14			13 30.47												

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Tδ	Tα		T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.

Aug. 25, 1878. λ Ursæ Min.

19 57 52.7] Key:

h m s

Tδ	Tα		T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.
		5 42.8	~~−736.1~~	~~2.72925 n~~	~~5.45850~~	~~+12.64~~	~~+2.89~~	~~+15.53~~		
20 3 30.9	−	7 37.3	−934.3	2.94166 n	5.88332	+20.61	+7.70 +2.00	+28.31	30 59.80	31 28.11 +.27 2838
5 16.0	−	9 26.3	−979.4	2.99096 n	5.98192	+23.09	+9.66 +1.34	+32.75	54.68	27.43 +.29 2772
7 8.7	−	11 17.7	−1092.1	3.03826 n	6.07652	+25.74	+12.01 −.38	+37.75	48.05	25.80 +.20 2600
9 0.1	−	13 14.0	−1203.5	3.08045 n	6.16090	+28.37	+14.58 −1.09	+42.95	42.25	25.20 +.09 2529
11 1.8	59 12.7	13.81	−1325.2	3.12228 n	6.24456	+31.24	+17.68 −1.07	+48.92	36.30	25.22 +.09 2531
13 24.4	10 15.25 +.21	9 27.62	−1467.8	3.16667 ~~1.10165~~	6.33334 ~~0.46147~~	+34.60	+21.69 −.81	+56.29	29.13	25.42 +.15 2557

20 29.50 +1.66
(6) 48 58.12 *
(11) 57.45
48 58.01
−1.42
56.59

1.31406 0.88629
1.36336 0.98489
1.41066 1.07949
1.45285 1.16387
1.49468 1.24753
1.53907 1.33631

±1.22
±1.03

2638
31 ~~19.40~~ +.18
26.20 +.18

Aug. 26, 1878. 51 Cephei. L. C.

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Tδ	Tα	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.
18 36 43.0	38 43.4	+440.6	2.64404	5.28808	+27.20	−5.11 +.38	+22.09	41 27.40	41 49.49 +.25 4974
37 38.8	39 6.3	+384.8	2.58524	5.17048	+23.76	−3.90 +1.44	+19.86	30.73	50.59 +.21 5080
38 35.6	27.6	+328.0	2.51587	5.03174	+20.25	−2.83 −.67	+17.42	31.05	48.47 +.22 4869
42 51.3	48.6	+72.3	1.85914	3.71828	+4.46	−.14 −1.13	+4.32	43.75	48.07 +.16 4823

40 9.6
27.7
50.8
41 11.7
32.2
257.9
40 8.66
3 54.93
44 3.59 44 3.59

1.43463 0.70882 n
1.37583 0.59122 n
1.30646 0.45248 n
0.64973 9.13902 n

±1.03
±.87

4936
49.15 +.21

V =

Aug. 26, 1878. λ Ursæ Min.

Tδ	Tα		T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.
19 57 33.6	57 14.6	6.3	−521.7	2.71742 n	5.43484	+12.30	+2.74 −1.07	+15.04	31 10.43	31 25.47 +.15 2562
59 36.1	58 10.0	5.9	−644.2	2.80902 n	5.61804	+15.18	+4.18 −.19	+19.36	6.98	26.34 +.16 2650
0 52.7	59 8.3	8.3	−720.8	2.85781 n	5.71562	+16.99	+5.23 +1.01	+22.22	5.30	27.52 +.18 2770
1 48.7	0 2.9	7.0	−776.8	2.89031 n	5.78062	+18.31	+6.08 −.60	+24.39	1.45	25.84 +.25 2609
3 6.1	1 1.0	9.3	−854.2	2.93156 n	5.86312	+20.13	+7.34 +.87	+27.47	59.83	27.30 +.26 2756

1 52.2 4.6
2 53.7 10.2
51.6
59 7.37
10 15.24 +.21

1.08978 0.43777
1.18138 0.62097
1.23017 0.71855
1.26267 0.78355
1.30392 0.86605

±.83
±.70

2669
31 26.49 +.20

48 52.08 ✓
−.21
51.87

Aug. 27, 1878. δ Ursæ Min.

Tδ	Tα		T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.
18 8 16.2	9 11.6	12 22.7	+317.4	2.50161	5.00322	−23.95	+3.24 −1.01	−20.71	51 32.48	51 11.77 +.19 1196
12 30.2	29.3	41.7	+63.4	1.80209	3.60418	−4.78	+.13 +1.01	−4.65	18.35	13.70 +.28 1398

46.7 38.6
10 4.6 13 16.0
21.2 34.1
38.6 57.2
56.0 14 8.8
11 13.7 25.9
31.3 43.3
253.0 302.3
10 21.44 13 33.59
3 12.19 .63
13 33.61

1.37933 n 0.51083
0.67981 n 9.11179

±1.44
±1.22

1297
51 12.73 +.24

Aug. 27, 1878. 51 Cephei, L. C.

A−1

Tδ	Tα	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.
18 38 38.8	38 48.1	+328.4	2.51640	5.03280	+20.28	−2.84 −1.33	+17.44	41 29.93	41 47.37 +.23 4760
42 39.0	39 7.2	+88.2	1.94547	3.89094	+5.45	−.20 +.53	+5.25	44.03	49.28 +.18 4946
44 0.9	29.2	+6.3	0.79934	1.59868	+.39	−.10 +.79	+.29 .39	49.08	49.47 +.25 4972

49.8
40 12.7
34.0
54.4
41 16.3
38.4
290.1
40 12.23
3 54.93
44 7.16 44 7.16

1.30699 0.45354 n
0.73606 9.31168 n
9.58993 7.01942 n

±1.10
±.93

4893
41 48.71 +.22

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TS	TL	T	log T	2 log T	Red I	Red II	Sum I+II	Arcle Readings	Corr. Circ. Read

Aug. 29, 1878. δ Ursæ Min.

		+ 256	1.40824	281648	− 1.93	+ .02	− 1.91	−.04 51	4.20	51	12.29 +.21 1250
		− 1322	2.12123 n	4242416	+ 9.98	+ .56	+ 10.54	+.62	2.40		12.94 +.22 1316
								−.04 50	23.48		1.20 +.30 1260
			0.28596 n	832409				−.55	12.73		11.80 +.19 11.94
			0.99895	9.75007				±.36		51	12.31 +.23 12.54
		−5272	2.72198 n	5.44396	+ 39.78	+ 8.94	+ 48.72	±.30			
		−6193	2.79190 n	5.58380	+ 46.73	+ 12.34	+ 59.07				
			1.59970	0.95157							
			1.66962	1.09141							

Aug. 29, 1878. 51 Cephei. L. b.

		+4255	2.62899	5.25798	+ 21.89	− 5.00	+ 21.89	+.41	25.60		
		+3653	2.56265	5.12530	+ 22.55	− 3.52	+ 19.03	−.43 41	30.58	41	50.99 +.25 5074
			1.42958	0.69872 n				±.65	−.56		49.61 +.22 4983
			1.35324	0.54604 n				±.53			5028
										41	50.25 +.24

Aug. 29, 1878. λ Ursæ Min.

		−5680	2.75435 n	5.50870	+ 13.38	+ 3.25	+ 16.63	−.31 31	8.60	31	25.23 +.15 2538
		−6726	2.82776 n	5.65552	+ 15.85	+ 4.55	+ 20.40	−.30	4.65		25.05 +.19 2524
		−7385	2.86835 n	5.73670	+ 17.40	+ 5.49	+ 22.89	−.42	2.80		24.89 +.23 2512
		−8038	2.90515 n	5.81030	+ 18.94	+ 6.50	+ 25.44	+.90	0.75		26.19 +.25 2644
								±.51			2554
								±.43		31	25.34 +.20
			1.12662	0.51154							
			1.20003	0.65836							
			1.24062	0.73954							
			1.27742	0.81314							

Aug. 31, 1878. λ Ursæ Min.

		+5652	2.75220	5.50440	− 13.32	+ 3.22	− 10.10	−.06 31	36.60	31	26.50 +.15 2665
		+2799	2.44700	4.89400	− 6.60	+ .79	− 5.81	+.49	32.82		27.01 +.19 2720
		−5498	2.74020 n	5.48040	+ 12.95	+ 3.04	+ 15.99	−.44	10.13		26.12 +.15 2627
								±.41			2671
			1.12441 n	0.50718				±.35		31	26.84 +.13 26
			0.81921 n	9.89678							
			1.11241	0.48318							

Sept. 1, 1878 δ Ursæ Min.

		+ 89.9	1.95376	3.90752	− 6.78	+ .26	− 6.52	+.08 51	15.60	51	9.08 +.24 932
		− 702.2	2.84646 n	5.69292	+ 52.98	+ 15.86	+ 68.84	−.09	0.10		8.94 +.21 915
								±.12			924
			0.83137 n	9.41502				±.10		51	9.01 +.23
			1.7240.7	1.20042							

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I8 I2 I4 log τ 2 log τ Red I Red II Sum Circle Readings Corrected Red

log Red I log Red II

Sept. 2, 1878. 51 Cephei, L. b.

h	m	s	m	s	m	s														
18	36	0.2	39	2.1			+ 503.2	2.70174	5.40348	+31.00	−6.67	+ 24.33	−21	41	22.15	41	46.48	+.30	4678
	37	13.4		22.8			+ 430.0	2.63347	5.26694	+26.49	−4.87	+ 21.62	+19		25.30		46.92	+.26	4718
	38	39.9		46.3			+ 343.5	2.53593	5.07186	+21.16	−3.11	+ 18.05	+38		29.10		47.15	+.22	4737
	40	3.6	40	6.8			+ 259.8	2.41464	4.82928	+16.60	−1.78	+ 14.82	+14		32.72		46.94	+.19	4713
	41	2.0		30.0			+ 201.4	2.30406	4.60812	+12.41	−1.07	+ 11.34	+17		34.30		45.64	+.18	4582
	42	20.8		49.5			+ 122.6	2.08849	4.17698	+ 7.55	− .40	+ 7.15	+67		40.25		47.50	+.26	4766
				12.8									±50						4699
				32.0			1.49223	1.49134	0.8243$_n$	+31.06		+ 24.39	±42			41	46.77	+.22	
				54.3			1.42406	1.42307	0.6877$_n$	+26.55		+ 21.68					46.84		
							1.32652	1.32553	0.4926$_n$	+21.21		+ 18.10					46.98		
				2566			1.20523	1.20424	0.2501$_n$	+16.04		+ 14.26					47.20		
			40	28.51			1.09465	1.09366	0.0289$_n$	+12.44		+ 11.97					46.98		
			3	54.86			0.87808	0.87809	9.5978$_n$	+ 4.57		+ 7.17					47.52		
			44	23.37												41	46.98		
																	82		

Sept. 6, 1878. δ Ursæ Min.

18	(9 | 45.6)	9	32.7		—	16	15.7	8.1	+2498	2.39759	4.79518	−18.85	+ 2.01	+.06	51	23.80	51	10.04	+.28	1032
	10	36.0		51.2	56.5	13 4.1		32.0	6.9	+1964	2.29273	4.59946	−15.04	+ 1.28	+.09		12.23		10.18	+.19	1037
	13	28.0	10	7.2	55.8	20.9		51.8	9.3	+2744	1.43775	2.87550	− 2.07	+ .02	−.17	50	51.90		9.83	+.26	1009
	17	32.9		26.0	55.5	38.0	17	7.6	7.6	+2174	2.33746$_n$	4.67492	+16.41	+ 1.52							10.26
				42.9	54.0	54.0		24.4	6.9						±13			51	10.02	+.24	
			11	1.1	54.9	1.4 12.4		41.1	6.2		1.27520$_n$	0.30268	− 16.84		±11						
				18.4	55.3	30.2		59.0	6.6		1.17734$_n$	0.10696	− 13.76								
				35.5	56.8	48.2	18	18.3	8.5		0.31536$_n$	8.38300	− 2.05								
				53.9	56.0	15 5.8			60.1		1.21507	0.18242	+17.93								
				2692			17	7.51													
			10	43.24	13	55.48															
			13	55.48			13	55.41													
			16	67.51																	

Sept. 7, 1878. δ Ursæ Min.

