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KG
11366
u.490

Fundamental Stars.
Observations and Reductions
From $12^h 28^m$ to $18^h 33^m$
B 3 1878

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For an explanation of the arrangement of the computation, see the Introductory Page in Book I.

For dates June 5 – July 28, the value of the inclination first adopted was afterwards altered when at the close of the year the values during the whole year were obtained. The changes thus made are indicated in red and applied to the corrected declination which had been obtained.

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K Draconis

α_0 15ˢ.927 — log sin δ 9.97424

12ʰ 28ᵐ 16ˢ — corr. α +.020 +.033 — " cos δ 9.52434

+70° 27′ 38″ — $\frac{d\alpha}{dt}$ — " 15 cos δ tan i 9.62984n — June 5

9.63+65n 041 after "

δ_0 38″.44

−28 4 50 — tan δ 2.818

1878 — corr. δ +.87 — sin z −.47

$\frac{d\delta}{dt}$

May 1 — May 2 — May 5 — May 6

	h m s	m s	m s		h m s		h m s		h m s		h m s		h m s	
12	28 5.6	28 14.5	28 48.2	27 36.2	28 14.3	28 48.4	27 25.1	28 15.6	28 49.4	27 21.2	28 16.5		50.5	
	13.4	17.8	37.5	41.0	17.5	37.2	38.0	18.6	52.8	25.6	19.8		53.8	
	16.9	20.4	54.7	48.0	20.5	54.5	36.2	21.7	55.8	32.7	22.7		56.6	
	24.7	23.9	57.8	54.4	23.6	57.7	41.8	24.9	59.0	39.3	25.8		59.9	
	28.7	26.6	1.0	59.6	26.4	0.7	49.4	28.0	2.0	44.0	29.0		3.0	
		29.8	4.0		29.7	3.6		31.1	5.1		32.1		6.0	
	29 5.8	32.8	6.7	29 57.3	33.0	6.7		34.4	8.0	30 3.0	35.3		9.3	
	3.6	36.0	10.2	8.8	35.9	9.8		36.9	11.2	8.7	38.2		12.2	
	7.7	24.8 39.2	72 13.1	8.3	2398 38.9	56 13.0		2517 40.5	273 14.0	13.6	2604 41.0	2663	15.0	
	12.7			13.7						17.5				
	18.0	26.68	22.0	18.8	26.64	22.0		27.97	23.6	24.0	28.93		24.5	
		0.80	25.3		0.62	25.3		1.92	26.6		2.92		27.6	
		34.74	28.5		34.49	28.2		35.84	29.7		36.80		30.6	
		32	31.7			31.4			32.7				33.6	
		24.3	34.7		1.75	34.5		6573	35.8		865		36.8	
			38.1			37.7			38.9				40.0	
			40.8			40.7			42.0				42.8	
			44.0			43.8			45.2				45.9	
I δ	28 17.86		3127 47.4	27 47.84		3104 46.8	27 36.50		3226 48.1	27 32.56		3312	49.4	
I δ Im	30 7.76		29 ~~0.510~~ 0.773	30 8.38		29 0.583			29 1.916	30 13.36		29	2.883	
App. R.A.						21.684			28 21.581			28	21.545	
I − R.A.			28 21.718			+38.90			+ 40.33				+41.34	
Corr'd (")			~~+39.25~~			+38.88			+ 40.31				+41.32	
			~~+38.93~~ 39.02			+38.87			+ 40.30				+41.31	
			+39.03											
ΔT + m			− 35.79			− 35.72			− 36.69				− 37.63	
n tan δ			− 3.12			− 3.12			− 3.74				− 3.67	
Red. to 1878.0			− 5.79			− 5.76			− 5.65				− 5.62	
Σ			− 44.70			− 44.60			− 46.08				− 46.92	
R.A. 1878.0			28ᵐ 16ˢ.07			15.98			15.83				15.96	
Im − I δ	+42″.91	−66″.99		+72.74	−67.80		+85.41			+90.32	−70.48			
log (")	1.63256	1.82601n		1.86177	1.83123n		1.93151			1.95578	1.84807n			
" Rm.	1.26240n	1.45585		1.49161n	1.46107		1.56135n			1.58562n	1.47791			
	0′ 0′	55′ 4′		0 0	55 4		0 0			0 0	55 4			
E	1″.6 +.01	14.7 +.42		14.1 +.29	14.7 +.42		18.4 +.39			21.8 +.45	13.7 +.40			
F	1.1 +.16	15.2 +.17		12.4 +.19	13.7 +.18		18.8 +.14			20.4 +.08	13.2 +.19			
G	20.8 −.38	32.3 −.01		31.8 −.10	31.4 +.01		37.1 −.34			38.9 −.42	29.8 +.02			
H	17.8 +.35	30.8 +.23		30.9 +.50	30.3 +.23		36.8 +.62			36.6 +.82	30.0 +.23			
	11.20 11.4	51	23.50	22.95 58	84	23.05	27.75 71			30.35 63	84	21.75		
Circle Reading	0 10.33	59 23.25		0 22.30	59 22.52		0 27.78			0 29.42	59 21.68			
Rm	− 18.30	28.57		−31.02	28.91		− 36.42			− 38.51	30.05			
Corr'd Reading	59 52.03	51.82		59 51.28	51.43		59 51.36			59 50.91	51.73			
δ +70°	22′ 56″.32	56″.53		22 57.07	56.92		22 56.99			22 57.44	56.62			
~~sub~~ = −28°	4′ 18″													
μ + log tan z	1.48772													
B + I + γ	+ 57			− 54			− 56			− 28				
log Rf	1.49229			1.48118			1.48116			1.48444				
Rf	+31″.11	+31″.11		+30.32	+30.32		+30.31			+30.51	+30.51			
Rmd	− .32	− .77		− .91	− .79		− 1.24			− 1.89	− .85			
Rm	− .02	− .45		− .04	− .44		− .05			− .08	− .47			
Rdr	− .04	− .20		− .22	− .21		− .18			− .16	− .21			
Σ	+30.73	+29.66 .49		+29.15	+28.84 .97		+28.84 .95			+28.98 .92	+28.97 29.10			
corr. δ	23′ 24.05	26.32		26.23	25.89		5			26.36	25.72			
Mean	23 26.68			26.06			24.84			26.04				
App. δ	27 ~~35.76~~ 35.29	+4′ 10.54	Reg	36.2	+4 10.92		37.0	+4 11.65		37.12	+4 11.38			
		+ .31	Rft		+ .31			+ .31			+ .31			
Δ	+ 4′ 9.3	+ 2.40	Rd. to 1878.0	10.1	+ 2.20		11.2	+ 1.40		11.2	+ 1.20			
corr. Δ	10.2	+4 13.27	Σ	11.0	+4 13.43		12.1	+4 13.36		12.1	+4 12.89			
Decl. 1878.0		27′ 40.0			39.5			39.2			38.9			

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	α m	s		δ		
Apr. 30	28	21.76		27	35.7	12
May 5		59	17		36.9	11
10		21.41	18		38.0	10
15		20.21	20		39.0	9
20		20.99	22		39.9	8
25		.76	23		40.7	6
30		20.52	24		41.3	6
June 4		.27	25		41.9	4
9		20.01	26		42.3	

May 7

27 24.2, 29.9, 35.7, 42.0, 48.5; 30 1.7, 6.9, 12.9, 18.6, 25.1 — 2696
28 17.7, 20.8, 23.8, 27.0, 30.0, 33.0, 35.9, 39.2, 42.2 — 344
28 57.5, 54.7, 57.7, 1.0, 3.9, 6.9, 10.0, 12.9, 15.8, 25.0, [28.2] 31.5, 34.5, 37.5, 40.6, 43.8, 46.8, 49.9

29.96, 3.82, 37.53, 1131

27 36.06
30 13.04

337 8 49.9
29 37.70
28 21.509
+42.26
+42.24
+42.23

− 38.50
− 3.57
− 5.58
− 47.65

16.12

May 8

27 28.5, 32.6, 88.0, 45.6, 57.8; 30 11.8, 16.1, 20.2, 28.1, 82.5 — 2771
28 18.5, 21.6, 24.8, 27.8, 30.7, 33.7, 36.8, 40.1, 48.1 — 411
28 52.4, 55.4, 58.4, 1.5, 4.6, 7.4, 10.7, 13.8, 16.9, 26.3, 29.5, 32.4, 35.2, 38.3, 41.6, 44.7, 47.8, 50.7

30.79, 4.57, 38.50, 1386

27 39.30
30 21.74

3465 50.7
29 46.20
28 21.473
+43.15
+43.13
+43.12

− 39.50
− 3.69
− 5.55
− 48.74

15.88

June 3

28 9.1, 18.7, 22.7, 28.1, 33.5; 30 35.0, 38.3, 45.8, 50.0, 54.8 — 5185
28 45.4, 48.3, 51.5, 54.6, 57.6, 0.8, 3.8, 6.8, 9.7 — 2836
29 19.2, 22.3, 25.3, 28.7, 31.8, 34.5, 37.6, 40.6, 48.6, 53.0, 56.3, 59.4, 2.5, 5.5, 8.5, 11.8, 14.6, 18.2

57.61, 31.51, 5.53, 9465

28 21.42
30 44.78

498 18.2
29 31.550
28 20.308
+71.24
+71.22
+71.21

− 67.47
− 3.69
− 4.38
− 75.54

16.01

June 5

27 44.0, 50.7, 53.3, 28, 8.7; 30 27.4, 31.7, 34.6, 40.9, 46.4
28 48.0, 50.9, 54.0, 57.3, 0.1, 3.1, 6.4, 9.4, 12.7 — 19 — 3073
29 21.8, 24.8, 28.1, 30.9, 34.2, 37.4, 40.2, 43.5, 46.4, 55.5, 58.7, 2.0, 4.9, 8.1, 11.2, 14.0, 17.3, 20.4

.021, 34.14, 8.01, 10236

27 56.30
30 36.20

721 20.4
29 34.120
28 20.205
+73.92
+73.90
+73.89

− 70.60
− 3.95
− 4.28
− 78.23

15.89

May 7		May 8		June 3		June 5	
+87.71	−69.27	+85.32	−77.12	+70.13	−73.23	+97.82	−62.08
1.94305	1.84055n	1.93105	1.88717n	1.84590	1.86469n	1.99043	1.79295n
1.57289n	1.47039	1.56089n	1.51701	1.47574n	1.49453	1.62027n	1.42279
0 0	55 4	0 0	55 4	0 0	55 4	0 0	55 4
19.9 +.42	14.3 +.42	19.0 +.40	10.3 +.33	8.9 +.16	7.5 +.27	19.8 +.42	13.2 +.39
19.7 +.08	13.7 +.18	19.1 +.09	10.3 +.19	8.9 +.09	7.8 +.19	20.0 +.08	12.8 +.19
36.9 −.32	30.5 +.02	36.9 −.32	26.6 −.04	26.8 −.14	23.8 −.15	37.1 −.34	29.6 +.02
35.1 +.52	29.8 +.23	35.9 +.52	26.2 +.22	26.5 +.46	24.7 +.22	36.1 +.52	29.9 +.23
28.40 70	22.1 85 22.40	27.95 69	70 18.45	17.85 57	53 15.65	28.45 68	83 21.40
0 27.90	59 22.08	0 27.72	59 18.35	0 17.78	59 15.95	0 28.25	59 21.38
−37.40	29.54	−36.38	32.89	−29.90	31.23	−41.71	26.47
59 50.50	59 51.62	59 51.34	51.24	59 47.88	47.18	59 46.54	47.85
22 57.85	22 56.73	22 57.01	57.11	23 0.47	1.17	23 1.81	0.50
				4 23			
				1.4872			
−20		−11		−71		−129	
1.4852		1.4861		1.4801		1.4743	
+30.56	+30.56	+30.63	+30.63	+30.21	+30.21	+29.81	+29.81
−1.33	−.82	−1.24	−1.02	−.84	−.91	−1.64	−.66
−.04	−.35	−.04	−.34	−.02	−.31	−.03	−.34
−.18	−.21	−.17	−.18	−.14	−.13	−.17	−.21
+29.01	+29.18	+29.18	+29.09	+29.21	+28.86	+27.98	+28.77
26.86	25.91	26.19	26.20	29.68	29.13	29.49	29.27
26.38		26.20		29.90		29.53	
37.4	+4 12.09	37.6	+4 11.76	41.8	+4 12.47	42.0	+4 12.90
	+ .31		+ .31		+ .32		+ .32
+4 11.0	+ 1.00	11.4	+ 0.80	11.9	− 3.40	12.5	− 3.60
11.9	+4 13.40	12.3	+4 12.87	12.8	+4 16.39	13.4	+4 9.62
	39.8		39.1		39.3		39.2

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June 6

h	m	s	m	s	m	s
12	29	66	28	49.3	29	23.3
		12.3		52.3		26.3
		18.0		53.6		29.5
		24.3		58.6		82.5
		29.8		1.7		35.5
				4.6		38.7
	30	31.2		8.0		41.9
		37.0		10.9		44.6
		42.2	150	14.0	3201	47.8
		47.3				
		51.7		1.67		57.0
				35.57		0.3
				9.59		3.5
						6.7
				10683		9.6
						12.7
						15.8
						18.8
	29	18.20			863	21.9
	30	41.88			29	35.610
					28	20.158
						+75.46
						+75.44
						+75.43
						− 71.51
						− 3.87
						− 4.23
						− 79.61
					m 28	s 16.04

	+17.41	−66.27
	1.24080	1.82132 n
	0.87245 n	1.45797
	121	879
	55 4	55 4

E	44.7	+.21	8.2	+.28	
F	45.3	+.18	9.7	+.19	
3	0.1	03	23.8	−.15	
4	1.1	+.02	25.6	+.22	
	52.40	44	16.1	54	16.02
	59 52.80		59 16.82		
	− 7.45		28.31	−.01	
	59 45.35	+.02	45.13	−.01	
+70°	23′	3.07		3.22	
		2.98		3.23	
28°	4′	23″			
	1.4872				
	− 79				
	1.4793				

	+30.15	+30.15
	− .05	− .74
	− .34	− .39
	− .10	− .14
	+29.66	+28.88 29.10
	23 32.79	32.53
	23 32.56	
	27 12.1	+4 10.04
		+ .32
	+4 9.5	− 3.70
	10.4	+4 6.66
		27 39.2

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ε Ursæ Maj.

α_0 39ˢ.461 — log sin δ 9.92171 — log R_1 1.61556 — R_1 41.26

12ʰ 48ᵐ 39ˢ — corr. α −.019 −.018 — " cos δ 9.74049 — " R_2 1.31489 — R_2 20.65

+56° 37′ 19″ — $\frac{d\alpha}{dt}$ — " 15 cos tan 9.84599 n — James 5 — I 3.81

δ_0 19″.00 — 9.84 780 n after " — 656

−14 14 31 — tan δ 1.52

1878 — corr. δ +.87 — sin z −.24

$\frac{d\delta}{dt}$

	May 1			May 2					May 5				May 6			
h	m s	m s	m s	m s												
12	48 21.0	48 32.30	48 52.95	49 8.3	—	—			49 33.4	—	49 —		48 57.8	—	48 54.95	
	24.1	35.90	56.64	11.9	—	—			36.5	—	—		8.4	—	58.90	
	26.7	39.77	0.58	15.3	—	49 0.25			39.5	—	1.48 1.48		7.1	—	260	
	29.3	43.40	4.18	18.8	—	0.25 .33 4.18			42.1	—	.37 5.18		9.0	—	6.50	
	34.7	46.98	7.70	22.0	—	.28 7.90			45.6	—	.38 9.00		12.8	—	10.00	
		54.62	13.69		54.70	13.60				—	14.70			56.90	15.72	
		58.38	17.23		58.50	17.12				—	18.58			1.00	19.35	
		2.35	20.87		2.18	20.90				—	22.12			4.65	23.23	
		6.06	24.90		5.95	24.65				—	25.95			8.00	26.85	
		9.90	28.38		9.76	28.46				—	29.63			11.80	30.44	
		39.67	34.15		—	34.15				—	35.42			—	36.29	
		0.41	37.70		0.29 20.94	37.70				1.41	39.10			2.59 23.24	40.09	
		21.01	41.70		20.95 .95	41.50				22.20	42.64			23.12 .12	43.82	
		41.66	45.35		41.57 .92	45.40				42.82	46.58			43.75 .10	47.40	
		2.26	49.20		2.22 .96	49.10				6643	50.36			64.47 .21	37.17	
	48 27.16	10501		49 15.26					49 39.42				49 6.62			
			49 21.002			49 20.942					49 22.143				49 23.168	
			48 43.573			48 43.559					48 43.516				48 43.500	
			+ 37.43			+ 37.38					+ 38.63				+ 39.67	
			+ 37.45			+ 37.40					+ 38.65				+ 39.69	
			− 35.80			− 35.73					− 36.72				− 37.66	
			− 1.68			− 1.68					− 2.02				− 1.98	
			− 4.11			− 4.10					− 4.06				− 4.04	
			− 41.54			− 41.51					− 42.80				− 43.68	
			m s 48 39.41			39.43					39.34				39.49	
	+53ˢ.84			+5.68					− 17.28				+16.55			
	1.73111			0.75435					1.23754 n				1.21880			
	1.57710 n			0.60034 n					1.08353				1.06479 n			
	50′ 0′			45 4					45 4				50 0			
δ	28″.0 +.49			55.4 +.02					38.8 +.33				1.9 +.01			
F	29.1 +.03			55.0 +.11					39.0 +.06				2.1 +.02			
G	48.1 −.68			14.0 −.33					56.7 −.15				20.8 −.38			
H	43.1 +.51			9.8 +.20					54.3 −.01				15.0 +.19			
	38.05 ″.35			4.70 .00					47.75 .23				11.35 −.16			
	50 37.08			50 3.55					49 47.20				50 9.95			
	−87.77			− 3.98					12.12				− 11.61			
	49 59.31			49 59.57					49 59.32				49 58.34			
+56°	32′ 49″.04			32 48.78					32 49.03				32 50.01			
−14°	14′ 12″															
	1.1646															
	+ 56			− 52					− 52				− 22			
	1.1702			1.1594					1.1594				1.1624			
	+14″.80			+14.43					+14.43				+14.53			
	− .74			− .02					− .07				− .07			
	− .05			− .01					− .03				− .01			
	− .09			.00					− .06				+ .04			
	+13.92			+14.40					+13.77				+14.49			
	33′ 2.96															
	33 2.96			2.79					2.95				4.50			
	37 12.25	+4′ 10.56		12.5	+4	10.92			13.3	+4	11.65		13.5	+4	11.38	
	+ ″.3	+ .16			+	.16				+	.16			+	.16	
	+4′ 9.2	+ 6.50		9.7	+	6.50			10.3	+	5.70		9.0	+	5.50	
	10.2	+4 17.52		10.6	+4	17.58			11.2	+4	17.51		9.9	+4	17.04	
		37′ 20.5				20.4					20.5				21.5	

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	a		δ	
	m s		′ ″	
Apr 30	48 43.59	7	37 12.0	12
May 5	.52	8	13.2	12
10	43.44	9	14.4	11
15	.35	10	15.5	10
20	43.25	11	16.5	9
25	.14	12	17.4	8
30	43.02	12	18.2	7
June 4	42.90	13	18.9	6
9	42.77		19.5	

May 8			June 3				June 5				June 6			
48 27.8	48 36.35	48 56.82	49 2.35	49 —	49 24.30	48 49.3	49 6.25	49 26.83	49 11.9	49 7.90	49 28.50			
31.3	40.10	0.70	26.7	11.11 7.30	27.90	53.7	10.05	30.52	13.6	11.50	32.05			
35.0	43.80	44.5	29.0	.00 11.00	31.74	57.8	13.80	34.30	17.8	15.25	35.80			
37.4	47.60	48.25	32.0	.09 14.90	35.78	0.7	17.53	38.18	21.8	19.00	39.55			
40.5	51.52	12.03	36.6	.00 18.62	39.37	4.7	21.20	41.90	25.8	22.70	43.30			
	58.70	17.57		26.08	44.93	50 42.6	28.79	47.63	50 43.8	30.22	48.91			
	2.30	21.37		30.05	48.50	45.5	32.38	51.40	47.0	34.05	52.60			
	6.44	25.10		33.59	52.40	50.0	36.40	55.00	50.2	37.88	56.40			
	10.03	28.90		37.40	56.05	53.0	40.00	58.72	53.5	41.63	0.27			
	13.88	32.60		41.38	59.85	55.8	43.55	2.40	55.7	45.40	4.02			
	43.87	38.03		11.05	5.50		13.77	8.20		15.27	9.62			
	4.45	41.70		31.82	9.42		34.35	11.98		35.84	13.40			
	25.11	45.32		52.35	12.90		55.03	15.72		56.44	17.00			
	45.51	49.31		12.97	16.70		15.73	19.43		17.11	20.83			
	6.31	53.00		33.70	20.33		36.26	23.30		37.84	24.70			
48 34.40	12.25		49 29.56	11.89		48 57.24	27.74		49 18.58	28.50				
		49 25.050			49 52.378	50 49.38		49 55.028	50 50.08		49 56.500			
		48 43.468			48 42.918			48 42.868			48 42.842			
		+41.58			+69.46			+72.16			+73.66			
		+41.60			+69.48			+72.18			+73.68			
		− 39.54			− 47.50			− 70.05			− 71.54			
		− 1.99			− 1.99			− 2.13			− 2.09			
		− 4.01			− 3.46			− 3.41			− 3.38			
		− 45.52			− 72.95			− 75.59			− 77.01			
		39.53			39.43			39.44			39.49			
+50.65			+22.82			+57.79	−54.35		+37.92	−53.58				
1.70458			1.35832			1.76185	1.73520m		1.57887	1.72900m				
1.55057m			1.20431m			1.60784m	1.58119		1.42667m	1.57680				
									543	556				
50 0			50 0			50 0	45 4		50 0	45 4				
24.8 +.48			1.5 +.01			26.0 +.49	7.1 +.26		8.9 +.16	4.7 +.23				
26.1 +.04			2.9 +.03			26.5 +.04	7.1 +.19		11.1 +.09	7.1 +.19				
44.1 −.62			20.7 −.38			44.2 −.62	22.8 −.20		26.7 −.14	20.8 −.25				
39.2 +.52			17.9 +.35			40.1 +.51	21.7 +.20		25.1 +.44	20.1 +.37				
34.45 42			11.10 01			35.10 42	45 11495		17.80 55	54 12.75				
50 33.55			50 10.75			50 34.20	49 14.68		50 17.95	49 13.18				
− 26.33			− 16.01			− 40.54	38.12		− 26.71	27.74				
49 58.02			49 54.74			49 53.66	49 52.80		49 51.24 +.08	50.92 +.11				
32 50.33			32 53.61			32 54.69	55.55		32 57.11	57.43				
									57.03	57.54				
− 10			− 61			− 87			− 45					
1.1636			1.1585			1.1559			1.1601					
+14.57			+14.40			+14.32	+14.32		+14.46	+14.46				
− .65			− .13			− .84	− .77		− .36	− .72				
− .08 14			− .02			− .08 02	− .46 17		− .08 01	− .29 17				
− .10			00			− .10	− .11		− .14	− .14				
+13.76 88			+14.26			+13.346	+13.35 27		+13.945	+13.34 45				
						805	882		1098	1097				
4.11			7.87			8.43			1098					
14.07 13.7	+4 11.76		18.8	+4 12.44		19.0	+4 12.90		19.15	+4 10.04				
+ .16			+ .16			+ .16			+ .16					
+4 9.9	+ 5.00		10.9	+ 0.20		10.6	.00		8.2	− 0.20				
10.8	+4 16.92		11.8	+4 12.83		11.5	+4 13.06		9.1	+4 10.00				
	21.0			20.7			21.5			21.0				

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June 9

L	m	s	m	s	m	s
12	49	0.1	49	12.35	49	32.92
		2.9		16.19		36.35
		5.8		19.82		40.32
		9.4		23.63		44.05
		13.7		27.20		47.88
	50	58.7		34.75		53.46
		2.0		38.40		57.34
		5.4		42.17		1.18
		8.3		46.03		4.80
		11.5		49.80		8.47
				19.84		14.15
				40.34		18.02
				1.05		21.78
				21.71		25.30
				42.23		29.30
	49	6.38		517		
	51	5.18				

50 1.034
48 42.764
+ 78.27
+ 78.29

− 76.30
− 2.00
− 3.30
− 81.60

m s
47 39.43

	s	s
	+54.65	−64.15
	1.73759	1.80720 m
	158539 m	1.65500
	415	376
	50′ 0″	45′ 3″

B	20.0	+.42	56.2	+.20	
F	21.4	+.07	59.6	+.17	
G	38.5	−.41	13.8	−.19	
H	36.2	+.52	12.8	+.23	
	29.25	60		41	5.00
	50	29.02	49′	5.60	
		−38.49		45.19	
	49	50.53	+.12	50.79	−.13
+56°	32′	57.82		57.56	
		57.70		57.69	

1.16446
− 78
1.15668

	+14.35	+14.35	
	− .75	− 1.03	
	− .05	− 35.16	
	− .15	− .10	
	+13.42	+12.97	13.06
	33′ 11.73	10.75	
	33 10.94	′ ″	
	34 19.5	+4 10.28	
		+ .17	
	+4′ 8.6	− 0.50	
	9.5	+4 9.95	
		37′ 20.9	

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ε Virginis

$12^h\ 56^m\ 6^s$
$+11°\ 36'\ 55''$
$+30\ 45\ 53$
1878

d_0 6.196
corr. d +.030 +.039
$\frac{dd}{dt}$
δ_0 54".80
corr. δ −.05
$\frac{d\delta}{dt}$

log sin δ 9.30393
" cos δ 9.99107
" 1500 Stars 0.09651n — June 5
0.09 ~~833~~ 708 n after "
tan δ 0.21
sin x +.51

log R_1 1.36514
" R_2 1.06437
R_1 23.18
R_2 11.60
I 2.11

May 1

	h m s	m s	m s
	12 56 27.2	56 17.70	56 29.37
	28.7	19.74	31.50
	30.4	21.90	33.68
	32.1	24.10	35.79
	34.0	26.26	37.88
	57 24.3	4.18	40.95
	25.8	6.19	42.99
	27.5	8.38	45.18
	29.0	10.42	47.20
	31.0	12.64	49.34
		21.94	53.49
		33.64	54.60
		45.13	56.80
		56.74	58.80
		8.36	1.00
	56 30.48	22.81	
	57 27.52		56 45.162
			56 9.038
			+36.12
			+36.09
			+36.08
			− 35.81
			− .23
			− 2.84
			− 38.88
			m s 56 6.28
	s +14.68	s −42.36	
	1.16673	1.62696n	
	1.26324n	1.72347	
	′ ′ 45 4	′ ′ 45 3	
E	50.9 +.07	40.0 +.44	
F	57.0 +.07	45.8 +.33	
G	14.4 −.34	2.7 +.18	
A	8.1 +.19	58.1 +.02	
	2,65−.91	.97 51.35	
	50 ~~42~~ 260	48 ~~41~~ 51.65	
	−18.33	52.90	
	49 44.27	44.55	
+11°	′ ″ 33 4.08	″ 3.80	
+30°	′ ″ 45 34		
	1.5848		
	+ 56		
	1.5404		
	−34.71	−34.71	
	− .02	− .21	
	− ~~55~~ 40	− ~~43~~ 31	
	.00	− .24	
	−35.~~28~~ 13	−35.~~59~~ 47	
	32′ 28.95	28.33	
	32 28.67		
	36 38.7	+4′ ″ 10.56	
		.33	
	+4′ ″ 10.1	+ 16.10	
	10.0	+4 26.33	
		′ ″ 36 55.0	

May 2

	h m s	m s	m s
	56 9.3	56 17.63	56 29.33
	11.5	19.75	31.37
	13.0	21.90	33.41
	14.9	23.80	35.50
	16.6	26.08	37.60
	57 21.3	3.98	40.80
	23.0	6.00	42.80
	24.8	8.18	44.99
	26.4	10.80	47.00
	{28.0 {28.8	12.40	49.29
		21.85	53.50
		33.44	54.53
		44.98	56.60
		56.66	58.80
		8.17	0.88
	56 13.06	22.10	
	57 24.78		56 45.020
			56 9.036
			+35.98
			+35.95
			+35.94
			− 35.73
			− .23
			− 2.84
			− 38.80
			6.22
	s +31.96	s −39.76	
	1.50461	1.59945n	
	1.60112n	1.69596	
	′ ′ 50 0	′ ′ 45 3	
E	14.4 +.30	45.0 +.34	
F	19.6 +.08	49.9 +.34	
G	39.1 −.44	7.3 +.11	
A	32.0 +.60	3.3 +.14	
	26.75 44	93 56.15	
	50 26.28	48 56.38	
	−39.91	49.65	
	49 46.37	46.03	
+11°	′ ″ 33 1.98	2.32	
+30°	′ ″ 45 34		
	1.5848		
	+ 51		
	1.5399		
	−34.67	−34.67	
	− .12	− .17	
	− ~~.85~~ 83	− ~~.48~~ 34	
	− .11	− .23	
	−34.95 3	−35.~~50~~ 38	
	27.0 5	26.94	
	27.00		
	38.8	+4 10.92	
		− .34	
	11.8	+ 16.00	
	11.7	+4 26.58	
		63.6	

May 5

	h m s	m s	m s
	56 19.3	56 18.95	30.40
	20.9 22.4	20.74	32.40
	24.3	22.81	34.55
	26.6	25.00	36.65
		27.14	38.76
		5.00	41.95
		7.18	44.00
		9.30	46.10
		11.42	48.10
		13.50	50.35
		22.93	53.52
		34.55	55.66
		46.10	57.73
		57.74	59.87
		9.28	1.94
	56 22.60	23.060	
			56 46.120
			9.03
			+37.09
			+37.06
			+37.05
			− 36.73
			− .28
			− 2.83
			− 38.84
			6.28
	s +23.52		
	1.37144		
	1.46795n		
	′ ′ 50 0		
E	2.4 +.01		
F	9.3 +.09		
G	29.3 −.08		
A	23.6 +.42		
	15.85 44		
	50 16.15		
	−29.37		
	49 46.78		
+11°	′ ″ 33 1.57		
+30°	′ ″ 45 34		
	1.5849		
	− 49		
	1.5299		
	−33.88		
	− .06		
	− ~~.93~~ 83		
	− .11		
	−34.08 9		
	27.50		
	39.1	+4 11.65	
		− .34	
	11.6	+ 15.70	
	11.5	+4 27.01	
		: 54.5	

May 6

	h m s	m s	m s
	56 15.3	56 19.70	31.20
	17.0	21.80	33.36
	19.0	23.80	35.42
	21.0	25.90	37.50
	22.7	28.00	39.63
	67 22.0	6.80	42.74
	23.7	8.00	44.80
	26.1	10.00	46.90
	28.1	12.22	49.00
	30.0	14.48	51.10
		23.84	54.30
		35.43	56.38
		46.91	58.52
		58.49	0.52
		10.30	2.74
	56 19.00	23.497	
	57 25.98		56 46.994
			9.03
			+37.98
			+37.94
			+37.93
			− 37.67
			− .27
			− 2.83
			− 40.77
			6.22
	s +27.99	s −38.99	
	1.44700	1.59095n	
	1.54351n	1.68746	
	′ ′ 50 0	′ ′ 45 3	
E	10.0 +.18	45.1 +.34	
F	16.2 +.09	50.9 +.33	
G	34.1 −.18	7.9 +.09	
A	26.8 +.46	1.2 +.06	
	22.05 55	82 56.50	
	50 21.78	48 56.28	
	−34.96	48.69	
	49 46.82	44.97	
+11°	′ ″ 33 1.53	3.38	
+30°	′ ″ 45 34		
	1.5848		
	− 20		
	1.5328		
	−34.10	−34.10	
	− .08	− .16	
	− ~~.84~~ 83	− ~~.43~~ 31	
	− .14	− .20	
	−34.36 5	−34.~~59~~ 77	
	27.18	28.61	
	27.90		
	39.2	+4 11.38	
		− .34	
	11.3	+ 15.60	
	11.2	+4 26.64	
		54.5	

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	α m s		δ ′ ″	
Apr. 30	56 9.04		36 38.6	
May 5	9.03	1	39.1	5
10	9.02	1	39.6	5
15	9.00	2	40.1	5
20	8.97	3	40.7	6
25	8.94	3	41.2	5
30	8.91	3	41.7	5
June 4	8.88	3	42.2	5
9	8.84	4	42.6	4

May 7				May 8				June 3				June 5			
56	32.8	—	56 32.20	56	35.7	—	56 33.00	57	42.3	—	—	56	46.3	56 57.57	57 35.4
	34.6	—	34.17		37.8	—	35.18		43.7	—	—		48.8	54.00	36.3
	35.8	—	36.34	✓	40.0	—	37.15		45.3	—	—		50.5	56.10	37.70
	37.9	—	38.48		43.2	—	39.40		47.2	—	—		52.2	58.26	39.80
	40.1	—	40.58			—	41.50		49.3	—	—		53.6	0.40	41.90
57	22.7	6.74	43.63	57	23.3	7.93	44.64	58	2.4	57 33.68	—	57	52.0	38.24	15.00
	24.1	8.90	45.77		25.5	9.82	46.72			37.90	—		53.9	40.32	17.19
	25.9	10.99	47.89		27.8	11.82	48.80			40.08	—		53.6	42.50	19.35
	27.6	13.00	49.98		29.6	13.88	50.90			42.06	—		57.2	44.63	21.40
	29.9	15.32	52.25		31.3	15.95	52.90			43.70	—		54.4	46.70	23.59
			53.38				56.00				57 24.03			56.07	26.77
		36.35 47.95	54.30			37.25 48.85	58.30				26.22			7.71	28.85
		47.90 .90	59.49			48.79 .79	0.50				28.30			19.31	30.87
		59.49 .89	1.58			0.50 .80	2.35			28.30 16.70	30.43			30.93	32.00
		10.99 .81	3.70			11.88 .70	4.64			39.88 .70	32.53			42.48	35.78
	56 36.04			56	39.18			57	45.56			56	50.28	9.50	
	57 26.04		56 47.888	57	27.50		56 48.842		58 2.40		57 16.700	57	55.62		57 19.300
			56 9.026				56 9.024				56 8.884				56 8.870
			+38.86				+39.76				+67.82				+70.43
			+38.83				+39.73				+67.79				+70.40
			+38.82				+39.72				+67.78				+70.39
			− 38.53				− 39.55				− 67.51				− 70.07
			− .27				− .27				− .28				− .29
			− 2.83				− 2.83				− 2.69				− 2.67
			− 41.63				− 42.65				− 70.48				− 73.03
			6.26				6.13				6.22				6.27
	+11.65	−38.15			+9.60	−38.72			−28.86	−45.70			+29.02	−36.32	
	1.06683	1.58149n			0.98227	1.58794n			1.46030n	1.65992n			1.46270	1.56015n	
	1.16284n	1.67800			1.07878n	1.68445			1.55681	1.75643			1.55921n	1.65666	
	45 4	45 3			45 4	45 3			45 3	45 3			50 0	45 3	
	49.1 +.11	46.8 +.31			45.1 +.20	43.6 +.37			56.2 +.20	35.2 +.52			8.8 +.15	48.1 +.29	
	54.8 +.11	57.3 +.32			51.3 +.17	49.2 +.34			2.8 +.16	40.3 +.22			14.8 +.09	53.2 +.30	
	12.1 −.24	8.7 +.06			8.2 −.07	7.3 +.11			19.3 −.28	58.1 +.09			32.3 −.12	9.3 +.02	
	6.3 +.18	4.5 +.18			2.1 +.07	3.0 +.13			15.8 +.21	55.8 +.03			26.2 +.45	6.0 +.21	
	8.10 16	87 57.75			56.65 37	95 55.45			7.75 29	86 46.65			20.55 57	82 58.70	
	58 0.58	48 57.82			49 56.68	48 55.78			49 8.52	48 47.35			50 20.52	48 59.15	
	−14.55	47.64			−11.99	48.36			36.04	57.07			−36.24	45.36	
	49 46.03	45.46			49 44.69	44.14			49 44.56	44.42			49 44.28	44.51	
	33 2.32	2.89			33 3.66	4.21			33 3.79	3.93			33 4.07	3.84	
	− 15				− 9				− 60				− 84		
	1.5333				1.5339				1.5288				1.5264		
	−34.14	−34.14			−34.19	−34.19			−33.79	−33.79			−33.60	−33.60	
	− .01	− .16			− .01	− .16			− .09	− .22			− .09	− .14	
	− .58	− .44			− .54	− .43			− .27	− .27			− .32	− .25	
	− .04	− .22			− .09	− .24			− .07	− .22			− .14	− .20	
	−34.77	−34.96			−34.83	−35.02			−34.24	−34.42			−33.85	−34.22	
	32 27.3	28.05			28.98	29.31			29.63	29.51			30.23	29.74	
	32 27.89				29.14				29.57				29.98		
	39.3	+4 12.09			39.4	+4 11.76			42.1	+4 12.47			42.3	+4 12.90	
		− .34				− .34				− .35				− .35	
	+4 11.4	+ 15.50			10.3	+ 15.40			12.5	+ 12.70			12.3	+ 12.50	
	11.3	+4 27.25			10.2	+4 26.82			12.4	+4 24.82			12.2	+4 25.05	
		56.1				56.0				54.4				55.0	

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June 6

h	m	s	m	s	m	s
12	57	21.7	56	-	57	4.95
		23.3		-		7.00
		25.5		-		9.00
		27.2	57.49	59.60		11.15
		29.5	.48	1.70		13.20
	57	56.6		39.80		16.50
		58.6		41.80		18.68
		0.6		44.05		20.80
		2.5		46.05		22.80
		4.2		48.25		25.00
			57.48			28.20
			9.06			30.30
			20.76			32.40
			32.39			34.50
			43.99			36.33
	57	25.48	10.368			
	58	0.50			57	20.786
					56	8.862
						+71.87
						+71.84
						+.7183
						- 71.55
						- .29
						- 2.64
						- 74.51
					m 56	s 6.23

June 9

m	s	m	s	m	s
56	56.5	56	58.03	57	9.75
	59.0		0.22		11.80
	0.9		2.30		13.89
	3.2		4.43		15.94
	4.1		6.50		18.04
58	3.5		44.46		21.28
	6.0		46.64		23.32
	7.6		48.65		25.37
	9.2		50.77		27.50
	10.8		52.88		29.63
		2.30			32.79
		13.88			34.89
		25.42			36.95
		37.01			39.10
		48.68			41.33
57	0.74	12.29			
58	7.42			57	25.458
				56	6.838
					+76.62
					+76.59
					+76.58
					- 76.31
					- .28
					- 2.64
					- 79.23
					6.28

	s -4.74	s -39.76	+24.72	-41.96
	0.67578 n	1.59945 n	1.39805	1.62284 n
	0.77410 286	1.69777 653	1.49137 n 013	1.72116 1992
	45 4	45 3	50 0	45 3
G	22.8 +.53	39.6 +.45	0.3 +.00	36.9 +.48
F	30.9 +.02	46.9 +.34	8.1 +.08	45.0 +.32
b	46.1 -.58	1.9 +.18	25.1 -.21	0.2 +.16
[illegible]	41.9 +.13	59.6 +.04	20.2 +.37	56.5 +.02
	34.45 .10	1.01 50.75	12.70 24	98 48.55
	49 35.42	48 52.00	50 13.42	48 49.65
	5.94	49.86	-31.00	52.62
	49 41.36 -.01	41.86 -.14	49 42.42 +.09	42.27 -.15
+11°	33 6.99 7.00	6.49 6.63	33 5.93 5.84	6.08 6.23
+30°	45 34			
	1.5348			
	- 42		- 75	
	1.5306		1.5273	
	-33.93	-33.93	-33.67	-33.67
	.07	- .17	- .07	- .19
	- .32	- .27	- .01	- .25
	- .02	- .25	- .06	- .24
	-34.34 .13	-34.62 .50	-33.81	-34.35 .25
	32 32.87	32.13	32.03	31.98
	32.50		32.00	
	36 42.1	+4 10.04	42.6	+4 10.28
		- .35		- .35
	+4 9.9	+ 12.40	10.6	+ 12.20
	9.8	+4 22.09	10.5	+4 22.13
		36 54.6		54.1

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E. Uhse May. Jr.

$13^h 19^m 1^s$

$+55° 33' 45''$

$-13\ 10\ 57$

1878

May 1 | June 3 | June 6 | June 9

$d\alpha$ $^s0.694$ | log sin δ 9.91632 | log R_1 1.60361 | log R_2 1.30294

Corr $d\alpha$ $-.061$ $-.056$ | " cos δ 9.75244 | R_1 | R_2

" 15 cos δ sin 1' 9.85794m — June 5 | 9.85975m after " | R_1 40.14 | R_2 20.09 | I 3.65

$\frac{d\alpha}{dt}$

$d\delta$ 45".09

Corr $d\delta$ +1.42

$\frac{d\delta}{dt}$

tan δ +1.46

sin x −.23

	May 1			June 3			June 6			June 9		
h	m s	m s	m s									
13	19 32.0	—	19 14.60	20 49.4	—	—	20 31.7	—	19 —	20 1.4	—	19 54.80
	37.6	—	18.10	52.3	—	—	34.8	—	—	4.4	—	58.41
	43.5	—	21.95	55.4	—	—	38.0	—	57.44 57.44	7.9	—	2.00
		—	25.50	58.2	—	—	40.4	—	.45 1.10	11.5	—	5.83
		—	29.22	2.0	—	—	43.9	—	.45 4.75	15.2	—	9.50
[20]												
21	32.7	20 14.85	35.00	21 6.6	20 46.52	20 —	21 9.9	20 50.50	20 10.35	20 53.4	—	14.85
	37.7	18.50	38.40	9.6	50.20	—	12.8	54.03	13.96	55.8	—	18.70
	40.5	22.05	42.38	14.0	53.93	13.63 13.63	15.0	57.85	17.62	59.5	—	22.15
	43.9	25.75	45.70	17.4	57.55 .63	17.28	18.4	1.57	21.31	3.0	—	25.77
	47.0	29.50	49.43	20.3	1.20 .44	20.74	21.3	5.30	24.93	6.7	—	29.55
		—	54.77	—	—	20 26.40		—	20 30.50	—		34.85
		21.87 41.96	58.53	—	—	30.05		57.45 1754	34.05	2.11		38.78
		42.18 42.18	2.20		13.57 13.67	33.60		17.63 .63	37.80	22.20		42.30
		2.14 .05	5.77		33.67 .68	37.39		37.73 .64	41.29	42.38		46.05
		22.13 41.99	9.43		53.88 .74	40.92		57.85 .71	45.00	—		49.60
	19 37.70			20 55.46			20 37.76			20 8.08		
	21 48.36		19 42.05	21 13.58		20 13.630	21 15.48		20 17.630	20 59.68		20 22.208
	[20]		19 4.720			19 4.197			19 4.130			19 4.064
			+37.32			+69.43			+73.50			+78.15
			+37.38			+69.49			+73.56			+78.21
			− 35.82			− 67.54			− 71.59			− 76.33
			− 1.62			− 1.91			− 2.04			− 1.92
			− 4.03			− 3.50			− 3.44			− 3.37
			− 41.47			− 72.96			− 77.03			− 81.62
			m s									
			19 0.57			0.67			0.60			0.59
	+4.34	−118.32	−58.62	−41.83	−59.95		−20.13	−57.85		+14.13	−37.47	
	0.63749n	2.07305n	1.76582n	1.62149n	1.77779n		1.30384n	1.76230n		1.15014	1.57368n	
	0.49543n	1.93099	1.62376	1.47943	1.63573		1.16359 235	1.62205 081		1.00989n 865	1.43343 219	
	50 3	50 2		50 2	50 2		50 3	50 2		50 3	50 2	
E	30.2 +.58	44.6 +.30		49.8 +.21	36.3 +.44		2.7 +.18	35.0 +.46		26.9 +.61	49.9 +.21	
F	31.9 +.15	44.7 +.40		51.3 +.41	37.3 +.24		5.1 +.29	37.2 +.23		28.3 +.16	51.3 +.41	
G	49.1 −.49	1.7 +.09		7.8 +.02	53.9 −.38		19.6 −.30	51.2 −.51		44.1 −.45	6.0 +.07	
H	45.6 +.16	0.2 +.23		5.9 +.39	63.5 +.24		16.2 +.36	51.8 +.25		42.0 +.21	5.8 +.38	
	39.65 40	1.02	53.15	58.80 103	54	45.10	11.15 53	43	43.10	35.50 53	107	57.95
	53 39.20	52 52.50	52.50	52 58.70	52 45.25		53 11.40	52 43.80		53 35.32	52 58.12	
	− 3.13	88.31	42.05	30.16	43.22		14.57	41.88		− 10.23	27.13	
	53 36.07	54 36.11		53 28.86	28.47		53 25.97 −.04	25.68 −.12		53 25.09 +.03	25.25 −.08	
			53 34.65									
+55°	29 12.28	10.24		29 19.49	19.88		29 22.38	22.67		29 23.26	23.10	
		13.50					22.42	22.79		23.23	23.18	
−13°	10 24			10 44								
	1.1298			1.1298								
	+ 54			− 57			− 32			− 67		
	1.1352			1.1241			1.1266			1.1231		
	+13.65	+13.65		+13.31	+13.31		+13.38	+13.38		+13.28	+13.28	
	− .01	− .86		− .45	− .92		− .10	− .86		− .05	− .36	
	− .29 .71	− .33		− .24 .45	− .20 .46		− .22 .13	− .19 .11		− .22 .45	− .18 .46	
	− .10	− .26		− .26	− .14		− .13	− .11		− .13	− .27	
	+13.13 25	+12.30		+12.39 45	+12.11		+12.93 1302	+12.22 30		+12.88 96	+12.47 53	
	29 25.53	25.80		31.94	31.99		35.41	35.09		36.19	35.71	
	29 25.66			31.96			35.26			36.43 35.95		
	33 35.8	+4 10.56		43.16	+4 12.47		43.66	+4 10.04		44.1	+4 10.28	
	11	+ .15			+ .16			+ .16			+ .16	
	+4 10.1	+ 9.30		11.2	+ 1.90		8.4	+ 1.40		8.1	+ 1.00	
	11.5	+4 20.01		12.6	+4 14.53		9.8	+4 11.60		9.5	+4 11.44	
		33 45.7			46.5			46.9			47.4	

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	m s		' "	
Apr. 30	19 4.73		33 35.5	13
May 5	.69	4	36.8	13
10	.63	6	38.1	12
15	.56	7	39.3	11
20	4.48	8	40.4	

	m s		' "	
May 20	19 4.48	9	33 40.4	10
25	.39	10	41.4	10
30	.29	11	42.4	9
June 4	.18	11	43.3	8
9	4.07	12	44.1	7
14	3.95	13	44.8	6
19	.82	13	45.4	5
24	.69	13	45.9	3
29	3.56		46.2	

June 13

20 43.3
✓ 48.6
51.0

21 14.2   21 0.95   20 20.70
17.2   4.58   24.45
20.2   8.29   28.00
23.8   12.00   31.75
26.0   15.57   35.37

40.48
44.60
28.05   28.05   48.30
48.10   .01   51.67
8.28   .14   55.43

20 47.63
21 20.28   20 28.067
19 3.968
+84.10
+84.16

− 82.44
− 1.75
− 3.27
− 86.46

0.61

−19.56   −52.21
1.29137 n   1.71775 n
1.15112   1.57750
4988   626

50 3   50 2

2.1 +.17   37.7 +.42
3.0 +.27   38.6 +.26
19.5 −.30   54.8 −.30
17.9 +.36   54.2 +.23
10.80 50   61 46.25
53 10.62   52 46.32
14.16   37.80
53 24.78 −.04   24.12 −.11

29 23.57   24.23
23.61   24.34

− 46
1.1252
+13.34   +13.34
− .10   − .69
− .13   − .14
− .12   − .15
+12.99   +12.39
3660   3673
3666
44.7   +4 9.72
+ .16
+4 8.0   + 0.40
9.4   +4 10.28

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η Ursæ Maj.

$13^h\ 42^m\ 44^s$
$+49°\ 55'\ 21''$
$-7\ \ 32\ 33$
1878

	May 1			May 2				May 5				May 7			
h	m s	m s	m s	m s				m s	m s			m s	m s		
13	42 54.4	42 —	43 06.7	42 29.2	42 43.00	43 0.62		42 30.5	42 44.40	1.98		42 32.0	42 46.15	43 3.60	
	57.0	—	3.6	32.9	46.20	3.70		33.7	47.80	5.00		35.1	49.30	6.80	
	57.9	49.47 49.47	7.25	35.1	49.40	7.60		36.4	50.70	8.32		37.7	52.42	9.90	
	2.7	.52 52.72	10.40	38.6	52.50	10.15		39.0	53.88	11.58		40.2	55.77	13.20	
	5.3	.58 53.98	13.55	41.0	55.77	13.31		42.8	57.10	14.70		43.0	58.81	16.39	
	44 4.4	53.58	18.29		—	18.20		44 14.2	54.74	19.54			—	21.30	
	14.0	56.75	21.49		—	21.40		17.1	58.00	22.73			—	24.30	
	16.4	59.80	24.62		—	24.62		19.9	1.30	25.96			—	27.70	
	18.6	3.15	28.00		—	27.80		22.0	4.46	29.10			—	30.72	
	21.5	6.35	31.19		—	31.00		24.7	7.65	32.30			—	33.95	
		49.52	38.80		49.37 24.63	—			50.78	37.10			52.49 27.75	38.73	
		7.17	39.10		7.08 .72	—			8.32	40.35			9.98 .62	42.05	
		24.72	42.28		24.60 .60	—			25.93	43.50			27.59 .59	45.30	
		42.32	45.57		—	—			43.58	46.77			45.23 .59	48.34	
		59.93	48.83		—	—			1.23	50.00			—	51.75	
	42 59.86	12366		42 35.36				42 36.48	12982			42 37.60			
	44 15.98		43 24.737			43 24.660		44 19.58		43 25.964				43 27.638	
			42 47.628			42 47.626				42 47.62				42 47.607	
			+ 37.10			+ 37.02				+ 38.24				+ 40.05	
			+ 37.13			+ 37.05				+ 38.37				+ 40.06	
			+ 37.10			+ 37.02				+ 38.34				+ 40.03	
			− 35.83			− 35.74				− 36.77				− 38.57	
			− 1.32			− 1.32				− 1.58				− 1.74	
			− 3.69			− 3.68				− 3.68				− 3.66	
			− 40.84			− 40.74				− 42.03				− 43.74	
			42 43.89			43.91				43.93				43.90	
	+24.87	−57.25	*	+49.29				+49.48	−53.62			+50.04			
	1.39568	1.70969n		1.69276				1.69448	1.72933n			1.69932			
	1.30995n	1.62396		1.60703n				1.60870n	1.64360			1.61359n			
	30 1	30 1		30 2				30 2	30 1			30 2			
☾	7.4 +.18	4.7 +.18		26.9 +.54				26.9 +.54	1.3 +.14			27.9 +.54			
☉	8.2 +.34	5.0 +.22		27.5 +.24				28.5 +.23	2.9 +.19			28.3 +.23			
♀	25.8 −.06	23.1 −.28		46.1 −.55				47.1 −.57	20.7 −.36			45.2 −.53			
♃	21.9 +.46	20.1 +.66		42.9 +.35				43.1 +.35	17.8 +.67			42.1 +.36			
	16.60 32	78	13.90	36.50 58				37.02 55	64	11.02		36.55 60			
	32 15.82	31 13.22		32 35.85				32 36.40	31 10.68			32 35.88			
	−20.42	42.07		−40.46				−40.62	44.02			−41.08			
	31 55.40	55.29		31 55.39				31 55.78	54.70			31 54.80			
+49°	50' 52.95	53.06		50 52.96				50 52.57	53.65			50 53.55			
−7'	32' 15"														
	0.8820														
	+ 53			− 47				− 32				− 7			
	0.8873			0.8773				0.8788				0.8813			
	+ 7.71	+ 7.71		+ 7.54				+ 7.56	+ 7.56			+ 7.61			
	− .17	− .71		− .65				− .66	− .77			− .67			
	− .25 .18	− .18		− .39				− .51	− .09			− .21			
	− .23	− .20		− .14				− .14	− .16			− .15			
	+ 7.06 13	+ 6.85	6.70	+ 6.76 54				+ 6.75 55	+ 6.54			+ 6.58			
	51 0.08	50 56		59.50				59.12	0.19			60.13			
	50 59.92			59.8				59.66							
	55 7.5	+4 10.56		9.8	+4 10.92			10.5	+4 11.65			11.1	+4 12.09		
	"	+ .08		10.3	+ .09				+ .09				+ .09		
	+4 9.6	+ 11.90		10.3	+ 11.60			10.9	+ 10.80			11.9	+ 10.30		
	9.9	+4 22.54		10.6	+4 22.61			11.32	+4 22.54			11.3	+4 22.48		
		55' 22.5			22.1				22.2				22.6		

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	α			δ			α		δ	
	m s			′ ″			m s		′ ″	
Apr. 30	42 47.63	1		55 9.2	13	June 9	42 47.20	9	55 18.3	8
May 5	.62			10.5		14	.11	10	19.1	7
10	.59	3		11.8	13	19	.01	10	19.8	6
15	.55	4		13.0	12	24	.91	11	20.4	6
20	47.50	5		14.2	12	29	46.80		21.0	
25	.44	6		15.3	11					
30	.37	7		16.4	11					
June 4	.29	8		17.4	10					
9	47.20	9		18.3	9					
~~June~~ May 13				June 20						
43 15.0	43 29.40	43	46.98	43 24.5	43 38.50	43 56.20				
18.3	32.70		50.20	26.9	41.90	59.43				
21.4	35.90		53.42	30.0	45.00	2.69				
24.4	38.90		56.50	32.3	48.03	5.80				
26.9	42.30		59.85	35.5	51.50	9.00				
44 5.79	38.79		4.58	45 13.8	49.00	13.80				
1.9	42.93		7.78	16.5	52.30	16.95				
4.9	46.15		10.98	19.5	55.48	20.20				
7.7	49.40		14.25	21.7	58.70	23.39				
10.0	52.70		17.50	24.4	2.00	26.63				
	35.84		22.25		44.99	31.50				
	53.39		25.39		2.62	34.60				
	11.02		28.70		20.19	38.00				
	28.65		31.81		37.88	41.10				
	46.19		35.10		55.50	44.22				
43 21.20	5509			43 29.84	10118					
45 4.48		44	11.018	45 19.18		44 20.236				
		42	47.124			42 46.985				
			+83.89			+ 93.25				
			+83.92			+ 93.28				
			~~+83.89~~			~~+ 93.25~~				
			− 82.47			− 91.61				
			− 1.42			− 1.61				
			− 3.18			− 3.04				
			− 87.07			− 96.26				
			43.95			43.98				
+49.82	−53.46			+50.40	−58.94					
1.69740	1.72803 n			1.70243	1.77041 n					
1.61348 n	1.64411			1.61855 n	1.68649					
224	287			727	525					
30 2	30 0			30 2	30 0					
16.7 +.40	52.0 +.15			17.4 +.42	46.3 +.23					
18.0 +.32	52.8 +.28			16.3 +.33	45.9 +.28					
33.5 −.04	10.1 −.17			33.5 −.04	2.4 −.01					
33.2 +.47	8.2 +.73			33.1 +.47	2.3 +.63					
25.10 115	99 1.05			25.45 118	113 54.35					
32 25.35	31 0.78			32 25.08	30 54.22					
−41.07	44.07			−41.54	48.58					
31 44.28 +.12	44.85 −.13			31 43.54 +.11	42.80 −.18					
51 4.07	3.50			51 4.81	5.55					
3.95	3.63			4.70	5.68					
32 26										
0.88221										
− 41				− 164						
0.87779				0.86556						
+ 7.55	+ 7.55			+ 7.34	+ 7.34					
− .67	− .76			− .67	− .94					
− .14 .10	− .06 .04			− .12	− .05					
− .29	− .25			− .30	− .28					
+ 6.459	+ 6.48.50			+ 6.285	+ 6.087					
10.44	10.13			10.95	11.75					
10.28				11.55						
18.95 +4	9.72			19.95 +4	10.05					
+	.09			+	.09					
+4 8.7 +	2.48			8.6 +	1.46					
9.0 +4	12.21			8.9 +4	11.54					
	22.5				22.9					

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η Bootis

α_0 13h 48m 53s.526

δ_0 +19° 0′ 36″.35

corr α −.007

corr δ +.026

$\frac{d\alpha}{dt}$

$\frac{d\delta}{dt}$

log ρ sin δ 9.51286

" ρ cos δ 9.97565

" ρ sin i 0.08115n — June 5

0.08296n after "

172

tan δ 0.34

sin Z +40

log R_1 1.38040

" R_2 1.07973

R_1 24.01

R_2 12.02

I 2.19

+23 22 12

May 1 | May 2 | May 5 | May 7

	May 1			May 2			May 5			May 7		
h m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s
13 48 37.5	49 3.44	49 15.33	48 56.8	49 3.24	49 15.32	48 54.4	49 4.42	16.45	48 57.8	49 6.40	49 18.25	
35.7	5.60	17.36	59.1	3.30	17.48	56.1	6.61	18.53	59.4	8.59	20.28	
37.6	7.77	19.78	1.0	7.70	19.70	58.0	8.75	20.78	0.6	10.63	22.52	
39.4	9.99	22.00	2.7	9.80	21.80	59.6	11.00	23.00	2.1	12.70	24.71	
1.2	12.18	24.27	4.7	12.04	24.00	1.7	13.18	25.18	4.6	14.80	26.99	27.49
49 59.2	57.30	27.48	50 5.1	57.30	27.32	50 3.6	52.48	28.50	50 5.7	54.29	30.17	
1.2	53.65	29.63	7.5	3.50	29.49	5.6	54.56	30.62	7.6	56.35	32.39	
2.9	56.00	31.80	9.4	55.60	31.69	8.3	56.80	32.80	9.5	58.63	34.54	
5.0	58.08	34.00	10.9	57.76	33.89	10.3	58.93	34.92	11.3	0.80	36.68	
7.0	0.20	36.14	12.4	0.10	35.93	11.7	1.28	37.20	13.8	2.95	38.90	
	7.80	39.35		7.66	39.30		8.79	40.38		10.64	42.15	
	9.83	41.47		9.86	41.35		20.79	42.58		22.55	44.30	
	31.81	43.73		31.66	43.63		32.81	44.78		34.54	46.55	
	43.73	45.90		43.65	45.80		44.79	47.00		46.55	48.74	
	55.85	48.19		55.65	47.97		56.81	49.20		58.60	51.00	
	48 57.68	15902		49 0.86	15828	658	48 57.96	16399		49 0.90	17288	
	50 3.06		49 31.804	50 9.06		49 31.848	50 7.90		49 32.798	50 9.58		49 34.576
			48 55.512			48 55.514			5552			48 55.520
			+36.29			+36.14			+37.28			+39.06
			+36.30			+36.15			+37.29			+39.07
			+3626			+36.11			+3725			+3903
			−35.83			−35.75			−36.78			−38.58
			−.38			−.38			−.45			−.43
			−2.99			−2.99			−2.99			−2.99
			−39.20			−39.12			−40.22			−42.00
			48 52.60			52.54			52.58			52.58
	+34.12s	−31.26s		+30.80	−37.40		+34.84	−35.10		+33.68	−35.00	
	1.53301	1.49499n		1.48855	1.57287n		1.54208	1.54531n		1.52787	1.54407n	
	1.61416n	1.57614		1.56970n	1.65402		1.62323n	1.62646		1.69852n	1.62522	
	25′ 1′	25′ 0		25 1	25 0		25 1	25 0		25 1	25 0	
E	43.9 +.26	24.9 +.48		41.4 +.30	18.3 +.39		44.1 +.26	20.9 +.44		45.0 +.24	21.1 +.44	
G	48.9 +.43	31.3 +.03		44.9 +.40	22.8 +.06		51.0 +.42	27.3 +.04		50.0 +.43	27.0 +.04	
I	8.0 +.05	49.7 −.66		5.0 +.12	42.7 −.58		10.8 −.08	47.0 −.68		7.9 +.05	45.3 −.65	
H	1.1 +.33	43.9 +.51		59.4 +.30	37.3 +.52		3.8 +.41	40.3 +.51		2.2 +.37	39.6 +.51	
	55.95 107	37.80 96		53.20 112	39 3050		57.49 101	31 3395		56.45 109	34 3320	
	26 55.48	25 37.45		26 52.68	25 30.28		26 57.42	25 33.88		26 56.28	25 33.25	
	−41.13	37.68		−37.13	45.08		−42.00	42.31		−40.60	42.19	
	26 14.35	15.13		26 15.55	15.36		26 15.42	16.19		26 15.68	15.44	
+18°	56′ 34.00	33.22		56 32.80	32.99		56 32.93	32.16		56 32.67	32.91	
+23°	22′ 4″											
	1.3958											
	+53			−46			−30			−6		
	1.4011			1.3912			1.3928			1.3952		
	−25.18	−25.18		−24.62	−24.62		−24.71	−24.71		−24.84	−24.84	
	−.19	−.16		−.16	−.23		−.21	−.21		−.19	−.21	
	−.21	−.85		−.27	−.86		−.25	−.86		−.21	−.86	
	−.27	−.09		−.28	−.10		−.25	−.08		−.27	−.08	
	−25.85 79	−25.48		−25.51	−24.99		−25.46	−25.05		−25.45	−25.18	
	56 8.21	7.74		7.59	8.03		7.54	7.11		7.22	7.73	
	56 7.78			7.80			7.34			7.48		
	0 18.9	+4 10.56		9.8	+4 10.92		9.5	+4 11.65		9.86	+4 12.09	
	″	− .26			− .26			− .26			− .26	
	+4′ 10.9	+ 16.70		11.3	+ 16.50		12.2	+ 16.10		12.4	+ 15.80	
	11.2	+4 27.00		11.5	+4 27.16		12.4	+4 27.49		12.6	+4 27.63	
		0′ 35.0			35.0			34.8			35.1	

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	α (m s)		δ (′ ″)	
Apr. 30	48 55.51	1	0 18.7	8
May 5	.52	0	19.5	8
10	.52	0	20.3	8
15	.52	1	21.1	7
20	55.51	1	21.8	8
25	.50	2	22.6	7
30	.48	3	23.3	7
June 4	.45	3	24.0	6
9	55.42		24.6	

June 3			June 6			June 9			June 13		
49 30.3	49 35.20	49 47.29	49 32.7	49 39.20	49 51.27	49 33.3	49 44.00	49 55.95	49 43.7	49 50.19	—
32.4	37.40	49.36	34.6	41.50	53.45	35.6	46.00	58.05	45.5	54.57 52.30	—
34.2	39.60	51.54	36.8	43.70	55.60	37.2	48.38	0.30	48.0	.49 54.35	—
36.0	41.68	53.73	38.8	45.85	57.76	39.5	50.50	2.50	50.5	.35 56.05	—
38.0	43.89	55.83	40.6	48.00	0.04	41.1	52.70	4.70	53.0	53.86 —	—
50 38.6	23.18	59.20	50 33.5	27.32	3.10	50 45.2	31.93	7.91		50 38.05	—
40.7	25.40	1.40	35.3	29.44	5.36	46.7	34.00	10.03		40.20	—
42.5	27.50	3.60	37.6	31.53	7.59	49.0	36.29	12.20		42.35	—
44.4	29.78	5.73	39.9	33.85	9.75	50.8	38.45	14.40		44.48	—
46.6	31.99	7.87	41.8	36.05	12.05	52.7	40.73	16.57		46.75	—
	39.55	11.20		43.65	15.33		48.32	19.90		54.32 18.33	—
	51.55	13.33		55.62	17.49		0.30	22.05		.36	—
	3.56	15.62		7.57	19.59		12.22	24.27		—	—
	15.59	17.80		19.62	21.72		24.28	26.47		—	—
	27.57	19.99		31.64	23.96		36.28	28.69		42.37	—
49 34.18	17.82		49 36.70	38.10		49 37.34	61.40		49 48.14		
50 42.56		50 3.564	50 37.62		50 7.620	50 48.88		50 12.280			50 18.345
		48 55.455			48 55.4[illegible]			48 55.418			48 55.386
		+68.11			+72.18			+76.86			+82.96
		+68.12			+72.19			+76.87			+82.97
		+68.08			+72.15			+76.83			+82.93
		− 67.58			− 71.64			− 76.37			− 82.48
		− .44			− .47			− .45			− .41
		− 2.93			− 2.91			− 2.89			− 2.86
		− 70.95			− 75.02			− 79.71			− 85.75
		52.61			52.60			52.57			52.59