18	8	44.7	7	52.8	45.2	10 49.7	13	59.7		+3139	2.49679	4.99358	−23.68	+ 3.17	+.44	51	25.23	51	4.72	+.27	499
	11	30.3	8	10.9	45.8	11 6.2	14	17.0		+1488	2.17114	4.34228	−11.49	+ .71	+.43		15.03		4.55	+.23	478
	14	28.0		29.1	46.6	25.2		35.6		− 29.4	1.46835$_n$	2.93670	+ 2.22	+ .03	−.06		0.80		3.05	+.24	329
				47.7	47.7	41.0		52.1													435
			9	2.8	45.3	58.3	15	10.7			1.37440$_n$	0.50108	−20.51		±.87			51	4.11	+.25	
				21.2	46.3	12 16.2		28.0			1.04875$_n$	9.84998	−10.48		±.75						
				39.8	47.4	34.0		46.4			0.34596	8.44420	+ 2.25								
				55.2	45.4	51.0	16	4.4		+ 19.9	2.28758	4.57516	− 14.63	+ 1.21	− 13.42			51	11.81		
						13 8.1		21.2		+ 28.3	1.46179	2.90358	− 2.14	+ .03	− 2.11				12.92		
			[10]	8	46.21	2897		2751		− 149.4	2.17435$_n$	4.34870	+ 11.27	+ .72	+ 11.99				12.79		
			[13]	11	58.86	11 58.86	15	10.57			1.16519$_n$	0.08266									
			[17]	15	10.57		[13]	58.55			0.32940$_n$	8.41108						51	12.51		
											1.08196	9.85620									

Sept. 8, 1878. δ Ursæ Min.

			9	36.0	+2															
18	8	37.6	9	56.6	12	5 27	16	3.1		+321.3	2.50691	5.01382	−24.24	+ 3.32	−.32	51	32.38	51	11.46	+.19	1165
	9	36.0	10	11.7	13	6.8		18.1		+ 59.3	1.77305	3.54610	− 4.47	+ .11	+.93		17.00		12.64	+.26	1290
	12	57.6		30.1		23.8		35.4		− 168.3	2.22608$_n$	4.45216	+12.70	+ .91	−.60		2.45		11.16	+.21	1137
	16	47.2		47.2		41.2		54.2							±.77						1197
			11	4.0		58.2	17	12.6			1.38452$_n$	0.52132	−20.92		±.65			51	11.75	+.22	
				22.0	14	16.0		28.0			0.65066$_n$	9.05360	− 4.36								
				38.5		3.49		43.0			1.10369	9.95966	+13.61								
				54.1		49.8	18	2.5													
					15	7.8		20.9													
				3002		2912		2198													
			10	46.69	13	59.02	17	11.09													
			13	59.02			13	58.93													
			17	11.09																	

Sept. 9, 1878. λ Ursæ Min.

	20	5	0.5	6	2.1		− 948.2	2.97690$_n$	5.95380	+22.27	+ 9.04	+31.31	+.14	30	50.62	31	21.83	+.24	2207
		6	26.5	7	51.0		−1034.2	3.01460$_n$	6.02920	+24.29	+ 10.76	+35.05	+.11		46.80		21.85	+.19	2204
		7	29.0	9	41.5		−1096.7	3.04009$_n$	6.08018	+25.76	+ 12.10	+37.86	−.30		43.65		21.51	+.12	2163
A-2		8	31.0	11	34.4		−1158.7	3.06397$_n$	6.12794	+27.22	+ 13.50	+40.72	+.18		41.30		22.02	+.09	2211
		9	49.0	13	26.3		−1236.7	3.09226$_n$	6.18452	+29.05	+ 15.38	+44.43	+.50		37.92		22.35	+.08	2243
		11	48.2				−1355.9	3.13222$_n$	6.26444	+31.85	+ 18.49	+50.34	−.61		30.85		21.19	+.13	2132
				9	43.06								± 33						2198
				20	30.77	+1.66	1.34884	1.34779	0.95632$_n$	+2233		+31.37	± 28			31	21.79	+.14	
							1.38654	1.38549	1.03172$_n$	+2435		+35.11					21.93		
				49	12.29		1.41203	1.41098	1.08270$_n$	+2582		+37.98					21.57		
					−1.66	49 10.63	1.43591	1.43486	1.13046$_n$	+2728		+40.78					22.08		
							1.46420	1.46315	1.18704$_n$	+2913		+44.60					22.42		
							1.50416	1.50311	1.26696$_n$	+3193		+50.42					21.27		
																31	21.86		

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Sept. 10, 1878. δ Ursae Min.

I δ	I α	I α	τ	log τ	2 log τ	Red. I	Red. II	Sum	Bricks Readings	Corrected Readings	Rdr
h m s	m s	m s	s			"	"	"	′	″	′	″	″	
18 11 17.4	—	12 54.7	+ 166.7	2.22194	4.44388	−12.58	+ .89	−11.69	+14 51	22.55	51	10.86	+.29	11.15
12 41.9	—	13 12.1	+ 822	1.91487	3.82974	− 6.20	+ .22	− 5.98	+32	17.05		11.07	+.26	11.33
13 26.0	—	28.6	+ 38.1	1.58092	3.16184	− 2.87	+ .05	− 2.82	+46	14.08		11.26	+.21	11.47
14 36.2	—	46.0	− 32.1	1.50657n	3.01302	+ 2.42	+ .08	+ 2.39	+26	8.73		11.12	+.15	11.27
15 36.0 51.0 10 51.0		14 4.1	− 91.9	1.96332n	3.92664	+ 6.93	+ .27	+ 6.66	−1.18	2.43		9.09	+.20	9.83
52.2 11 9.7		22.0						7.20				9.63		11.01
52.6 27.5		89.6		1.09955n	9.95138				±52					
52.8 45.2		56.5		0.79248n	9.33724				±44		51	10.79	+.22	
51.2 12 1.0		15 12.3		0.45853n	8.66934									
10 51.96		27.9		0.28412	8.52052									
3 12.24		14 3.99		0.84093	9.43414									
(5) 14 4.20														
191 3.99		14 4.06												

Sept. 10, 1878. 51 Cephei, L. C.

18 36 41.0	39 20.3	55.7	+ 488.5	2.68886	5.37772	+30.16	− 6.29	+23.87	+43 41	24.33	41	48.20	+.29	48.49
38 8.2	49.8	53.8	+ 401.3	2.60347	5.20694	+24.78	− 4.24	+20.54	−34	26.93		47.47	+.25	47.72
39 35.6	40 13.1	55.8	+ 313.9	2.49679	4.99358	+19.38	− 2.60	+16.78	−09	30.98		47.76	+.21	47.97
	32.7	54.0							±36					48.06
	54.1	54.1		1.47945	0.79846n				±30		41	47.81	+.25	
	—			1.39406	0.62768n									
	—	40 54.68		1.28738	0.41432n									
	—	3 54.86												
	—													
		44 49.54												

Sept. 12, 1878. δ Ursae Min.

18 9 14.9	9 45.1	12 57.5	+ 292.2	2.46568	4.93136	−22.04	+ 2.75	−19.29	+22 51	27.83	51	8.54	+.23	8.77
10 28.7	10 2.8	13 14.1	+ 228.4	2.34908	4.69816	−16.85	+ 1.61	−15.24	+14	23.65		8.41	+.28	8.69
11 41.8	20.3	32.1	+ 145.3	2.16227	4.32454	−10.96	+ .68	−10.28	+08	18.63		8.35	+.28	8.63
12 10.2	37.6	49.3	+ 116.9	2.06781	4.13562	− 8.82	+ .44	− 8.38	+12	16.55		8.17	+.26	8.43
13 10.1	54.3	14 7.4	+ 57.0	1.75587	3.51174	− 4.30	+ .10	− 4.20	+14	12.43		8.23	+.18	8.41
14 14.0	11 12.2	24.2	− 6.9	0.83885n	1.67770	+ .52	+ .00	+ 52	−15	7.73		8.25	+.15	8.40
	30.0	41.9							±15					8.33
	47.0	58.0		1.34329n	0.43886				±13			8.33	+.23	
	12 8.5	15 16.3		1.22669n	0.20566									
	25.48	30.24		1.03988n	9.83204									
	10 54.98	14 6.93		0.94542n	9.64312									
	3 12.24	7.22		0.63348n	9.01924									
		14 7.08		9.71646	9.18520									

Sept. 13/14 1878. 51 Cephei L. C.

18 38 50.3	39 36.1	43 30.0	47 35.6	+3655	3.56289	5.12578	+2257	−352	+23 41	25.13	41	44.18	+.27	44.45
43 19.3	57.4	51.6	48.3	+ 96.5	1.98453	3.96906	+ 5.96	− 0.25	+40	38.75		44.46	+.16	44.62
48 17.0	40 20.1	44 10.4	48 9.4	− 201.2	2.30363n	4.60926	− 12.42	− 4.07	−16	57.30		43.81	+.25	44.06
51 48.9	39.3	34.9	29.2	− 413.1	2.61606n	5.23212	− 25.51	− 4.50	−45 42	13.58		43.57	+.20	43.77
41 21.2	41 0.0	56.0	+ 49.6	1.69580	1.39160	+ 15.82	− 1.28	+ 14.54	±35					44.22
42	22.2	45 17.7	49 11.5								41	44.01	+.22	
	43.9	39.2	32.8	1.54344	1.35348n	0.54652n		+ 19.05	±30					
42 16.9	59.0	59.0	54.3	1.42440	0.77512n	9.38980n		+ 5.71						
41 1.32	26.0	46 19.9	50 15.3	1.34141	1.09422n	0.02800n		− 13.49						
44 55.72	2.679	321.5	273.0	1.17241	1.40665n	0.65286n		− 30.01						
48 50.33	42 40.12	180.	180.	1.12439	1.25104n									
Means 44 55.79	3 14.86	45 50.5	45 3.0											
41 1.32	44 55.72	48 50.33												

Sept. 14, 1878. δ Ursae Min.

18 9 37.3	9 50.2	13 3.5	+ 275.1	2.43949	4.87898	−20.70	+ 2.43	−18.27	+22 51	27.65	51	9.38	+.23	9.61
10 7.9	10 15.8	16.2					+ 1.4							
10 43.1	7.7 29.5	37.7	+ 209.3	2.32077	4.64154	− 15.75	+ 1.41	− 14.34	+23	23.68		9.34	+.28	9.62
12 3.0	26.3	56.3	+ 129.4	2.11193	4.22386	− 9.74	+ .54	− 9.20	+05	18.85		9.15	+.29	9.44
13 15.0	41.3	14 12.6	+ 57.4	1.75891	3.51782	− 4.32	+ .11	− 4.21	−09	13.28		9.07	+.23	9.30
14 7.5	11 1.1	28.5	+ 4.9	0.69020	1.38040	− .37	+ .00	− .37	−64	8.95		8.58	+.17	8.75
15 18.9	17.3	48.0	− 66.5	1.82282n	3.64564	+ 5.00	+ .14	+ 5.14	+23	4.30		9.44	+.18	9.62
	35.7	15 4.6							±27					
	53.6	22.5	1.31710	1.31605n	0.38648	−20.75		−18.32	±23		51	9.16	+.23	9.39
12 9.9			1.19838	1.19733n	0.14904	− 15.79		− 14.88				4.33		
		22.9	0.98954	0.98849n	9.73144	− 9.76		− 9.22				4.30		
	2431	14 12.21	0.63652	0.63547n	9.02534	− 4.33		− 4.22				4.13		
	11 0.34		0.56781	9.56676n	6.88	− .37		− .37				4.06		
	3 12.14	12.395	0.70843	0.69938	9.15314	+ 5.22		+ 5.16				8.58		
											51	9.14		9.46