June 3		June 6		June 9		June 13		
+29.38	−39.00	+30.92	−30.00	+34.94	−36.60	+30.20		
1.46805	1.59106n	1.49024	1.47712n	1.54332	1.56348n	1.48001		
1.54920n	1.67221	1.57320n 196	1.56008 5884	1.62628n 504	1.64644 520	1.56297n 173		
25 1	25 0	25 1	25 0	25 1	25 0	25 1		
34.8 +.43	11.9 +.23	33.5 +.47	20.6 +.43	39.1 +.35	11.3 +.21	33.0 +.48		
40.9 +.30	18.1 +.09	41.0 +.30	28.8 +.03	45.8 +.41	19.1 +.09	38.7 +.24		
58.8 +.07	36.2 −.28	56.9 −.05	44.4 −.63	2.2 +.14	35.1 −.22	57.1 −.03		
54.3 +.32	31.8 +.50	53.1 +.33	40.2 +.51	58.4 +.30	31.8 +.50	52.7 +.34		
46.80 113	54 24.05	45.20 105	34 32.50	50.65 120	58 23.20	103	45.05	
26 47.20	25 24.50	26 46.12	25 33.50	26 51.38	25 24.32	26 45.38		
− 35.42	47.01	− 37.43	36.31	− 42.29	44.30	− 36.56		
26 11.78	11.61	26 8.69 +.11	9.81 −.10	26 9.09 +.12	8.62 −.12	26 8.82 +.11		
56 36.57	36.84	56 39.66	38.54	56 39.26	39.73	56 39.53		
		39.55	38.64	39.14	39.85	39.42		
22 0								
1.3958								
− 53		− 19		− 57		− 40		
1.3905		1.3939		1.3901		1.3918		
−24.58	−24.58	−24.77	−24.77	−24.55	−24.55	−24.65		
− .14	− .26	− .16	− .15	− .21	− .23	− .15		
− .13	− .03	− .13	− .04	− .14	− .02	− .16		
− .28	− .14	− .26	− .08	− .30	− .14	− .26		
−25.13	−25.01	−25.32	−25.04	−25.13	−24.94	−25.13		
11.48	11.84	14.29	13.62	14.01	14.91			
11.66		13.96		14.46		14.29		
23.9	+4 12.47	24.25	+4 10.04	24.6	+4 10.28	25.1	+4 9.72	
	− .27		− .27		− .28		− .28	
+4 12.2	+ 11.70	10.3	+ 11.40	10.1	+ 11.00	10.8	+ 10.50	
12.4	+4 23.90	10.5	+4 21.17	10.3	+4 21.00	11.0	+4 19.94	
	35.6		35.1		35.5		34.2	

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	α		δ	
June 9	48 55.42		0′ 24.6	6
14	.38	4	25.2	6
19	.34	4	25.8	5
24	.30	4	26.3	5
29	55.25	5	26.8	

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	June 20			June 24			June 25			June 26		
13	49 48.0	49 59.20	50 11.12	47 31.7	47 40.75	47 52.60	47 33.7	47 42.90	47 54.90	47 40.3	47 45.20	47 57.10
	50.4	1.31	13.30	34.9	42.90	54.80	35.6	45.00	57.00	42.8	47.38	59.35
	51.8	2.50	15.40	36.5	44.95	57.00	37.5	47.35	59.24	44.4	49.58	1.50
	53.6	5.65	17.62	38.0	47.38	59.25	39.4	49.53	1.40	46.5	51.62	3.60
	55.3	7.90	19.74	40.0	49.44	1.46	41.8	51.58	3.60	48.4	53.88	5.77
	51 3.4	47.00	23.00	48 36.3	28.74	4.70	48 42.6	30.85	7.00	48 42.4	33.30	8.98
	5.6	49.30	25.28	38.0	30.92	6.83	45.0	32.95	9.00	44.6	35.30	11.32
	7.3	51.44	27.49	39.8	33.20	9.00	46.9	35.30	11.32	45.9	37.44	13.47
	9.3	53.60	29.66	42.4	35.42	11.30	48.8	37.50	13.50	48.4	39.71	15.66
	11.0	55.77	31.80	43.9	37.62	13.52	50.6	39.70	15.63	49.9	41.92	17.88
		3.51	35.00		45.08	17.00		47.27	18.98 21.00		49.53	21.10
		15.44	37.27		57.02	18.76		59.23	23.25		1.46	23.30
		27.43	39.39		9.07	21.00		11.29	25.40		13.46	25.55
		39.42	41.60		21.12	23.33		23.27	27.70		25.52	27.72
		51.42	43.84		33.18	25.53		35.26			37.53	29.93
	49 51.82	13722		47 36.22	4647		47 37.60	5632		47 44.48	6750	
	51 7.32		50 27.444	48 40.08		48 9.094	48 46.78		48 11.264	48 46.24		48 13.500
			48 55.330			48 55.298			48 55.288			48 55.278
			+92.11			−46.20			−44.02			−41.78
			+92.12			−46.19			−44.01			−41.77
			+92.08			−46.23			−44.05			−41.81
			−91.61			+46.68			+44.51			+42.26
			− .46			− .46			− .46			− .49
			− 2.80			− 2.77			− 2.76			− 2.75
			− 94.87			+ 43.45			+ 41.29			+ 39.02
			48 52.57			52.54			52.55			52.52

	June 20		June 24		June 25		June 26	
	+35.62	−39.88	+32.87	−30.99	+33.66	−35.52	+29.02	−32.74
	1.55169	1.60076n	1.51680	1.49122n	1.52711	1.55047n	1.46270	1.51508n
	1.63284n (465, 341)	1.68372 (248)	1.59976n (852)	1.57418 (294)	1.61007n (0883)	1.63343 (219)	1.54566n (442)	1.59804 (680)
	25 1	25 0	25 1	25 0	25 1	25 0	25 1	25 0
E	40.4 +.32	9.1 +.16	34.7 +.45	17.2 +.36	36.5 +.40	12.7 +.25	30.1 +.50	16.1 +.33
F	43.9 +.38	13.1 +.10	39.8 +.27	22.8 +.06	41.8 +.32	17.6 +.09	35.9 +.19	21.8 +.06
G	2.2 +.14	31.3 −.08	58.2 +.34	42.6 ∓.57	59.8 +.11	35.8 ∓.36	53.9 ∓.36	38.9 ∓.43
H	57.9 +.30	27.0 +.46	53.9 +.32	37.1 +.52	54.2 +.32	30.9 +.50	49.7 +.38	35.7 +.52
	21.30 114	64 20.20	46.45 108	37 29.90	48.15 115	58 24.25	42.00 71	48 27.50
	26 51.10	25 20.12	26 46.65	25 29.92	26 48.08	25 24.25	26 42.40	25 28.12
	−42.94 (43.12)	48.27	−39.79	37.51	−40.74	43.00	−35.13	39.63
	26 7.98 +.13	8.39 −.13	26 6.86 +.11	7.43 −.10	26 7.34 +.11	7.25 −.13	26 7.27 +.10	7.70 −.11
+18°	56 40.37	39.96	56 41.49	40.92	56 41.01	41.10	56 41.08	40.60
	40.24	40.09	41.38	41.02	40.90	41.23	40.98	40.71
23°	21′ 58″							
	1.3958							
	−162		−153		−167		−120	
	1.3796		1.3805		1.3791		1.3838	
	−23.97	−23.97	−24.02	−24.02	−23.94	−23.94	−24.20	−24.20
	− .22	− .27	− .18	− .16	− .19	− .22	− .14	− .18
	− .13 (09)	− .02	− .13 (09)	− .03 (2)	− .10 (09)	− .03 (2)	− .12 (09)	− .03 (2)
	− .28	− .16	− .27	− .09	− .29	− .14	− .18	− .12
	−24.60 56	−24.42	−24.60 56	−24.30 29	−24.55 1	−24.33 2	−24.64 1	−24.53 2
	56′ 15.68	15.67	16.82	16.73	16.39	16.91	16.37	16.19
	56 15.68		16.78		16.65		16.28	
	0 25.9	+4′ 10.05	26.3	+4 9.90	26.4	+4 9.52	26.5	+4 9.65
		− .29		− .30		− .31		− .31
	+4′ 10.2	+ 9.70	9.5	+ 9.30	9.8	+ 9.20	10.2	+ 9.10
	10.4	+4 19.46	9.7	+4 18.90	10.0	+4 18.41	10.4	+4 18.44
		0′ 35.1		35.7		35.1		34.7

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ζ Draconis

$14^h\ 1^m\ 5^s$

$+64°\ 57'\ 33''$

$-22\ \ 34\ \ 45$

1878

α_0 $5^s.219$ — $\log a$ 9.95713 — $\log R_1$ 1.72944

δ_0 $33''.11$ — $\log \cos\delta$ 9.62661 — $\log R_2$ 1.42877

$\log \sin 1''$ 9.73211 n — June 5 — R_1 53.63

$\log \sin 1''$ 9.73390 n — after — R_2 26.85

268 — I 4.87

$\tan\delta$ +2.141

$\sin z$ −.38

	May 2				May 7				June 3				June 5			
h	m s	m s		m s												
14	1 54.2	–		1 38.2	0	86.7	1	14.70	1	41.30	2	3.16	–	–	1 9.8	1 19.00	1	45.98
	59.3	–		40.6		42.9		19.50		46.14		35.8	–	–	13.5	24.00		50.83
	8.0	–		43.0		47.6		24.45		50.95	√	40.6	–	–	17.9	28.88		55.80
	6.6	–		45.5		50.8		29.12		56.00		44.8	–	–	22.8	33.70		0.69
	10.8	–		47.8		53.4		34.03		2.05			–	–	26.8	38.49		5.60
		–		50.4														
	2 39.0	–		52.9	2	54.2		—		9.00	3	26.9	3.67	2 9.90	2 40.3	6.46		13.00
	43.8	–		53.4		57.4		—		13.67		31.5	8.52	14.80	44.9	11.60		17.82
	47.6	–	4317	57.9		0.6		—		18.28		35.3	13.49	19.60	50.9	16.28		22.65
	52.2					6.5		—		22.95		38.8	18.05	24.36	56.0	21.17		27.40
	57.4	—		5.0		10.0		—		27.70		44.0	22.90	29.40	59.5	23.80		32.37
		47.97	4797	7.7														
		14.90	48.35	10.2				24.36	57.21	34.96				36.67		28.81		39.61
				12.5				51.29	57.29	39.98				41.52		55.78		44.45
				14.9				18.32	57.47	44.77			19.61	19.61 46.37		22.65		49.50
				17.3				44.88	57.25	49.95			46.45	.60 51.48		49.41		54.50
				19.7				++++		54.72			13.33	.70 56.22		16.28		57.00
				22.2														
	2 2.78		1341	2.46	0	46.28					2	38.20			1	18.16	11293	
	2 46.00		1	48.010	3	1.74				1 51.305	3	35.30		2 19.637	2	50.32		2 22.586
			1	9.922						1 9.873				1 9.311				1 9.263
				+38.09						+41.432				+70.33				+73.83
				+38.11						+41.45				+70.35				+73.35
				+38.09						+41.43				+70.33				+73.33
				− 35.75						− 38.59				− 67.60				− 70.24
				− 2.37						− 2.70				− 2.80				− 3.02
				− 4.70						− 4.65				− 4.09				− 4.03
				− 42.82						− 45.94				− 74.49				− 77.27
				m s														
				1 5.19						5.36				5.15				5.32
	$-14^s.77$	$-59^s.99$				$+65.02$		-70.44				-18.56	-75.66			$+64.43$		-27.73
	1.16938n	1.77808n				1.81305		1.84782n				1.26858n	1.87887n			1.80909		1.44295n
	0.90149	1.51019				1.54516n		1.57993				1.00069	1.61098			1.54120n		1.17506
	25′ 4″	25′ 4″				30′ 0″		25′ 4″				25′ 4″	25′ 4″			30′ 0″		25′ 4″
6	43.8 +.22	18.9 +.49				27.2 +.49		13.6 +.40				34.0 +.45	2.1 +.20			20.0 +.42		31.1 +.50
7	41.5 +.11	16.2 +.17				26.4 +.04		11.7 +.19				34.1 +.01	2.0 +.12			19.2 +.09		30.9 +.02
9	58.8 −.04	33.2 −.04				44.1 −.62		27.7 −.01				50.1 −.58	18.3 −.30			35.2 −.23		46.3 −.59
14	0.1 .00	33.2 +.22				42.8 +.67		29.8 +.23				50.2 +.04	19.1 +.21			35.1 +.52		46.6 +.07
	51.30 29	54		26.05		35.65 42		81	2065			42.05 −.08	23	1020		27.60 80		80 38.70
	29 51.05	29 25.38				30 35.12		29 20.70				29 42.10	29 10.38			30 27.38		29 38.72
	7.97	32.87				−35.09		38.01				10.02	40.83			−34.77		14.96
	29 59.02	57.75				30 0.03		29 58.71				29 52.12	51.21			29 52.61		53.68
+64°	52′ 49.33″	50.60				52′ 46.32″		52′ 49.64″				52′ 56.23″	57.14			52′ 55.74″		54.67
−22°	34′ 12″											34′ 22″				34′ 22″		
	1.3790											1.3790				1.3790		
	− 45					− 4						− 52				− 58		
	1.3745					1.3786						1.3738				1.3732		
	+23.69	+23.69				+23.91		+23.91				+23.65	+23.65			+23.62		+23.62
	− .05	− .75				− .88		− 1.03				− .08	− 1.20			− .87		− .16
	− .88	− .47				− .07		− .47				− .33 24	− .22 21			− .08		− .58
	− .07	− .21				− .10		− .20				+ .02	− .06			− .20		.03
	+23.04 18	+22.24 38				+22.88 8		+22.34 33				+23.26 35	+22.18 8			+22.53 3		+23.14 28
	53′ 12.51″	12.98				11.20		11.97				19.58	19.32			18.27		14.95
	53′ 12.75″	″				11.58						19.45				18.11		
	57′ 22.28	+4 10.92				28.7		+4 12.09				30.7	+4 12.47			31.1		+4 12.90
	″	+ .25						+ .25					+ .26					+ .26
	+4′ 9.5	+ 10.80				12.1		+ 9.40				11.3	+ 2.40			13.0		+ 2.04
	10.2	+4 21.97				12.8		+4 21.74				12.8	+4 15.13			13.7		+4 15.16
		57′ 34.7″						33.3					34.6					33.3

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	α		δ	
Apr. 30	1m 9.94s		57' 21.6"	15
May 5	.90	4	23.1	14
10	.84	6	24.5	14
15	.76	8	25.9	14
20	9.67	9	27.3	13
25	.56	11	28.6	12
30	.43	13	29.8	11
June 4	.29	14	30.9	10
9	9.14	15	31.9	

	α		δ	
June 9	1m 9.14s	16	57' 31.9"	9
14	8.98	18	32.8	8
19	.80	19	33.6	7
24	.61	19	34.3	5
29	8.42		34.8	

June 6

1 13.0	1 20.75	1 47.37	
19.5	25.32	52.39	
22.9	30.34	57.00	
27.0	35.22	2.02	
31.5	40.18	6.80	
3 18.3	7.70	14.05	
23.6	12.73	19.00	
27.7	17.58	23.99	
31.0	22.45	28.99	
34.9	27.40	33.82	
	30.36	40.98	
	57.12	45.79	
	23.97	50.69	
	50.71	55.55	
	17.57	0.53	
1 22.78	119.73		
3 27.10		2 23.946	
		1 9.223	
		+74.72	
		+74.74	
		+74.72	
		− 71.66	
		− 2.94	
		− 4.00	
		− 78.60	
		5.35	

June 9

1 8.7	1 24.90	1 51.60
11.8	29.85	56.77
17.3	34.53	1.70
19.8	39.60	6.40
26.0	44.29	11.20
3 30.4	12.03	18.40
37.2	17.00	23.52
40.8	22.12	28.50
44.3	26.90	83.00
48.3	31.88	88.10
	34.63	45.39
	1.53	50.37
	28.30	53.76
	55.21	0.14
	21.99	5.00
1 16.72	141.66	
3 40.20		2 28.332
		1 9.132
		+79.20
		+79.22
		+79.20
		− 76.38
		− 2.82
		− 3.91
		− 83.11
		5.22

June 13

1 23.6	1 57.5	2 24.3
27.0	0.1	26.8
33.4	2.6	29.1
36.9	4.8	31.6
43.3	7.2	34.2
	9.9	36.6
3 39.7	12.0	39.1
44.5	14.7	41.6
49.4	658 17.0	3077 43.9
53.6		
58.2	7.31	0.9 51.2
	34.13	1.0 53.7
	1.00	0.9 56.0
		1.2 58.8
	102.48	—
1 32.84		
3 49.08		2 34.148
		1 9.004
		+85.14
		+85.16
		+85.14
		− 82.50
		− 2.56
		− 3.78
		− 88.84
		5.31

June 19

1 15.4	1 38.45	2 5.40
19.8	43.26	10.18
24.4	48.05	14.88
29.8	53.20	19.97
33.7	58.04	24.78
3 50.2	25.70	32.03
54.0	30.87	36.87
57.6	35.30	41.80
1.0	40.12	46.78
4.7	45.20	51.70
	48.20	58.83
	15.04	2.80
	41.84	8.60
	8.59	13.37
	35.34	18.34
1 24.62	20.901	
3 57.50		2 41.802
		1 8.791
		+93.01
		+93.03
		+93.01
		− 90.02
		− 3.00
		− 3.57
		− 96.59
		5.21

June 6		June 9		June 13		June 19	
+61.17	−63.15	+71.61	−71.87	+61.31	−74.93	+77.18	−75.70
1.78654	1.80037n	1.85497	1.85655n	1.78753	1.87466n	1.88750	1.87910n
1.51868n	1.53248	1.58889n	1.59047n	1.52145n	1.60858n	1.62142n	1.61302
2046 / 1922	429 / 305	765	8923	021	734	018	178
30 0	25 4	30 0	25 4	30 0	25 3	30 0	25 3
13.9 +.29	7.3 +.27	18.1 +.38	1.3 +.20	12.8 +.25	59.2 +.20	19.9 +.42	58.0 +.20
14.9 +.09	8.1 +.19	18.2 +.09	1.4 +.14	12.9 +.10	58.4 +.20	19.1 +.09	56.1 +.25
29.8 −.07	21.6 −.23	34.5 −.20	15.9 −.27	29.6 −.08	15.0 −.24	36.6 −.31	13.2 −.17
31.1 +.56	23.2 +.21	34.8 +.52	17.8 +.21	29.9 +.50	15.7 +.22	35.9 +.50	13.9 +.23
21.85 87	44 14.45	26.30 79	28 8.60	21.20 77	7.10 38	28.25 72	51 6.60
30 22.42	29 15.05	30 26.40	29 9.10	30 21.30	29 7.08	30 27.88	29 5.30
−33.15	34.22	−38.81	38.95	−33.22	40.60	−41.82	41.02
29 49.27 +.10	49.27 −.10	29 47.59 +.12	48.05 −.11	29 48.08 +.09	47.68 −.11	29 46.06 +.12	46.32 −.11
52 59.08	59.08	53 0.76	0.30	53 0.27	0.67	53 2.29	2.03
58.98	59.18	0.64	0.41	0.18	0.78	2.17	2.14
− 14		− 52		− 38		− 128	
1.3776		1.3738		1.3752		1.3667	
+23.86	+23.86	+23.65	+23.65	+23.72	+23.72	+23.26	+23.26
− .78	− .83	− 1.07	− 1.08	− .78	− 1.18	− 1.24	− 1.20
− .02	− .17	− .02	− .17	− .01	− .16	− .02	− .16
− .22	− .11	− .20	− .07	− .19	− .10	− .18	− .13
+22.84	+22.75	+22.36	+22.33	+22.74	+22.28	+21.82	+21.79
21.82	21.93	23.00	22.74	22.92	23.06	23.99	23.93
21.88		22.87		22.99		23.96	
31.35	+4 10.04	31.95	+4 10.28	32.67	+4 9.72	33.6	+4 10.02
	+ .26		+ .26		+ .27		+ .28
+4 9.5	+ 1.80	9.1	+ 1.20	9.7	+ 0.40	9.6	− 0.50
10.2	+4 12.10	9.8	+4 11.74	10.4	+4 10.39	10.3	+4 9.80
	34.0		34.6		33.4		33.8

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June 20 | June 24 | June 26

	m	s	m	s	m	s										
14	1	26.5	1	40.85	2	6.60	58	57.2	59	21.67	59	48.26	59	44	59	26.17	59	52.70
		31.8		44.60		11.58		2.9		26.35		53.09		9.6		31.00		57.58
		35.5		49.75		16.60		7.3		30.90		58.00		13.8		35.98		2.52
		38.7		54.60		21.30		13.0		36.00		2.78		17.8		40.85		7.28
		45.3		59.39		26.20		16.9		40.95		7.70		22.0		45.58		12.00
	3	44.8		26.98		33.74	0	57.5		8.78		15.00	1	1.4		13.10		19.50
		48.3		32.04		38.50		2.0		13.78		19.83		4.8		18.00		24.33
		51.4		37.00		43.42		5.4		18.68		24.70		9.0		22.88		29.22
		55.7		41.92		48.30		10.5		23.44		29.68		13.9		27.68		33.99
		59.9		46.90		53.00		14.9		28.80		34.60		16.8		32.67		38.78
				49.72		0.60				31.17		41.84				35.92		46.27
				16.46		5.20				57.95		46.62				2.42		57.19
				43.39		10.35				24.76		51.60				29.16		56.00
				10.23		15.19				51.59		56.50				56.08		1.00
				36.97		19.80				18.64		1.37				22.87		5.75
	1	35.56		21.77			59	7.46		12.11			59	13.52		14.65		
	3	52.02			2	43.354	1	6.06			0	24.822	1	9.18			0	29.290
					1	8.753					1	8.607					1	8.553
						+94.60						−43.78						−39.23
						+94.62						−43.76						−39.21
						+94.60						−43.78						−39.23
						− 91.63						+ 46.67						+ 42.24
						− 2.90						− 2.88						− 3.06
						− 3.53						− 3.38						− 3.31
						− 98.06						+ 40.41						+ 35.87
					m	s												
					1	5.29						5.23						5.16
					s													
				+67.79		−68.67				+77.36		−41.24				+75.77		−39.89
				1.83117		1.83677 m				1.88852		1.61532 m				1.87950		1.60086 m
				1.56509 m		1.57069				1.62248 m		1.34924				1.61342 m		1.33478
				385		6945				128		800				218		354
				30 0		25 4				30 0		25 4				30 0		25 4
ξ				15.2 +.31		2.1 +.20				17.8 +.38		15.4 +.43				17.3 +.37	[148]	14.3 +.41
η				13.9 +.09		59.8 +.16				17.3 +.09		14.2 +.18				16.8 +.09		15.8 +.17
ζ				30.5 −.08		16.1 −.27				35.4 −.24		31.6 +.01				33.2 −.15		31.2 +.02
14				31.8 +.50		17.0 +.21				35.6 +.52		32.1 +.22				33.2 +.51		32.2 +.22
				22.85 82		30 9.10				26.60 75		84 23.50				25.25 82		82
				30 22.85		29 8.75				30 26.52		29 23.32				30 25.12		29 23.38
				−36.74		37.21				−41.92		22.35				−41.06		21.62
				29 46.11	+.11	45.96	−.10			29 44.60	+.12	45.67	−.07			29 44.06	+.12	45.00 −.07
+64°				53 2.24		2.39				53 3.75		2.68				53 4.29		3.35
				2.13		2.49				3.63		2.75				4.17		3.42
−22°				34 22														
				1.3790														
				−159						−151						−115		
				1.3631						1.3639						1.3675		
				+23.07		+23.07				+23.12		+23.12				+23.31		+23.31
				− .97		− .98				− 1.25		− .35				− 1.20		− .33
				− .32		− .29				− .03		− .07				− .03		− .07
				− .20		− .08				− .19		− .21				− .20		− .20
				+21.58		+21.80				+21.63		+22.34				+21.88		+22.51
				53 24.01		24.29				25.29		25.09				26.06		25.98
				53 24.15		' "				25.19						26.02		
				57 33.75	+4	10.05				34.3	+4	9.90				34.5	+4	9.65
				+ .28						.91	+	.29				8.5	+	.30
				+4 9.6	−	8.60				9.8	−	1.20				9.2	−	1.40
				10.3	+4	9.73					+4	8.99					+4	8.55
					'	"												
					57	23.9						34.2						34.6

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α Bootis

$14^h\ 10^m\ 6^s$

$+19°\ 49'\ 6''$

$+22\ 33\ 42$

1878

α_0 5.796 — log sin δ 9.53024 — log R_1 1.38257 — R_1 24.13

corr. α +.008 +.032 — " cos δ 9.97348 — R_2 12.08

$\frac{d\alpha}{dt}$ — " 1.5 cos δ tan i 0.07898n — June 5 — I

δ_0 6.″44 — 0.08079n after " 7955

corr. δ −.50 — tan δ +.36

$\frac{d\delta}{dt}$ — sin x +.38

June 3

h	m	s	m	s	m	s
14	10	41.4	10	48.66	11	0.50
		43.6		50.52		2.54
		45.8		52.80		4.73
		47.9		55.00		7.00
		49.7		57.20		9.20
				–		12.50
				–		14.67
				–		16.74
				–		19.00
				–		21.15
			52.84	16.97		–
			4.79	.87		–
			16.81	.81		–
			—			–
			—			–
	10	45.68				

June 4

m	s				
11	53.0	10	49.35	11	1.60
	55.4		51.80		3.84
	57.2		54.05		6.05
	58.6		56.20		8.18
	0.2		58.44		10.40
			8.00		13.75
			10.05		15.95
			12.23		18.19
			14.45		20.20
			16.70		22.48
			54.05		25.70
			6.01		27.95
			18.11		30.17
			30.16		32.38
			42.29		34.62
11	56.88		9062		

June 5

10	40.6	10	37.00	11	3.18
	42.5		39.27		5.32
	44.4		41.37		7.50
	46.1		43.60		9.60
	48.0		45.81		11.90
			–		15.25
			–		17.40
			–		19.62
			–		21.87
			–		24.03
		55.41	19.54		27.27
		7.50	.58		29.45
		19.63	.63		31.68
		31.65	.57		33.80
		—			36.04
10	44.32				

June 6

10	45.4	10	52.52	11	4.55
	46.9		54.80		6.65
	49.2		56.70		8.90
	51.3		59.00		11.00
	53.2		1.20		13.10
			40.69		16.58
			42.90		18.70
			45.10		21.00
			47.30		23.18
			49.55		25.32
		56.84			28.53
		8.84			30.80
		20.96			32.97
		32.98			35.18
		45.11			37.42
10	49.20	10473			

11	16.883	11	18.124	11	19.580
10	8.763	10	8.759	10	8.753
	+68.12		+69.36		+70.83
	+68.11		+69.35		+70.82
	+6809		+69.33		+7080
	− 67.61		− 68.84		− 70.27
	− .47		− .47		− .50
	− 2.94		− 2.96		− 2.96
	− 71.05		− 72.27		− 73.73
10	m 5.83		5.85		5.85

11	20.946				
10	8.747				
	+72.20				
	+72.19				
	+7217				
	− 71.67				
	− .49				
	− 2.95				
	− 75.81				
	5.84				

	s				
	+31.20		−38.76		+35.26
	1.49415		1.58838n		1.54728
	1.57313n		1.66736		1.62626n
	35′ 3′		35′ 1		35′ 3
♂	9.″3 +.32		46.2 +.22		14.1 +.43
♀	14.1 +.29		52.1 +.42		20.1 +.25
☾	32.2 +.03		9.9 −.04		36.4 −.14
♃	— [275] +34		6.0 +.47		31.1 +.34
	′ 1.98		58.05 107		25.25 88
	38 20.78		36 58.55		38 25.42
	−37.42		46.49		−42.29
	87 43.36		87 46.04		87 43.13
+19°	45′ 4.″99		45 3.31		45 5.22
+22°	33′ 32″				
	1.3787				
	− 51		−142		− 54
	1.3736		1.3645		1.3733
	−23.64		−23.15		−23.62
	− .17		− .27		− .21
	− .23.17		− .14		− .24
	− .24		− .27		− .22
	−24.22 82		−23.83 74		−24.39 19
	44′ 10.77				
	44 40.77		39.52		41.03
	48 53.75	+4 12.47	53.9	+4 13.48	54.05	+4 12.90
	−	.26		− .26		− .26
	+4′ 13.0	+ 12.21	14.4	+ 12.50	13.0	+ 12.40
	12.5	+4 24.91	13.9	+4 25.72	12.5	+4 25.04
		′ 49 5.″7		5.2		6.1

		1.38257			
		1.08190			
		1.58253n			
		129			
		35′ 3			
		6.4 +.24			
		13.3 +.30			
		28.1 +.02			
		23.8 +.34			
		17.25 90			
		38 17.90			
		−38.24			
		87 39.66 +.11			
		45 8.69			
		8.58			
		− 10			
		1.3777			
		−23.86			
		− .18			
		− .23			
		− .22			
		−24.49			
		44.19			
		54.2	+4 10.04		
		−	.26		
		10.0	+ 12.20		
		9.5	+4 21.98		
			6.2		

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	α			δ	
May 20	10m 8.80			48 51.6	8
25	.79	1		52.4	7
30	.78	1		53.1	8
June 4	.76	2		53.9	7
9	8.73	3		54.6	7
14	.70	3		55.3	6
19	.66	4		55.9	6
24	.62	4		56.5	5
29	8.57	5		57.0	

June 9

11	39	10	57.10	11	9.27	11	0.2	11	3.27	11	15.20						
	53		57.30		11.39		1.8		5.25		17.85						
	68		1.64		13.59		3.7		7.50		19.67						
	82		3.70		15.70		5.6		9.72		21.83						
	103		5.80		17.90		7.0		11.91		24.05						
			45.37		21.20	12	0.64		57.48		27.33						
			47.60		23.45		8.7		59.60		29.53						
			49.90		25.65		10.7		59.80		31.65						
			51.96		27.85		13.2		57.90		33.68						
			54.30		30.05		15.2		0.20		36.02						
			1.53		33.40		.87		7.53		38.41						
			13.57		35.59		2.80		19.62		41.54						
			25.64		37.78		4.90		31.64		43.68						
			37.75		39.93		6.80		43.73		46.00						
			49.83		42.05		8.90		55.80		48.04						
11	6.90		12.832			11	3.66		15.832								

				11	25.664	12	10.84			11	31.664						
				10	8.728					10	8.704						
					+76.94						+82.96						
					+76.93						+82.95						
					+76.91						+82.93						
					− 76.39						− 82.51						
					− .47						− .43						
					− 2.03						− 2.91						
					− 79.79						− 85.85						
					5.87						5.81						

+18.76				+28.00		−39.18											
1.27323				1.44716		1.69306n											
1.35402n				1.52795n		1.67385											
278				671		261											
35 2				35 3		35 1											
51.1	+.20			1.4	+.17	40.6	+.32										
56.9	+.32			6.6	+.30	45.8	+.41										
14.1	−.25			23.8	−.15	3.3	+.14										
10.6	+.40			19.2	+.35	59.7	+.31										
2.60	67			12.60	67		118	51.95									
38	3.18			38	12.75	36	52.35										
	−22.60				−33.72		47.19										
37	40.58	+.07		37	39.03	+.09	39.54	−.13									
45	7.77			45	9.32		8.81										
	7.70				9.23		8.94										
− 47				− 36													
1.3740				1.3751													
−23.66				−23.72		−23.72											
− .06				− .14		− .27											
− .18				− .12		− .07											
− .17				− .17		− .30											
−24.07				−24.16		−24.37											
43.69				45.07		44.57											
43.69				44.82													
54.6	+4	10.28		55.2	+4	9.72											
	−	.26			−	.27											
+4 10.9	+	11.80		10.4	+	11.20											
10.4	+4	21.82		9.49	+4	20.65											
		5.5				5.5											