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	I8	Ia	Id	τ	log τ	2 log τ	Red. I	Red. II	Sum	Circle Readings	Corrected Readings	
	Sept. 14, 1878. 51 Cephei. L.C.											
	h m s	m s	m s	s			"	"	"	' "	' "	
	18 37 51.6	39 42.0		+ 430.4	2.63387	5.26774	+26.51	− 4.88	+21.63	−0641 24.08	41 45.71	+.28 4899
	39 2.4	40 3.6		+ 359.6	2.55582	5.11164	+22.15	− 3.41	+18.74	+18 27.25	45.99	+.24 4623
	41 1.0	245		+ 241.0	2.38202	4.76404	+14.85	− 1.53	+13.32	+14 32.68	46.00	+.19 4619
	21.3	44.7		+ 220.7	2.34380	4.68760	+13.60	− 1.28	+12.32	+25 33.80	45.62	+.18 4580
		41 7.2								±.18		4605
A-1		28.0		1.42446	1.42347	0.6885 n	+2657		+2169	±.15	41 45.83	+.22
		50.1		1.34641	1.34542	0.5324 n	+2220		+18.79		48.27	
		42 12.1		1.17261	1.17162	0.1848 n	+1488		+13.35		46.04	
		31.8		1.13439	1.13340	0.1084 n	+1363		+12.35		46.03	
											45.65	
		2440									41 46.02	
		41 7.11									45.87	
		3 54.86										
		45 1.97										
	Sept. 15, 1878. δ Ursæ Min.											
	18 9 14.8	9 52.1	13 48	+299.6	2.47654	4.95308	−22.54	+ 2.89	−19.65	−1351 31.18	51 11.53	+.20 4473
	10 40.7	10 10.6	22.0	+ 213.7	2.32980	4.65960	−16.08	+ 1.47	−14.61	+01 26.22	11.61	+.24 4187
A+1	11 49.8	25.8	40.0	+ 144.6	2.16017	4.32034	−10.88	+ .67	−10.21	+14 21.92	11.71	+.29 4200
A	12 39.4	44.4	56.8	+ 95.0	1.97772	3.95544	− 7.15	+ .29	− 6.86	−02 15.42	11.56	+.28 4184
	14 1.8	11 2.8	14 13.9	+ 12.6	1.10037	2.20074	− .95	+ .01	− .94	+02 12.62	11.68	+.20 4188
	15 25.7	19.5	32.8	− 71.3	1.85309 n	3.70618	+ 5.37	+ .16	+ 5.53	−02 6.15	11.68	+.16 4184
		37.2	54.9							±.06		4186
		55.1	15 6.1	1.38415 n	1.35310 n	0.4606 n	−2260		−19.71	±.05	51 11.63	+.23
		12 11.4	23.6	1.20741 n	1.20636 n	0.1671 n	−16.12		−14.65		11.47	
				1.03778 n	1.03673 n	9.8278 n	−10.91		−10.24		11.37	
		2589	2509	0.85533 n	0.85428 n	9.4629 n	− 7.17		− 6.88		11.68	
		11 2.10	14 14.54	9.97798 n	9.9769 n	7.708 n	− .95		− 0.94		11.54	
		3 12.24	14.34	0.73070 n	0.72965	9.2137 n	+ 5.38		+ 5.54		11.68	
			14 14.44	**Sept. 15, 1878. 51 Cephei. L.C.**							11.69	
											51 11.60	
	18 37 19.1	39 43.9		+ 466.6	2.66894	5.33788	+28.74	− 5.74	+23.00	+1241 25.58	41 48.58	+.27 4885
	38 14.3	40 7.0		+ 411.4	2.61426	5.22852	+25.34	− 4.46	+20.88	−48 27.12	48.00	+.25 4835
A-1	39 22.7	27.9		+ 343.0	2.53529	5.07058	+21.13	− 3.10	+18.03	+16 30.65	48.68	+.21 4889
	40 18.8	49.5		+ 286.9	2.45773	4.91546	+17.67	− 2.17	+15.50	+1.04 34.08	49.58	+.19 4977
	41 27.0	41 11.2		+ 218.7	2.33985	4.67970	+13.47	− 1.26	+12.21	−.15 36.20	48.41	+.17 4858
	42 22.9	33.3		+ 162.8	2.21165	4.42330	+10.03	− .70	+ 9.33	−.72 38.52	47.85	+.16 4801
		52.8								±.49		4875
		42 15.3		1.45953	1.45854	0.7587 n	+2881		+2307	±.41	41 48.52	+.21
		36.6		1.40485	1.40386	0.6493 n	+2540		+20.94		48.68	
				1.32588	1.32489	0.4914 n	+2118		+18.08		48.06	
		2775		1.24832	1.24733	0.3362 n	+1771		+15.54		48.73	
		41 10.83		1.13074	1.12945	0.1005 n	+1350		+12.24		49.62	
		3 54.86		1.00224	1.00125	9.8444 n	+1035		+9.35		48.44	
		45 5.69		**Sept. 16, 1878. δ Ursæ Min.**							47.87	
											41 48.56	
	18 9 31.0	9 53.6	13 4.3	+ 284.7	2.45439	4.90878	−21.43	+ 2.61	−18.82	−3151 29.35	51 10.53	+.22 1075
	10 37.1	10 11.3	24.5	+ 218.6	2.33965	4.67930	−16.45	+ 1.54	−14.91	−.60 25.08	10.17	+.29 1046
A+1	12 7.3	28.4	41.9	+ 128.4	2.10857	4.21714	− 9.66	+ .53	− 9.13	+.43 20.32	11.19	+.30 1149
A	13 12.6	48.0	14 0.3	+ 63.1	1.80003	3.60006	− 4.75	+ .13	− 4.62	+.52 15.95	11.33	+.25 1158
	14 24.6	11 3.5	14.2	− 8.9	0.94939 n	1.89878	+ .67	+ .00	+ .67	+.07 16.30	10.97	+.16 1113
	15 48.6	21.8	32.6	− 92.9	1.96802 n	3.93604	+ 6.99	+ .27	+ 7.26	−.10 3.50	10.76	+.20 1096
		37.9	49.8							±.37		1106
		55.1	15 8.2	1.33206 n	1.33095 n	0.4163 n	−2148		−18.87	±.31	51 10.82	+.24
		12 12.5	25.1	1.21726 n	1.21621 n	0.1868 n	−1649		−14.95		10.73	
				0.98618 n	0.98513 n	9.7246 n	− 9.69		− 9.16		11.16	
		2721	2009	0.67764 n	0.67659 n	9.1076 n	− 4.76		− 4.63		11.32	
		11 3.57	14 15.66	9.82700	9.82595	7.406 n	+ .67		+ 0.64		10.97	
		3 12.24	15.81	0.84563	0.84458	9.4435 n	+ 7.01		+ 7.28		10.78	
			14 15.74	**Sept. 16, 1878. 51 Cephei, L.C.**							51 10.81	
	18 36 55.3	39 46.3	11.7	+ 494.3	2.69399	5.38798	+30.45	− 6.44	+24.01	+2541 23.75	41 47.76	+.30 4806
A-1	37 38.3	40 10.8	14.8	+ 451.3	2.65447	5.30894	+27.80	− 5.37	+22.43	.00 25.10	47.53	+.28 4781
	38 25.5	32.2	14.9	+ 404.1	2.60649	5.21298	+24.89	− 4.30	+20.59	+.22 27.18	47.77	+.26 4803
	39 30.1	52.9	14.2	+ 339.5	2.58084	5.06168	+20.91	− 3.04	+17.87	−.33 29.38	47.25	+.23 4748
	40 54.4	41 37.3	16.0	+ 255.2	2.40688	4.81376	+15.72	− 1.72	+14.00	−.20 33.42	47.42	+.19 4761
	41 52.0	59.0	16.3	+ 197.6	2.29579	4.59158	+12.17	− 1.03	+11.14	+.07 36.58	47.72	+.16 4788
		42 17.6	13.6							±.19		4784
		41.8	16.4	1.48458	1.48359	0.8088 n	+3052		+24.08	±.16	41 47.58	+.24
				1.44506	1.44407	0.7297 n	+2787		+22.52		47.82	
			37.9	1.39708	1.39609	0.6338 n	+2495		+20.65		47.83	
			41 14.74	1.32143	1.32044	0.4825 n	+2096		+17.92		47.30	
			3 54.86	1.19747	1.19648	0.2346 n	+1576		+14.04		47.46	
			45 9.60	1.08638	1.08539	0.0124 n	+1220		+10.17		47.75	
											41 47.63	

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	Is	Id	Id	τ	log τ	2 log τ	Red. I.	Red. II.	Sum	Circle Readings	Corrected Readings

Sept. 17, 1878. δ Ursæ Min.

	h m s	m s	m s		s													
			14 34.5															
48.91	18 9 23.8	9 55.0	52.0	+ 283.3	2.45225	4.90450	−21.32	+ 2.58	− 18.74	−11	51	28.35	51	9.61	+.24	9.85
46.23	13 35.7	10 13.3	15 9.3	+ 41.4	1.61700	3.23400	− 3.12	+ .06	− 3.06	+53	51	13.35		10.29	+.20	10.49
40.19	17 8.1	30.2	2726 27.4	− 171.0	2.23300	4.46600	+12.87	+ .94	+ 13.81	−42	50	55.45		9.26	+.28	9.54
45.86		46.8								±44						9.96
46.05		11 6.1	16 37.0	1.32986 m	1.32881 m	0.41204 n	−21.37		− 18.79	±37			51		+.23	
	11 5.21	23.0	29.4 24.2 64.3	0.49461 m	0.49356 m	8.7241 n	− 3.12		− 3.06					4.956		
	14 16.96	39.5	24.17 11.6	1.11061	1.10956	9.9735 n	+12.90		+ 13.84					18.29		
	17 29.09	2869 58.0	28.9 28.9											9.29		
		12 16.0	283 45.8													
	5126	13 7.9	28.8 28 3.7										51	9.71		
		23.5	28.8 21.2													
		42.0	30.2 40.0													
		57.0														
		14 17.0	14 17.087													

Sept. 17, 1878. 51 Cephei, L.L.

11.73	18 37 29.5	39 52.2		+ 464.1	2.66661	5.33322	+28.59	− 5.68	+ 22.91	+1	41	23.42	41	46.33	+.30	46.63
11.87	38 53.1	40 14.6		+ 380.5	2.58035	5.16070	+23.44	− 3.82	+ 19.62	+53		27.08		46.70	+.25	46.95
1.200	39 38.0	36.2		+ 335.6	2.52582	5.05164	+20.67	− 2.97	+ 17.70	−13		28.35		46.05	+.24	46.29
11.84	41 3.2	58.8		+ 250.4	2.39863	4.79726	+15.43	− 1.65	+ 13.78	−19		32.25		46.03	+.20	46.23
11.88	41 56.0	41 19.2		+ 197.6	2.29579	4.59158	+12.17	− 1.03	+ 11.14	−45		34.65		45.79	+.18	45.97
11.84	43 42.5	39.0		+ 91.1	1.95952	3.91904	+ 5.61	− .22	+ 5.39	+.05		40.92		46.31	+.16	46.47
11.86		42 1.2								±28						46.42
		23.3		1.45720	1.45621	0.7540 m	+28.66		+ 22.98	±24			41	46.20	+.22	
		44.0		1.37694	1.36995	0.5815 m	+23.49		+ 19.67					46.48		
				1.31641	1.31542	0.4724 m	+20.72		+ 17.75					46.73		
		2885		1.18922	1.18823	0.2180 m	+15.46		+ 13.81					46.10		
		41 18.72		1.08638	1.08539	0.0124 m	+12.20		+ 11.17					46.06		
		3 54.46		0.75011	0.74912	9.3398 m	+ 5.63		+ 5.41					45.82		
		45 13.58												46.33		
													41	46.24		

Sept. 18, 1878. δ Ursæ Min.

	(7 33.0)	Δ t i	Δ															
48.85	18 8 58.3	9 57.3	13 8.9	+ 406.3	2.60885	5.21770	−30.65	+ 5.31	[−25.34	+69	51	33.80	51	9.73	+.18	9.91
48.25	8 47.0	10 14.2	26.3	+ 381.0	2.58092	5.16184	−28.74	+ 4.67	− 24.07	−88		31.43		9.91	+.19	10.10
48.89	9 5.00	32.0	44.0	+ 332.3	2.52153	5.04306	−25.07	+ 3.55	− 21.52	+03		27.00		9.01	+.24	9.25
49.77	11 14.0	50.6	14 1.7	+ 269.3	2.43024	4.86048	−20.32	+ 2.33	− 17.99	−51		21.30		8.42	+.29	8.71
48.58	12 7.0	11 7.4	19.4	+ 185.3	2.26788	4.53576	−13.98	+ 1.2010	− 12.78	88 −31		16.05		8.63	+.28	8.91
48.01	13 21.7	25.0	36.6	+ 132.3	2.12156	4.24312	− 9.98	+ .56	− 9.42	−75		12.50		8.27	+.20	8.47
48.73		42.2	54.4	+ 57.6	1.76042	3.52084	− 4.34	+ .11	− 4.23							9.22
		59.0	15 11.0		1.48646 m	0.72520				±58						
		12 16.7	30.1		1.45853 m	0.66934				±49			51	8.99	+.23	
		3044	2324		1.39914 m	0.55056										
		11 7.16	14 19.16		1.30785 m	0.36798										
		3 12.24	19.40		1.14549 n	0.04326										
			14 19.28		0.99917 m	9.75062										
					0.63803 m	9.02834										

Sept. 18, 1878. 51 Cephei, L.L.