June 13

June 19

11	3.8	11	10.70	11	22.78												
	6.5		12.75		24.94												
	8.7		15.10		27.00												
	10.2		17.40		29.30												
	12.0		19.50		31.50												
			58.95		34.79												
			1.18		36.98												
			3.40		39.20												
			5.60		41.50												
			7.85		43.50												
			15.09		46.78												
			27.10		48.98												
			39.19		51.30												
			51.23		53.42												
			3.40		55.65												
				8.24													
11	6.84		19.601														

June 20

11	4.4	11	12.38	11	24.80												
	6.0		14.45		26.45												
	7.7		16.60		28.70												
	9.6		18.78		30.82												
	11.9		21.06		32.97												
			0.60		36.38												
			2.72		38.55												
			4.98		40.78												
			7.15		42.95												
			9.43		45.17												
			16.64		48.50												
			28.65		50.967												
			40.77		53.477												
			52.84		55.997												
			4.98		58.730												
11	7.92		20.388														

										11	39.202						
										10	8.658						
											+90.54						
											+90.53						
											+90.51						
											− 90.04						
											− .50						
											− 2.86						
											− 93.40						
											5.80						

														11	40.774		
														10	8.650		
															+92.13		
															+92.12		
															+92.10		
															− 91.64		
															− .49		
															− 2.85		
															− 94.98		
															5.80		

+30.96														+32.86			
1.49080														1.51667			
1.57159n														1.59746n			
035														622			
35 3														35 3			
5.9	+.23													7.8	+.28		
9.8	+.30													11.6	+.30		
28.0	+.02													29.4	+.05		
22.8	+.34													25.7	+.34		
16.95	89													18.60	97		
38	16.62													38	18.62		
	−37.29														−39.58		
37	39.33	+.11												37	39.04	+.11	
45	9.02													45	9.31		
	8.91														9.20		
− 119														− 156			
1.3668														1.3631			
−23.27														−23.07			
− .17														− .19			
− .23														− .23			
− .22														− .24			
−23.89														−23.73			
45.12														45.54			
55.9	+4	10.02												56.0	+4	10.05	
	−	.28													−	.28	
10.8	+	10.50												10.5	+	10.40	
10.3	+4	20.24												10.0	+4	20.17	
		5.4														5.7	

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June 24

	m	s
14	8	45.0
		47.1
		48.9
		50.9
		53.3
	9	59.7
		1.4
		3.8
		5.6
		7.4
	8	49.04
	10	3.64

	m	s
	8	53.90
		56.00
		58.25
		0.42
		2.70
		42.10
		44.40
		46.54
		48.72
		50.88
		58.25
		10.30
		22.39
		34.48
		46.53
	11	19.5

	m	s
	9	6.00
		8.00
		10.28
		12.48
		14.73
		18.00
		20.15
		22.40
		24.62
		26.80
		30.04
		32.30
		34.35
		36.67
		38.85

9 22.390
10 8.618
= 46.23
− 46.24
− 46.26

+ 46.66
− .48
− 2.82
+ 43.36

m s
10 5.75

June 25

	m	s
	8	49.8
		51.8
		53.8
		56.7
		58.8
10	0	0.3
		1.9
		3.5
		5.4
		7.3
	8	54.38
	10	3.68

	m	s
	8	36.19
		38.30
		0.60
		2.80
		4.97
		44.84
		46.52
		48.83
[51.66]		50.00
		53.28
		0.61
		12.63
		24.65
		36.70
		48.83
	12	32.2

	m	s
	9	8.29
		10.45
		12.60
		14.80
		17.00
		20.27
		22.47
		24.70
		26.80
		29.00
		32.29
		34.55
		36.75
		38.93
		41.00
		43.2

9 24.684
10 8.608
= 43.92
− 43.93
− 43.95

+ 44.45
− .49
− 2.81
+ 41.15

5.83

June 26

	m	s
	8	49.4
		51.9
		53.6
		55.9
		57.8
10	1	1.1
		3.3
		5.2
		6.9
		8.5
	8	53.72
	10	5.80

	m	s
	8	58.35
		0.55
		2.80
		5.00
		7.20
		46.35
		48.56
		51.00
		53.20
		53.75
		2.78
		14.78
		26.92
		38.93
		51.00
	13	3.1

	m	s
	9	10.40
		12.57
		14.75
		16.98
		19.19
		22.49
		24.69
		26.90
		29.20
		31.30
		34.57
		36.70
		38.90
		41.15
		43.35

9 26.882
10 8.598
= 41.72
− 41.73
− 41.75

+ 42.22
− .52
− 2.80
+ 38.90

5.78

	s	s
	+33.35	−41.25
	1.52310	1.61542 n
	1.60389 n	1.69621
	265	497
	35 3	35 1
E	6.4 +.24	36.9 +.39
	11.2 +.30	42.2 +.34
	30.1 +.06	0.7 +.12
H	25.6 +.34	57.0 +.30
	16.25 4.94	15 48.80
	38 18.32	36 49.20
	−40.17	49.68
	37 38.15 +.12	38.88 −.14
+19°	45 10.20	9.47
	10.08	9.61
+22°	33 28	
	1.3787	
	−150	
	1.3637	
	−23.10	−23.10
	− .20	− .30
	− .25	− .13
	− .24	− .29
	−23.79	−23.78
	44 46.38	45.83
	44 46.10	
	48 56.5 +4	9.90
	−	.29
	+4 10.4 +	9.90
	9.9 +4	19.51
		49 5.6

	s	s
	+30.30	−39.00
	1.48144	1.59106 n
	1.86223 n	1.77185
	5 099	6 061
	35 3	35 1
	2.5 +.18	40.0 +.33
	7.2 +.30	44.5 +.39
	25.4 −.07	2.6 +.14
	20.8 +.35	58.7 +.30
	13.95 76	1162.30
	38 13.98	36 51.45
	−36.50	27.04
	37 37.48 +.11	27.09 −.13
		3842
	45 10.87	9.93
	.10.76	10.06
	−155	
	1.3632	
	−23.08	−23.08
	− .16	− .27
	− .22	− .13
	− .19	− .29
	−23.65	−23.77
	47 17	16.33
	46.75	
	56.6 +4	9.52
	−	.29
	9.8 +	9.80
	9.3 +4	19.03
		5.8

	s	s
	+33.16	−38.12
	1.52061	1.58115 n
	1.60140 n	1.66194
	0.16	0.70
	35 3	35 1
	6.5 +.24	41.2 +.31
	11.6 +.30	46.3 +.41
	28.7 +.03	3.8 +.14
	24.7 +.34	59.8 +.31
	17.60 91	117 52.50
	38 17.88	36 52.78
	−39.94	45.91
	37 37.94 +.11	38.69 −.13
	45 10.41	9.66
	10.30	9.79
	−110	
	1.3677	
	−23.32	−23.32
	− .19	− .25
	− .25	− .13
	− .23	− .29
	−23.97	−23.99
	46.40	45.84
	46.12	
	56.7 +4	9.65
	−	.30
	10.6 +	9.70
	10.1 +4	19.05
		5.2

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θ Bootis

α 14h 21m 3s

δ +52° 24' 54"

− 10 2 6

1878

α_0 2.605 — log sin δ 9.89897

corr α + .007 — " cos δ 9.78529

$\frac{d\alpha}{dt}$ + .008 — " 15 cos δ sin t 9.89079n — June 5

δ_0 53".89 — " " 9.89260n " after 136

tan δ +1.30

corr δ +1.01 — sin x − .17

$\frac{d\delta}{dt}$

I 3.38

June 3			June 4			June 5			June 25		
h m s	m s	m s									
14 21 17.9	21 31.25	21 50.00	21 15.4	21 32.52	21 57.27	21 25.3	21 34.24	21 57.83	19 23.3	19 —	19 57.70
21.3	34.70	53.40	17.9	36.05	54.60	28.2	36.99	57.20	26.0	48.01 42.63	1.00
25.0	38.08	56.75	20.8	39.45	58.00	31.0	40.97	59.60	28.9	45.81 45.81	45.0
27.9	41.50	0.20	24.4	42.70	1.30	34.5	44.32	2.90	32.0	45.91 49.29	7.79
30.4	44.85	3.60	27.9	46.04	4.73	37.0	47.60	6.30	35.8	45.84 52.60	11.20
23 7.0	48.80	8.65	23 13.3	47.10	9.05	23 14.00	48.70	11.30	21 15.5	53.50	16.40
10.1	49.15	11.95	19.0	50.48	13.23	17.1	52.05	14.72	18.7	56.52	19.70
12.7	52.56	15.35	21.4	53.84	16.57	19.7	55.43	18.05	21.2	0.20	22.95
15.5	55.90	18.73	23.8	57.30	20.09	22.0	58.75	21.53	23.8	3.55	26.30
18.0	59.40	22.05	26.6	0.56	23.38	25.0	2.20	24.98	26.2	7.00	29.86
38.08		27.30		39.36	28.53		40.83	30.05		45.89	34.80
56.79		30.69		57.98	31.80		59.57	33.57		4.44	38.30
15.35		34.05		16.64	35.18		18.12	36.70		23.034	41.67
33.99		37.30		35.22	38.58		36.78	40.08		41.62	44.99
52.56		40.61		53.86	42.01		55.43	43.50		0.21	48.32
21 24.56	7.77		21 21.34	83.06		21 31.20	90.73		19 29.20	11.579	
23 12.66		22 15.354	23 21.22		22 16.612	23 19.76		22 18.146	21 21.08		20 23.088
		21 6.071			21 6.057			21 6.042			21 5.673
		+ 69.28			+ 70.55			+ 72.10			− 42.63
		+ 69.27			+ 70.54			+ 72.09			− 42.64
		M 67.63			− 68.85			− 70.29			+ 44.43
		− 1.70			− 1.70			− 1.82			− 1.77
		− 3.47			− 3.45			− 3.44			− 3.04
		− 72.86			− 74.00			− 75.55			+ 39.59
		21m 2.55			2.61			2.60			2.63
				reg.							
	+50.79	−57.31		+55.27	−64.61		+46.95	−61.61		+53.84	−58.04
	1.70578	1.75823n			1.81080n		1.67164	1.78965n		1.73111	1.76873n
	1.59657n	1.64902			1.70109		1.56243n	1.68044		1.62371n	1.65633
										247	509
	0 2	0 1		0 1			0 2	0 1		0 2	0 1
G	50".8 +.20	25".3 +.53		19.1 +.47			48.3 +.24	21.8 +.50		48.4 +.29	17.9 +.45
F	53.0 +.39	28.2 +.18		21.9 +.22			51.1 +.41	25.1 +.19		47.6 +.43	20.1 +.23
B	9.5 −.05	45.0 −.54		39.1 −.36			5.9 +.07	40.2 −.41		4.6 +.09	36.6 −.23
A	7.8 +.40	43.4 +.48		37.8 +.56			3.9 +.34	38.0 +.56		1.9 +.28	35.3 +.60
	.15 .94	1.65 35.15		29.10 89			57.10 106	84 31.60		55.00 109	105 27.25
	3 0.28	1 35.48		1 29.48			2 57.30	1 31.28		2 54.88	1 27.48
	−39.50	44.54		50.24			−36.51	47.91		−42.04	45.32
	2 20.78	20.05		2 19.74			2 20.79	2 19.19		2 12.84 +.12	12.80 −.12
+52°	20' 27".57	28".30		20 28.62			20 27.56	20 29.16		20 35.51	35.55
										35.39	35.67
− 10°	1' 50"										
	1.00860										
	− 49			− 139			− 51			− 149	
	1.00311			0.99941			1.00209			0.99931	
	+ 10.07	+ 10".07		+ 9.86			+ 10.07	+ 10.07		+ 9.84	+ 9.84
	− .68	− .86		− 1.10			− .58	− 1.00		− .76	− .89
	− .21	− .11		− .10			− .27	− .11		− .27	− .07
	− .24	− .16		− .22			− .26	− .21		− .27	− .26
	+ 8.94 9.00	+ 8.95 8.97		+ 8.40 8.7			+ 9.02 11	+ 8.75 80		+ 8.66 86	+ 8.59 62
	20 36.67	37.27		37.10			36.67	37.96		44.05	44.29
	20 36.92	1' 11"		48.6	+4 13.48		37.32			44.17	
	24 48.3	+4 12.47		+ .12			48.3	+4 12.90		52.5	+4 9.52
	+	+ .12		11.5	+ 5.30		+ .12			+	+ .13
	+ 4' 11".4	+ 5.60					11.5	+ 5.10		8.3	+ 1.40
	12.4	+4 18.19		12.5	+4 18.90		12.5	+4 18.12		9.3	+4 11.05
		24' 55".1			56.0			56.4			55.2

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	α m s		δ ′ ″	
May 20	21 6.24	5	24 44.9	13
25	.19	6	46.2	12
30	.13	7	47.4	11
June 4	6.06	7	48.5	11
9	5.99	9	49.6	10
14	.90	9	50.6	9
19	.81	11	51.5	8
24	.70	11	52.3	8
29	5.59		53.1	

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1878phae..proj..149A.

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β Ursæ Min.

$14^h\ 51^m\ 5^s$
$+74°\ 39'\ 14''$
$-32\ 16\ 26$
1878

α_0 $4^s.592$
corr. α $+.094$ $+.095$
$\frac{d\alpha}{dt}$
δ_0 $13''.57$
corr. δ $+1.15$
$\frac{d\delta}{dt}$

$\log\sin\delta$ 9.98423
" $\cos\delta$ 9.42267
" 1500 tan 9.52817n — June 5
9.52996n after "
874
$\tan\delta$ +3.644
$\sin x$ −.53

$\log \frac{R_2}{R_1}$ 1.63271
R_2 ~~43.92~~
R_1 42.92
I 7.80

June 4

h	m	s	m	s
14	53	13.2	57	—
	1	19.2		—
		27.4	40.7	32.9
		34.4	.5	36.6
		41.0	40.7	40.4
			41.0	44.9
			40.9	48.4
			.8	52.5
			.8	56.4

m	s
52	8.1
	12.0
	15.4
	19.8
	23.4
	27.5
	31.5
	35.0
2120	39.0

m	s
57	36.3
	43.3
	51.8
	56.2
	6.0
	42.6
	46.4
	50.5
	54.3
3830	58.0

m	s
57	26.5
	30.8
	34.9
	38.4
	42.6
	46.4
	50.5
	54.3
	58.0

40.77 / 23.56 / 6.41
7074
53 27.44
40.77 / 42.92
48.13 / 42.92

June 5

h	m	s
14	50	50.72

m	s
52	23.580
51	9.859
	+73.72
	+73.63
	+73.62
	− 68.88
	− 4.75
	− 5.27
	− 78.96
51	4.98

m	s
52	25.480
51	9.813
	+ 75.67
	+ 75.58
	+ 75.57
	− 70.38
	− 5.10
	− 5.22
	− 80.70
	4.78

$-63^s.86$
1.805234
1.33340
45′ 2″

$+34.76$
1.54108
1.06925n
45′ 3″

ℰ	54.8	+.16	
ℱ	54.8	+.35	
ℊ	11.3	−.12	
ℋ	12.3	+.40	
	3.05	n.79	

	29.1	+.60	
	30.1	+.15	
	[45.3]	−.47	
	44.9	+.17	
	45		

48 3.30 / 21.55 / 48 24.85
48 37.35 / −11.73 / 48 25.62

+74° 34′ 23.80″
34′ 22.73″

−32° 15′ 50″
1.56084
−130
1.54774

+35.27 / −.57 / −.15 / −.21 / −.20 / +34.29.35

+36.02 / −.17 / −.14 / −.23 / −.11 / +35.47.60

34′ 5.85″ / 39 9.9 / +14′ 12.1″
+4′ 13.48″ / + .36 / + 3.70
13.3 / +4 17.54 / 39′ 15.4″

58.33 / 10.05 / 11.7 / 12.5
+4 12.90 / + .36 / + 3.60
12.9 / +4 16.86 / 15.2

June 9

h	m	s
14	50	20.50

m	s
52	25.480
51	9.813
	+ 75.67
	+ 75.58
	+ 75.57
	− 70.38
	− 5.10
	− 5.22
	− 80.70
	4.78

$+70.55$
1.84850
1.37848n
724
45′ 3″

	36.2	+.50	
	37.4	+.17	
	52.8	−.37	
	53.4	+.06	
	44.50	36	

48 44.95 / −23.90 / 48 21.05 +.06
48 25.62

34 27.30 / 27.24
34 22.73

35 24.0 / 11.1 / 8.7
+4 10.28 / + .37 / + 2.50
9.9 / +4 13.15 / 15.6

June 19

h	m	s
14	51	10.2
		19.8
		23.8
		32.3
		40.0
		43.8
		50.3
		56.0
		6.0
		12.5
	54	0.86

m	s
57	32.7
	36.3
	40.6
	44.4
	48.3
	51.8
	55.8
	59.8
433.2	3.5

m	s
51	46.3
	50.0
	53.8
	58.0
	1.5
	5.2
	9.1
	13.0
143	17.4
	1.59
	44.69
	27.28
17356	

m	s
52	29.0
	33.0
	37.0
	40.9
	44.4
	48.3
	52.6
	56.4
4022	0.6
	11.9
	15.9
	19.3
	22.9
	27.3
	31.2
	35.2
	38.8
2455	43.0

52 25.62
52 31.050 / 51 9.627 / +81.42 / +81.33 / +81.32
52 44.520 / 51 9.085 / +95.44 / +95.35 / +95.34

	− 76.44	
	− 4.79	
	− 5.04	
	− 86.27	
	4.78	

	− 90.11	
	− 5.10	
	− 4.49	
	− 99.70	
	4.82	

$+78.90$
1.89708
1.42706n
582
45′ 3″

-76.34
1.88275n
1.41273
149
45′ 2″

	38.0	+.47	44.7	+.30
	36.9	+.16	44.7	+.40
	54.2	−.27	0.2	+.06
	52.9	+.06	1.1	+.25
	46.10	42	~~52.45~~	101

52.45

48 45.50 / −26.73 / 48 18.77 +.07
47 52.68 / 25.87 / 18.55 −.08

34 ~~29.58~~ 29.51
29.80 / 29.88

	− 104		
	1.5500		
	+35.48		+.48
	− .87		− .80
	− .20		− .20
	− .10		− .25
	+34.25.36		+34.28.31

3.87 / 4.03 / 13.2 / 9.2 / 10.4
+4 10.02 / + .39 / + 0.40
+4 10.81
4.19
14.8

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α δ

	m	s		′	″	
May 30	51	10.07	20	39	8.5	13
June 4		9.87	23		9.8	12
9		9.64	26		11.0	11
14		.38	28		12.1	11
19		9.10	30		13.2	9
24		8.80	32		14.1	8
29		8.48	34		14.9	7
July 4		8.14	35		15.6	5
9		7.79			16.1	

June 20

52	35.9		—	52	30.3	48	36.9	49	29.0	50	11.6	48	49.2	49	31.2	50	13.6	49	6.0	48	38.7	50	16.2
	43.7		—		34.5		4.8		32.7		15.5		56.5		34.8		17.8		14.0		37.0		20.2
	48.5		—		33.0		15.0		36.6		19.4		2.5		38.7		21.5		24.3		41.0		23.8
	38.0		—		42.0		22.0		40.7		23.1		10.9		42.8		25.7		30.0		45.0		28.0
	3.2		—		45.7		29.5		44.4		26.8		18.6		46.3		29.3		37.4		49.2		31.6
			—		49.6				48.3		31.0				50.2		33.2				53.8		35.9
53	53.8		—		53.3	51	27.9		52.0		34.9	51	20.9		54.2		37.0	51	47.3		56.7		40.0
	39.6		—		57.7		33.9		55.8		38.9		26.3		58.0		41.2		53.2		0.4		43.5
	6.4		—	4121	1.0		41.5	3995	0.0	2439	42.7	4184	29.9	2646	2.2	2646	45.3	4486	57.3	4486	4.5	2867	47.5
	12.2				50.0								41.2						6.8				
	17.7		45.78	45.78	12.9		53.9		44.39		54.5		46.5		46.49		56.7		12.4		48.96		59.0
			28.53	.61	17.0				27.10		58.3				29.40		0.6				31.86		2.4
					20.9				10.03		2.2				12.52		4.6				14.66		6.8
					24.6						6.0						8.5						10.7
					28.4				8152		9.9		8841				12.7		9548				14.9
					32.4						14.0						16.3						18.6
					36.0						17.8						20.3						22.7
					40.1						21.8						24.4						26.3
52	49.68			2568	44.4	49	13.64			903	2.38	49	3.54			1127	28.6	49	22.34			1319	30.2
54	5.74			52	48.85	51	41.84			50	27.173	51	32.96			50	29.470	51	59.40			50	31.827
				51	9.025					51	8.784					51	8.720					51	8.656
				+	96.68						−41.61						−39.25						−36.83
				+	96.59						−41.70						−39.34						−36.92
				+	96.58						−41.71						−39.35						−36.94
																							3
				−	91.70					+	46.61					+	44.34					+	42.16
				−	4.93					−	4.90					−	4.95					−	5.21
				−	4.43					−	4.19					−	4.13					−	4.06
				−	101.06					+	37.58					+	35.26					+	32.89
											9												
					4.64						4.68						4.73						4.72

	−4.16		−80.04				+73.53		−74.67				+85.93		−63.49				+69.49		−87.57		
	0.61909 n		1.90331 n				1.86646		1.87315 n				1.93414		1.80271 n				1.84192		1.94236 n		
	0.14907		1.43329				1.39644 n		1.40313				1.46412 n		1.33269				1.37190 n		1.47234		
	783		2.05				520		189				288		145				066		110		
	45 3		45 2				45 3		45 2				45 3		45 2				45 3		45 2		
	10.4	+.34	43.7	+.31			33.9	+.64	43.2	+.32			37.8	+.47	47.2	+.26			32.5	+.56	38.6	+.40	
	9.7	+.30	42.7	+.36			33.9	+.14	43.3	+.38			37.1	+.16	46.8	+.43			32.1	+.15	38.9	+.27	
	26.1	−.04	58.1	−.01			50.9	−.44	0.0	+.06			53.5	−.32	2.8	+.09			48.7	−.49	54.3	−.34	
	25.9	+.34	59.5	+.22			50.4	+.10	1.1	+.25			52.6	+.06	3.9	+.34			48.4	+.13	55.6	+.22	
	18.25	94		88	5090		42.40	34		101	57.60		48.65	37		112	55.00		40.60	35		55	46.45
48	18.02	47	51.00			48	42.28	47	51.90			48	45.25	47	55.18			48	40.42	47	46.85		
	.41		27.12				−24.91		25.30				−29.12		21.57				−23.54		29.67		
48	19.43	−.00	18.12	−.08		48	17.37	+.07	17.20	−.07		48	16.13	+.09	16.69	−.06		48	16.88	+.06	16.52	−.08	
	34 28.92		30.23				34 30.98		31.15				34 32.27		31.66				34 31.47		31.83		
			30.31				30.91		31.22				32.13		31.72				31.41		31.91		
	− 144						− 145						− 133						− 92				
	1.5460						1.5459						1.5471						1.5512				
	+35.16		+35.16				+35.15		+35.15				+35.24		+35.24				+35.58		+35.58		
	.07		− .89				− .75		− .78				− 1.03		− .56				− .67		− 1.07		
	− .23		− .20				− .26		− .20				− .20		− .38				− .26		− .20		
	− .24		− .22				− .08		− .25				− .09		− .28				− .09		− .14		
	+34.69	.55	+33.85	.91			+34.06	.18	+33.93	.88			+33.86	.93	+34.28	.85			+34.56	.64	+34.17	.23	
	3.64		4.22				5.04		5.20				6.06		5.97				6.05		6.14		
	3.94						5.12						6.02						6.10				
	13.4		+4 10.25				14.1		+4 9.90				14.3		+4 9.52				14.4		+4 9.65		
			+ .39						+ .40						+ .41						+ .41		
	+4 9.5		+ 0.20				9.0		− 0.50				8.3		− 0.70				8.3		− 0.30		
	10.7		+4 10.64				10.2		+4 9.80				9.5		+4 9.23				9.5		+4 9.26		
			14.6						14.9						15.2						15.4		

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July 1

h	m	s	m	s	m	s
14	48	58.2	49	43.7	50	26.3
		6.1		47.3		30.4
		13.6		51.1		34.0
		22.6		53.4		37.8
		29.7		59.0		41.6
				3.1		45.7
	51	37.1		6.6		49.4
		44.5		10.7		53.7
		48.6	5313	14.4	3766	57.7
		57.4				
		4.3				
				59.03		9.5
				41.84		13.2
				24.78		17.1
						20.7
				12565		24.5
						28.6
						32.5
						36.5
	48	14.04			2230	40.4
	51	50.78			50	41.883
					51	6.327
						−26.44
						−26.53
						−26.54
						+ 32.16
						− 5.56
						− 3.74
						+ 22.86
					m	s
					51	4.74
		s		s		
		+87.84		−68.90		
		1.94369		1.83822 n		
		1.47367 n		1.36820		
		243		696		
		45 3		45 2		
ε		38.6 +.46		45.7 +.28		
ζ		38.0 +.18		44.8 +.41		
ι		56.4 −.04		3.0 +.09		
η		56.1 +.03		4.7 +.36		
		47.50 63		114	54.35	
	48	47.28	47	54.55		
		−29.76		23.85		
	48	17.52 +.08		17.90 −.07		
+74°	34	30.88		30.45		
		30.75		30.52		
−32°	15	52				
		1.5604				
		− 212				
		1.5392				
		+34.61		+34.61		
		− 1.08		− .66		
		− .15		− .13		
		− .16		− .28		
		+33.22		+33.55		
	35	3.71		4.07		
	35	40.2				
	39	15.2	+4	11.94		
			+	.43		
	+4	11.2	−	1.60		
		12.4	+4	10.77		
			39	14.8		

July 3

m	s	m	s
49	17.6	49	47.3
	25.1		51.0
	32.7		54.7
	40.3		58.4
	47.8		2.4
			6.3
57	47.9		10.3
	55.3		14.1
	62.6	230	18.2
	5.8		
	12.6		2.56
			45.50
			28.33
			13639
49	32.70	2550	44.0
57	59.84	50	45.463
		51	8.191
			−22.73
			−22.82
			−22.83
			+ 28.50
			− 5.69
			− 3.60
			+ 19.21
			4.67
	s		
	+72.76		−74.38
	1.86189		1.87146 n
	1.39187 n		1.40144
	063		020
	45 3		45 2
	34.0 +.54		44.6 +.30
	32.1 +.15		42.2 +.35
	51.4 −.42		1.0 +.08
	51.0 +.09		2.2 +.28
	42.70 36		101	52.80
48	42.12	47	52.50
	−24.65		25.20
48	17.47 +.07		17.70 −.07
	34 30.88		30.65
	30.81		30.72
	− 232		
	1.5372		
	+34.45		+34.45
	− .72		− .76
	− .19		− .14
	− .09		− .25
	+33.45		+33.30
	4.30		4.05
	4.18		
	15.5	+4	12.77
		+	.45
	11.3	−	1.90
	12.5	+4	11.32
			15.5

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δ Bootis

15ʰ 10ᵐ 35ˢ
+33° 46′ 15″
+ 8 36 33
1878

α_0 35ˢ.111
corr. α −.056
$\frac{d\alpha}{dt}$ −.032
δ_0 15″.28
corr. δ −.10
$\frac{d\delta}{dt}$

log sin δ 9.74498
″ cos δ 9.91974
″ 15 cos δ tan α 0.02524n — June 5
0.02705n after ″
581
tan δ +.67
sin z +.15

log R_1 1.43631
$C_1 R_2$ 1.13564
R_1 27.31
R_2 13.67
I 2.49

June 4

h	m	s	m	s	m	s														
15	11	42	11	13.80	11	29.46	11	14.4	11	—	11	31.00	11	10.0	11	18.69	11	32.43	11	12.3	11	23.35	11	36.93
		6.2		18.24		31.85		16.9	22.34	19.85		33.60		12.5		21.00		34.81		14.4		25.80		39.38
		8.8		20.71		34.40		19.2	.33	22.33	35.98	—		14.7		23.60		37.30		16.8		28.28		41.85
		11.0		23.19		36.86		21.8	.31	24.80	36.73	—		17.0		26.10		39.75		19.0		30.79		44.40
		13.0		25.75		39.35		23.8	.21	27.19		—		19.3		28.58		42.32		21.0		33.27		46.90
				10.32		43.00	12	33.8	16.98	12.00		—	12	29.5		13.32		45.79	12	28.4		17.87		50.60
				12.82		45.33		36.9		—		—		32.2		15.85		48.39		30.8		20.50		53.15
				13.70		48.05		38.0		—	4.966	4.966		34.3		18.30		50.88		33.3		22.92		55.60
				17.87		50.45				—	.56	52.05		36.2		20.75		53.49		35.6		25.45		58.10
				20.28		53.00				—	.62	54.60		37.9		23.25		55.90		37.7		28.05		0.54
			20.74			56.70			22.30			58.30			23.59		59.70			28.30			4.30
			34.38			59.12			36.04			085			37.32		2.04			41.89			6.68
			48.01			1.67			49.61			3.18			50.93		4.52			55.60			9.12
			1.64			4.05			3.28			5.78			4.56		7.00			9.17			11.55
			15.30			6.66			16.98			8.28			18.29		9.50			22.96			14.20
	11	8.64	24.07				11	19.22	24.83				11	14.70	25.69				11	16.70	27.02			
					11	48.014	12	36.57			11	49.648	12	34.02			11	50.938	12	33.16			11	55.584
					10	38.290					10	38.288					10	38.286					10	38.279
						+69.72						+71.35						+72.65						+77.30
						+69.78						+71.41						+73.71						+77.36
						+69.75						+71.38						+72.68						+77.33
						− 68.90						− 70.43						− 71.76						− 76.46
						− .87						− .76						− .92						− .88
						− 3.18						− 3.18						− 3.17						− 3.17
						− 72.95						− 74.55						− 75.85						− 80.51
					10ᵐ	35ˢ.06						35.09						35.09						35.07
		+39.37				+40.42		−46.98						+36.24		−43.08				+38.88		−37.58		
		1.59517				1.48316		1.67145n						1.55919		1.63428n				1.58973		1.57496n		
		1.62041n				1.50840n		1.69669						1.58624n		1.66133				1.61678n		1.60201		
														500		009				554		077		
		40′ 1′				40 1		35 4						40 1		35 4				40 1		35 4		
b		18″.7 +.46				9.9 +.28		48.2 +.13						11.4 +.31		47.1 +.16				14.1 +.38		52.6 +.04		
F		21.3 +.22				13.4 +.26		51.8 +.16						16.3 +.25		51.3 +.17				17.9 +.25		56.8 +.07		
G		40.3 −.41				29.9 −.03		7.3 −.03						32.2 −.05		5.7 00				35.1 −.15		12.4 −.26		
H		38.4 +.56				27.1 +.65		6.1 +.17						30.2 +.65		6.9 +.18				32.9 +.62		11.3 +.20		
		39.50 1.83				19.90 116		57.75 43	57.75					21.80 116		51	56.40			20.60 110		05	2.50	
		41 29.68				41 20.08		39 58.35						41 22.62		39 57.75				41 25.00		40 3.28		
		−41.73				−32.24		49.74						−38.57		45.85				−41.38		40.00		
		40 47.95				40 47.84		48.09						40 43.95	+.11	43.60	−.13			40 43.62	+.12	43.28	−.12	
+33°		42′ 0.40				42 0.51		1.26						42 4.40		4.75				42 4.73		5.07		
														4.29		4.88				4.61		5.19		
+ 8′		36″ 34																						
		0.9404																						
		− 123				− 32								+ 17						− 21				
		0.9281				0.9372								0.9421						0.9383				
		− 8.47				− 8.65		− 8.65						− 8.75		− 8.75				− 8.68		− 8.68		
		− .39				− .23		− .56						− .33		− .47				− .38		− .36		
		− .07				− .89		− .33						− .70		− .25				− .86		− .30		
		− .21				− .29		− .11						− .29		− .15				− .28		− .01		
		− 9.184				− 9.262		− 9.652						− 9.452		− 9.705				− 9.420		− 9.35.25		
		41′ 5.26				51.29		50.74						54.87		55.33				55.21		55.94		
		41 51.24				51.02								55.10						55.57				
		46 54	+4′	13.48		5.8	+4	12.90						5.85	+4	10.04				6.0	+4	10.28		
			−	.10			−	.10							−	.10					−	.10		
		+ 4′ 14.1	+	9.90		14.6	+	9.70						10.7	+	9.50				10.9	+	8.80		
		14.0	+4′	23.28		14.5	+4	22.60						10.6	+4	19.44				10.8	+4	18.98		
			46′	14.5				13.5								14.5						14.6		