		Δ -1																
10.75	18 36 28.7	39 54.5		+ 527.6	2.72230	5.44460	+32.57	− 7.33	+ 25.24	+25	41	19.88	41	45.12	+.28	45.40
10.44	37 46.2	40 17.3		+ 451.1	2.65427	5.30854	+27.85	− 5.36	+ 22.49	+101		23.40		45.87	+.27	46.16
11.49	38 57.0	38.0		+ 377.3	2.57669	5.15338	+23.30	− 3.75	+ 19.55	+09		25.43		44.98	+.26	45.24
11.58	40 39.6	41 0.8		+ 276.7	2.44201	4.88402	+17.08	− 2.02	+ 15.06	−72		27.15		44.21	+.22	44.43
11.13	41 47.3	21.7		+ 209.0	2.32015	4.64030	+12.90	− 1.15	+ 11.75	−36		32.85		44.60	+.19	44.79
10.96	43 3.4	42.8		+ 132.9	2.12352	4.24704	+ 8.21	− .46	+ 7.75	−29		36.95		44.70	+.16	44.86
11.06		42 4.3								±49						45.15
		25.8			1.51289	0.86534 n				±41			41	44.92	+.23	
		47.7			1.44486	0.72928 n										
		2529			1.36728	0.57412 n										
		41 21.43			1.23260	0.30476 n										
		3 54.86			1.11074	0.06104 n										
		45 16.29			0.91471	9.66778 n										

Sept. 19, 1878. 51 Cephei, L.L.

										[22.52]								
48.06	18 37 46.0	39 58.9	43 57.3	47 46.7	+ 451.9	2.65504	5.31008	+27.60	+51	− 5.38	[	41	25.10	41	46.37	+.27	46.64
47.81	(38 18.3)	40 1.0	44 12.4	48 8.6	+ 419.6	2.62284	5.24568	+25.91	−84	− 4.64	+21.27	)	30.80		46.78	+.24	47.02
48.03	39 39.0	41.8	35.0	30.6	+ 338.9	2.53087	5.06014	+20.92	−33	− 3.03	[+17.89	]	37.56		45.64	+.16	45.80
47.48	40 43.0	41 1.8	57.7	57.1	+ 274.9	2.43917	4.87834	+16.97	−50	− 1.99	+14.98		42.23		45.48	+.15	45.63
47.61	42 5.86	24.3	45 17.8	49 11.6	+ 139.3	2.14395	4.28790	+ 8.60	+71	− .51	+ 8.09		49.28		46.57	+.27	46.84
47.88	44 24.0	44.7	38.8	33.8	+ 53.9	1.73159	3.46318	+ 3.33	−07	− .08	+ 3.25		54.15		45.80	+.26	46.06
	46 0.9	42 7.4	59.8	54.2	− 43.0	1.63347 m	3.26694	− 2.66		− .05	− 2.71						46.23
47.81	47 26.1	29.6	46 22.7	50 1.50	−128.2	2.16789 n	1.21578	− 7.92	±45	− .43	− 8.35			41	45.94	+.22	
		48.0	43.7	37.6		1.44563	0.73082 n		±38								
		2758	3392	2892		1.41343	0.66642 n										
		41 23.98	45 17.69	49 12.13		1.32066	0.48088 n										
		45 17.69				1.22976	0.29008 n										
		49 12.13				0.93454	9.70864 n										
				45 17.93		0.52218	8.88392 n										
						0.42406 n	8.68768 n										
						0.39848 n	8.63652 n										

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T8	T2	T2	T	log T	2 log T	Red I	Red II	Sum I + II	Circle Readings	Corr. Circ. Read.

Sept. 22, 1878. 2 Urs. Min.

19	52	8.8	52	24.7	56.56	12.6	+ 1533	2.18554 m	4.37108	+ 3.61	+ .21	+ 3.85 +.28	31	18.83	31	22.68 +.29 2297
	53	28.3	53	18.8	58.57	2.8	− 2328	2.36698 m	4.73396	+ 5.48	+ .54	+ 6.02 +.14		16.60		2262 +.26 2288
	54	42.0			47.45	55.4	− 3065	2.48643 m	4.97286	+ 7.21	+ .94	+ 8.15 −.83		13.85		2200 +.21 2221
	56	24.0	49	36.7	58.3	54.3	− 4085	2.61119 m	5.22238	+ 9.61	+ 1.88	+ 11.29 +.68		11.95		2324 +.18 2342
	57	21.1		34.8	54.7	54.7	− 4656	2.66881 m	5.33602	+ 10.96	+ 2.18	+ 13.14 +.19		9.63		2277 +.16 2293
	58	32.4					− 5369	2.72989 m	5.45978	+ 12.63	+ 2.90	+ 15.53 −.72		6.33		2186 +.16 2202
												±.45				2274
				59	51.96							±.38			31	22.55 +.21
				10	16.34 +.21											8
			(5)	49	35.62 −.21											
			(2)		36.75											
				49	35.66				0.55718	93729						
					−.15				0.73862	97361 7						
				49	35.51				0.85807	99507						
									0.98283	0.24159						
									1.03965	0.33823						
									1.10158	0.46199						

Sept. 23, 1878. 51 Cephei, L. C.

18	48	37.0	48	1.1			− 2066	2.31513 m	4.63026	− 12.76	− 1.12	− 13.88 +.16	47	3.10	48	4922 +.17 4939
	50	14.5		19.3			− 2841	2.45347 m	4.90694	− 17.54	− 2.13	− 19.67 −.64	2	6.13	1	4646 +.14 4660
	51	45.5		43.7			− 3751	2.57415 m	5.14830	− 23.16	− 3.71	− 26.87 +.40		14.30		4743 +.21 4764
	52	42.3	49	3.7			− 4319	2.63538 m	5.27076	− 26.67	− 4.91	− 31.58 −.81		17.75		4617 +.26 4643
	53	44.0		26.8			− 4936	2.69338 m	5.38676	− 30.48	− 6.42	− 36.90 −.59		23.28		4638 +.27 4665
	53	3.5		44.4			− 5731	2.75823 m	5.51646	− 35.38	− 8.65	− 44.03 −.52		30.55		4652 +.20 4672
			50	8.8								±.98				4724
				30.3					1.10572 m	0.05100 m		±.79			40	47.03 +.21
				49.3					1.24406 m	0.32768 m					1	
				22.4					1.36474 m	0.56904 m						
				49	25.27				1.42597 m	0.69150 m						
				3	54.86				1.48397 m	0.80750 m						
				45	30.41				1.54882 m	0.93720 m						

Sept. 23, 1878. 2 Urs. Min.

19	33	40.0	35	24.8			+ 9453	2.97557	5.95114	− 22.24	+ 8.98	− 13.26 +.02	31	36.45	31	23.19 +.16 2335
	39	58.2	36	20.8			+ 5671	2.75366	5.50732	− 13.34	+ 3.23	− 10.11 −.31		32.33		22.22 +.20 2242
	[41	26.1]	37	13.3			+ 4792	2.68052	5.36104	− 11.27	+ 2.31	[− 8.96] +.30		30.20		23.40 +.23 2363
	43	47.8	38	7.8			+ 3375	2.52827	5.05654	− 7.94	+ 1.14	− 6.80 +.59		28.98		23.67 +.25 2392
	45	12.6	39	10.2			+ 2527	2.40261	4.80522	− 5.95	+ .64	− 5.31 ±.52				2333
			40	4.1								±.44			31	23.12 +.21
			41	3.2					1.34719 m	0.95333						
				57.7					1.12528 m	0.50951						
			42	56.5					1.05214 m	0.36323						
				19.4					0.89989 m	0.05873						
			39	8.71					0.77423 m	9.80741						
			10	16.36 +.21												
				49	25.07	49 25.28										

Sept. 25, 1878. 2 Urs. Min.

19	(28	12.2)	35	31.3			+									
	32	14.2	36	25.1			+ 12812	3.10762	6.21524	− 30.14	+ 16.50 +.37	− 13.64	31	36.55	31	22.95 +.16 2311
	36	51.6	37	26.5			+ 10392	3.01670	6.03340	− 24.45	+ 10.85 −.39	− 13.60		33.25		21.16 +.19 2135
	38	1.0	38	24.5			+ 7618	2.88184	5.76368	− 17.92	+ 5.83 +.40	− 12.09		33.43		21.96 +.18 2214
	39	33.8	39	20.7			+ 6924	2.84036	5.68072	− 16.29	+ 4.82 −.53	− 11.47		31.50		21.00 +.21 2121
	40	37.8	41	14.3			+ 5996	2.77786	5.55572	− 14.11	+ 3.61 −.22	− 10.50		31.02		21.80 +.22 2152
	42	37.1	41	8.7			+ 5356	2.72884	5.45768	− 12.60	+ 2.88 −.61	− 9.72		28.95		21.89 +.24 2213
	42		42	4.2			+ 4163	2.61941	5.23882	− 9.80	+ 1.74	− 8.06				2172
				56.0					1.47920 m	1.21739		±.64			31	21.84 +.20
				211.3					1.38828 m	1.03555		±.54				5
			39	16.81					1.25342 m	0.76583						
			10	16.42 +.21					1.21194 m	0.68287						
									1.14944 m	0.55787						
									1.10042 m	0.45983						
				49	33.23	49 33.44			0.99099 m	0.24097						

Sept. 26, 1878. 2 Urs. Min.

19	30	11.0	12.8	35	28.0	45	49.3	33.3	+ 11620	3.06521	6.13042	− 27.34	+ 13.57 −.24	− 13.77	31	36.83	31	23.06 +.16 2322
	31	10.6	14.2	36	26.2	46	49.8	37.8	+ 11024	3.04234	6.08468	− 25.93	+ 12.21 +.80	− 13.72		37.83		24.11 +.15 2426
	31	56.3	14.3	37	22.3	47	43.9	35.9	+ 10565	3.02387	6.04774	− 24.85	+ 11.22 −.05	− 13.63		36.88		23.25 +.16 2341
	33	10.3	14.8	38	18.0	48	39.8	36.8	+ 9827	2.99242	5.98484	− 23.12	+ 9.70 −.24	− 13.42		36.48		23.06 +.16 2322
	34	19.3	18.7	39	13.7				+ 9137	2.96080	5.92160	− 21.49	+ 8.39 −.29	− 13.10		35.10		22.00 +.17 2217
	35	17.0	18.3						+ 8560	2.93247	5.86494	− 20.14	+ 7.36 +.04	− 12.78		37.13		24.35 +.15 2450
			44	41	10.3								±.67					2340
				205									±.57				31	23.30 +.16
					16.42													
			6	(5)	29	49	35.70											
(6)	49	31.12	(4)		19.21	10	16.49 +.21											
4		36.70		10	13.70		52.19 −.09											
	49	32.35				39	16.28											

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1876phae.proj.1666R

TS T2 T2 T log T 2 log T Red I Red II Sum I+II Circle Readings Corr. Circ. Read.

Sept. 30, 1878. λ Urs. Min.

19	38	9.0		–	45	54.2	+6874	2.83721	5.67442	–16.17	+4.75	–11.42 +.71	31	33.10	31	2168 +.19	2187.0
	39	47.0		–	46	49.0	+5894	2.77041	5.54082	–13.86	+3.69	–10.37 +.01		31.33		2096 +.21	2117.7
	40	58.3		–	47	41.4	+5181	2.71441	5.42882	–12.19	+2.69	–9.50 –.19		30.25		2075 +.22	2097.0
	42	14.7	183 38	22.3	48	42.1	+4417	2.64513	5.29026	–10.39	+1.96	–8.43 –.81		28.53		2010 +.25	2035.0
	43	38.3	–	–		–	+3631	2.56003	5.12006	–8.54	+1.32	–7.22 +.18		28.30		2108 +.26	2134.2
	45	9.0	22.8 40	18.8		38.2	+2674	2.42716	4.85432	–6.29	+.72	–5.57 +.13		26.58		2101 +.28	2129.3
			18.9 41	10.9		37.0						±.37					2116.5
			14.3 42	2.3		33.4		1.20873 n	0.67765			±.31			31	2093 +.24	
			22.4 43	6.4		38.1		1.14191 n	0.54291								
								1.08591 n	0.43091								
			39	19.34 (4)	49	36.68		1.01663 n	0.29233								
			10	16.54 (8)		35.88		0.93153 n	0.12213								
				+.21	49	36.24 +.12		0.79866 n	9.85641								
						36.36											

Oct. 2, 1878. λ Urs. Min.