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	α			δ	
May 20	10m 38.30			46′ 1.″7	
25	.30	0		2.9	12
30	.30	0		4.1	12
June 4	.29	1		5.3	12
9	38.28	1		6.4	11
14	.26	2		7.5	11
19	.23	3		8.5	10
24	.19	4		9.5	10
29	38.14	5		10.4	9

June 19

11	28.3	11	37.10	11	5.07.0	11	23.4	11	38.40	11	52.24	9	15.8	—		9	33.80	9	11.6	9	22.89	9	36.02
	30.7		39.52		03.10		25.8		40.85		54.68		17.8	—			36.28		13.8		24.85		38.50
	33.2		42.00		05.39		28.0		43.88		57.26		20.3	—			38.75		16.0		27.40		41.00
	35.0		44.38		08.04		30.8		46.00		59.68		22.2	—			41.22		18.0		29.87		43.50
	36.9		46.90		0.55		32.6		48.48		2.05		24.2	—			43.75		20.3		32.30		46.50
																							4
12	49.7		31.58		4.20	12	54.1		33.12		5.80	10	38.1	147.0			47.34	10	36.6		17.00		49.78
	51.9		34.07		6.70		56.3		35.70		8.37		37.3	17.27			49.80		38.8		19.50		52.20
	53.9		36.48		9.20		58.3		38.05		10.80		39.0	19.49			52.33		41.05		22.00		54.70
	56.0		39.00		11.80		0.6		40.63		13.24		41.2	22.30			54.85		42.9		24.50		57.20
	57.7		41.60		14.20		2.4		43.13		15.78		43.4	24.70			57.42		45.3		27.00		59.70
			41.98		17.85				43.46		19.50			76	43		1.10				27.36		3.38
			55.60		20.40				57.187		22.00			38.88	52.85		3.60				41.00		5.90
			9.22		22.80				10.80		24.52			52.35	.35		6.18				54.72		8.30
			22.84		25.36				24.47		26.82			6.09	.42		8.53				8.33		10.77
			36.55		27.80				38.13		29.50			19.75	.44		11.00				22.00		13.30
11	32.82		4619			11	28.12		5404									9	15.94		27341		
12	53.84			12	9.238	12	58.38			12	10.808		9.20.06				9 52.340	10	40.82			9	54.682
				10	38.228					10	38.220		10 39.20				38.188						38.178
					+ 91.01						+ 92.59						− 45.78						− 43.50
					+ 91.07						+ 92.65						− 46.72						− 43.44
					+ 91.04						+ 92.62						− 45.75						− 43.47
					− 90.14						− 91.73						+ 46.59						+ 44.29
					− .94						− .91						− .90						− .91
					− 3.12						− 3.11						− 3.08						− 3.07
					− 94.20						− 95.75						+ 42.67						+ 40.37
					35.04						35.06						35.02						34.99
	+36.42		−44.60				+42.69		−47.57				+32.35		−46.79				+38.74		−46.14		
	1.56134		1.64933				1.63033		1.67783				1.50987		1.67015				1.58816		1.66408		
	1.58839		1.67638				1.65738		1.70438				1.53692		1.69720				1.61521		1.69113		
	715		514				614		314				568		596				397		4989		
	40 1		35 4				40 1		35 4				40 1		35 4				40 1		35 4		
	9.8 +.28		43.0 +.24				17.1 +.43		41.4 +.28				4.3 +.17		39.8 +.31				10.4 +.29		41.0 +.29		
	11.5 +.26		44.3 +.17				18.8 +.24		43.1 +.15				6.2 +.23		42.6 +.14				12.9 +.26		42.3 +.13		
	30.8 +.03		2.4 +.03				36.5 −.22		0.0 00				26.6 −.10		0.5 +.01				30.9 −.03		0.2 00		
	27.8 +.65		0.2 00				33.8 +.61		59.1 −.01				23.9 +.66		59.2 −.01				28.2 +.65		58.3 −.02		
	20.30 116		44 52.70				26.80 106		42 50.70				145.115 96		45 50.15				20.65 117		40 50.60		
	41 19.98		39 52.48				41 26.55		39 50.90				41 15.25		39 50.52				41 20.60		39 50.45		
	−38.76		47.47				−45.43		50.63				− 34.43		49.80				−41.23		49.11		
	40 41.22	+.11	39.95	−.14			40 41.12	+.13	41 53	−.15			40 40.82	+.10	40.32	−.15			40 39.37	+.12	3956	−.15	
	42 7.13		8.40				42 7.23		6.82				42 7.53		8.03				42 8.98		8.79		
	7.02		8.54				7.10		6.97				7.43		8.18				8.86		8.94		
	− 97						− 138						− 143						− 124				
	0.9307						0.9266						0.9261						0.9280				
	− 8.53		− 8.53				− 8.44		− 8.44				− 8.44		− 8.44				− 8.47		− 8.47		
	− .33		− .50				− .46		− .67				− .36		− .57				− .37		− .53		
	− .08		− .34				− .10		− .34				− .09		− .34				− .09		− .34		
	− .29		− .11				− .26		− .10				− .24		− .11				− .29		− .10		
	− 9.240		− 9.48.33				− 9.283		− 9.43				− 9.030		− 9.36				− 9.220		− 9.24		
	57.82		59.21				57.87		57.62				58.43		58.82				59.66		59.60		
	58.52						57.74						58.62						59.63				
	8.5	+4	10.02				8.7	+4	10.05				9.5	+4	9.90				9.7	+4	9.52		
		−	.11					−	.11					−	.11					−	.12		
	+11	10.0	+	6.50			11.0	+	6.60				10.9	+	5.80				10.1	+	5.60		
	9.9	+4	16.71				10.9	+4	16.54				10.8	+4	15.69				10.0	+4	15.00		
			15.2						143						14.2						14.6		

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	α		δ	
June 29	10m 38.14s	6	46' 10.4"	8
July 4	.08	6	11.2	7
9	38.02	7	11.9	6
14	.95	7	12.5	6
19	37.87	8	13.1	

1878

June 26

h m s	m s	m s
15 9 20.8	9 24.80	9 38.33
23.0	27.22	40.80
25.2	29.73	43.10
27.9	32.20	45.78
30.4	34.65	48.28
10 32.4	19.40	52.00
35.1	21.83	54.50
36.9	24.22	57.00
39.2	26.65	59.40
41.0	29.30	1.98
	29.72	5.60
	43.26	8.10
	56.98	10.59
	10.57	13.00
	24.28	15.33

9 25.46 28481
10 37.92

9 56.962
10 38.168
−41.21
−41.15
−41.18

+ 42.13
− .96
− 3.06
+ 38.11
10m 35.07s

+31.50s −39.96s
1.49831 1.60163n
1.52536n 1.62868
412 744
40' 1 35 4

3.1 +.15 47.0 +.16
5.8 +.23 48.8 +.19
24.7 −.19 6.3 −.01
21.3 +.66 5.2 +.15
13.90 .85 49 56.65

41 13.72 39 56.82
−33.52 42.53
40 40.20 +.09 39.35 −.12

+33° 42 8.15 (8.06) 9.00 (9.12)

+8° 36' 30"
0.9404
− 84
0.9320

− 8.55 − 8.55
− .25 − .41
− .08 (6) − .34 (35)
− .21 − .12
− 9.09 (7) − 9.42 (33)
41 58.99 57.49
41 59.39
46 9.9 +4' 9.65
− .12
+4' 10.5 + 5.40
10.4 +4 14.83
46 14.3

July 1

m s	m s	m s
9 34.3	9 34.53	9 48.28
36.5	37.21	51.00
39.0	39.72	53.43
41.6	42.10	53.76
43.7	44.66	58.31
10 44.8	29.21	2.00
47.6	31.66	4.42
49.8	34.10	7.00
52.0	36.72	9.82
54.0	39.10	11.88
	39.65	15.65
	53.36	18.00
	6.92	20.62
	20.59	23.00
	34.16	25.66

9 39.02 3468
10 49.64

10 6.936
10 38.113
−31.18
−31.12
−31.15

+ 32.13
− 1.02
− 3.00
+ 28.11
35.05

+27.92 −42.70
1.44592 1.63043n
1.47297n 1.65748
173 624
40 1 35 4

0.3 +.13 45.8 +.18
1.3 +.17 46.5 +.20
23.1 −.28 6.9 −.02
21.1 +.66 5.2 +.15
11.70 .68 51 56.35

41 11.45 39 56.10
−29.71 45.44
40 41.74 +.08 41.54 −.12

42 6.61 (6.53) 6.81 (6.93)

− 206
0.9198

− 8.31 − 8.31
− .20 − .46
− .06 (05) − .28 (2)
− .17 − .13
− 8.74 (3) − 9.150
57.80 57.83
57.82
10.7 +4 11.94
− .12
12.9 + 4.60
12.8 +4 16.42
14.2

July 3

m s	m s	m s
9 28.3	9 38.33	9 52.00
31.2	40.85	54.40
32.9	43.35	56.90
35.0	45.78	59.50
37.0	48.18	2.00
10 52.1	33.00	5.63
54.6	35.36	8.10
56.8	37.90	10.60
59.5	40.33	13.05
1.2	42.82	15.60
	43.30	19.30
	56.96	21.78
	10.60	24.22
	24.24	26.66
	37.88	29.23

9 32.88 5298
10 56.84

10 10.596
10 38.089
−27.49
−27.43
−27.46

+ 28.47
− 1.05
− 2.98
+ 24.44
35.04

+37.82 −46.24
1.57657 1.66502n
1.60362n 1.69207
238 083
40 1 35 4

11.0 +.30 42.4 +.25
11.0 +.25 42.8 +.14
33.9 −.10 4.3 +.02
30.9 +.64 2.2 +.06
22.45 1.09 47 53.35

41 21.70 39 52.92
−40.14 49.21
40 41.56 +.11 42.13 −.14

42 6.79 (6.68) 6.22 (6.36)

− 225
0.9179

− 8.28 − 8.28
− .36 − .53
− .07 (5) − .24 (19)
− .27 − .12
− 8.98 (6) − 9.17 (2)
57.72 57.24
57.48
11.05 +4 12.77
− .13
13.6 + 4.30
13.5 +4 16.94
14.4

July 7

m s	m s	
9 38.4	9 46.82	0.22
41.0	49.15	2.66
43.0	51.73	5.10
45.0	54.00	7.72
47.2	56.56	10.10
10 59.3	41.15	13.86
2.0	43.76	16.37
4.0	46.10	18.82
6.1	48.70	21.41
8.1	51.15	23.86
	51.65	27.61
	5.16	30.00
	18.88	32.50
	32.52	35.00
	46.17	37.50

9 47.92 9438
11 3.90

10 18.876
10 38.041
−19.16
−19.10
−19.13

+ 20.06
− .98
− 2.93
+ 16.15
35.03

+35.96 −44.02
1.55582 1.65341n
1.58287n 1.68046
163 7922
40 1 35 4

9.1 +.26 42.2 +.26
11.1 +.25 44.9 +.18
31.5 −.04 3.7 +.03
28.2 +.65 1.9 +.05
30.30 1.12 52 52.95

41 19.98 39 53.18
−38.27 47.41
40 41.71 +.11 41.09 −.13

42 6.64 (6.58) 7.26 (7.39)

− 176
0.9228

− 8.37 − 8.37
− .33 − .51
− .07 − .20
− .28 − .13
− 9.03 − 9.21
57.50 58.18
57.84
11.6 +4 13.24
− .13
13.8 + 3.70
13.7 +4 16.81
14.6

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July 10

9	40.3	9 33.07	6.50
	42.9	53.36	9.00
	44.6	57.88	11.47
	47.3	083	14.10
	49.7	2.82	16.67
11	1.7	47.63	20.30
	4.7	50.00	22.72
	4.2	52.44	25.27
	9.0	54.88	27.67
	11.0	57.66	30.15
		9 57.82	34.00
		11.55	36.88
		25.22	39.00
		38.92	41.36
		52.52	43.88
9	44.96	1268 3	
11	6.72		10 25.286
			10 38.003
			− 12.78
			− 12.72
			− 12.75
			+ 13.78
			− 1.06
			− 2.89
			+ 9.83
			35.06

+40.27 −41.49

1.60498 1.61794 n

1.63203 n 1.64499

079 375

40 1 35 4

12.1	+.33	45.1	+.20
13.9	+.25	46.8	+.20
37.1	−.26	9.7	−.14
31.5	+.64	6.7	+.16
24.60	96	42	5740

41 23.65 39 5682

−42.36 44.16

40 40.79 +.12 40.98 −.13

42 7.56 7.37

7.44 7.50

−161

0.9243

− 8.40	− 8.40
− .41	− .43
− .076	− .25
− .24	− .10
− 9.121	− 9.183
58.33	58.37
58.35	
12.05 +4	12.88
−	.14
+4. 13.7 +	3.30
13.6 +4	16.04
	14.4

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γ Ursæ Min.

α_0 15h 20m 56s

δ_0 +72° 16′ 5″

λ_0 −29 53 17

1878

α_0 56.330

Corr. α −.228

$\frac{d\alpha}{dt}$ −.186

δ_0 5″.20

Corr. δ +.16

$\frac{d\delta}{dt}$

log sin δ 9.97886

" cos δ 9.98368

" sec δ and τ 9.58918n — June 5

9.59099n after " 8975

tan δ +3.127

sin z −.50

log R_1 1.87237

" R_2 1.57170

R_1 74s.54

R_2 37.30

I 6.77

	June 4			June 24			June 26			July 1			
h	m s	m s	m s										
15	22 7.5	—	22 0.2	18 27.2	19 27.1	20 4.0	18 50.1	19 31.9	20 8.9	18 40.0	19 —	20 18.6	
	14.6	—	3.7	36.1	30.3	7.5	53.3	35.2	12.5	46.0	55.2 43.0	22.0	
	18.0	—	7.0	41.7	33.6	11.2	2.5	38.3	15.8	53.4	.2 48.4	25.4	
	25.6	—	10.5	5.03	37.1	14.4	8.0	41.6	19.0	0.2	.4 52.0	29.0	
	30.7	—	14.0	5.57	40.4	17.5	16.8	45.1	22.4	8.0	.2 57.2	32.3	
		—	17.2		43.9	21.2		48.8	25.8		.2 58.6	35.6	
		—	20.5	21 25.4	47.3	24.5	21 10.2	52.2	29.2	21 24.3	55.0 1.8	39.1	
		—	24.3	30.6	50.6	28.0	14.9	55.4	32.7	28.1	54.8 5.0	42.2	
		—	12.51 27.7	35.3	3643 54.0	1595 31.2	19.0	4074 58.9	2023 36.0	34.2	58.0 8.5	2900 45.8	
				41.6			24.3			41.2			
		—	37.6	46.8	40.48	41.7	31.4	45.27	46.0	47.2	55.12	53.7	
		13.90 13.90	41.0		17.72	44.9		22.48	49.6		32.22	57.4	
		57.23 .93	44.6		55.10	48.3		59.68	52.8		9.51	2.3	
			47.6			51.7			56.3			6.1	
		55.73 55.73	51.3		53.30	55.1		6.743	59.8		9.685	9.4	
		11.03	54.7			58.4			3.0			13.0	
		25.18	58.0			1.8			6.5			16.4	
			1.4			5.4			9.8			19.8	
	22 19.28		4611 4.9	18 42.20		4959 8.6	19 2.54		5871 13.3	18 53.57		856 23.3	
			22 13.915	21 35.94		20 17.767	21 19.96		20 22.477	21 35.20		20 32.283	
			20 61.092			20 60.318			20 60.240			20 59.925	
			+ 72.82			− 42.55			218			− 27.67	
			+ 73.05			− 42.32			− 37.74			− 27.44	
			+ 73.01			− 42.36			− 37.51			− 27.48	
			− 18.91			+ 46.58			− 37.56			+ 32.11	
			− 4.08			− 4.22			+ 42.12			− 4.78	
			− 4.76			− 3.99			− 4.48			− 3.63	
			− 17.75			+ 38.87			− 3.89			+ 23.70	
			20 56.17			56.14			+ 33.75			55.98	
									54.23				
	−5.36			+95.57	−78.17		+81.94	−57.48		+98.76	−62.92		
	0.72916n			1.98032	1.89304n		1.90276	1.75952n		1.99458	1.79879n		
	0.31834			1.56750n	1.48222		1.49375n	1.35051		1.58557n	1.38978		
				7131	403		251	4927		433	854		
	10′ 1′			10 1	10 0		10 1	10 0		10 1	10 0		
E	23.9 +.58			53.1 +.10	45.2 +.25		48.1 +.18	54.6 +.13		53.9 +.09	57.8 +.15		
F	23.8 +.20			51.9 +.42	44.7 +.26		46.8 +.42	54.1 +.27		51.9 +.42	49.9 +.30		
G	42.3 −.47			10.1 −.05	2.9 −.01		3.9 +.14	10.3 −.18		13.1 −.19	9.8 −.16		
H	40.8 +.51			9.0 +.50	2.7 +.64		3.9 +.42	10.6 +.72		11.9 +.49	9.8 +.73		
	33.10 .77			1.60 97	114	54.05	56.00 116	94	2.45	3.50 81	102	0.80	
	11 32.70			12 1.02	10 53.88		11 55.68	11 2.40		12 2.70	11 0.32		
	2.08			−37.27	30.48		−31.17	22.41		−38.51	24.53		
	11 34.78			11 23.75 +.11	24.36 −.09		11 24.51 +.09	24.81 −.08		11 24.19 +.11	24.85 −.07		
+72°	11 13.57			11 24.60	23.99		11 23.84	23.54		11 24.16	23.50		
				24.49	24.08		23.75	23.62		24.05	23.57		
−29°	52 36				52 46								
	1.5195				1.5195								
	−120				−142								
	1.5075				1.5053		−78			−203			
							1.5117			1.4992			
	+32.17			+32.01	+32.01		+32.49	+32.49		+31.56	+31.56		
	−.01			−1.44	−.97		−1.01	−.52		−1.55	−.63		
	−.77			−.14	−.08		−.18	−.05		−.10	−.05		
	−.19			−.24	−.28		−.29	−.24		−.20	−.26		
	+31.82			+30.19	30.78		+31.09	+31.68		+29.73	+30.63		
	11′ 45.46			54.72	54.80		54.84	56.30		53.78	54.20		
	11 45.46			54.76			55.07			53.99			
	15 59.7	+4 13.48		64.7	+4 9.90		16 5.05	+4 9.65		6.1	+4 11.94		
	+	.34			+ .38			+ .39			+ .40		
+4′	14.2	+ 5.50		9.9	+ 0.50		10.0	+ 0.20		12.1	− 0.90		
	14.4	+4 19.32		10.1	+4 10.78		10.2	+4 10.24		12.3	+4 11.44		
		16′ 4.8			5.5			5.3			5.4		

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	α		δ			α		δ	
May 30	20m 61.23s		15′ 58.2″		July 9	20m 59.53s		15′ 67.4″	
June 4	61.10	13	59.6	14	14	59.23	30	68.1	7
9	60.94	16	61.0	14	19	58.91	32	68.6	5
14	.76	18	62.3	13					
19	60.56	20	63.5	12					
24	.33	23	64.6	11					
29	60.08	25	65.7	11					
July 4	59.81	27	66.6	9					
9	59.53	28	67.4	8					

July 3			July 7			July 8			July 10		
20 5.3	19 48.5	20 22.4	18 59.0	19 53.95	30.3	18 41.3	19 55.4	20 32.4	19 20.5	19 59.1	36.7
10.8	58.7 57.9	26.1	7.8	36.48	33.7	49.5	58.6	35.9	25.6	3.0	40.1
17.2	.7 53.2	29.3	15.1	39.92	37.2	55.5	1.9	39.3	32.0	6.2	43.6
24.8	.6 58.5	32.5	21.0	31.0	40.3	2.7	5.3	42.6	40.9	9.7	47.0
29.8	.5 2.0	36.0	26.0	6.70	43.8	8.9	8.7	45.9	48.0	13.0	50.3
	.6 5.9	39.5		10.10	47.3		12.0	49.4		16.4	54.0
21 29.0	1.1 8.8	42.6	21 47.0	13.3	50.5	21 27.6	15.3	52.8	21 38.8	19.8	57.4
34.3	.6 12.3	46.0	52.3	16.9	54.0	32.3	19.0	56.3	41.1	23.1	0.7
41.0	.8	3239 49.5	57.5	606 20.1	3942 57.1	37.7	784 22.2	4142 59.6	57.2	1169 26.6	4538 4.0
45.2			2.9			44.6			58.0		
52.3	58.70	59.7	8.7	6.73	7.5	49.2	8.71	9.9	3.0	12.99	14.4
	35.99	3.0		43.80	11.1		46.02	13.1		50.42	17.5
	13.26	6.4		21.16	14.4		23.28	16.5		27.63	20.6
		9.9			17.8			19.8			24.1
	10795	13.0		13169	21.3		13801	23.3		15104	27.4
		16.6			24.4			26.7			30.9
		20.3			27.8			30.0			34.6
		23.5			31.4			33.4			38.0
20 17.58		1193 26.9	19 13.78		1904 34.7	18 55.58		2095 36.8	19 33.40		2487 41.2
21 40.36		20 35.983	21 57.68		20 43.897	21 38.28		20 46.003	21 50.42		20 50.347
		20 59.850			20 59.628			20 59.572			59.455
		− 23.87			− 15.73			− 13.57			− 9.11
		− 23.64			− 15.50			− 13.34			− 8.88
		− 23.68			− 15.54			− 13.38			− 8.92
		+ 28.46			+ 20.04			+ 18.03			+ 13.76
		− 4.89			− 4.59			− 4.89			− 4.96
		− 3.52			− 3.30			− 3.24			− 3.12
		+ 20.05			+ ~~11.75~~	12.15		+ 9.90			+ 5.68
		56.03			56.05			55.90			56.03

+18.40	−64.38		+90.12	−73.78		+110.42	−52.28		+76.95	−60.07	
1.26482	1.80875n		1.95482	1.86794n		2.04305	1.71834n		1.88621	1.77866n	
0.85581n	1.39974		1.54581n	1.45893		1.63404n	1.30933		1.47720n	1.36965	
457	850		457	769		280	809		596	841	
10 1	10 0		10 1	10 0		10 1	10 0		10 1	10 0	
24.9 +.53	57.8 +.15		51.7 +.12	46.9 +.22		58.0 +.07	56.3 +.18		46.4 +.21	62.9 +.14	
23.1 +.21	49.7 +.30		50.6 +.42	47.1 +.29		57.6 +.34	55.2 +.25		44.3 +.36	50.6 +.30	
43.8 −.51	9.5 −.15		9.7 −.04	5.1 −.03		17.2 −.30	14.8 −.36		5.1 +.12	12.7 −.29	
40.6 +.52	9.6 +.73		8.0 +.49	4.8 +.69		15.0 +.48	14.1 +.71		3.1 +.39	11.0 +.72	
34.35 75	103	0.65	0.70 99	117	56.00	7.60 59	73	5.05	55.75 111	87	2.80
11 33.10	11 0.15		12 0.00	10 55.98		12 6.95	11 4.85		11 54.72	11 1.80	
−7.17	25.10		−35.14	28.77		−43.06	20.39		−30.01	23.42	
11 25.93 +.02	25.25 −.07		11 24.86 +.10	24.75 −.08		11 23.89 +.13	25.24 −.06		11 24.71 +.09	25.22 −.06	
11 22.42	23.10		11 23.49	23.60		11 24.46	23.11		11 23.64	23.13	
22.40	23.17		23.39	23.68		24.33	23.17		23.55	23.19	
−222			−174			−224			−160		
1.4973			1.5021			1.4971			1.5035		
+31.43	+31.43		+31.78	+31.78		+31.41	+31.41		+31.88	+31.88	
−.05	−.65 4		−1.28	−.87		−1.93	−.42		−.94	−.57 4	
−.08 6	−.05 4		−.08	−.04		−.10 .08	−.05 4		−.10 .08	−.08 5	
−.19	−.26		−.25	−.29		−.15	−.18		−.28	−.22	
+31.1x3	+30.478		+30.17	+30.58		+29.235	+30.767		+30.568	+31.045	
53.53	53.65		53.56	54.26		53.58	53.94		54.13	54.24	
53.59			53.91			53.76			54.18		
6.47	+4 12.77		7.1	+4 13.24		7.25	+4 13.54		7.57	+4 12.88	
	+ .42			+ .44			+ .44		1	+ .46	
+4 12.9	− 1.30		13.2	− 1.90		13.5	− 2.00		13.4	− 2.40	
13.1	+4 13.89		13.4	+4 11.78		13.7	+4 11.98		13.6	+4 10.94	
	5.5			5.7			5.7			5.1	

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July 13

h	m	s	m	s	m	s
15	19	11.4	20	5.8	20	42.4
		21.7		8.8		45.9
		29.1		12.3		49.3
		36.6		16.0		52.7
		41.8		19.3		56.4
				22.6		0.0
	21	88.8		25.7		3.3
		44.8		29.7		6.5
		47.7	1729	32.4	1465	10.0
		53.0				
		1.4		19.21		19.9
				56.28		23.3
				33.53		27.1
						30.4
				16902		33.4
						37.0
						40.0
						43.7
	19	28.12			3018	47.0
	21	49.60			20	56.340
					20	59.275
						− 2.94
						− 2.71
						− 2.75
						+ 7.32
						− 4.75
						− 2.94
						− 0.87
					m	s
					20	55.97

July 15

h	m	s	m	s	m	s
19	55.2		20	10.2	20	47.8
	58.5			13.8		50.8
	8.7			17.4		54.6
	12.6			21.0		57.7
	22.0			24.6		1.1
				27.8		4.3
21	56.7			30.9		7.6
	31			34.5		11.1
	85		2172	37.0	96	14.6
	15.0					
	21.6			24.13		25.0
				1.07		28.2
				38.47		31.6
						35.0
				367		39.0
						41.9
						45.0
						48.4
20	7.60				3462	51.8
22	8.98				21	1.223
					20	59.150
						+ 2.07
						+ 2.30
						+ 2.26
						+ 2.84
						− 5.11
						− 2.82
						− 5.09
						56.13

	s	s		
	+88.22	−53.26	+53.62	−67.76
	1.94557	1.72640n	1.72933	1.83097n
	1.53656n	1.31739	1.32032n	1.42196
	532	615	1908	072
	10 1	10 0	10 1	10 0
E	49.6 +.15	54.4 +.13	36.6 +.40	49.8 +.17
F	48.9 +.43	53.8 +.27	36.1 +.19	49.1 +.30
G	10.2 −.06	15.7 −.34	56.1 −.11	9.9 −.17
H	7.8 +.49	12.6 +.72	54.2 +.32	7.2 +.72
	59.90 101	5.05 73	46.35 80	102 59.85
	11 59.12	11 4.12	11 45.75	10 59.00
	−34.40	20.77	−20.91	26.42
	11 24.72 +.10	24.89 −.06	11 24.84 +.06	25.42 −.07
+72°	11 23.63	23.46	11 23.51	2293
	23.53	23.52	23.45	23.00
−29°	52 46			
	1.5195			
	−103		− 45	
	1.5092		1.5150	
	+32.30	+32.30	+32.73	+32.73
	− 1.23	− .44	− .45	− .43
	− .13	− .08	− .14	− .07
	− .25	− .18	− .20	− .26
	+30.79	+31.60	+31.94	+31.68
	11' 54.25	55.15	5544	5469
	11 54.10		5506	
	16 8.0	+4 11.84	82	+4 11.45
		+ .47		+ .48
	+4 1.33	− 2.86	131	− 3.00
	13.5	+4 9.54	13.3	+4 8.93
		16 4.2		4.0

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α Coronae

$15^h\ 29^m\ 31^s$

$+27°\ 7'\ 35''$

$+15\ \ 15\ 13$

1878

α_0 $31^s.356$ — $\log \text{rad}$ 9.65892

bom. $d\alpha$ −.002 +.018 — " $\cos\delta$ 9.94939

$d\alpha$ — " 15 constant 0.05489 m — June 5

$d\alpha$ — 0.05676 m — after " I 2.32

δ_0 $35''.24$ 546

bom. δ −.73 — $\tan\delta$ +.51

$d\delta$ — $\sin z$ +.26

$d\delta$

	June 4			June 6			June 19			June 20		
h	m s	m s	m s	m s	m s		m s	m s	m s	m s	m s	m s
15	30 13.3	30 14.02	30 26.69	30 6.1	30 17.00	30 29.70	30 31.9	30 35.33	30 47.89	30 31.9	30 36.94	30 46.60
	16.4	16.32	29.00	8.8	19.30	32.05	24.2	37.64	50.30	34.0	39.20	51.90
	18.9	18.64	31.35	10.6	21.65	34.30	25.7	39.98	52.60	36.0	41.40	54.35
	20.6	20.90	33.70	12.8	23.90	36.60	28.0	42.22	54.98	38.0	43.80	56.51
	22.5	23.32	35.75	14.7	26.20	39.00	30.0	44.60	57.28	40.4	46.10	58.89
		5.00	39.50	31 2.34	8.00	42.45	31 43.6	26.27	0.80	31 39.0	28.00	2.28
		7.28	41.69	2.60	10.30	44.90	46.0	28.60	3.00	41.0	30.25	4.62
		9.63	44.17	28.3	12.60	47.00	48.4	31.00	5.40	43.0	32.43	7.00
		12.05	46.49	30.2	14.90	49.40	50.5	33.10	7.80	45.0	34.72	9.30
		14.40	48.85	32.4	17.28	51.75	52.4	35.60	10.07	47.0	37.15	11.64
												15.10
		18.64	52.32		21.61	53.00		39.95	13.50		41.49	17.39
		31.34	54.59		34.33	57.33		52.61	15.84		54.21	
		44.14	56.81		47.10	59.80		5.41	18.04		6.97	19.72
		56.89	59.19		59.77	2.04		18.12	20.45		19.70	22.00
		9.67	1.55		12.62	4.45		30.91	22.75		32.51	24.30
	30 18.80	22068		30 10.60	23543		30 25.96	2700		30 36.06	3488	
			30 44.86	31 28.06		30 47.086	31 48.18		31 6.40	31 43.00		31 6.976
			29 34.520			29 34.520			29 34.499			29 34.493
			+69.62			+72.56			+90.90			+92.48
			+69.60			+72.54			+90.88			+92.46
			− 68.92			− 71.79			− 90.16			− 91.75
			− .66			− .70			− .71			− .69
			− 3.16			− 3.16			− 3.14			− 3.14
			− 72.74			− 75.65			− 94.01			− 95.58
			m s									
			29 31.40			31.44			31.39			31.40
	+25.34	−		+36.49	−40.97		+39.44	−42.78		+30.92	−36.02	
	1.40381			1.56217	1.61247 m		1.59594	1.63124 m		1.49024	1.55654 m	
	1.45870 m			1.61887 m	1.66917		1.65264 m	1.68794		1.54694 m	1.61324	
				763	793		140	670		570	200	
	15 1			15 4	15 3		15 4	15 3		15 4	15 3	
ℰ	40.3 +.30			48.5 +.12	19.4 +.54		49.8 +.09	16.2 +.47		41.1 +.29	24.3 +.60	
⊕	44.0 +.17			54.9 +.11	26.2 +.18		53.1 +.15	19.7 +.25		44.1 +.17	28.0 +.16	
☾	59.3 −.03			6.4 −.01	38.0 −.24		7.8 −.05	34.9 −.06		59.0 −.04	44.3 −.46	
☿	69.9			6.8 +.18	39.9 +.24		6.7 +.18	33.4 +.33		57.8 −.02	42.8 +.19	
	49.80 44			57.45 40	72 28.70		53.80 37	99 25.55		50.05 40	44.3 49	34.30
	19 50.88			19 59.15	18 30.88		19 59.35	18 26.05		19 50.50	18 34.35	
	−28.75			−41.58	46.68		−44.94	48.75		−35.23	41.04	
	19 22.13			19 17.57 +.12	17.56 −.13		19 14.41 +.13	14.80 −.14		19 15.27 +.10	15.39 −.11	
+27°	3 26.22			3 30.78	30.79		3 33.94	33.55		3 33.08	32.96	
				30.66	30.92		33.81	33.69		32.98	33.07	
+15°	15 12			15 6								
	1.1960			1.1960								
	−117			+26			−93			−132		
	1.1843			1.1986			1.1867			1.1828		
	−15.29			−15.80	−15.80		−15.37	−15.37		−15.23	−15.23	
	−.14			−.30	−.37		−.34	−.41		−.21	−.29	
	−.38 24			−.35 30	−.24		−.38 34	−.24		−.34	−.25 16	
	−.11			−.10	−.18		−.09	−.25		−.10	−.12	
	−15.88			−16.5540	−16.50		−16.15 08	−16.27		−15.88	−16.8422	
	3 10.44			14.26	14.43		17.81	17.52		17.20	17.35	
	3 10.44			14.34			17.66			17.22		
	7 24.1	+4 13.48		24.45	+4 10.04		27.16	+4 10.02		27.35	+4 10.05	
	−	.18		−	.18		−	.19		−	.19	
	+4 13.7	+ 11.10		10.1	+ 10.80		9.5	+ 8.00		10.1	+ 7.80	
	13.0	+4 24.48		9.4	+4 20.66		8.8	+4 17.83		9.4	+4 17.66	
		7 34.8			35.0			35.5			34.9	