19	53	47.0	56	4.1	48.4		–2558	2.40705 m	4.81410	+6.00	+.66	+6.66 +.19	31	10.65	31	17.31 +.16	17479
	55	1.4	57	1.2	49.2		–3297	2.51812 m	5.03624	+7.76	+1.09	+8.85 –.05		8.23		17.08 +.15	17235
	56	12.5		59.5	51.5		–4028	2.60293 m	5.20586	+9.43	+1.61	+11.04 +.87		6.65		17.69 +.16	17855
	57	8.7	58	48.9	44.9		–4570	2.65992 m	5.31984	+10.75	+2.10	+12.85 +.10		4.35		17.20 +.18	17380
	58	23.6	59	48.9	48.9		–5319	2.72583 m	5.45166	+12.51	+2.54	+15.35 –.99		0.70		16.05 +.24	16292
	59	4.5		—	47.6		–5728	2.75800 m	5.51600	+13.47	+3.30	+16.77 +.16		0.43		17.20 +.24	17442
				–	59	48.52						±.37					17287
				–	10	16.58 +.21		0.77852	9.81614			±.31			31	17.09 +.19	
				–				0.88959	0.03828								
					49	31.94 +.21		0.97440	0.20790								
					49	31.73		1.03139	0.32188								
								1.09736	0.45370								
								1.12947	0.51804								

Oct. 3, 1878. λ Urs. Min.

	32	12	35	37.0			+10560	3.02366	6.04732	–24.84	+11.20	–13.64 +.42	31	33.83	31	20.19 +.18	20377
19	33	49.4	36	30.9			+9485	2.97704	5.95408	–22.31	+9.04	–13.27 +.02		33.05		19.78 +.19	19975
	35	1.2	37	31.5			+8767	2.94285	5.88570	–20.62	+7.72	–12.90 –.50		32.15		19.25 +.20	19458
	36	10.3	38	22.9			+8076	2.90720	5.81440	–19.00	+6.55	–12.45 +.27		32.48		20.03 +.19	20229
	37	52.9	39	22.2			+7050	2.84819	5.69638	–16.58	+4.99	–11.59 +.18		31.15		19.56 +.21	19778
	38	53.7	40	15.1			+6442	2.80902	5.61804	–15.15	+4.17	–10.98 +.02		30.70		19.72 +.21	19933
	39	43.4	41	12.8								±.26					19955
			42	11.4				1.39512 m	1.04935			±.22			31	19.76 +.20	
			43	5.7				1.34850 m	0.95611								
				1895				1.31431 m	0.88773								
			39	21.06				1.27866 m	0.81643								
			10	16.60	49	37.66		1.21965 m	0.69841								
				+.21		37.87		1.18648 m	0.62007								

Oct. 8, 1878. λ Urs. Min.

19	38	13.4		–	45	36.3	+6776	2.83097	5.66194	–15.93	+4.61	–11.32 +.80	31	30.55	31	19.23 +.22	19459
	39	0.5		–	46	40.0	+6305	2.79969	5.59938	–14.83	+3.99	–10.84 –.45		28.80		17.96 +.24	18209
	42	36.5		–	47	31.8	+4145	2.61752	5.23504	–9.75	+1.73	–8.02 –.85		25.53		17.51 +.29	17805
	45	17.0		–	48	42.3	+2540	2.40483	4.80966	–5.97	+.65	–5.32 +.51		24.18		18.86 +.30	19165
				– ✓	49	33.0						±.75					18655
		16.7	40	12.7		20.3 –		1.27235 m	0.66389			±.63			31	18.39 +.26	
		14.8	41	6.5		28.0 –		1.17107 m	0.60133								
		18.1	42	6.1		23.8 –		0.98890 m	0.23695								
		16.3	43	0.3		38.3 –		0.77621 m	9.81161								
						35.0											
			39	16.48 (8)	49	29.08											
			10	16.70 (4)		33.18											
				+.21	49	30.90 +.09											
						30.99											

Oct. 14, 1878. λ Urs. Min.

19	54	39.0	56	9.1			–3019	2.47986 m	4.95972	+7.10	+.92	+8.02 +.08	31	12.18	31	22.20 +.18	20881
	56	31.8	57	6.2			–4147	2.61773 m	5.23546	+9.75	+1.73	+11.48 +.41		9.08		20.56 +.15	20719
	58	32.7	58	1.7			–5356	2.72884 m	5.45768	+12.50	+2.88	+15.47 –.29		3.35		18.82 +.19	19019
	59	41.0		66.8			–6039	2.78097 m	5.56194	+14.26	+3.66	+17.86 –.79		0.40		18.26 +.25	18518
	1	31.5	59	64.6			–7144	2.85394 m	5.70788	+16.80	+5.13	+21.93 –.74		56.35		18.28 +.28	18561
	3	5.7	0	63.0			–8086	2.90773 m	5.81546	+19.01	+6.57	+25.58 –.69		52.83		18.41 +.27	18611
			1	48.3								±.91					17300
			2	44.1				0.85118	9.96161			±.77			31	19.09 +.22	
			3	36.8				0.98905	0.23735								
								1.10016	0.45957								
				396				1.15224	0.56383								
			56	54.07				1.22526	0.70977								
			10	16.74	49	37.28		1.27905	0.81735								
				+.21		37.49											

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Iδ	Ia	Ia	τ	log τ / 2 log τ / Δ Red I / − Δ Red II	Red I	Red II	Sum	Bodle Reading	Corrected Reading	Rdr.

Oct. 16, 1878. 2 Hrs. Min.

19	55	47.7	56	9.2			− 431.0	2.63448 n	5.26896	+ 10.13	+ 1.87 +1.30	+ 12.00	30	6.05	30	18.05	+.16	182
	58	19.0	57	4.7			− 522.3	2.71792 n	5.43584	+ 12.28	+ 2.74 .00	+ 15.02		1.68		16.70	+.21	169
	59	7.2		57.4			− 570.5	2.75626 n	5.51252	+ 13.41	+ 3.27 +.24	+ 16.68		0.23		16.91	+.24	173
	0	9.4	58	57.6			− 632.7	2.80120 n	5.60240	+ 14.88	+ 4.02 +.15	+ 18.90		57.88		16.78	+.28	178
	1	57.4	59	57.0			− 740.7	2.86964 n	5.73928	+ 17.42	+ 5.51 −1.02	+ 22.93		52.68		15.61	+.28	159
	3	54.2	0	53.9			− 854.5	2.93323 n	5.86646	+ 20.16	+ 7.38 −.69	+ 27.54		48.45		15.99	+.23	164
			1	43.7							±.62							167
			2	40.3							±.52				30	16.67	+.23	
			3	39.9														
				36.37				1.00578	0.27083									
				59 53.74				1.08922	0.43771									
				10 16.84	49	36.90		1.12756	0.51439									
				+.21		36.69		1.17250	0.60427									
								1.24094	0.74115									
								1.30453	0.86833									

Oct. 21, 1878. 2 Hrs. Min.

19	31	57.6	35	38.9	45	56.3	40.5	+ 1064.4	3.02710	6.05420	−25.02	+ 11.38 +1.94	− 13.64	31	32.58	31	18.94	+.19	191
	39	44.7	36	38.6	46	57.6	42.7	+ 597.3	2.77619	5.55238	− 14.04	+ 3.58 +.48	− 10.46		27.88		17.42	+.25	176
	42	1.61	37	32.6	47	48.0	40.1	+ 445.9	2.64924	5.29848	− 10.48	+ 2.00 −.04	− 8.48		24.33		15.85	+.30	161
	46	13.6	38	27.1	48	44.7	40.7	+ 208.4	2.31890	4.63780	− 4.90	+ .44 −.25	− 4.46		21.10		16.64	+.30	169
	49	28.2	39	25.7	49	41.7	41.7	+ 13.8	1.13988	2.27976	− .32	+ .00 −.61	− 32		16.65		16.33	+.25	165
	50	57.5	40	22.6	50	36.3	40.3	− 75.5	1.87795 n	3.75590	+ 1.78	+ .06 −.49	+ 1.72		14.65	16.49	12.81	+.21	167
			41	22.3	51	37.6	45.5						1.84				12.81		170
			42	21.7	—	—						±.87				31	16.94	+.25	
			43	9.0	—	—						±.73							
				2265		17 49	41.64		1.39836 n	1.65603									
				39 25.17		19	42.04		1.14745 n	0.55421									
				10 16.87					1.02050 n	0.30031									
				+.21		49	41.86		0.69016 n	9.63963									
							+.12		9.51114 n	9.28159									
							41.98		0.24921	8.75773									

Oct. 22, 1878. 2 Hrs. Min.

19	37	13.2	—	—	46	0.7	44.9	+ 752.5	2.87651	5.75302	− 17.69	+ 5.69 +.63	− 12.00	31	32.30	31	20.30	+.20	203
	38	19.0	—	—		57.3	39.4	+ 688.7	2.83803	5.67606	− 16.19	+ 4.76 +.90	− 11.43		32.00		21.57	+.20	217
	39	30.2	35	43.7	47	53.7	47.8	+ 597.5	2.77634	5.55268	− 14.05	+ 3.58 +.18	− 10.47		29.93		19.46	+.23	196
	41	50.8	36	32.9	48	49.5	45.5	+ 476.9	2.67843	5.35686	− 11.21	+ 2.28 −.98	− 8.93		24.93		18.60	+.29	189
	44	37.2	39	33.2	49	44.1	44.1	+ 310.5	2.49206	4.98412	− 7.30	+ .97 +.09	− 6.33		24.30		19.66	+.30	199
	46	9.7	—	—	50	46.5	50.5	+ 218.0	2.33846	4.67692	− 5.12	+ .48 −.47	− 4.64		20.13		19.10	+.30	194
	49	3.2	41	22.8	—	—		+ 44.5	1.64836	3.29672	− 1.05	+ .02 —	− 1.03						198
			42	20.6	—	—			1.24779 n	0.95485		±.59				31	19.62	+.25	
			43	21.2	—	—			1.20929 n	0.67789		±.50							
				177		(6) 49	45.37		1.14760 n	0.55451									
				39 32.95		(6)	49.83		1.04969	0.35869									
				10 16.88					0.86332 n	9.48595									
				+.21		49	47.60		0.70972 n	9.67875									
							+10		0.01962 n	8.29855									
							47.70												

Nov. 2, 1878. 2 Hrs. Min.

19	59	36.5	56	—			− 589.8	2.77070 n	5.54140	+ 13.87	+ 3.49 +.43	+ 17.36	30	60.32	31	17.68	+.24	179
	1	18.4	57	12.8	0.9		− 691.7	2.83992 n	5.67984	16.26	4.81 +.29	21.07		56.45		17.52	.28	178
	2	14.3	58	12.9	2.0		− 747.6	2.87367 n	5.74735	17.58	5.61 +.24	23.19		54.28		17.47	.25	177
	3	11.9	59	9.0	5.0		− 805.2	2.90590 n	5.81180	18.93	6.51 +.28	25.44		52.20		17.64	.25	179
	4	22.7	0	5.8	5.8		− 876.0	2.94250 n	5.88500	20.60	7.71 −.81	28.31		48.20		16.51	.17	167
	5	28.6		58.2	2.2		− 941.9	2.97400 n	5.94800	22.14	8.91 −.56	31.05		45.78		16.83	.12	169
			1	53.8	3.7							±.49		0.2				170
			2	53.8	5.1	5.7		1.14197	0.5432			±.41			31	17.28	+.23	
			3	45.9	1.7			1.21119	0.6817								+.10	
					294	380	87	1.24494	0.7492									
			0	3.68	75	46.80		1.27717	0.8136									
			10	4.53	49	54.24		1.31377	0.8868									
				16.88		46.56	.64	1.34527	0.9498									
				+.21														

Nov. 3, 1878. 2 Hrs. Min.

19	55	31.8	56	24.6			− 339.7	2.53110 n	5.06220	+ 7.99	+ 1.16 +.23	+ 9.15	31	12.48	31	21.83	+.18	213
	57	39.2	57	21.1			− 467.1	2.66941 n	5.33882	+ 10.98	2.19 +.33	13.17		7.98		21.15	.26	214
	58	29.2	58	20.7			− 517.1	2.71357 n	5.42714	+ 12.16	2.69 +.08	14.85		7.10		21.95	.21	231
	59	41.3	59	12.8			− 589.2	2.77026 n	5.54052	+ 13.86	3.49 −.48	17.34		3.12		20.46	.14	200
	0	13.0	0	10.2			− 622.9	2.79442 n	5.58884	+ 14.64	3.93 −.63	18.57		1.78		20.32	.13	204
	1	14.7	1	40			− 682.6	2.83417 n	5.66834	+ 16.05	4.68 −.55	20.73	31	59.72		20.45	.08	205
			1	54.5							±.60							210
			2	56.7				0.90237	0.0640		±.51				31	20.99	+.17	
			3	53.0				1.04668	0.3407								+.19	
				2626				1.08484	0.4290									
			0	9.18				1.14153	0.5424									
			10	4.82	49	52.31		1.16569	0.5907									
				14.87		57.06		1.20544	0.6702									
				+.21		52.10												

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Rdr.		Id	Id	Id	τ	log τ / 2 log τ = 2 log Rad I − 2 log Rad II	Rad I	Rad II	Sum	Circle Readings	Corrected Readings	Rdr.
						Nov. 4, 1878. 2 Urs. Min.						
.16	20	1 36.3	–		−708.3	2.85022 n 5.70044	+16.65	+ 5.04 +.95 + 21.69		30 60.05	31 21.74	+.26 2200
21		3 8.6	–		−800.6	2.90342 n 5.80684	+18.82	6.44 −.28 25.26		55.25	2051	.26 2077
24		4 8.10	–		−883.0	2.94596 n 5.89192	+20.76	7.83 −1.05 28.59		51.20	19.79	.21 2000
28		5 4.76	–		−959.6	2.98209 n 5.96418	+22.56	9.25 −.05 31.81		49.05	20.86	.14 2100
28		6 26.5	0 6.0	6.0	−998.5	2.99935 n 5.99870	+23.48	10.01 +.37 33.49		47.80	21.29	.13 2142
23		8 20.3	1 2.2	6.2	−1112.3	3.04622 n 6.09244	+26.15	12.42 +.08 38.67		42.48	21.05	.08 2113
			1 33.0	29				±.51				2105
23			2 32.6	4.5		1.22149 0.7023		±.43			31 20.87	+.18
			3 30.1	5.9		1.27469 0.8087						+.11
			0 5.10			1.31723 0.8938						
			10 16.87 +.21			1.35336 0.9660						
						1.37062 1.00055						
			49 48.23 −.21			1.41749 1.19429						
			48.02									
						Nov. 5, 1878. 2 Urs. Min.						
.19	19	56 32.2	56 19.2		−403.7	2.60606 n 5.21212	+9.49	+ 1.64 +.61 + 11.13		31 11.38	31 22.51	+.18 2269
25		57 28.3	57 19.6		−459.8	2.66257 n 5.32514	10.81	2.12 +.33 12.93		9.30	2223	.18 2241
30		58 32.9	58 10.0		−524.4	2.71966 n 5.43932	12.33	2.76 −.13 15.09		6.65	21.74	.21 2195
30		59 20.4	59 11.0		−571.9	2.75732 n 5.51464	13.45	3.28 +.52 16.73		5.65	2238	.22 2260
25		4.3	0 7.6		−675.8	2.82982 n 5.65964	16.89	4.59 −.66 20.48		0.68	21.16	.26 2142
21		2 12.2	1 0.2		−743.7	2.87140 n 5.74280	17.49	6.55 −.66 23.04		30 58.12	21.16	.26 2142
			1 59.1					±.53				2208
25			2 55.1			0.97733 0.2140		±.45			31 21.86	+.22
			3 48.0			1.03384 0.3270						+.14
			229.8			1.09093 0.4412						
			0 5.53			1.12859 0.5165						
			10 16.86 +.21	49 48.67 −.21		1.20169 0.6615						
				48.46		1.24267 0.7446						
						Nov. 13, 1878. 2 Urs. Min.						
.20	1	23 28.0	17 19.6		−190.5	2.27989 n 4.55978	+5.65	+.46 +.17 + 6.11		47 49.92	47 56.03	+.12 5615
.20		25 30.7	18 4.2		−313.2	2.49582 n 4.99164	9.29	1.24 −.20 10.53		45.15	55.68	.10 5578
.23		26 57.8	47.6		−400.3	2.60239 n 5.20478	11.87	2.03 +.02 13.90		42.00	55.90	.10 5600
.29			19 32.9					±.16				5598
30			20 18.7			0.75196 9.6624		±.13			47 55.87	+.11
30			21 2.7			0.96789 0.0942						+.36
			44.7			1.07446 0.3074						
25			22 32.6									
			23 14.9									
			217.7									
			20 17.54									
						Nov. 23, 1878. 2 Urs. Min.						
.26	1	23 36.8	17 24.0		−195.3	2.29070 n 4.58140	+5.79	+ 0.48 +.14 + 6.27		47 43.82	47 50.09	+.10 5019
.28		25 12.7	18 7.3		−291.2	2.46419 n 4.92838	8.64	1.07 −.33 9.71		39.88	49.59	.13 4972
.25		26 34.8	51.5		−373.3	2.57206 n 5.14412	11.07	1.76 +.20 12.83		37.25	50.08	.17 5025
.25		28 0.8	19 37.9		−459.3	2.66210 n 5.32420	13.62	2.67 −.02 16.29		33.50	49.79	.24 5005
.19			20 21.3					±.20				5008
.12			21 6.0			0.76277 9.6840		±.17			47 49.89	+.16
			50.4			0.93626 0.0310						+.31
23			22 34.7			1.04413 0.2467						
.10			23 20.5			1.13417 0.4268						
			2536									
			20 21.51									
						Nov. 24 1878. 2 Urs. Min.						
		11 37.0			+529.4	2.72378 5.44756	−15.70	+ 3.55 − 12.15				
.18	1	13 33.2	–	17 24.5	+393.2	2.59461 5.18922	−11.66	+ 1.96 −9.70 +.90	47 65.35	47 53.20	+.20 6340	
.26		15 1.0	–	18 12.9	+325.4	2.51242 5.02484	− 9.65	+ 1.34 8.31 −.65	61.35	51.65	.20 6185	
.21		15 58.0	–	53.9	+268.4	2.42878 4.85756	− 7.96	+ .41 7.05	65.12	[56.81]	.19 5700	
.14		17 36.1	20 11 35.6	19 43.1	+170.3	2.23121 4.46242	− 5.05	+ .37 4.68 +.50	59.80	52.75	.25 5300	
.13		18 20.7	19 51 2 19.5	20 24.2	+126.2	2.10106 4.20212	− 3.74	+ .20 3.54 −.26	56.68	52.00	.24 5224	
.08			169 13 1.3	24.2 –				−.49	55.82	51.78	.28 5201	
			17.8	46.7 26.2 –		1.19585 n 0.5502		±.62				5250
.17			15.4 14 28.7	24.8 –		1.06668 n 0.2918		±.52			47 52.28	+.22
.14			18.2 15 13.9	27.5 –		0.98449 n 0.1274						+.36
			478	24.2		0.90085 n 9.9602						
			12 17.97	(6) 20 25.38		0.70328 n 9.5650						
			8 9.12 +.10	(6) 27.09		0.57313 n 9.3047						
				20 26.31 −.36								

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Id	Id	Id	τ	log τ + Rd I	2 log τ − Rd II	Rd I	Rd II	Sum	brick Readings	corrected Readings	Rdr.

Nov. 26, 1878. 2 Urs. Min.

1	(11 | 36.5)		− 25.0	17	27.2	+525.0	2.72016	5.44032	− 15.57	+ 3.49 +.99	− 12.08	47	67.78	47	55.70	+.24	5594
	11	44.7		− 26.2	18	12.8	+464.4	2.66689	5.33378	− 13.77	+ 2.73 −.73	− 11.04		65.05		54.01	.21	5422
	12	45.3		= 29.3	19	04	+366.7	2.56431	5.12862	− 10.87	+ 1.70 −.30	− 9.17		63.60		54.43	.22	5465
	14	23.0	19.9	12	19.9	32.1	47.7	+318.5	2.50311	5.00622	− 9.44	+ 1.28 +.19	− 8.16		63.08		54.92	.22	5514
	15	11.2	19.2	13	3.6	31.7	20	31.7	+245.4	2.38987	4.77974	− 7.28	+ .76 −.11	− 6.52		61.12		54.60	.24	5484
	16	24.3	19.6		48.5			—	+172.4	2.23654	4.47308	− 5.11	+ .38 −.06	− 4.73		59.38		54.65	.24	5489
	17	37.3	24.4	14	37.8			—					±.43						5495
			23.2	15	21.0			—		1.19223 n	0.5429		±.36		47	54.72	+.23	
								—		1.13896 n	0.4364						+.34	
				12	21.26	20	28.86			1.03638 n	0.2312							
				8	9.18		30.44			0.97518 n	0.1088							
					+.10					0.86194 n	9.8823							
						20	29.65			0.70861 n	9.5757							
							+.05											
							29.70											

Nov. 30, 1878. 2 Urs. Min.

1	8	31.0	9	22.1	29.3	17	31.5	+719.5	2.85703	5.71406	− 21.34	+ 6.56 −.10	− 14.78	48	8.32	47	53.54	+.17	5371
	10	16.0	10	6.9	30.7	18	17.3	+614.5	2.78852	5.57704	− 18.22	+ 4.78 +.19	− 13.44		7.25		53.81	+.19	5400
	11	48.4		51.6	31.9	19	3.0	+522.1	2.71775	5.43550	− 15.48	+ 3.45 −.38	− 12.03		5.25		53.22	+.21	5343
	13	18.1	11	38.0	32.2		47.8	+437.4	2.64088	5.28176	− 12.97	+ 2.42 +.09	− 10.55		4.23		53.68	+.22	5390
	14	16.2	12	20.3	31.0	20	29.0	+374.3	2.57322	5.14644	− 11.10	+ 1.77 +.18	− 9.33		3.08		53.75	+.24	5399
	15	48.8	13	4.1			—	+281.7	2.44979	4.89958	− 8.35	+ 1.01 −.01	− 7.34		0.90		53.56	+.24	5380
				49.8			—					±.17							5381
			14	36.0			—			1.32910 n	0.8167	±.14			47	53.59	+.21	
			15	20.7			—			1.26059 n	0.6796						+.31	
				24.95						1.18982 n	0.5381							
			12	21.06	(5)	20	30.62			1.11295 n	0.3844							
			8	9.30	(9)		.36			1.04529 n	0.2490							
				+.10						0.92186 n	0.0022							
						20	30.45											
							+.06											
						20	30.51											

Dec. 1, 1878. 2 Urs. Min.

1	11	0.2		− 26.8	17	29.0	+568.0	2.75435	5.50870	− 16.82	+ 4.08 +.43	− 12.74	48	7.80	47	55.06 54.60	+.20	5526
	12	2.8		− 26.7	18	13.3	+505.4	2.70364	5.40728	− 14.97	+ 3.23 −.37	− 11.74		6.00		54.26	+.20	5446
	13	10.4	22.7	10	53.8	25.9	57.0	+437.8	2.64128	5.28256	− 12.97	+ 2.42 +.84	− 10.55		6.02		55.47	.20	5567
	15	1.6	15.7	11	34.3	27.8	19	43.4	+326.6	2.51402	5.02804	− 9.67	+ 1.35 +.03	− 8.32		2.95		54.63	.23	5486
	16	3.0	15.3	12	15.3	25.7	20	25.7	+265.2	2.42357	4.84714	− 7.85	+ .89 −.23	− 6.96		1.32		54.36	.24	5460
	17	37.6	23.9	13	8.3			—	+170.6	2.23198	4.46396	− 5.05	+ .37 −.73	− 4.68	47	58.55		53.87	.23	5410
			21.6		50.5			—					±.48						5483
			15.7	14	29.1			—		1.22588 n	0.6108		±.41		47	54.61	+.22	
			21.4	15	19.2			—		1.17517 n	0.5093						+.31	
			69.3			90	(5) 20	26.58		1.11281 n	0.3846							
				12	19.87	(7)	20	29.28		0.98555 n	0.1301							
				8	9.33			3		0.89516 n	9.9492							
					+.10	20	28.17			0.70351 n	9.5660							
							+.06											
							28.17	30										
								19										

Dec. 7, 1878. 2 Urs. Min.

1	11	44.0		− 33.0	17	35.2	+529.7	2.72403	5.44806	− 15.69	+ 3.55 +.92	− 12.14	47	66.25	47	54.11	+.23	5434
	13	9.8		− 32.4	18	2.00	+443.9	2.64729	5.29458	− 13.15	+ 2.49 −.24	− 10.66		63.62		52.96	.22	5318
	14	5.0		− 31.1	19	2.2	+388.7	2.58961	5.17922	− 11.51	+ 1.91 −.32	− 9.60		61.48		51.88	.22	5210
	16	0.3	23.0	11	38.6	34.3	49.9	+273.4	2.43680	4.87360	− 8.10	+ .95 +.57	− 7.15		60.92		53.77	.22	5399
	16	50.0	29.3	12	29.3		—	+223.7	2.34967	4.69934	− 6.63	+ .63 +.69	− 6.00		59.90		53.90	.21	5411
	17	45.8	24.3	13	8.7		—	+167.9	2.22505	4.45010	− 4.97	+ .36 −.60	− 4.61		57.25		52.64	.18	5282
			23.6		52.5		—					±.79						5842
			24.6	14	38.0		—			1.19556 n	0.5501	±.67			47	53.21	+.21	
			23.2	15	21.0		—			1.11882 n	0.3966						+.30	
			28.0			(4)	20	32.95		1.06114 n	0.2813							
				12	24.67	(6)		34.16		0.90833 n	9.9767							
				8	9.49					0.82120 n	9.8014							
					+.10	20	33.68			0.69658 n	9.5522							
							+.06											
							33.74											

Dec. 8, 1878. 2 Urs. Min.