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α			δ			α			δ		
May 20	29m 34.48	2	7′ 20.″7	11		June 29	29m 34.44	4	7′ 29.″0	8	
25	.50	2	21.8	11		July 4	.40	5	29.8	8	
30	.52	2	22.9	11		9	.35	6	30.6	7	
June 4	.52	0	24.0	11		14	.29	6	31.3	6	
9	34.52	0	25.1	10		19	34.23	7	31.9	5	
14	.51	1	26.1	10		24	.16	7	32.4	5	
19	.50	1	27.1	10		29	.09	8	32.9	4	
24	.47	3	28.1	9		Aug 3	34.01	8	33.3	3	
29	34.44	3	29.0			8	33.93		33.6		

July 7

28	36.8	28	—		57.70	28	39.2	28	46.90	28	59.71	28	41.6	28	37.28	29	4.00	28	52.3	28	57.83	29	10.41
	39.0		49.58	47.26	0.00		41.1		49.33		1.90		44.7		53.60		6.28		54.0		0.00		12.65
	40.7		.55	49.53	2.37		43.6		51.64		4.22		46.3		56.00		8.58		53.7		2.30		14.90
	43.0		.56	37.88	4.62		45.6		53.93		6.61		47.8		58.20		11.00		58.1		4.56		17.35
	44.8		.64	54.28	7.00		47.8		56.27		8.00		49.8		0.50		13.22		0.3		6.86		19.54
29	48.2		36.00		10.40	29	53.9		38.00		12.38	29	58.0		42.30		16.71	29	59.1		48.68		23.00
	50.5		38.26		12.78		53.6		40.28		14.70		59.9		44.52		19.05		2.1		50.80		25.50
	1.23		40.63		15.10		57.6		42.54		17.00		2.0		47.00		21.32		3.8		53.26		27.78
	6.43		43.00		17.38		59.6		44.84		19.42		3.7		49.23		23.68		5.7		55.72		30.10
	56.6		45.27		19.75		1.3		47.10		21.72		5.8		51.57		26.10		8.3		57.88		32.47
			49.58		23.10				51.61		25.18				55.92		29.57				2.31		36.00
			2.34		25.56				4.29		27.53				8.62		31.81				14.98		38.22
			15.08		27.98				17.04		29.84				21.37		34.10				27.77		40.56
			27.85		30.15				29.81		32.05				34.15		36.45				40.60		42.83
			40.63		32.43				42.56		34.46				46.97		38.80				53.27		45.40
28	40.86		7.548			28	43.46		8.531			28	46.04		10.698			28	56.08		13.893		
29	52.38			29	15.096	29	57.60			29	17.062	30	1.88			29	21.398	30	3.96			29	27.786
				29	34.368					29	34.357					29	34.335					29	34.299
					− 19.27						− 17.30						− 12.94						− 6.51
					− 19.29						− 17.32						− 12.96						− 6.53
					+ 20.02						+ 18.01						+ 13.74						+ 7.29
					− .75						− .80						− .81						− .77
					− 3.01						− 3.00						− 2.98						− 2.94
					+ 16.26						+ 14.21						+ 9.95						+ 4.58
					31.36						31.27						31.35						31.87

+34.24	−37.28			+33.60	−40.54			+35.36	−40.48			+31.71	−36.17						
1.53453	1.57148			1.52634	1.60788			1.54851	1.60724			1.50120	1.65835						
1.59123	1.62818			1.58304	1.66458			1.60521	1.66394			1.55790	1.61505						
5999	694			180	334			397	270			666	381						
15 4	15 3			15 4	15 3			15 4	15 3			15 4	15 3						
43.4 +.23	22.3 +.58			42.8 +.24	18.6 +.52			44.5 +.21	17.0 +.49			37.2 +.37	19.6 +.64						
46.4 +.19	26.2 +.18			44.9 +.18	21.8 +.22			46.4 +.19	19.1 +.26			41.2 +.10	24.1 +.19						
3.9 +.03	43.3 −.43			3.6 +.03	40.0 −.32			6.2 .00	39.6 −.30			0.5 +.01	43.2 −.43						
2.2 +.06	43.1 +.19			1.9 +.05	38.6 +.26			4.1 +.12	36.8 +.28			57.2 −.03	41.2 +.23						
53.65 51	52	32.80		53.20 50	68	29.30		55.35 52	73	28.30		48.85 45	53	31.40					
19 53.98	18 33.72			19 53.30	18 29.75			19 53.30	18 28.12			19 49.02	18 32.02						
−39.01	42.48			−38.29	46.19			−40.29	46.13			−36.13	41.21						
19 14.97 +.11	16.20 −.12			19 15.01 +.11	15.94 −.13			19 15.01 +.11	14.25 −.14			19 12.89 +.10	13.23 −.11						
													.72						
3 33.38	32.15			3 33.34	32.41			3 33.34	34.10			3 35.46	35.12						
33.27	32.27			33.23	32.54			33.22	34.24			35.36	35.23						
−.171				−.221				−.159				−.101							
1.1789				1.1739				1.1801				1.1859							
−15.10	−15.10			−14.92	−14.92			−15.14	−15.14			−15.34	−15.34						
−.26	−.30			−.26	−.36			−.28	−.36			−.22	−.29						
−.20	−.14			−.24	−.17			−.25	−.17			−.34	−.25						
−.13	−.13			−.12	−.17			−.13	−.18			−.11	−.13						
−15.69	−15.67			−15.50	−15.59			−15.80	−15.82			−16.01	−16.11						
17.58	16.60			17.73	16.95			17.48	18.22			19.45	19.29						
17.09				17.34				17.10	17.95			19.37							
30.3	+4 13.24			30.48	+4 13.54			30.7	+4 12.88			31.2	+4 11.87						
	− .23				− .23				− .23				− .24						
+4 13.2	+ 4.90			13.1	+ 4.70			12.8	+ 4.40			11.8	+ 4.00						
12.5	+4 17.91			12.4	+4 18.01			12.1	+4 17.05			11.1	+4 15.63						
	35.0				35.4				35.0				35.0						

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July 15

h	m	s	m	s	m	s
15	29	2.3	29	–	1477	
		5.0	6.92	4.60	17.24	
		7.0	.75	6.75	19.45	
		8.5	1.68	9.00	21.69	
		10.7	1.82	11.96	24.00	
	30	10.3		53.10	27.50	
		12.0		53.32	29.72	
		13.7		57.78	32.05	
		15.1		0.07	34.60	
		16.6		2.54	36.77	
				6.79	40.22	
				19.44	42.72	
				32.13	45.00	
				45.02	47.40	
				57.80	49.75	
	29	6.70	16118			
	30	13.54				

July 23

29	10.9	29	18.52		32.27
	12.7		21.83		34.55
	14.5		24.10		36.83
	16.7		26.50		39.22
	19.0		28.80		41.56
30	23.9		10.46		45.00
	2.80		12.68		47.30
	29.7		15.70		49.66
	31.7		17.53		52.05
	33.7		19.77		54.27
			24.15		57.76
			36.89		0.10
			49.65		2.35
			2.39		4.68
			15.11		7.05
29	14.76	24819			
30	29.80				

29 32.236
29 34.275
– 2.04
– 2.06

29 49.688
29 34.171
+ 15.47
+ 15.45

+ 2.83
– .83
– 2.92
– 0.92

– 14.69
– .77
– 2.81
– 18.27

m s
29 31.34

31.37

s	s		s	s
+25.54	–41.30		+34.88	–40.16
1.40722	1.61595n		1.54258	1.66379 n
1.46392n	1.67265		1.59928n	1.66049
268	141		804	592
15 4	15 3		15 4	15 3

b	29.9 +.51	15.3 +.46	40.0 +.31	15.0 +.45
δ	33.8 +.01	18.2 +.27	44.1 +.17	19.2 +.26
l	53.4 –.46	38.0 –.24	2.1 +.03	38.0 –.24
N	49.9 +.04	35.2 +.31	0.2 00	36.5 +.29
	41.65 .10	.80 26.65	51.05 51	76 26.50
	19 41.75	18 26.68	19 51.60	18 27.18
	–29.10	47.06	–39.74	45.76
	19 12.65 +.08	13.74 –.13	19 11.86 +.11	12.94 –.13
+27°	3′ 35.70	″ 34.61	3 36.49	35.41
	35.62	34.74	36.38	35.54
+15°	15′ 3″			
	1.1959			
	– 44		– 165	
	1.1915		1.1794	
	–15.54	– 15.54	– 15.11	– 15.11
	– .15	– .38	– .27	– .35
	– .38	– .27	– .49	– .35
	– .02	– .20	– .13	– .19
	–16.09 1594	–16.39 29	–16.00 1580	–16.20 1586
	3′ 19.68	18.95	20.58	19.68
	3 19.06	′ ″	20.13	
	4 31.4	+4 11.45	32.3	+4 12.21
	′ ″	– .25		– .27
	+4 12.3	+ 3.80	12.2	+ 2.90
	11.6	+4 15.00	11.5	+4 14.84
		7′ 34.1		35.0

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α Serpentis

15h 38m 16s
+6° 48′ 38″
+35 34 10
1878

			α₀	15.541		log m δ	9.07404		log R₁	1.35913				
									″ R₂	1.05846				
			Corr. α	+ .015		″ cos δ	9.99692							
				+ .020										
			dα/dt			″ 15 cos δ tan i	0.10242 n	— June 5	R₁	22.86				
							0.10423 n 299	after ″	R₂	11.44				
			δ₀	38.32					I	2.08				
			Corr. δ	−.32		tan δ	+.12							
			dδ/dt			sin z	+.58							

	June 4			June 19			June 25			July 1		
h 15	m s 39 29.8	m s 39 —	m s 39 12.30	39 14.2	39 22.20	39 33.60	37 48.4	37 41.95	37 53.40	37 19.1	37 19.95	37 31.23
	31.2	—	14.40	16.7	24.35	35.56	49.8	44.00	57.56	21.0	22.00	33.41
	33.0	4.90 4.90	16.49	18.6	26.30	37.73	51.4	46.10	.60 57.60	23.0	24.00	35.46
	34.5	.96 7.04	18.50	20.5	28.38	39.80	52.9	48.10	.54 59.62	24.7	26.00	37.42
	37.6	5.04 9.20	20.70	22.6	30.37	42.00	55.2	50.25	.54 1.70	26.2	28.10	39.56
		46.55	23.70	40 24.5	7.79	44.92	38 9.3	A−19 d−2		38 21.0	5.64	42.50
		48.64	25.80	26.8	9.97	47.10	11.5			22.6	7.66	44.75
		50.78	27.87	28.5	12.07	49.22	13.0			24.2	9.87	46.78
		52.80	30.00	30.1	14.18	51.31	14.7			26.0	11.82	48.93
		54.90	32.00	31.8	16.20	53.35	16.3			27.6	13.92	51.00
		4.97	35.00		26.32	56.33					24.01	54.20
		16.48	37.25		37.74	58.60					35.42	56.10
		27.87	39.25		49.18	0.68					46.79	58.32
		39.30	41.49		0.61	2.70		46.08 34.64			58.28	0.40
		50.73	43.50		12.04	4.75		57.56 .70			9.78	2.38
	39 33.22	139.35		39 18.52	245.89		37 51.54			37 22.80	234.28	
			39 27.870	40 28.34		39 49.178	38 12.96		37 34.670	38 24.28		37 46.856
			38 18.741			38 18.770			38 18.758			38 18.744
			+69.13			+90.41			−44.09			−31.88
			+69.11			+90.39			−44.11			−31.90
			− 68.93			− 90.18			+ 44.22			+ 32.08
			− .16			− .14			− .16			− .18
			− 3.20			− 3.23			− 3.22			− 3.20
			− 72.29			− 93.58			+ 40.84			+ 28.70
			m s 38 15.58			15.60			15.51			15.56

	s −5.35		+30.66	−39.16	−16.87	−38.29	+24.06	−37.42
	0.72835 n		1.48657	1.59284 n	1.22712 n	1.58309 n	1.38130	1.57310 n
	0.83077		1.59080 n	1.69707	1.33135	1.68732	1.48553 n	1.67733
			8956	583	011	608	429	609
	35′ 2′		35 3	35 1	35 2	35 1	35 3	35 1
E	36.3 +.44		17.0 +.49	49.6 +.15	14.9 +.37	48.3 +.17	9.3 +.32	50.9 +.13
F	43.7 +.38		24.1 +.19	56.1 +.36	22.0 +.28	55.2 +.37	14.9 +.29	56.5 +.36
G	1.0 +.08		41.1 −.36	14.9 −.26	39.3 −.34	12.2 −.15	34.9 −.06	17.9 −.31
H	57.1 +.20		35.2 +.31	8.8 +.50	34.0 +.46	7.2 +.48	29.6 +.34	11.5 +.49
	48.65 1.10		29.05 63	3.25 75 2.75	27.10 77	87 0.25	22.10 89	67 4.40
	37 49.52		38 29.35	37 2.35	37 27.55	37 0.72	38 22.18	37 4.20
	6.77		−38.98	49.78	21.45	48.68	−30.59	47.57
	37 56.29		37 50.37 +.11	52.13 −.14	37 49.00 −.07	49.40 −.14	37 51.59 +.09	51.77 −.14
+6°	44′ 52.06″		44 57.98	56.22	44 59.35	58.95	44 56.86	56.58
			57.87	56.36	59.42	59.09	56.67	56.72
+35°	33′ 16″		33 40					
	1.6142		1.6143					
	−114		−91		−115		−198	
	1.6028		1.6052		1.6028		1.5945	
	−40.07		−40.29	−40.29	−40.07	−40.07	−39.31	−39.31
	− .01		− .04	− .10	− .02	− .10	− .04	− .09
	− .14		− .14	− .08	− .13	− .10	− .13	− .08
	− .28		− .16	− .19	− .19	− .22	− .22	− .17
	−40.50		−40.65	−40.66	−40.50	−40.49	−39.70	−39.65
	44 11.56		17.22	15.70	19.02	18.60	16.97	17.07
	44 11.56		16.46		18.81		17.02	
	48 24.4	+4′ 13.48	26.4	+4 10.02	27.1	+4 9.52	27.8	+4 11.94
		− .39		− .42		− .45		− .47
	+4′ 12.8″	+ 13.90	9.9	+ 11.90	8.3	+ 11.20	10.8	+ 10.50
	12.5	+4 26.99	9.6	+4 21.50	8.0	+4 20.27	10.5	+4 21.97
		48′ 38.6″		38.0		39.1		39.0

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α m s		δ ′ ″	
May 20	38 18.65	48 22.4	
25	.69	23.0	
30	.72	23.7	
June 4	.74	24.4	
9	18.76	25.1	
14	.77	25.8	
19	.77	26.4	
24	.76	27.0	
29	18.75	27.6	
June 29	38 18.75	48 27.6	
July 4	.73	28.2	
9	.70	28.7	
14	.66	29.2	
19	18.62	29.7	
24	.57	30.1	
29	.51	30.5	
Aug 3	.45	30.8	
8	18.39	31.1	

July 3

37	15.0	37	23.61	37	25.00	37	23.9	37	34.00	37	45.38	37	30.6	37	38.10	37	49.61	38	6.2	37	–	37	53.90
	17.0		23.65		37.05		25.7		36.00		47.41		32.5		40.22		51.76		8.1		–		54.00
	19.0		27.77		39.10		27.5		38.10		49.33		34.3		42.37		53.82		10.0		–	[0.18]	1.18
	21.0		29.75		41.22		29.2		40.20		51.63		36.4		44.50		53.88		11.1		–		2.23
	23.0		31.83		43.26		31.2		42.28		53.72		38.3		46.62		58.00		13.0		–		4.36
38	27.3		9.25		46.36	38	34.5		19.68		56.82	38	39.4		23.90		1.00	38	44.0		30.32		7.52
	29.0		11.34		48.50		36.6		21.72		58.90		40.9		25.96		3.05		45.5		32.35		9.54
	30.6		13.33		50.58		38.1		23.80		1.00		42.6		28.00		5.28		46.9		34.46		11.52
	32.3		15.40		52.56		39.8		25.88		3.05		44.5		30.10		7.22		48.0		36.50		13.53
	34.5		17.58		54.73		41.3		28.00		5.10		46.1		32.20		9.23		50.4		38.50		15.78
			27.72		57.87				38.12		8.20				42.36		12.42						19.00
			29.13		59.40				49.53		10.32				53.81		14.33				0.13 11.57		21.05
			50.54		2.00				0.97		12.33				5.16		16.66				11.58 .58		23.10
			1.98		4.05				12.36		14.41				16.63		18.70				23.12 .68		25.22
			13.38		6.10				23.82		16.50				28.03		20.83				34.43 .57		27.23
37	19.00	25	27.5			37	27.50		480			37	34.42		25.99			38	9.68				
38	30.74			37	51.550	38	38.06			38	0.960	38	42.70			38	5.198	38	47.16			38	11.600
					18.733						18.704						18.690						18.666
					– 28.18						– 17.74						– 13.49						– 7.07
					– 28.20						– 17.76						– 13.57						– 7.09
					+ 28.42						+ 17.99						+ 13.71						+ 7.25
					– .19						– .19						– .19						– .18
					– 3.19						– 3.16						– 3.15						– 3.12
					+ 25.04						+ 14.64						+ 10.37						+ 3.95
					15.59						15.60						15.57						15.55

+31.55	– 40.19			+33.46	– 37.10			+30.78	– 37.50				+1.92	– 35.56					
1.49900	1.60412 n			1.52453	1.56937 n			1.48827	1.57403 n				0.28330	1.55096 n					
1.60323 n	1.70835			1.62876 n	1.67360			1.59250 n	1.67826				0.38753 n	1.65519					
199	718			752	236			126	702				629	395					
35 3	35 1			35 3	35 1			35 3	35 1				35 2	35 1					
19.2 +.53	48.3 +.17			22.9 +.59	54.0 +.09			16.9 +.49	49.9 +.14				37.7 +.42	50.6 +.13					
24.9 +.18	54.1 +.39			29.0 +.16	59.8 +.29			23.1 +.21	55.3 +.37				45.3 +.41	57.3 +.34					
46.1 –.48	144 –.24			48.9 –.49	19.9 –.29			45.0 –.47	17.7 –.31				5.6 +.07	18.9 –.31					
40.1 +.24	9.6 +.50			42.9 +.19	15.0 +.48			37.8 +.27	18.9 +.49				58.9 +.25	11.3 +.49					
32.65 47	82	1.35		35.90 45	57	6.95		30.95 50	3.80 69				51.65 112	65	4.75				
38 32.58	37 1.60			38 35.92	37 7.18			38 30.70	37 3.45				37 51.88	37 4.52					
– 40.11	51.09			– 42.54	47.16			– 39.13	47.67				– 2.47	45.21					
37 52.47	+.12 52.69	–.14		37 53.38	+.12 54.34	–.13		37 51.57	+.11 51.12	–.13			37 49.44	+.01 49.73	–.13				
44 55.88	55.66			44 56.97	54.01			44 56.78	57.23				44 58.91	58.62					
55.76	55.80			54.85	54.14			56.67	57.36				58.90	58.75					
– 215				– 219				– 158					– 100						
1.5928				1.5924				1.5985					1.6043						
– 39.16	– 39.16			– 39.12	– 39.12			– 39.67	– 39.67				– 40.21	– 40.21					
– .07	– .11			– .07	– .09			– .06	– .10				.00	– .08					
– .18 14	– .10 08			– .18 14	– .10 08			– .18 14	– .10 08				– .20 17	– .14 12					
– .12	– .20			– .11	– .14			– .12	– .17				– .28	– .16					
– 39.53 49	– 39.57 5			– 39.48 4	– 39.45 3			– 39.93	– 40.03 20				– 40.68 3	– 40.59 5					
16.27	16.25			15.41	14.71			16.68	17.34				18.27	18.20					
16.26				15.06				17.01					18.24						
28.1	+4 12.77			28.6	+4 13.54			28.8	+4 12.88				29.1	+4 11.87					
	– .49				– .52				– .52					– .55					
+4 11.8	+ 10.20			13.5	+ 9.70			11.8	+ 9.50				10.9	+ 9.20					
11.5	+4 22.48			13.2	+4 22.72			11.5	+4 21.86				10.6	+4 20.52					
	38.7				37.8				38.9					38.8					

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July 15

h	m	s	m	s	m	s
15	37	44.0	37	48.00	38	0.35
		46.2		51.20		2.43
		48.1		53.18		4.34
		50.0		53.28		6.25
		52.0		57.46		8.18
	38	5.4		34.68		11.81
		5.85		36.77		14.00
		5.52		38.75		16.00
		5.70		40.85		18.18
		5.84		43.00		20.25

			53.22		23.40	
			4.57		25.43	
			16.07		27.39	
			27.47		29.53	
			38.81		31.38	
	37	48.06	8014			
	38	55.16			38	16.028
					38	18.650
						− 2.62
						− 2.64
						+ 2.82
						− .20
						− 3.11
						− 0.27
					38	15.54

July 16

	37	44.4	37	57.00	38	2.43
		46.2		53.05		4.53
		48.0		53.70		6.46
		49.9		57.20		8.61
		51.7		59.30		10.72
	38	5.24		36.72		13.70
		5.45		38.80		15.87
		5.64		40.89		17.92
		5.80		42.95		20.05
		6.1		45.70		22.10

			55.13		25.22	
			6.55		27.33	
			17.93		29.43	
			29.40		31.50	
			40.87		33.33	
	37	48.04	8988			
	38	56.25			38	17.976
						18.642
						− 0.67
						− 0.69
						+ 0.84
						− .18
						− 3.10
						− 2.44
						15.54

July 23

	37	58.7	38	6.56		17.93
		0.6		8.61		20.00
		2.6		10.66		22.10
		4.8		12.70		24.10
		6.9		14.84		26.10
	39	6.7		52.15		29.38
		8.6		54.33		31.43
		10.4		56.38		33.47
		11.8		58.42		35.30
		13.6		0.53		37.58

			10.68			40.72
			22.05			42.84
			33.47			45.00
			44.94			47.05
			56.36			49.10
	38	2.72	167.50			
	39	10.22			38	33.500
						18.578
						+ 14.92
						+ 14.90
						− 14.71
						− .18
						− 3.04
						− 17.93
						15.57

	+27.97	−39.13		+29.94	−38.30	
	1.44664	1.59251 n		1.47625	1.58320 n	
	1.55092 n	1.69674		1.58048 n	1.68743	
	4968	550		7924	619	
	35 3	35 1		35 3	35 1	
ζ	10.0 +.33	45.0 +.24		13.5 +.42	47.4 +.19	
Ε	16.9 +.27	51.8 +.42		20.8 +.24	54.3 +.38	
Ψ	37.1 −.19	12.8 −.18		42.0 −.39	14.9 −.26	
4	29.9 +.34	5.8 +.47		34.9 +.31	9.4 +.50	
	23.55 1175	496	18.90	27.75 58	81	1.15
	38 23.48	36 58.85		38 27.80	37 1.50	
	− 35.56	49.74		− 38.06	48.69	
	37 47.92	48.59	−.14	37 49.74	50.19	−.14
+6	45 0.43	44 59.76		44 58.61	58.16	
	0.33	59.90		58.50	58.36	
+35°	33 38					
	1.6143					
	− 44			− 99		
	1.6099			1.6044		
	−40.73	−40.73		−40.22	−40.22	
	− .05	− .10		− .06	− .10	
	− .27	− .19		− .31	− .18	
	− .19	− .24		− .14	− .20	
	−41.34	−41.17		−40.53	−40.64	
	44 19.19	18.73		17.87	17.66	
	44 18.96	"		17.76		
	48 29.3	+4 11.45		29.4	+4 12.14	
	"	− .56			− .56	
	+4 10.3	+ 9.00		11.6	+ 8.90	
	10.0	+4 19.89		11.3	+4 20.48	
		48 38.8			38.2	

	+30.78	−36.72				
	1.48827	1.56490 n				
	1.59250 n	1.66913				
	126	787				
	35 3	35 1				
ζ	15.2 +.45	50.2 +.14				
Ε	22.6 +.21	57.2 +.35				
Ψ	42.8 −.41	18.0 −.31				
4	36.8 +.28	12.0 +.49				
	29.00 53	67	4.10			
	38 29.35	37 4.85				
	− 39.13	46.68				
	37 50.22	51.03	−.13			
	44 58.13	57.32				
	58.02	57.45				
	− 161					
	1.5982					
	−39.65	−39.65				
	− .06	− .09				
	− .34	− .27				
	− .13	− .17				
	−40.18	−40.18				
	17.97	17.42				
	17.90					
	30.0	+4 12.21				
		− .60				
	12.3	+ 8.30				
	12.0	+4 19.91				
		37.6				

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ε Serpentis

15h 44m 44s
+4° 50′ 47″
+37 32 1
1878

			α_0	44.127s		log sin δ	8.92678					
			corr. α	−.010 (red: −.030)		" cos δ	9.99844					
			$\frac{d\alpha}{dt}$			" 15 cos δ tan i	0.10394n to June 5					
							0.10 ~~575~~ 451 n after "		I	2.07		
			δ_0	46.54″								
			corr. δ	−.54		tan δ	+.08					
			$\frac{d\delta}{dt}$			sin z	+.61					
	June 4			June 19			June 20			June 24		
h	m s	m s	m s									
15	45 34.2	45 29.49	45 40.90	45 45.2	45 50.70	46 2.20	45 44.8	45 52.30	46 3.81	43 27.0	43 34.10	43 45.55
	36.2	31.60	42.90	47.2	52.90	4.35	46.6	54.40	5.80	28.7	36.05	47.60
	37.3	33.72	45.00	49.2	55.00	6.42	48.0	56.56	7.95	30.4	38.05	49.60
	39.4	35.85	47.00	51.0	57.00	8.42	50.0	58.56	10.00	32.0	40.32	51.78
	41.9	37.39	49.15	53.3	59.30	10.52	51.8	0.70	12.05	34.3	42.39	53.67
		15.00	52.28	46 50.6	36.25	13.55	46 52.5	4 37.90	15.20	44 34.7	19.60	56.80
		17.00	54.36	52.3	38.40	15.70	54.5	40.00	17.12	36.6	21.70	58.90
		19.18	56.39	54.0	40.45	17.82	56.3	42.05	19.28	38.6	23.80	1.00
		21.29	58.48	55.7	42.55	19.85	58.0	44.05	21.30	40.5	25.85	3.00
		23.30	6.23	57.6	44.68	21.91	59.7	46.27	23.40	42.1	28.00	5.10
		33.61	3.63		54.98	25.00		56.50	26.45		38.18	8.15
		44.99	5.74		6.38	27.00		7.92	28.60		49.64	10.40
		56.35	7.80		17.77	29.12		19.26	30.60		0.96	12.40
		7.77	9.82		29.11	31.15		30.60	32.67		12.40	14.50
		19.15	11.87		40.47	33.30		42.05	34.70		23.79	16.55
	45 37.80	28187		45 49.18	71 8863		45 48.24	9633		43 30.48	497	
		~~45 56.374~~	45 56.374	46 54.04		46 17.726 (42)	46 56.20		46 19.266	44 38.50		44 0.994
			44 47.361			47.40			44 47.398			47.390
			+69.01			+90.34			+91.87			−46.40
			+69.02			+90.35			+91.88			−46.39
			+69.04 (red)			+90.37 (red)			+91.90 (red)			−46.37 (red)
			− 68.93			− 90.19			− 91.77			+ 46.55
			− .10			− .11			− .11			− .11
			− 3.23			− 3.27			− 3.27			− 3.26
			− 72.26			− 93.57			− 95.15			+ 43.18
			m s									
			44 44.11			44.17			44.12			44.17
	+18.57s			+28.56	−36.30		+31.03	−36.93		+30.51	−37.51	
	1.26881			1.45576	1.55991n		1.49178	1.56738n		1.48444	1.57415n	
	1.37275n			1.56151n	1.66566		1.59753n	1.67313		1.59019n	1.67990	
				027 (red)	442 (red)		629 (red)	189 (red)		8895 (red)	866 (red)	
	35′ 0′			35 1	30 4		35 1	30 4		35 1	30 4	
E	57.2″ +.13			5.1 +.18	42.2 +.26		8.1 +.23	41.2 +.28		5.7 +.19	38.9 +.33	
F	4.8 +.22			12.3 +.26	49.9 +.19		14.6 +.25	48.8 +.19		13.2 +.26	46.7 +.20	
G	21.3 −.34			28.8 −.05	4.6 +.02		30.2 −.03	2.3 +.03		30.3 −.03	2.4 +.03	
H	17.1 +.68			24.1 +.66	0.9 +.02		25.9 +.66	59.7 00		25.1 +.66	58.9 −.01	
	9.25 (red) .69			16.95 (red) 105	49	53.40 (red)	19.15 (red) 111	50	51.75 (red)	18.00 (red) 108	55	50.65 (red)
	36 10.10			36 17.58	34 54.40		36 19.70	34 53.00		36 18.58	34 51.72	
	−23.59			−36.43	46.31		−39.58	47.11		−38.92	47.85	
	35/37 46.51			35 41.15 +.10 (red)	40.71 −.13 (red)		35 40.12 +.11 (red)	40.11 −.13 (red)		35 39.66 +.11 (red)	39.57 −.13 (red)	
+4°	47′ 1.84″			47 7.20	7.64		47 8.23	8.24		47 8.69	8.78	
				7.10 (red)	7.77 (red)		8.12 (red)	8.37 (red)		8.58 (red)	8.91 (red)	
+37°	31′ 36″			31 30								
	1.6454			1.6454								
	−112			−90			−127			−139		
	1.6342			1.6364			1.6327			1.6315		
	−43.07″			−43.29	−43.29		−42.92	−42.92		−42.81	−42.81	
	− .02			− .04	− .06		− .04	− .06		− .04	− .07	
	− .08 (6)			− .09 (5)	− ~~.36~~ .34 (20)		− .09 (7)	− .34 (24)		− .09 (7)	− .34 (32)	
	− .17			− .26	− .12		− .28	− .12		− .27	− .14	
	−43.34 (2)			−43.68 (4)	−43.81 (67)		−43.33 (1)	−43.44		−43.24 (19)	−43.36	
	46′ 18.54 (2)			23.46	24.10		24.81	25.03		25.39	25.65	
	46 18.54 (2)			23.78			24.92			25.52		
	50 32.6	+4′ 13.48″		34.4	+4 10.02		34.5	+4 10.05		35.0	+4 9.90	
		− .41			− .45			− .45			− .46	
	+4′ 14.1″	+ 13.90		10.6	+ 12.10		9.6	+ 12.00		9.5	+ 11.50	
	13.6	+4 26.97		10.1	+4 21.67		9.1	+4 21.60		9.0	+4 20.94	
		50′ 46.5″			45.4			46.5			46.5	

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α m	α s	δ ′	δ ″		α m	α s	δ ′	δ ″
May 20	44 47.25	50	30.6		June 29	44 47.38	50	35.6
25	.29		31.2		July 4	.36		36.2
30	.33		31.9		9	.33		34.7
June 4	.36		32.6		14	.30		37.2
9	47.38		33.2		19	47.26		37.6
14	.39		33.8		24	.21		38.0
19	.40		34.4		29	.16		38.4
24	.39		35.0		Aug. 3	.10		38.7
24	47.38		35.6		8	47.04		39.0