1	11	12.6		− 29.0	17	31.0	+557.6	2.74632	5.49264	− 16.51	+ 3.93 +.53	− 12.58	47	66.45	47	52.87	+.23	5310
	13	11.1		− 33.5	18	20.0	+438.1	2.64157	5.28314	− 12.97	+ 2.43 +.07	− 10.54		62.95		52.41	.23	5264
	13	27.0	22.7	10	58.7	30.5	19	1.5	+422.8	2.62613	5.25226	− 12.52	+ 2.26 +.30	− 10.26		62.90		52.64	.23	5287
	15	5.0	23.4	11	38.9			—	+327.8	2.51561	5.03122	− 9.71	+ 1.36 −.70	− 8.35		60.00		51.65	.22	5187
	15	58.4	18.4	12	18.4			—	+271.1	2.43313	4.86626	− 8.03	+ .93 +.24	− 7.10		59.70		52.60	.21	5281
	18	1.3	24.4	13	4.9			—	+148.2	2.17114	4.34228	− 4.39	+ .28 −.41	− 4.11		56.08		51.97	.19	5216
			12.0		41.0			—					±.41						5257
			22.1	14	36.6			—		1.21785 n	0.5947		±.35		47	52.36	+.22	
			18.8	15	16.8			—		1.11310 n	0.3852						+.30	
			137.8			(3)	20	31.00		1.09766 n	0.3543							
				12	19.69	(7)		29.20		0.98714 n	0.1333							
				8	9.67					0.90466 n	9.9683							
					+.10	20	29.74			0.64267 n	9.4443							
							+.07											
							29.81											

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Rdr.		Id	Ic	Id	τ	log τ	2 log τ	Red I	Red II	Sum	Circle Reading	Corrected Reading	Rdr.
		h m s	m s	m s	s			"	"	"	′ "	′ "	
						Dec. 11, 1878. α Ursæ Min.							
24 5594	1	10 54.5	− 30.3 17	32.3	+576.3	2.76065 5.52130		−17.07	+ 4.20 +53	− 12.87	47 60.32	47 47.45	+.24 4769
21 5422		11 44.3	− 30.7 18	17.2	+526.5	2.72140 5.44280		−15.59	+ 3.51 +200	− 12.08	57.02	44.94	.22 4816
22 5465		13 22.6 17.5 10	48.1 29.6 19	0.6	+428.2	2.63165 5.26330		−12.68	+ 2.32 +40	− 10.36	56.88	46.52	.24 4676
22 5514		15 36.7 21.2 11	36.7 29.6	45.1	+293.9	2.46820 4.93640		− 8.70	+ 1.09 +32	− 7.61	54.88	47.27	.21 4748
24 5484		16 34.0 23.9 12	23.9 30.4 20	30.4	+236.8	2.37438 4.74876		− 7.01	+ .71 +69	− 6.30	53.95	47.65	.20 4785
24 5489		17 38.1 22.0 13	6.5	—	+172.1	2.23578 4.47156		− 5.10	+ .37 +87	− 4.73	52.58	47.85	.18 4803
5495		21.3	30.9	—					±.87				28.297
23		23.3 14	36.8	—		1.23218 n 0.6234			±.73			47 46.95	+.22 47.16
34		22.5 15	20.5	—		1.19293 n 0.5449							+.29
		117		(8) 20	30.12	1.10318 n 0.3654							
		12	21.67 (7)		31.26	0.93973 n 0.0385							
		8	9.59			0.84591 n 9.8508							
			+.16	20	30.78	0.70731 n 9.5736							
					+.06								
					30.84								
						Dec. 12, 1878. α Ursæ Min.							
17 5371	1	10 58.4	− 17	31.7	+571.3	2.75686 5.51372		−16.92	+ 4.13 +07	− 12.79	47 61.00	47 48.21	+.24 4845
19 5400		11 26.2	− 18	14.0	+543.5	2.73520 5.47040		−16.10	+ 3.74 −92	− 12.36	59.58	47.22	.24 4746
21 5343		14 0.1 18.1 10	49.1 19	0.6	+389.6	2.59062 5.18124		−11.54	+ 1.92 +125	− 9.62	59.02	49.40	.23 4963
22 5390		15 30.6 20.2 11	35.7	46.8	+294.1	2.47582 4.95164		− 8.86	+ 1.13 +65	− 7.73	56.55	48.82	.21 4903
24 5399		16 47.3 17.3 12	17.3 20	30.7	+222.4	2.34713 4.69426		− 6.59	+ .63 −47	− 5.96	53.70	47.74	.17 4791
24 5380		17 54.7 19.1 13	3.6 21	17.0	+155.0	2.19033 4.38066		− 4.59	+ .30 −58	− 4.29	51.95	47.66	.14 4780
5381		21.2	50.2	36.2					±.72				29028
21		20.6 14	34.1 22	47.1		1.22839 n 0.6158			±.61			47 48.18	+.20 48.38
31		18.5 15	16.5 23	2.9		1.20673 n 0.5725							+.33
		65.0		27.0		1.66215 n 0.2833							
		12	19.29 (9)	20 30.22		0.94735 n 0.0587							
		8	9.62 (7)	28.91		0.81866 n 9.7963							
			+.10			0.66186 n 9.4827							
				20 29.66									
				+.04									
				29.69									
						Dec. 14, 1878. α Ursæ Min.							
20 5526	1	9 41.0	9 26.4 27.7 17	34.7	+652.6	2.81465 5.62930		−19.33	+ 5.39 +27	− 13.94	47 63.05	47 49.11	+.22 4933
20 5446		12 16.0	10 11.7 31.6 18	18.1	+497.6	2.69688 5.39376		−14.74	+ 3.13 +21	− 11.61	60.65	49.04	.23 4927
20 5567		12 27.7	57.7 30.7 19	1.7	+485.9	2.68655 5.37310		−14.39	+ 2.99 +27	− 11.40	60.50	49.10	.23 4933
23 5486		14 1.6	11 41.2 31.5	47.0	+392.0	2.59329 5.18658		−11.61	+ 1.94 +29	− 9.67	58.80	49.13	.22 4935
24 5460		15 30.9	12 25.4 30.6 20	30.6	+302.7	2.48101 4.96202		− 8.96	+ 1.16 −81	− 7.80	55.85	48.05	.20 4825
23 5410		16 39.8	13 6.7	—	+233.8	2.36884 4.73768		− 6.92	+ .69 −26	− 6.23	54.85	48.61	.19 4880
5483			54.4	—					±.38				29433
22			14 43.0	—		1.28618 n 0.7314			±.32			47 48.84	+.22 49.06
31			15 22.6	—		1.16841 n 0.4958							+.33
			286.1	(8) 20	31.42	1.15808 n 0.4752							
			12	25.12 (9)	34.78	1.66482 n 0.2886							
			8	9.66		0.95254 n 0.0641							
				+.10 20	33.58	0.84837 n 9.8397							
					+.06								
					33.64								
						Dec. 16, 1878. α Ursæ Min.							
23 5434	1	11 3.3	− 26.7 17	28.7	+565.8	2.75266 5.50532		−16.76	+ 4.05 +33	− 12.71	47 62.35	47 49.64	+.23 4987
22 5318		13 5.6	− 28.4 18	14.9	+443.5	2.64689 5.29378		−13.13	+ 2.49 −04	− 10.64	59.92	49.28	.22 4950
22 5210		13 23.7 16.7 10	47.7 30.5 19	1.6	+425.4	2.62880 5.25760		−12.60	+ 2.29 +16	− 10.31	59.78	49.47	.23 4970
22 5399		14 58.6 17.2 11	32.7 31.8	47.3	+330.5	2.51917 5.03834		− 9.79	+ 1.38 −43	− 8.41	57.32	48.91	.20 4911
21 5411		17 44.1 19.2 12	19.2 28.0 20	28.0	+204.7	2.31112 4.62224		− 6.06	+ .53 −25	− 5.53	54.65	49.12	.17 4929
18 5282		18 21.7 16.6 13	2.1		+127.4	2.10517 4.21034		− 3.77	+ .21 +24	− 3.56	53.20	47.64	.14 4978
5342		22.4 13	57.4						±.26				297.25
21		21.4 14	34.9			1.22419 n 0.6074			±.22			47 49.34	+.20 49.54
30		21.0 15	19.0			1.11842 n 0.3958							+.36
		65.5		(8) 20	29.08	1.10033 n 0.3697							
		12	19.36 (7)		29.08	0.99070 n 0.1404							
		8	9.72			0.78265 n 9.7243							
			+.10	20	29.08	0.57670 n 9.3124							
		Subtract 8m			+.06 29.14								
						Dec. 18, 1878. α Ursæ Min.							
	1	14 52.0	−	+8 12.7									
23 5310		16 16.4	−	# #	+512.5	2.70969 5.41938		−16.98	+ 3.32 +56	− 11.86	48 0.28	47 48.42	+.22 4804
23 5264		18 30.2	− 22.2 20	24.2	+428.1	2.64155 5.28310		−12.68	+ 2.43 +23	− 10.25	47 58.75	48.50	+.21 4871
23 5287		20 25.7 11.5 14	24.0 24.8 21	10.5	+294.3	2.46879 4.93758		− 8.71	+ 1.10 +49	− 7.67	56.40	48.79	+.18 4897
22 5187		21 25.5 12.7 15	12.7 27.0	58.0	+179.1	2.25310 4.50620		− 5.30	+ 0.41 −66	∓ 4.89	52.58	47.69	+.13 4782
21 5281		22 13.4 13.3	57.8 24.2 22	39.9	+119.0	2.07555 4.15110		− 3.52	+ .18 −66	∓ 3.34	51.05	47.71	+.11 4782
19 5216		17.7 16	46.7 28.12 3	28.1	+ 69.1	1.83948 3.67896		− 2.05	+ .06 +02	+ 1.99	50.38	48.39	+.11 4850
5257		14.7 18	12.7						±.48				4848
22		[12]	13.98 [20]	25.14		1.18122 n 0.5214			±.41			47 48.25	+.16
30		8	9.75	22.73		1.11308 n 0.3852							
			+.10			0.94032 n 0.0396							
				20 24.44		0.72463 n 9.6083							
				+.05		0.84708 n 9.2532							
				24.49		0.31101 n 8.7810							

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δ | α | α | T | log T | 2 log T | Red I | Red II | Diff I+II | Circle Corr. Reading | Corr. Circle Read. | T

Dec. 19, 1878. 2 Hrs. Mean Time

1	10	26.1?		+ 241	17	26.1	+ 6027	2.78010	5.56020	− 17.85	+ 4.60 + .30	− 13.25	48	1.75	47	48.71	+.22	48
	10	54.3		− 223	18	18.8	+ 5745	2.75929	5.51858	− 17.01	+ 4.17 + .24	− 12.84	47	58.80		47.18	+.21	47
	12	10.6	28.2 / 10	14.7	27.7	58.7	+ 4982	2.69740	5.39480	− 14.76	+ 3.14 + .11	− 11.62		59.83		49.51	+.23	
	13	9.3	13.7	44.7	27.3 / 19	42.8	+ 4395	2.64296	528592	− 13.02	+ 2.44 + .35	− 10.58		57.23		48.78	+.20	
	13	36.6	17.3 / 11	32.8		—	+ 4122	2.61511	523022	− 12.21	+ 2.15 + .27	− 10.06		55.35		48.19	+.17	23
	14	56.7	24.2 / 12	2.42		—	+ 3321	2.52127	504254	− 9.84	+ 1.39 + .27	− 8.45		53.68		48.21	+.15	31
	15	53.5	19.8 / 13	4.3		—	+ 2733	2.43664	487328	− 8.10	+ .91 ±.64	− 7.16						
	17	6.6	18.7	47.7		—	+ 2022	2.30578	461156	± 5.99	+ .52	− 5.47			47	48.43	+.20	
			23.7 / 14	37.2		—		1.25163 n	0.66226		±.54							
			19.3 / 15	17.3	4/20	25.35		1.23082 n	0.62064									
			49		(8)	30.37		1.16893 n	0.49686									
			12	20.61				1.11445 n	0.38998									
			8	9.76	20	28.70	(0.77731)	1.08664 n	0.33228									
			Ex. Mean	+.10		28.80		0.99280	0.14460									
						28.78		9.40817 n	9.97534									
						27		9.88362										

Dec. 20. 1878. 2 Hrs. Mean Time

1	11	25.6		− 23.1	18	25.1	+ 5388	2.73143	5.46286	− 15.96	+ 3.67 − .43	− 12.26	47	58.40	47	46.11	+.19	15
	12	43.5		− 25.6	19	12.1	+ 4609	2.66361	532722	− 13.65	+ 2.69 − .16	− 10.96		57.35		46.39	+.18	16
	13	31.6		− 22.0		53.0	+ 4128	2.61574	523148	− 12.23	+ 2.16 + .07	− 10.07		56.70		46.63	+.17	25
	15	32.5	14.0 / 11	45.0	26.2 / 20	41.7	+ 2849	2.45469	490938	− 8.44	+ 1.03 + .33	− 7.11		54.33		46.92	+.14	27
	17	11.1	14.4 / 12	29.9			+ 1933	2.28623	457246	− 5.72	+ .47 − .09	− 5.25		51.78		46.53	+.11	28
	18	43.8	14.4 / 13	14.4			+ 1006	2.00260	400520	− 2.98	+ .13 + .27	− 2.85		49.73		46.90	+.10	29
			14.4	58.9							±.25						28.03	
			15.1 / 14	43.1				1.20296 n	0.56492		±.21				47	46.58	+.15	
			16.0 / 15	29.5	[4] [20]	24.22		1.13814 n	0.42928							8		
			13.1 / 16	11.1	(7)	24.34		1.08727 n	0.33354									
								0.92622 n	0.01144									
			[12]	14.49	20	24.30		0.75776 n	9.67452									
			8	9.85		+.06		0.47413 n	9.10726									
				+.10		24.36												

Dec. 24. 1878. 2 Hrs. Mean Time

1	11	42.3		−			+ 5241	2.71941	5.43882	− 15.52	+ 3.47 − .16	− 12.05	48	0.38	47	46.03	+.22	14
	12	37.3		−			+ 4691	2.67127	5.34254	− 13.90	+ 2.78 − .07	− 11.12	47	58.68		46.63	+.20	23
	14	2.0		−			+ 3844	2.58478	516956	− 11.39	+ 1.87 − .14	− 9.52		57.85		46.73	+.19	30
	15	38.8	11	33.3	17.8		+ 2876	2.45879	491758	− 8.52	+ 1.05 + .16	− 7.47		56.20		46.68	+.17	31
	16	48.7	12	17.4	17.4		+ 2227	2.34772	4.69544	− 6.60	+ .63 + .21	− 5.97		54.48		47.01	+.14	
				58.4	13.9						±.16			53.05		47.08	+.12	
			13	45.7	16.7			1.19094 n	0.54088		±.14							23
			—	—				1.14280 n	0.44460						47	44.81	+.17	49
			—	—	12	16.45		1.05631 n	0.27162							46.83		46
					8	9.84		0.93032 n	0.01964									
						+.10		0.81925 n	9.79750									
					20	26.49												
						26.59												
						34												

Dec. 26. 1878. 2 Hrs. Mean Time

1	11	17.6		−	17	23.8	+ 5445	2.73600	5.47200	− 16.13	+ 3.75 − .20	− 12.38	47	56.93	47	44.55	+.19	
	13	4.6		−	18	7.2	+ 4375	2.64098	528196	− 12.96	+ 2.42 + .78	− 10.54		56.08		45.54	+.18	
	15	19.7		−		50.7	+ 3024	2.48058	496116	− 8.96	+ 1.16 − .40	− 7.80		52.23		44.43	+.11	
	16	59.8	12.2 / 11	27.7	19	38.0	+ 2023	2.30660	461200	− 5.99	+ .52 + .14	− 5.47		50.45		44.98	+.10	
	18	22.2	15.7 / 12	15.4	20	21.2	+ 1199	2.07882	415764	− 3.55	+ .18 + .57	− 3.37		48.78		45.41	+.10	
	19	26.4	9.0	52.5	21	7.3	+ 567	1.75358	350716	− 1.68	+ .04 − .88	− 1.64		45.60		43.96	+.10	
			11.2 / 13	40.2		60.3					±.54							
			7.7 / 14	21.2	22	37.3		1.20753 n	0.57906		±.46				47	44.81	+.13	
			14.3 / 15	12.3	23	22.2		1.11251 n	0.38402									
			7.01			26.10		0.95211 n	0.06322									
			12	11.68	9.20	22.33		0.77753 n	9.71406									
				9.87	(8)	21.55		0.55035 n	9.25970									
				+.10	20	22.02		0.22511 n	8.60922									
						+.04												
						22.06												

Dec. 23, 1878. 2 Hrs. Mean Time

Subst. 1m																		
1	11	30.0		− 28.0	18	30.0	+ 6000	2.77815	5.55630	− 17.77	+ 4.55 + .81	− 13.22	48	1.90	47	48.68	+.23	
	12	43.7		− 29.5	19	16.0	+ 5263	2.72123	5.44246	− 15.59	+ 3.50 − .05	− 12.09	47	59.93		47.84	+.21	
	13	43.5		− 31.7	20	2.6	+ 4615	2.66385	5.33770	− 13.82	+ 2.75 − .27	− 11.07		58.70		47.63	+.20	
	15	0.1	19.4 / 11	50.4	32.3	47.8	+ 3899	2.59095	5.18190	− 11.55	+ 1.92 − .45	− 9.63		57.10		47.47	+.18	
	16	35.0	18.5 / 12	34.0			+ 2950	2.46982	4.93964	− 8.74	+ 1.10 + .52	− 7.64		56.08		46.44	+.18	
	17	44.0	19.6 / 13	19.6	(4) / 21	30.38	+ 2260	2.35411	4.70822	− 6.69	+ 0.65 − .58	− 6.04		53.43		47.39	+.13	
			19.4 / 14	3.9	(7)	29.62					±.49							
			22.2	51.2				1.24968 m	0.65836		±.41				47	47.91	+.19	
			19.5 / 15	33.0	21	29.90		1.13276 m	0.54452									
			20.0 / 16	18.0		+.06		1.04038 m	0.43946									
					[20]	29.96		1.06248 m	0.28396									
			13	19.80				0.94135 m	0.04170									
			8	9.82				0.82564 m	9.81028									

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T5 T2 T2 T log T 2 log T Red I Red II Sum I+II Sum I+II Circle Reading Corr. Circ. Read.

Dec. 30, 1878. α Ursa. Min.

22			—	—	25	32.5	−1845	2.26600n	4.53200	+5.46	+0.43	+5.89	+43		47	39.68	47	45.57	+.15	45.72
21			—	~~11.0~~	26	19.5	−6845	2.83537n	5.67074	+26.27	+5.93	+26.20	−42			18.45		44.85	+.22	45.07
23			—	17.19	26	37.3													
20			—	—	27	43.0		0.73753	9.63406				±61						
17	23	22.7	16.721	1.2	28	26.0		1.30690	0.77289				±51				47	45.11	+.18	45.29
15	31	42.7	17.6	46.6	29	15.1													
29			16.222	29.7	29	58.9													
20			18.022	16.0	30	38.9													
					31	29.0													
			20	17.24															
					28	28.80													
					9 20	18.87													
					(5)	17.24													
						18.27													
						−.06													
					20	18.23													

Dec. 31, 1878. α Ursa. Min.

19	15	11.3		—	17	19.1	+3054	2.48487	4.98974	−9.04	+1.18	+11.0	−7.86	47	54.43	47	46.57	+.16	46.73
18	16	31.2		—	18	1.9	+2255	2.35315	4.70630	−6.68	+0.64	+5.3	−6.04		52.08		46.04	+.12	46.16
17	25	29.9		—		52.6	−3132	2.49582n	4.99164	+9.28	+1.24		+10.52		29.38		38.90	+.32	40.22
14	27	0.7		—	19	26.0	−4040	2.60638n	5.21276	+11.96	+2.06	−6.1	+14.02		30.70		44.72	+.30	45.02
11	28	28.0	62 12	6.2	20	16.0	−4913	2.69135n	5.38270	+14.55	+3.05	−10.8	+17.60		26.63		44.23	+.32	44.55
10	29	55.6	68	51.3	21	3.1	−5789	2.76260n	5.52520	+17.14	+4.24	−0.5	+21.38		24.00		45.38	+.30	45.68
28			38 13	32.8		47.6						±75						24	22.814
15			0.6 14	14.1	22	33.2		0.95640n	0.07880			±63				47	45.39	+.24	45.63
			5.8 15	3.8	23	12.2		0.82468n	9.80836										
						7		0.96735	0.09370										
			12	4.64	9 20	18.97		1.07791	0.31482										
			8	9.93	(5)	13.57		1.16288	0.48476										
						16.76		1.23413	0.62726										
					20	+.04 16.72													

Jan. 5, 1879. α Ursa. Min.

22	14	21.9		—	17	5.2	+347.2	2.54058	5.08116	−10.28	+1.52	−.15	−8.73	47	52.68	47	43.95	+.12	44.07
20	23	15.1		—	18	54.0	−186.0	2.26951n	4.53902	+5.50	+0.44	−.17	+5.94		37.90		43.84	+.18	44.02
19	30	3.7		—	18	42.5	−594.6	2.77422n	5.54844	+17.60	+4.47	−6.3	+22.07		21.25		43.32	+.24	43.56
17	31	41.1		—	19	26.0	−692.0	2.84011n	5.68022	+20.48	+6.05	+9.4	+26.53		18.38		44.91	+.22	45.13
14			67.9 11	57.9	20	9.1						±54							176.75
12			58.9 12	43.4	20	53.7		1.01184n	0.18305			±46				47	44.00	+.19	44.19
23			59.4 13	28.4	21	41.2		0.74077	9.64091										
17			58.5 14	12.0	22	24.0		1.24548	0.65033										
16			60.9 14	58.9	23	5.9		1.31137	0.78211										
			11	54.12	9 20	9.07													
			8	10.00	(5)	9.12													
					20	9.09													
						+.04 9.13													

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Reduction to mean of wires.

	λ Ursae Minoris		51 Cephei		ν Ursae Minoris		α Ursae Minoris	
	m	s	m	s				
A_{+1}	+ 11	6.5	+ 4	15.8	+ 3	29.1	+ 16	2.7
	+ 9	15.4	+ 3	33.2	+ 2	54.2	+ 14	35.2
	+ 7	24.3	+ 2	50.6	+ 2	19.4	+ 13	7.7
A_0	+ 3	42.1	+ 1	25.3	+ 1	9.7	+ 11	40.2
	+ 2	46.6	+ 1	4.0	+ 0	52.3	+ 10	12.6
	+ 1	51.1	+ 0	42.6	+ 0	34.8	+ 8	45.1
	+ 0	55.6	+ 0	21.3	+ 0	17.4	+ 7	17.6
	+ 0	0.0	+ 0	0.0	+ 0	0.0	+ 5	50.1
	− 0	55.6	− 0	21.3	− 0	17.4	+ 2	55.0
	− 1	51.1	− 0	42.6	− 0	34.8	+ 2	11.3
	− 2	46.6	− 1	4.0	− 0	52.3	+ 1	27.5
	− 3	42.1	− 1	25.3	− 1	9.7	+ 0	43.8
							+ 0	0.0
								etc.
A_{-1}	− 7	24.3	− 2	50.6	− 2	19.4		
	− 9	15.4	− 3	33.2	− 2	54.2		
	− 11	6.5	− 4	15.8	− 3	29.1		
$A_{\pm 2}$	12	57.6						
	14	48.7						
	16	39.8						
	18	30.9						
	20	22.0						

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Tabular corrections for the reduction to the meridian, due to the omission of m from the angle T.

Sidereal argument = T

The corrections given are those due to $m = 1^s$

The correction required therefor = m × the tabular values.

T / s	λ Urs. Min.	S Urs. Min.	ζ Urs. Min	51 Cephei
	"	"	"	"
1	,001	,004	,002	,003
2	,002	,008	,003	,006
3	,004	,012	,004	,009
4	,005	,015	,006	,012
5	,006	,019	,008	,015
6	,007	,023	,009	,018
7	,008	,027	,011	,021
8	,010	,031	,012	,024
9	,011	,034	,013	,027
10	,012	,038	,015	,031
11	,013	,042	,016	,035
12	,014	,046	,017	,038
13	,015	,050	,019	,042
14	,017	,054	,021	,045
15	,018	,058	,023	,048

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