June 25

43	30.7	43	36.40	43	47.70		43	30.4	43	38.54	43	48.80		43	42.8	43	48.44	43	59.95
	32.2		38.47	51.84	48.77			32.0		40.60		51.92			44.6		50.63		2.00
	34.0		40.40	.84	—			33.6		42.70		54.00			47.3		52.77		4.00
	35.9		42.48	.86	—			35.8		44.61		56.00			49.1		54.78		6.05
	37.9		44.50		56.00			37.4		46.75		58.03			51.2		56.80		8.05
44	38.5		21.77		59.00		44	40.1		—		1.30		44	52.5		34.00		11.22
	40.6		23.90		1.20			42.0	28.17	26.10		3.40			54.1		36.10		18.32
	42.6		26.00		3.20			44.3	.05	28.05		5.44			56.0		38.05		13.43
	44.2		28.00		5.30			46.0	.13	30.20		7.47			57.9		40.10		17.33
	[46.2]		30.10		7.35			48.0	.16	32.30		9.50			0.0		42.20		19.67
			40.45		10.35					42.64		12.77					52.68		22.65
			57.85		12.50					53.97		14.70					4.01		24.80
			3.21		14.55					5.42		16.75					15.43		26.82
			14.54		16.60					16.82		18.90					26.86		29.00
			25.96		18.70					28.13		21.00					38.09		31.05
43	34.14		1601				43	33.84		2698				43	47.00		7707		
44	42.42			44	3.20	2	44	44.08			44	5.39	6	44	56.10			44	15.41
					47.38							47.38							47.37
					−44.19							−41.99							−31.96
					−44.18							−41.98							−31.95
					−44.16							−41.96							−31.93
				+	44.20						+	42.08						+	32.07
				−	.11						−	.11						−	.12
				−	3.26						−	3.26						−	3.24
				+	40.83						+	38.71						+	28.71
					44.03							44.11							44.12
	+29.06		−39.22					+31.56		−38.68					+28.41		−40.69		
	1.46330		1.59351n					1.49914		1.58749n					1.45847		1.60949n		
	1.56906n		1.69926					1.60489n		1.69324					1.55922n		1.71524		
	781		802					363		200					798		400		
	35 1		30 4					35 1		30 4					35 1		30 4		
	4.5 +.18		36.0 +.40					5.7 +.19		36.2 +.39					4.8 +.18		37.5 +.36		
	11.9 +.26		43.9 +.17					13.2 +.26		44.3 +.17					11.5 +.26		43.9 +.17		
	28.2 −.07		58.2 −.06					29.1 −.05		57.3 −.11					30.8 −.03		1.3 +.02		
	22.3 +.65		53.4 −.01					24.1 +.66		56.3 −.02					25.2 +.66		58.8 −.01		
	1635 102		50		47.10			1740 106		43		46.75			1780 107		54		49.40
	36 16.72		34 48.38					36 18.02		34 48.52					36 18.08		34 50.38		
	−37.07		50.02					−40.26		49.34					−36.24		51.91		
	35 39.65	+.10	38.41	−.14				35 37.76	+.11	37.86	−.14				35 41.84	+.10	42.29	−.15	
	47 8.70		9.94					47 10.59		10.49					47 6.51		6.06		
	8.60		10.08					10.48		10.63					6.41		6.21		
	−113							−67							−196				
	1.6341							1.6387							1.6258				
	−43.06		−43.06					−43.52		−43.52					−42.25		−42.25		
	−.04		−.07					−.45		−.07					−.04		−.08		
	−.06		−.34					−.06		−.34					−.07		−.24		
	−.26		−.12					−.26		−.11					−.27		−.14		
	−43.42	2	−43.59	4				−43.98	0	−44.04	43.94				−42.63	1	−42.71	66	
	2518		2659					2658		2669					2380		2355		
	2588							2663							2368				
	35.1	+4	9.52					35.2	+4	9.65					35.87	+4	11.94		
		−	.47						−	.48						−	.49		
	+4 9.2	+	11.46					8.6	+	11.30					12.2	+	10.60		
	8.7	+4	20.45					8.1	+4	20.47					11.7	+4	22.05		
			46.3							47.1							45.7		

June 26

July 1

July 3

43	41.1	43	52.18	44	3.60														
	43.5		54.32		5.68														
	45.0		56.33		7.75														
	46.3		58.42		9.78														
	47.9		0.50		11.87														
44	53.6		37.65		15.00														
	55.1		39.82		17.00														
	57.2		41.90		19.80														
	59.3		44.00		21.15														
	0.9		46.05		23.20														
			56.35		26.30														
			7.74		28.43														
			19.07		30.40														
			30.44		32.50														
			41.88		34.58														
43	44.76		9548																
44	57.22			44	19.09	6													
					47.36	3													
					−28.27														
					−28.26														
					−28.29														
				+	28.42														
				−	.12														
				−	3.24														
				+	25.06														
					44.16														
	+34.34		−38.12																
	1.53580		1.58115n																
	1.64155n		1.68690																
	031		566																
	35 1		30 4																
	13.1 +.35		41.2 +.28																
	19.1 +.24		47.1 +.20																
	39.5 −.38		51 +.01																
	33.9 +.61		2.8 +.08																
	26.30 82		57		53.15														
	36 26.40		34 54.05																
	−43.81		48.63																
	35 42.59	+.13	42.68	−.14															
	47 5.76		5.67																
	5.68		5.81																
	−213																		
	1.6241																		
	−42.08		−42.08																
	−.06		−.07																
	−.07		−.24																
	−.20		−.14																
	42.40		−42.53	49															
	2323		2332																
	2327																		
	36.1	+4	12.77																
		−	.51																
	12.8	+	10.40																
	12.3	+4	22.66																
			45.9																

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July 7

h	m s	m s	m s
15	43 57.7	44 0.62	44 11.80
	53.7	2.56	14.00
	55.2	4.67	16.00
	57.0	6.69	18.15
	58.9	8.85	20.26
	45 0.4	46.10	23.32
	2.4	48.10	25.33
	4.0	50.27	27.46
	6.1	52.33	29.53
	7.6	54.47	31.63
		4.68	34.67
		16.06	36.77
		27.45	38.87
		38.86	40.96
		50.25	43.05
	43 55.30	137.30	
	45 4.10		44 27.460
			44 47.341
			− 19.88
			− 19.87
			− 19.85
			+ 19.99
			− .12
			− 3.21
			+ 16.66
			m s 44 44.12

	s	s
	+32.16	−36.54
	1.50732	1.56396n
	1.61307n	1.64971
	183	847
	35 1	30 4
ε	9.9 +.28	42.2 +.26
ζ	17.1 +.25	49.3 +.19
G	35.1 −.16	5.2 +.01
H	32.2 +.63	3.4 +.10
	22.50 100	56 53.70
	36 23.58	34 55.02
	− 41.03	46.74
	35 42.55 +.12	41.76 −.13
+ 4°	47 5.80	6.59
	5.68	6.72
+37°	31 30	
	1.6454	
	−166	
	1.6288	
	−42.54	−42.54
	− .05	− .06
	− .06	− .20
	− .25	− .14
	−42.90	−42.94
	46 22.78	23.78
	46 23.28	′ ″
	50 36.5	+4 13.24
		− .54
	+1′ 13.2	+ 10.00
	12.7	+4 22.70
		50′ 46.0

July 8

m s	m s	m s
43 54.4	44 2.58	44 14.00
56.1	4.67	16.05
57.6	6.66	18.10
59.9	8.73	20.10
1.6	10.78	22.27
45 4.8	48.10	25.36
7.0	50.18	27.43
9.0	52.26	29.53
10.9	54.36	31.56
12.5	56.48	33.67
	6.68	36.70
	18.10	38.75
	29.51	41.00
	40.91	43.00
	52.28	45.10
43 57.92	147.48	
45 8.84		44 29.496
		47.335
		− 17.84
		− 17.83
		− 17.81
		+ 17.98
		− .12
		− 3.21
		+ 14.65
		44.15

+31.58	−39.34
1.49941	1.59483n
1.60516n	1.69258
392	699 34
35 1	30 4
10.0 +.28	39.9 +.31
17.5 +.25	46.8 +.20
35.8 −.19	4.0 +.03
31.1 +.64	1.1 +.02
22.90 98	56 51.95
36 23.60	34 52.95
−40.29	50.18
35 43.31 +.12	43.13 −.14
47 5.04	5.22
4.92	5.36
−217	
1.6237	
−42.04	−42.04
− .05	− .07
− .07 6	− .24 19
− .24	− .14
−42.40 39	−42.49 4
22.33	22.92
22.72	
36.6 +4	13.54
	− .54
13.9 +	9.90
13.4 +4	22.90
	46.6

July 10

m s	m s	m s
43 53.8	44 6.80	44 18.20
57.4	9.00	20.33
59.0	11.00	22.39
1.1	13.05	24.46
3.3	15.70	26.49
45 5.6	52.40	29.75
8.0	54.50	31.72
9.3	56.58	33.82
11.0	58.73	35.85
12.5	0.75	38.00
	10.99	41.05
	22.37	43.22
	33.83	45.27
	45.25	47.33
	56.59	49.38
43 59.36	169.03	
45 9.28		44 33.406
		47.323
		− 13.52
		− 13.51
		− 13.49
		+ 13.70
		− .13
		− 3.20
		+ 10.37
		44.18

+34.45	−35.47
1.53719	1.54986n
1.64294n	1.65561
170	437
35 1	30 4
10.9 +.30	42.6 +.25
18.1 +.25	49.1 +.19
38.3 −.32	8.7 −.09
32.0 +.63	3.1 +.09
24.60 86	44 55.65
36 24.82	34 53.88
−43.95	45.25
35 40.87 +.13	41.13 −.13
47 7.48	7.22
7.35	7.35
−158	
1.6296	
−42.62	−42.62
− .06	− .06
− .07 6	− .33
− .22	− .11
−42.97 6	−43.04 42.99
24.39	24.36
24.38	
36.8 +4	12.88
	− .56
12.4 +	9.70
11.9 +4	22.02
	46.4

July 13

m s	m s	m s
44 5.1	44 13.36	24.70
7.2	15.42	26.80
9.0	17.50	28.80
10.4	19.61	31.00
12.2	21.65	33.00
45 10.6	58.85	36.05
12.7	1.00	38.10
14.5	3.00	40.25
16.3	5.10	42.20
18.1	7.20	44.37
	17.51	47.48
	28.86	49.54
	40.19	51.53
	51.61	58.63
	3.03	53.86
44 8.78	201.20	
45 14.44		44 40.240
		47.304
		− 7.06
		− 7.05
		− 7.03
		+ 7.24
		− .12
		− 3.18
		+ 3.94
		44.18

+31.46	−34.20
1.49776	1.53403n
1.60351n	1.63978
227	854
35 1	30 4
5.5 +.18	41.8 +.27
13.2 +.26	49.3 +.19
32.0 −.07	7.7 −.05
26.8 +.65	3.2 +.10
19.25 102	51 54.75
36 19.62	34 55.50
−40.13	43.63
35 39.49 +.11	39.13 −.12
47 8.86	9.22
8.75	9.34
−98	
1.6356	
−43.21	−43.21
− .04	− .06
− .07	− .34
− .26	− .13
−43.60 58	−43.74 65
25.17	25.69
25.13	
37.1 +4	11.87
	− .57
11.7 +	9.40
11.2 +4	20.70
	46.1

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July 15

July 16

July 22

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ζ Ursae Min.

15h 48m 27s
+78° 10' 8"
−35 47 20
1878

α_0 26.625 s
corr. α +.394 +.300
$\Delta\alpha$
$\Delta\delta$
δ_0 7.95 "
corr. δ +.28
$\Delta\delta$
Δz

log sin δ 9.99067
" cos δ 9.31181
" 15 cos δ sin 1' 9.419+2n / 788
tan δ +4.774
sin z −.58

I 10.07

June 19 | June 20 | June 25 | Eq ✓ | June 26 | poor obs.

h	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s
15	48	30.4	48	33.2	49	48.4	48	55.7	48	54.6	49	5.03	46	46.6	46	38.5	47	39.7	46	40.7	47	36.0
		35.3		38.3		53.8		7.4		59.8		5.70		39.0		43.4		46.4		45.6		41.2
		40.3		3.8		59.5		12.0		5.2		0.4	✓	10.0		48.3		59.6		50.6		45.7
		58.9		8.3		4.4		22.4		10.08		5.5		20.5		53.8		11.5		56.0		37.2
		6.0		13.0		9.0		31.5		15.0		10.2		26.8		58.7		16.7		0.8		56.3
				18.5		14.0				19.7		15.4				3.6				6.0		1.3
	51	36.9		23.4		18.7	51	27.8		25.0		20.0	48	46.2		8.5	48	59.4		11.0		6.2
		47.3		29.4		24.1		33.7		20.4		25.3		56.4		13.6		16.6		16.2		11.1
		55.8	1223	34.4	812	29.3		42.5	1343	34.6	921	30.0		5.4	877	19.3		13.8	70	20.1	5056	16.6
		6.1						52.8						13.5				15.2				
		13.1		13.59		44.4		57.7		14.92		45.7		21.0						0.78		31.2
				9.02		49.0				10.23		50.9						156		56.18		36.4
				4.54		54.2				5.70		55.5								51.42		41.4
						59.6						0.5										46.4
				27.15		4.8				30.85		5.4				58.63						37.4
						10.0						10.5				53.58				16.38		36.5
						14.6						15.8				49.31						1.7
						19.8						21.0										6.3
	48	48.18												8.58								
		40.48			409	24.5	49	13.80			513	26.0	47	##		16.52						46	28	115
	51	55.64	50	9.050	50	9.050	51	42.90			50	10.288	49	4.50					46	58.78				
					48	31.734						31.688												
						+ 97.32						+ 98.61												
						+ 98.93						+ 98.22												
						+ 97.02						+ 98.31												
						− 90.14						− 91.77												
						− 6.68						− 6.46												
						− 5.11						− 5.04												
						− 101.98						− 103.27												
					m	s																		
					48	27.07						27.01												

	s		s																					
	+80.87		−106.59						+56.48		−92.62				+45.26		−70.86				+57.35		−79.07	
	1.90775		2.02772n						1.75189		1.96670n				1.65571		1.84917n				1.75853		1.89801n	
	1.32691n		1.44684						1.17101n		1.38582				1.07483n		1.26829				1.17765n		1.31713	
	567		560						577		458				359		705				641		587	
	15	2	15	1					15	2	15	2			15	2	15	2			15	2	15	2
	'	"	'	"																				
ζ	46.1	+.28	55.8	+.08					39.0	+.40	0.0	+.07			35.3	+.45	4.4	+.12			38.2	+.41	1.8	+.08
Φ	46.4	+.42	56.2	+.36					39.4	+.28	0.3	+.29			36.1	+.22	5.2	+.33			38.9	+.27	2.1	+.20
ℓ	0.8	+.08	10.1	−.05					53.6	−.40	13.9	−.23			51.0	−.52	18.8	−.31			53.1	−.43	16.5	−.20
H	3.1	+.31	13.2	+.49					55.9	+.22	16.3	+.47			52.7	+.24	21.3	+.46			56.6	+.22	18.9	+.46
	53.45	109		88	2.95					50		60	6.95		43.15	39		60	11.60		45.65	47		54	9.15
	17	54.10	17	3.82					17	46.98	17	7.62			17	43.78	17	12.42			17	46.45	17	9.82
		−21.23		27.98						−14.83		24.31				−11.88		18.98				−15.05		26.76
	17	32.87	+.06	31.80	−.08				17	32.15	+.05	31.93	−.07		17	31.90	+.03	31.40	−.49		17	31.40	+.04	30.58	−.06
	'	"		"																				
+78°	5	15.48		16.55					5	16.20		16.42			5	16.45		16.95			5	16.95		17.77
		15.42		16.63						16.15		16.49				16.42		17.44				16.91		17.83
−35°	46	37																						
	1.6177																							
	− 89								− 126						− 112						− 065			
	1.6088								1.6051						1.6065						1.6112			
	+40.63		+40.63						+40.28		+40.28				+40.41		+40.41				+40.85		+40.85	
	− .73		− 1.26						− .36		− .95				− .22		− .55				− .36		− .69	
	− .28		− .11						− .20		− .15				− .19		− .15				− .28		− .15	
	− .27		− .22						− .12		− .15				− .10		− .15				− .12		− .14	
	+39.35		+39.01						+39.60		+39.03				+39.95		+39.56				+40.25		+39.91	
	5	54.93		55.70						55.81		55.56				56.37		57.04				57.14		57.44
	5	55.32								55.68						56.70						57.44		
	10	5.7	+4	10.02						58.5	+4	10.05				7.65	+4	9.52				4.3	+4	9.65
	'	"	+	.42							+	.42					+	.45					+	.45
	+4	10.4	+	2.30						10.2	+	2.10				10.4	+	0.90				9.9	+	0.70
		10.7	+4	12.74						10.5	+4	12.57				10.7	+4	10.87				10.2	+4	10.60
			'	"								8.2						7.6						8.2
			10	8.1																				

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α

	m	ℓ
June 19	48	31.75
24		31.42
29		31.06
July 4		30.66
9		30.24
July 14		29.79
19		29.32
24		28.82
29		28.31

δ

10	5.6	12
	6.8	12
	8.0	10
	9.0	9
	9.9	8
	10.7	7
	11.4	6
	12.0	5
	12.5	

July 1

33	47	11.8	46	50.6	47	46.7																	
36		22.7		56.5		51.7																	
40		31.7		1.0		56.2																	
42		39.6		6.1		13																	
45		49.3		11.3		6.7																	
47				16.6		11.7																	
50	47	5.20		21.2		16.7																	
51		1.3		26.3		21.7																	
		7.0	1009	31.3	594	26.7																	
		15.9																					
		26.4		11.21		41.8																	
				6.60		46.5																	
				1.74		51.4																	
						56.3																	
				19.55		1.8																	
						7.0																	
						12.0																	
						16.8																	
	47	31.02			157	21.8	47	9.68															
	50	8.52			48	6.517			49	8.560													
						30.880			48	30.800													
						−24.36				−22.24													
						−24.75				−22.63													
						−2466				−2254													
						+ 32.06				+ 30.43													
						− 7.28				− 7.68													
						− 4.26				− 4.18													
						+ 26.52				+ 18.57													
						27.04				27.13													
		+35.50		−122.00		+58.88																	
		1.55023		2.08636 n		1.76997																	
		0.96935 n		1.50548		1.18909 n																	
		811		424		785																	
		15 2		15 1		15 2																	
		31.9 +.51		49.2 +.16		37.1 +.43																	
		32.2 +.21		48.8 +.43		36.9 +.23																	
		49.9 −.54		5.9 +.10		54.9 −.29																	
		50.8 +.26		8.0 +.49		55.9 +.22																	
		40.90 +.44		118 57.55		46.00 59																	
		17 41.20		16 57.98		17 46.20																	
		− 9.32		32.02		−15.46																	
		17 31.88	+.03	30.00	−.09	17 30.74	+.05																
		5 16.47		18.35		5 17.61																	
		16.44		18.44		17.56																	
		− 195				− 224																	
		1.5982				1.5953																	
		+39.65		+39.65		+39.38																	
		− .14		− 1.65		− .39																	
		− .11		− .30		− .15																	
		+39.27		37.68		+38.78																	
		55.73		56.06																			
		55.90				56.79																	
		8.4	+4	11.94		8.6	+4	12.58															
			+	.47			+	.48															
	+4	12.5	−	0.40		12.4	−	0.70															
		12.8	+4	12.01		12.7	+4	12.28															
				7.9				8.6															

July 2

10	47	48.7	47	53.4	48	48.0																	
		4.0		58.6		53.7																	
	√	15.2		3.4		58.5																	
		30.8		8.4		3.6																	
				13.2		8.8																	
				18.0		13.6																	
50		21.3		23.1		18.9																	
		26.6		28.1		23.5																	
	ref	37.1	1198	33.6	768	28.2																	
		40.0																					
		53.0		13.31		3.8	43.7																
				8.53		3.9	48.8																
				3.84		3.9	53.8																
						4.0	57.0																
				25.68		3.7	3.7																
						3.7	8.7																
						3.8	13.9																
						3.9	18.0																
	#7						—																
	48	9.68																					
	49	8.560																					
	48	30.800																					
		−22.24																					
		−22.63																					
		−2254																					
		+ 30.43																					
		− 7.68																					
		− 4.18																					
		+ 18.57																					
		27.13																					
		+58.88																					
		1.76997																					
		1.18909 n																					
		785																					
		15 2																					
		37.1 +.43																					
		36.9 +.23																					
		54.9 −.29																					
		55.9 +.22																					
		46.00 59																					
		17 46.20																					
		−15.46																					
		17 30.74	+.05																				
		5 17.61																					
		17.56																					
		− 224																					
		1.5953																					
		+39.38																					
		− .39																					
		− .11																					
		− .15																					
		+38.78																					
		56.79																					
		8.65	+4	12.58																			
			+	.48																			
		12.4	−	0.70																			
		12.7	+4	12.28																			
				8.6																			

July 3

	47	35.3	46	54.4	47	50.3																	
		46.1		59.2		54.8																	
		53.7		4.6		0.2																	
		3.9		9.3		5.7																	
		12.7		14.9		10.2																	
				19.9		13.4																	
	48	41.2		24.5		20.0																	
		34.0		29.9		25.3																	
		27	1316	34.9	921	30.2																	
		1.23																					
		21.3		14.62		45.6																	
				10.23		50.4																	
				5.87		55.4																	
						0.7																	
				30.72		5.5																	
						11.0																	
						13.5																	
						2.08																	
	47	54.34			528	27.9	47	13.34															
	49	3.50			48	10.240	49	35.54															
						30.720																	
						−20.48																	
						−20.87																	
						−2078																	
						+ 28.41																	
						− 7.45																	
						− 4.10																	
						+ 16.86																	
						27.10																	
		+15.90		−53.26				+64.52		−77.68													
		1.20140		1.72640 n				1.80969		1.89031 n													
		0.62052 n		1.14552				1.22881 n		1.30943													
		1928		428				757		819													
		15 2		15 2				15 2		15 2													
		26.9 +.54		8.7 +.21				38.1 +.41		0.8 +.08													
		26.7 +.24		8.2 +.34				39.1 +.27		1.8 +.30													
		44.5 −.52		26.1 −.04				58.3 −.24		17.7 −.81													
		45.9 +.32		27.9 +.47				56.9 +.20		20.5 +.46													
		35.70 58		98 17.00				46.70 64		53 9.25													
		17 36.00		17 17.72				17 47.35		17 10.20													
		− 4.17		13.98				−16.94		20.39													
		17 31.83	+.01	31.70	−.04			17 30.41	+.05	30.59	−.06												
		5 16.52		16.65				5 17.94		17.76													
		16.47 51		16.69				17.89		17.82													
		− 212						− 167															
		1.5965						1.6010															
		+39.49		+39.49				+39.90		+39.90													
		− .03		− .31				− .46		− .67													
		− .13		− .29				− .11		− .69													
		− .14		− .24				− .16		− .13													
		+39.22		+38.85				+39.17		+39.01													
		55.73		55.54				57.06		56.83													
		55.64						56.94															
		8.85	+4	12.47				9.88	+4	13.24													
			+	.49					+	.57													
		13.2	−	0.90				12.6	−	1.60													
		13.5	+4	12.36				12.9	+4	12.15													
				8.0						9.1													

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July 8

h	m	s	m	s	cm	s
15	46	50.2	47	5.1	48	0.4
		0.3		10.0		5.4
		1.2		15.0		10.4
		18.7		19.4		15.2
		28.3		25.0		20.5
				30.1		25.5
	49	8.4		35.2		30.4
		18.6		40.5		35.4
		26.3	22.56	45.3	1839	40.7
		34.1				
		42.8		25.07		33.4
				20.43		0.8
				15.86		5.7
						10.6
			6136			15.8
						21.1
						26.0
						31.1
	47	9.34			1427	36.2
	49	26.04			48	20.453
					48	30.303
						− 9.85
						− 10.24
						− 10.15
						+ 17.97
						− 7.45
						− 3.68
						+ 6.84
					m	s
					48	27.29

July 10

47	34.5	47	9.1	48	4.0			
	46.1		13.8		9.1			
	54.0		18.6		14.3			
	1.2		24.0		19.4			
	10.0		29.0		24.3			
			33.8		29.8			
49	16.7		39.1		35.1			
	27.6		44.3		39.7			
	36.5	2607	49.0	2203	44.6			
	44.3							
	51.4		28.97		39.3			
			24.48		33.3			
			19.98		10.6			
					15.3			
			7343		18.9			
					23.0			
					29.9			
					34.9			
47	53.16			1798	39.6			
49	35.30			48	24.477			
					30.128			
					− 5.65			
					− 6.04			
					− 5.95			
					+ 13.69			
					− 7.56			
					− 3.50			
					+ 2.63			
					27.11			

July 13

46	56.0	47	15.1	48	1.0			
	3.1		19.9		15.0			
	13.9		25.1		20.0			
[23.4]	33.5		29.9		25.2			
			35.2		30.3			
			40.0		35.0			
49	3.21		44.9		40.3			
	4.21		50.0		45.3			
	49.3	3155	55.4	2721	50.6			
	54.0							
	4.7		35.06		6.0			
			30.23		11.1			
			25.93		15.8			
					20.8			
			9122		25.5			
					30.7			
					35.4			
					41.4			
47	14.34			2334	46.1			
49	49.04			48	30.407			
					29.887			
					+ 0.55			
					+ 0.16			
					+ 0.25			
					+ 7.23			
					− 7.23			
					− 3.23			
					− 3.23			
					27.18			

July 15

46	51.2	47	20.0	48	15.7			
	3.7		24.3		19.5			
	21.0		30.0		24.3			
	26.7		34.2		30.4			
	31.2		40.2		35.1			
			44.7		39.4			
49	4.16		49.8		44.5			
	31.8		54.6		49.8			
	59.0	3567	58.9	3139	55.2			
	9.2							
	17.7		39.63		10.1			
			34.88		13.8			
			30.69		21.8			
					25.8			
			10520		30.2			
					35.6			
					40.2			
					45.1			
47	14.76			2762	37.0			
49	59.86			48	35.067			
					29.673			
					+ 5.39			
					+ 5.00			
					+ 5.89			
					+ 2.80			
					− 7.77			
					− 3.05			
					− 8.02			
					27.05			

+71.11		−65.59		+31.32		−70.82		
1.85193		1.81684n		1.49582		1.85016n		
1.27105n		1.23596		0.91494n		1.26928		
6981		477		370		804		
15 2		15 2		15 2		15 2		
39.9	+.38	4.2	+.11	30.5	+.52	2.7	+.09	
40.9	+.31	5.2	+.33	30.1	+.22	2.9	+.30	
57.8	−.02	21.2	−.25	48.4	−.57	20.8	−.27	
59.2	+.22	23.8	+.47	49.5	+.28	22.8	+.47	
48.85	.89	12.7	.66	12.70	39.45	.45	5.9	11.75
17	49.45	17	13.60		17	39.62	17	12.30
	−18.67		17.22			− 8.22		18.59
17	30.78	+.06	30.82	−.05	17	31.40	+.02	30.89 −.05
+78°	5 17.57		17.53		5	16.95		17.46
	17.51		17.58			16.93		17.51
−35°	46 40							
	1.6177							
	−.214					− 157		
	1.5960					1.6020		
	+39.45		+39.45			+39.99		+39.99
	− .56		− .48			− .13		− .56
	− .14		− .11			− .11		− .19
	− .22		− .16			− .11		− .15
	+38.53		+38.70			+39.64		+39.79
	5 56.07		56.30			56.59		56.70
	5 56.18					56.65		
	10 9.7	+4	13.54			10.1	+4	12.88
	"	+	.52				+	.53
	+4 13.6	−	1.80			13.5	−	2.10
	13.9	+4	12.26			13.8	+4	11.31
		10'	8.4					8.0

+76.07		−78.63						
1.88121		1.89659n						
1.30033n		1.31471						
29909		347						
15 2		15 1						
40.1	+.38	59.8	+.07					
41.1	+.31	0.4	+.29					
59.4	+.04	18.9	−.31					
59.9	+.23	19.3	+.46					
49.75	.96	51.9	.35					
17	50.12	17	9.35					
	−19.97		20.64					
17	30.15	+.06	30.24	−.06				
5	18.20		18.11					
	18.14		18.17					
	− 98							
	1.6079							
	+40.54		+40.54					
	− .64		− .68					
	− .24		− .15					
	− .24		− .13					
	+39.46		+39.58					
	5 57.66		57.79					
	57.72							
	10.8	+4	11.87					
		+	.55					
	12.9	−	2.60					
	13.2	+4	9.82					
			7.5					

+80.31		−84.79						
1.90477		1.92834n						
1.32389n		1.34746						
265		622						
15 2		15 1						
41.2	+.36	58.8	+.07					
41.9	+.34	59.2	+.31					
59.1	+.02	16.9	−.30					
0.1	+.23	17.2	+.47					
50.15	.95	55.7	.85					
17	50.58	17	8.02					
	−21.08		22.26					
17	29.50	+.06	30.28	−.07				
5	18.85		18.07					
	18.79		18.14					
	− 43							
	1.6134							
	+41.06		+41.06					
	− .71		− .80					
	− .24		− .14					
	− .24		− .14					
	+39.87		+39.98					
	58.78		58.15					
	58.46							
	10.8	+4	11.45					
		+	.56					
	12.4	−	2.90					
	12.7	+4	9.11					
			7.6					

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July 16

47 39.7
49.0
66.0
65
17.1

47 21.0
26.1
30.8
35.8
40.9
45.8
51.0
55.4

3679 1.1

48 15.4
20.0
26.0
30.9
36.0
40.6
45.7
51.5

3217 55.6

40.88
35.74
31.36

11.6
16.1
20.8
26.1

10798

31.1
36.4
41.7
46.4

47 57.66

2822 52.0

48 11.28

48 35.998
29.579
+ 6.41
+ 6.02
+ 6.11

+ 0.82
— 7.04
— 2.95
— 9.17

26.82

+38.33
1.58354
1.00266 n
142

15 2

29.3 +.53
31.2 +.21
48.7 −.56
50.8 +.26
39.00 44

17 40.00
— 10.06
17 29.94 +.03

5 18.41
18.38

− 98
1.6079
+40.54
− .16
− .24
− .11
+40.03

58.49
11.0 +4 12.14
+ .56
+4 12.5 − 3.00
12.8 +4 9.70
8.2

July 22

47 52.0
1.0
12.0
21.6
29.8

49 9.4
16.8
23.0
32.0
40.6

53.72
49.09
44.39

14.20

48 11.28

49 24.36

+37.79
1.57738
0.99650 n
526

15 2

28.1 +.54
30.2 +.22
48.2 −.57
49.3 +.28
38.15 47

17 38.45
— 9.92
17 28.53 +.03

5 19.82
19.79

− 178
1.5999
+39.80
− .16
− .26
− .12
+39.26 36

59.15
59.35
11.8 +4 12.29
+ .59
12.4 − 3.80
12.7 +4 9.08
8.4

47 33.6
38.5
43.4
48.8
53.9
58.9
3.7
8.7
14.0

48 35

53.9
58.9
54.0
59.3
4.3
9.1

3448

24.1
29.6
34.3
39.6
44.2
49.4
54.3
59.3

3995 4.1

48 49.067
28.995
+ 20.07
+ 19.68
+ 19.77

− 12.53
− 7.22
− 2.37
− 22.12

26.95

−35.29
1.54765 n
0.96677
553

15 2

8.8 +.21
10.1 +.34
27.6 −.01
28.8 +.48
102 16.20

17 18.82
9.26
17 28.08 −.02

20.27
20.29

−178
1.5926
+39.80
− .14
− .23
− .26
+39.17 26

59.55

+4 12.29
+ .59
− 3.80
+4 9.08
8.4

47 13.5
22.0
34.3
39.7
62.0

48 55.6 5.7
55.9 11.0
56.0 16.1
20.1
26.9

55.83
51.00
46.52

15335

48 32.30

50 11.36

+18.82
1.27462
0.69374 n
250

15 2

23.8 +.53
25.8 +.25
43.1 −.48
42.7 +.35
33.45 65

17 33.85
— 4.94
17 28.91 +.01

5 19.44
19.43

−158
1.6019
+39.99
− .04
− .26
− .16
+39.53 63

59.06
59.40
11.9 +4 12.21
+ .59
12.5 − 3.96
12.8 +4 8.90
8.3

− 80.24
1.90439 n
1.32351
227

15 1

56.9 +.07
58.7 +.32
16.0 −.29
19.9 +.48
58

17 6.62
21.06
17 27.68 −.06

20.67
20.73

− 39.99
− .71
− .21
− .14
+39.93 3901

59.74

+4 12.21
+ .59
− 3.96
+4 8.90
8.3

48 31.7
36.4
40.8
46.0
51.0
56.0
0.4
6.0

45900 10.7

48 25.9
31.4
36.5
41.7
47.0
51.4
56.5
1.8

41187 6.8

48 51.117
28.695
+ 22.22
+ 21.83
+ 21.92

− 14.72
− 7.20
− 2.27
− 24.19

26.93

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ε Coronæ

15h 52m 32s

+27° 13′ 56″

+15 8 52

1878

d_s 32.284 s

corr. d −.047 −.062

$\frac{da}{dt}$

δ_0 56″.31

corr. δ −.60

$\frac{d\delta}{dt}$

log sin d 9.66048

" cos δ 9.94898

" 15 cos δ tan 0.05629n 505

tan δ +.51

sin z +.26

I 2.32

	June 24		June 25		July 1		July 2	
h	m s	m s	m s	m s	m s	m s	m s	m s
15	51 9.0	51 19.40	51 32.02	51 13.4	51 21.72	51 34.49	51 26.5	51 34.00
	11.0	21.70	34.44	15.2	24.00	36.78	28.2	36.20
	13.2	24.04	36.80	17.3	26.33	39.10	30.3	38.53
	15.1	26.35	39.10	19.0	28.66	41.58	32.0	40.82
	17.0	28.60	41.46	22.0	30.97	43.70	34.4	43.22
	52 26.2	10.48	44.97	53 28.8	12.70	47.20	52 44.5	24.85
	28.8	12.78	47.29	[52] 30.7	15.00	49.60	47.0	27.31
	30.6	15.00	49.56	32.6	17.27	51.85	48.9	29.68
	32.4	17.40	51.95	34.5	19.60	54.10	50.8	32.00
	34.2	19.78	54.15	36.5	22.00	56.50	52.7	34.30
		24.02	57.55		26.34	0.05		38.56
		36.75	0.05		39.11	2.25		51.32
		49.58	2.37		51.85	4.57		4.07
		2.31	4.68		4.60	6.92		16.87
		15.09	6.92		17.33	9.20		29.63
	51 13.06	24775		51 17.38	25923		51 30.28	20445
	52 30.44		51 49.558	53 32.62		51 51.846	52 48.78	
			52 35.439	52		35.435		52 4.090
			−45.89			−43.89		−31.31
			−45.84			−43.84		−31.26
			−45.83			−43.53		−31.25
			+ 46.54			+ 44.18		+ 32.06
			− .69			− .69		− .78
			− 3.16			− 3.15		− 3.12
			+ 42.69			+ 40.34		+ 28.16
			m s 52 32.24			32.19		32.25

	s +36.49	s −40.89		+34.47	4 −80.77		+33.81	−44.69	+30.94	−28.50
	1.56217	1.61162n		1.53744	2.00383n	1.61034n	1.52905	1.65021n	1.49052	1.45484n
	1.61846n	1.66791		1.59373n	2.05962	1.66663	1.58534n	1.70650	1.54681n	1.51113
	722	667		2.49		539	410	526	557	0989
	10′ 3	10′ 1		10 3	10 1		10 3	10 1	10 3	10 2
E	24″.6 +.61	56″.4 +.08		21.9 +.58	56.4 +.08		21.9 +.58	52.2 +.11	19.4 +.54	11.6 +.29
F	28.5 +.16	0.0 +.29		25.4 +.18	0.2 +.29		24.7 +.18	55.0 +.37	21.9 +.22	13.7 +.33
G	45.4 −.47	17.0 −.30		41.8 −.38	16.6 −.30		44.6 −.46	14.3 −.24	42.1 −.39	33.8 −.05
H	43.2 +.14	16.3 +.47		39.2 +.26	14.5 +.48		41.8 +.21	12.3 +.49	39.1 +.26	31.4 +.48
	35.00 „.49	54 6.70		31.85 64	55 6.50		33.25 51	73 3.25	30.75 63	105 22.70
	13 35.42	12 7.42		13 32.08	12 6.92		13 33.25	12 3.45	13 30.62	12 22.62
	− 41.54	46.55		− 39.24	+4.72 46.41		− 38.49	50.87	−35.22	32.44
	12 53.88 +.12	53.97 −.13		12 52.84 +.11	+.64 53.33 −.13		12 54.76 +.11	54.32 −.14	12 55.40 +.10	55.06 −.09
+27°	9′ 54″.47	54″.38		9 56.51	55.02		9 53.59	54.03	9 52.95	53.29
	54.35	54.51		55.40	55.15		53.48	54.17	52.85	53.38
+15°	8′ 42″									
	1.1928			− 110			− 194		− 223	
	− 138			1.1818			1.1734		1.1705	
	1.1790									
	− 15.10	− 15.10		− 15.20	− 15.20		− 14.91	− 14.91	− 14.81	− 14.81
	− .30	− .37		− .27	− .37		− .26	− .44	− .21	− .18
	− .25	− .25		− .28	− .15		− .18	− .98	− .18	− .12
	− .12	− .14		− .16	− .14		− .13	− .18	− .16	− .26
	−15.780	−15.782		−15.881	−15.662		−15.484	−15.631	−15.362	−15.375
	9′ 38.65	38.79		39.59	39.33		38.41	38.56	37.53	38.03
	9 38.72			39.46			38.30		37.78	
	13 49.3	+4′ 9.90		49.55	+4 9.52		50.7	+4 11.94	50.88	+4 12.50
	−	−.20		−	−.20		−	−.21	−	−.21
	+4′ 10.6	+ 7.80		10.1	+ 6.80		12.4	+ 5.60	13.1	+ 5.40
	10.0	+4 4.70		9.5	+4 16.12		11.8	+4 17.33	12.5	+4 17.69
		13′ 55.4			55.6			55.6		55.5

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α

	m	s	
June 9	52	35.47	0
14		.47	1
19		.46	2
24		.44	2
29		35.42	4
July 4		.38	4
9		.34	5
14		.29	6
19		35.23	

δ

	°	″	
	13	46.1	11
		47.2	11
		48.3	10
		49.3	10
		50.3	9
		51.2	8
		52.0	8
		52.8	7
		53.5	

July 3

51	28.0	51	37.70
	30.0		40.00
	31.8		42.28
	34.5		44.43
	36.2		46.72
52	44.6		28.62
	47.0		31.00
	48.4		33.26
	51.3		35.56
	52.1		37.90
			42.23
			54.99
			7.78
			20.52
			33.27
51	32.10		38.79
52	48.86		

	50.42		3.18
	52.67		5.36
	53.00		7.78
	54.26		10.10
	57.62		12.46
			16.00
			18.22
			20.46
			22.78
			25.16
52	7.758		
	35.386		
	− 27.63		
	− 27.58		
	− 27.57		
	+ 28.40		
	− .80		
	− 3.10		
	+ 24.50		
	32.26		

July 7

51	37.6	51	46.00
	39.8		48.26
	41.6		50.47
	43.4		52.83
	46.1		55.70
52	30.3		32.05
	32.9		34.28
	34.7		36.60
	37.6		44.00
	38.2		46.32
			50.53
			3.31
			16.06
			28.83
			41.65
51	41.76		8038
52	54.54		

	58.62		1.48
	1.00		13.79
	3.25		16.00
	5.67		18.35
	8.00		20.69
			24.26
			26.45
			28.83
			31.19
			33.53
52	16.076		
	35.354		
	− 19.28		
	− 19.23		
	− 19.22		
	+ 19.98		
	− .75		
	− 3.07		
	+ 16.16		
	32.24		

July 8

51	37.0	51	48.00
	39.1		50.28
	41.0		52.59
	43.4		55.00
	45.8		57.23
52	52.8		30.00
	54.4		41.32
	56.7		43.63
	58.9		45.92
	0.9		48.23
			52.62
			5.33
			18.11
			30.83
			43.62
51	41.26		9051
52	56.80		

	0.72		13.50
	3.00		15.72
	5.32		18.10
	7.63		20.45
	10.00		22.78
			26.10
			28.50
			30.83
			33.26
			35.47
52	18.102		
	35.340		
	− 17.24		
	− 17.19		
	− 17.18		
	+ 17.97		
	− .80		
	− 3.06		
	+ 14.11		
	32.21		

July 13

51	53.4	51	58.70
	56.6		1.05
	59.0		3.20
	0.5		5.66
	2.5		8.00
53	12.6		49.53
	14.7		32.03
	16.8		34.30
	18.7		36.76
	20.5		38.88
			3.32
			16.02
			28.80
			41.62
			54.29
51	58.28		14405
53	16.66		

	11.30		24.18
	13.66		26.50
	16.05		28.73
	18.38		31.15
	20.70		33.46
	37.00		
	39.30		
	41.64		
	43.85		
	46.33		
52	28.810		
	35.297		
	− 6.49		
	− 6.44		
	− 6.43		
	+ 7.22		
	− .77		
	− 3.01		
	+ 3.44		
	32.25		

+35.66	−41.10	+34.32	−38.46
1.55218	1.61384 n	1.58555	1.58501 n
1.60847 n	1.67013	1.59184 n	1.64130
723	6889	060	006
10 3	10 1	10 3	10 1
24.7 +.61	57.8 +.07	21.9 +.58	59.8 +.07
27.2 +.17	59.6 +.30	25.2 +.18	3.9 +.31
47.2 −.50	19.3 −.30	44.0 −.45	21.8 −.24
43.6 +.18	17.0 +.47	41.9 +.21	20.0 +.46
35.95 46	8 54	8.53	32.95 52	60	10.80
13 35.68	12 8.42	13 33.25	12 11.38
−40.59	46.79	−39.07	43.78
12 55.09 +.11	55.21 −.14	12 54.18 +.11	55.16 −.12
9 53.26	53.14	9 54.17	53.19
53.15	53.28	54.06	53.31
−231		−180	
1.1707		1.1748	
−14.81	−14.81	−14.96	−14.96
− .28	− .37	− .26	− .33
− .14	− .08	− .14	− .09
− .18	− .11	− .13	− .15
− .12	− .14	− .09	− .15
−15.395	−15.480	−15.49	−15.53
37.80	37.88	38.57	37.78
37.84		38.18	
51.06 +4	12.77	51.7 +4	13.24
−	.22	−	.23
+4 132 +	5.20	13.6 +	4.60
12.6 +4	17.75	12.9 +4	17.61
	55.6		55.8

+36.84	−38.70	+30.53	−47.85
1.56632	1.58771 n	1.48473	1.67988 n
1.62261 n	1.64400	1.54102 n	1.73617
137	276	3978	493
10 3	10 1	10 3	10 1
25.7 +.61	59.6 +.07	14.9 +.45	45.6 +.23
28.8 +.16	3.2 +.30	19.2 +.26	49.8 +.43
47.7 −.50	22.3 −.22	38.5 −.26	9.4 −.02
45.0 +.17	20.2 +.46	35.8 +.30	6.9 +.48
36.70 44	61	10.95	26.70 75	112	57.50
13 36.80	12 11.32	13 27.10	11 57.92
−41.94	44.06	−34.76	54.47
12 54.86 +.12	55.38 −.13	12 52.34 +.10	52.39 −.15
9 53.49	52.97	9 56.01	55.96
53.37	53.10	55.91	56.11
−231		−109	
1.1697		1.1819	
−14.78	−14.78	−15.20	−15.20
− .30	− .33	− .21	− .57
− .18	− .09	− .24	− .14
− .11	− .15	− .19	− .28
−15.373	−15.395	−15.84	−16.09
38.01	37.75	40.14	40.02
37.90		40.08	
51.88 +4	13.54	52.68 +4	11.84
−	.23	−	.24
140 +	4.40	12.6 +	3.60
13.4 +4	17.71	12.0 +4	15.23
	55.6		55.8

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July 15

	m	s	m	s
July 9	52	35.34	1	13 52.0
14		.29	5	52.8 8
19		.23	6	53.5 7
24		.17	6	54.1 6
29		.10	7	54.7 6
Aug. 3		35.02	8	55.2 5
8		34.94	8	55.6 5

July 15

h	m	s	m	s	m	s
15	57	37.0	52	3.00	16.00	
		38.8		7.64 5.42	18.37	
		1.0		.74 7.74	20.72	
		3.5		.74 —	23.00	
		5.8		—	25.20	
	53	11.1		54.10	28.58	
		14.6		56.20	31.00	
		17.6		58.70	33.82	
		19.4		1.10	35.73	
		21.3		3.50	38.15	
				7.71	41.40	
				20.66	43.65	
				33.36	46.00	
				45.95	48.20	
				58.72	50.52	
	52	1.02		16.40		
	53	16.80			52 33.26	
					52 35.275	
					− 2.00	
					− 1.95	
					− 1.94	
					+ 2.80	
					− .83	
					− 2.99	
					− 0.94 1.021	
					m s	
					52 32.26	

July 16

m	s				
57	57.0	52	5.00	52 17.76	
	1.4		7.36	20.00	
	3.2		9.68	22.37	
	5.4		12.00	24.66	
	7.7		14.28	26.90	
			56.00	30.50	
			58.30	32.83	
			0.66	35.26	
			2.90	37.62	
			5.35	39.77	
			9.66	43.36	
			22.34	45.66	
			35.20	47.82	
			47.91	50.28	
			0.64	52.44	
		52	3.34	17.575	
				52 35.150	
				35.263	
				− 0.11	
				− 0.06	
				− 0.05	
				+ 0.82	
				− .75	
				− 2.98	
				− 2.41	
				32.24	

July 23

	m	s	m	s	m	s
	52	10.3	52	20.48	52	33.25
		12.5		22.60		35.60
		14.0		25.00		37.83
		16.8		27.40		40.10
		18.5		29.78		42.43
	53	2.63		11.50		45.93
		2.80		18.83		48.33
		3.00		16.10		50.50
		3.20		18.40		52.83
		3.35		20.78		53.82
				25.05		57.63
				37.84		1.05
				50.59		3.85
				3.32		5.33
				16.12		8.50
	52	14.42		25.92		
	53	29.96			52	50.584
						35.179
						+ 15.40
						+ 15.45
						+ 15.46
						− 14.73
						− .77
						− 2.90
						− 18.40
						32.18

	+32.26		−43.52				+31.81				+36.16		−39.38	
	1.50866		1.63869 m				1.50256				1.55823		1.59528 m	
	1.56495 m		1.69498				1.55885 m				1.61452 m		1.65157	
		371		374				761				328		033
	10	3	10	1			10	3			10	3	10	1
	16.9	+.49	50.3	+.14			15.9	+.47			20.5	+.56	54.5	+.09
	21.6	+.23	54.1	+.39			20.2	+.25			24.4	+.19	58.7	+.32
	41.1	−.36	14.3	−.35			39.7	−.31			44.4	−.46	18.1	−.31
	36.6	+.29	10.2	+.50			36.2	+.30			40.4	+.24	15.4	+.48
	29.00	.65		68	2.30		27.80	71			32.45	53		58 6.30
	13	29.05	12	2.22			13	28.00			13	32.42	12	6.68
		−36.72		49.54				−36.21				−41.16		44.83
	12	52.33	+.10	57.76	−.14		12	51.79	+.10		12	51.26	+.11	57.51	−.13
+2°	9	56.02		56.59			9	56.56			9	57.09		56.64	
		55.92		56.73				56.46				56.98		56.97	
+15°	8	42												
	1.1928													
	−42						−97				−156			
	1.1886						1.1831				1.1772			
	−15.44		−15.44				−15.24				−15.04		−15.04	
	−.23		−.42				−.23				−.29		−.34	
	−.28		−.10				−.31				−.35		−.43	
	−.14		−.10				−.18				−.13		−.14	
	−16.09		−16.10				−15.96				−15.84		−15.86	
	9	39.92		40.60				40.60				41.31		41.32
	9	40.26										41.32		
	13	52.97	+4	11.45				58.1	+4	12.14		54.0	+4	12.21
			−	.25					−	.25			−	.27
	+4	12.7	+	3.30				12.5	+	3.20		12.7	+	2.30
		12.1	+4	14.50				11.9	+4	15.09		12.1	+4	14.24
			13	54.8						55.7				55.6

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φ Herculis

$16^h\ 4^m\ 55^s$
$+45°\ 15'\ 20''$
$-2\ 52\ 32$
1878

June 25 | July 2 | July 7 | July 16

α_0 55.362 | log sin δ 9.85141 | log R_1 1.50851 | log R_2 1.20784
Corr. α +.177 +.105 | log cos δ 9.84754 | R_1 32.25 | R_2 16.14
$\frac{d\alpha}{dt}$ | log Reduction 9.95485 n 361 | I
δ_0 19.80
Corr. δ +.10 | tan δ +1.04
$\frac{d\delta}{dt}$ | sin z −.05

	June 25	July 2	July 7	July 16
h	m s	m s	m s	m s
16	3 24.1	3 37.90	3 53.00	4 44.7
	27.4	40.80	56.95	47.8
	30.4	48.85	59.90	50.4
	32.8	46.68	2.83	53.4
	35.3	49.60	5.80	55.3
	5 2.9	42.30	10.10	5 59.7
	5.9	45.70	13.00	2.4
	8.0	48.30	16.00	4.4
	10.3	51.10	18.95	7.3
	13.0	54.10	21.70	9.6
		43.77	24.30	57.68
		59.90	29.30	13.76
		15.47	32.10	29.92
		32.14	35.00	45.98
		48.24	38.00	2.12
	3 30.00	8002	3 50.32	14946
	5 8.02		4 16.004 4.68	
			4 58.548 5	
			− 42.54	
			− 42.72	
			− 42.64	
			+ 44.15	
			− 1.37	
			− 3.19	
			+ 39.59	
			m s	
			4 55.59	

	June 25	July 2	July 7	July 16
	4 5.180	5 7.86	3 59.0	4 −.3
	57.82	10.88	1.3	−
	57.70	13.87	4.0	−
	0.58	16.62	7.0	−
	8.50	19.38	9.4	−
	5.634	24.00	5 18.5	6.50
	57.38	27.00	21.8	9.35
	2.00	29.87	24.0	12.36
	5.00	32.92	26.6	15.37
	7.90	35.83	29.1	18.43
57.68	40.00			
13.76	43.00			
29.92	46.00			
45.98	49.00			
2.12	51.88			
14946	4	4 4.14		
	4 39.892 5	24.20		
	58.491			
	− 28.58			
	− 25.76			
	− 28.88			
	+ 36.40			
	− 1.62			
	− 3.11			
	+ 25.67			
	55.56			

	June 25	July 2	July 7	July 16
	4 18.10	4 16.4	4 21.00	4 37.10
	21.00	18.8	24.00	40.00
	24.00	21.2	26.80	43.00
	27.00	23.0	29.81	46.00
	29.90	25.4	32.74	48.86
	34.30		37.57	53.43
	37.22		40.36	56.32
	40.15		43.38	59.30
	43.10		46.45	2.15
	46.00		49.15	5.10
	50.46		26.87	9.40
24.00 40.14	53.50		42.98	12.33
40.15 .15	56.82		59.26	15.30
56.35 .21	59.26		15.28	18.28
12.40 .15	2.20		31.42	21.10
	4 21.06	29681		
	4 40.162			4 59.182
	58.404			58.260
	− 18.24			+ 0.90
	− 18.42			+ 0.72
	− 18.34			+ 0.80
	+ 19.95			+ 0.80
	− 1.48			− 1.49
	− 3.04			− 2.90
	+ 15.43			− 3.59
	55.59			55.57

	June 25	July 2	July 7	July 16
	+46.00	−52.08	+39.57	−34.79
	1.66276	1.71617 n	1.59737	1.54145 n
	1.61761 n	1.67102	1.55222 n	1.49630
	637	6978	098	506
	10 2	10 0	10 2	10 1
	+46.00	−52.08	+39.57	−34.79
	1.66276	1.71617 n	1.59737	1.54145 n
	1.61761 n	1.67102	1.55222 n	1.49630
	637	6978	098	506
	10 2	10 0	10 2	10 1
	+36.02	−44.04		+38.10
	1.55654	1.64385 n		1.58092
	1.51139 n	1.59870		1.53577 n
	015	746		453
	10 2	10 0		10 2

	June 25	July 2	July 7	July 16
ε	17.1 +.41	48.3 +.20	11.9 +.30	4.8 +.18
ζ	18.9 +.31	50.3 +.30	12.4 +.34	5.2 +.22
η	35.9 −.16	6.9 −.06	33.5 −.04	26.2 −.11
μ	32.9 +.47	5.3 +.70	29.3 +.48	23.4 +.66
	26.50 103	114 57.60	22.70 108	95 15.50
	12 26.20	10 57.70	12 21.78	11 14.90
	−41.46	46.88	−35.66	31.35
	11 44.74 +.12	44.58 −.13	11 46.12 +.10	46.25 −.09
+45°	11 3.61	3.77	11 2.23	2.10
	3.49	3.90	2.13	2.19
−2°	52 26			
	0.4610			
	−106		−219	
	0.4504		0.4391	
	+2.82	+2.82	+2.75	+2.75
	−.58	−.74	−.43	−.33
	−.18	−.08	−.12	−.12
	−.26	−.28	−.27	−.24
	+1.846	+1.785	+1.936	+2.006 13
	11 5.35	5.65	4.09	4.32
	11 5.50		4.20	
	15 15.85	+4 9.52	14.4	+4 12.50
		+ .04		+ .04
	+4 10.3	+ 4.00	13.2	+ 2.40
	10.4	+4 13.56	13.3	+4 14.94
		15 19.1		19.1

	June 25	July 2	July 7	July 16
	8.8 +.21	55.8 +.13		5.3 +.14
	18.3 +.34	58.2 +.21		8.4 +.34
	29.1 +.02	17.3 −.42		28.9 +.02
	26.2 +.47	14.3 +.71		24.2 +.47
	18.95 104	63 6.55		17.10 97
	12 18.60	11 6.40		12 16.70
	−32.46	39.69		−34.34
	11 46.14 +.09	46.09 −.11		11 42.36 +.10
	11 2.21	2.26		11 5.99
	2.12	2.37		5.89
	−163			−94
	0.4447			0.4516
	+2.78	+2.78		+2.83
	−.85	−.53		−.39
	−.09	−.04		−.14
	−.26	−.16		−.24
	+2.88	+2.05		+1.99 2.06
	4.20	4.42		7.95
	4.31			
	18.5	+4 13.24		28.2 +4 12.14
		+ .04		+ .05
	14.2	+ 1.30		12.2 − 0.40
	14.3	+4 14.58		12.3 +4 11.79
		18.9		19.7

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	α m s		δ ′ ″	
June 9	4 58.64	1	15 11.5	14
14	.63	2	12.9	13
19	.60	3	14.2	13
24	.56	4	15.5	12
29	58.51	5	16.7	12
July 4	.45	6	17.8	11
9	.38	7	18.9	11
14	.30	8	19.8	9
19	58.21	9	20.7	9

	α m s		δ ′ ″	
July 19	4 58.21	10	15 20.7	8
24	58.11	11	21.5	7
29	58.00	11	22.2	5
Aug 3	57.89	12	22.7	5
8	57.77		23.2	

July 22

	4 41.7		4 34.20		4 50.40		4 22.0		4 36.60		4 32.66		5 1.0	—	4 54.60
	44.4		37.05		53.40		24.0		39.50		33.40		3.0	—	57.57
	47.6		40.20		56.40		27.7		42.34		58.44		5.6	—	0.60
	50.0		43.10		59.20		29.6		45.10		1.33		8.3	—	3.43
	52.4		46.10		2.10		32.3		48.23		4.38		10.3	—	6.47
	5 52.3		38.74		6.53		5 22.0		41.10		8.74		5 56.3	43.00	11.00
	54.7		41.63		9.44		24.0		44.00		11.63		59.0	43.84	13.67
	57.3		44.57		12.33		27.0		46.80		14.53		1.1	42.05	16.67
	0.1		47.53		15.22		29.4		48.73		17.30		3.2	37.85	19.63
	2.0		50.60		18.20		32.1		52.67		20.56		6.0	34.76	22.40
			40.09		22.66				42.35		24.70			—	27.00
			56.30		25.55				58.44		27.76			0.53 1667	29.82
			12.34		28.48				14.60		30.72			16.67 .67	32.83
			28.52		31.50				30.66		33.60			32.80 .66	35.68
			44.61		34.43				46.86		36.50			48.90 .65	38.65
	4 47.28		6186				4 27.12		7291				5 5.64		
	5 57.32		5 12.372				5 26.90				5 14.582		6 1.12		5 16.662
			58.145								58.125				58.105
			+ 14.23								+ 16.46				+ 18.56
			+ 14.05								+ 16.28				+ 18.38
			+ 1413								+ 1636				+ 1846
			− 12.56								− 14.75				− 16.85
			− 1.53								− 1.52				− 1.54
			− 2.78								− 2.76				− 2.74
			− 16.87								− 19.03				− 21.13
			55.50								55.55				55.53
	+25.09		−44.95				+47.46		−12.32				+11.02	−44.46	
	1.39950		1.65273m				1.67633		1.09061				1.04218	1.64797m	
	1.35435m		1.60758				1.63118m		1.04422				0.99703m	1.60282	
	311		634				2994						579	158	
	10 1		10 0				10 2		10 1				10 1	10 0	
	53.1 +.10		49.9 +.17				13.7 +.34		20.2 +.49				41.8 +.29	51.7 +.15	
	55.4 +.25		52.7 +.28				16.2 +.33		23.2 +.21				43.8 +.38	53.8 +.27	
	17.9 −.31		14.9 −.37				36.5 −.19		44.6 −.53				4.2 +.14	14.8 −.36	
	12.3 +.49		10.3 +.73				32.1 +.47		40.5 +.52				59.9 +.31	10.5 +.72	
	5.50 53		81 2.60				25.10 95		69 32.40				53.00 112	78 3.25	
	12 4.68		11 1.95				12 24.62		11 32.12				11 52.42	11 2.70	
	−22.61		40.51				−42.77		11.07				− 9.93	40.07	
	11 42.07	+.06	42.46	−.11			11 41.85	+.12	43.19				11 42.49	+.03 42.77	−.11
	11 6.28		5.89				11 6.50		5.16				11 5.86	5.58	
	6.22		6.06				6.38						5.83	5.69	
	− 174						− 151						− 165		
	0.4436						0.4459						0.4445		
	+ 2.78		+ 2.78				+ 2.79		+ 2.79				+ 2.78	+ 2.78	
	− .17		− .55				− .61		− .54				− .03	− .54	
	− .28		− .18 .96				− .24		− .09				− .19	− .18 .96	
	− .13		− .20				− .24		− .17				− .28	− .20	
	+ 2.35		+ 1.84				+ 1.80		+ 2.49				+ 2.36	+ 1.98	
	8.54		7.97				8.18		7.65				8.19	7.67	
	8.27						7.92						7.93		
	21.2	+4	12.29				21.38	+4	12.21				21.5	+4 12.39	
		+	.05					+	.05					+ .05	
	+4 12.9	−	1.40				13.5	−	1.60				13.6	− 1.70	
	13.0	+4	10.94				13.6	+4	10.64				13.7	+4 10.74	
			19.2						18.6					18.7	

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τ Herculis

16h 16m 4s
+19° 26′ 27″
46 36 16

−4 13 28
1878

α₀ 4s.374 — log cos δ 9.86131 — log R₁ 1.51907 — log R₂ 1.21840
corr. α +.099 +.040 — " cos δ 9.83698 — R₁ 33s.04
dα/dt — " 15 cos δ tan δ 9.94 (+29 305) — R₂ 16.53
dδ/dt — tan δ +1.06 — I
δ₀ 16″.11 — sin z −.07
corr. δ +.64
dδ/dt

June 25 — June 26 — July 1 — July 2

h	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s
16	14	35.2	14	45.80	15	2.42	14	32.3	14	48.30	15	4.60	14	44.2	14	58.20	15	14.68	15	57.8	15	59.90	16	16.32
		37.4		48.00		5.53		35.5		57.00		7.60		48.1		1.22		17.62		54.2		2.84		19.32
		40.0		51.95		8.53		39.3		54.00		10.62		50.6		4.28		20.60		56.6		5.88		22.30
		42.3		53.00		11.48		42.3		57.20		13.60		52.9		7.22		23.61		59.1		8.76		25.38
		45.3		58.00		14.49		44.9		00.0		16.68		55.7		10.22		26.78		2.3		11.75		28.35
										5m														
	16	11.0		52.05		19.00				54.15		21.00	16	23.7		4.22		31.28	17	2.56		6.00		32.87
		14.0		53.00		21.90				57.20		24.05				7.28		34.28		2.88		8.90		35.83
		16.4		57.88		24.92				0.29		27.20				10.23		37.46		3.20		11.20		38.81
		18.9		1.00		27.94				3.29		30.00				13.22		40.22		3.45		13.00		41.95
		22.2		4.00		30.95				6.35		33.00				16.22		43.33		3.66		15.48		45.00
				51.97		35.48				54.10		37.75		4.23		4.78				5.83				49.32
				8.49		38.45				10.62		40.55		20.66		50.66				22.32				52.40
				24.95		41.55				27.05		43.72		37.32		53.66				38.89				55.40
				41.50		44.60				43.69		46.63		53.74		56.78				55.41				58.43
				57.99		47.42				0.26		49.78		10.23		57.82				12.08				1.60
	14	48.08	12.490				14	38.86	13572				14	50.30	18618				14 15	56.80	19453		15	
	16	16.50			15	24.980					15	27.144	16	23.70			15	37.236	17 16	31.50			18	38.986
						7.588						7.578						7.523						7.511
						−42.61						−40.43						−30.29						−28.60
						−42.71						−40.58						−30.39						−28.70
						−42.65						−40.47						−30.33						−28.64
						+ 44.12						+ 42.04						+ 32.01						+ 30.38
						− 1.44						− 1.52						− 1.62						− 1.71
						− 3.21						− 3.20						− 3.15						− 3.14
						+ 39.47						+ 37.32						+ 27.24						+ 25.53
					m	s																		
					16	44.5						4.46						4.48						4.44
		+44.90		−51.52				+48.28				+46.94								+42.11		−52.59		
		1.65225		1.71198n				1.68377				1.67154								1.62439		1.72090n		
		1.59654n		1.65627				1.62806n				1.61583n								1.56868n		1.66519		
		530		503				682				459								744		398		
		50 1		45 4				50 1				50 1								50 1		45 4		
ξ		18.8 +.47		54.3 +.03				21.4 +.50				20.0 +.49								15.9 +.41		54.0 +.03		
η		20.1 +.23		55.8 +.09				23.8 +.20				20.5 +.22								16.6 +.25		53.5 +.14		
ζ		37.4 −.27		11.4 −.21				40.3 −.41				41.6 −.45								38.0 −.30		13.9 −.32		
α		34.2 +.61		9.7 +.20				37.3 +.57				37.2 +.57								34.1 +.61		11.3 +.20		
		28.10 104		11	2.85			30.85 86				30.80 83								26.95 97		05	3.95	
		51 27.62		50 2.80				51 30.70				51 29.82								51 26.15		50 3.18		
		−37.49		45.32				− 42.47				− 41.29								−37.04		46.26		
		50 48.13	+.11	48.12	−.13			50 48.23	+.12			50 48.53	+.12							50 49.11	+.10	49.44	−.13	
+46°		32′ 0.22		0.23				32 0.12				31 59.82								31 59.24		58.91		
		0.11		0.36				0.00				59.70								59.12		59.04		
− 4°		13′ 22″																						
		0.6286																						
		− 103						− 53				− 187								− 216				
		0.6183						0.6233				0.6099								0.6070				
		+ 4.15		+ 4.15				+ 4.20				+ 4.07								+ 4.05		+ 4.05		
		− .55		− .73				− .64				− .60								− .48		− .75		
		− .07		− .35				− .14				− .06								− .06		− .28		
		− .26		− .03				− .22				− .21								− .24		− .01		
		+ 3.27		+ 3.04	14			+ 3.286				+ 3.19	20							+ 3.287		+ 3.049		
	32	3.38		3.50																2.41		2.13		
	02	3.44						3.26				2.90								2.27				
	36	12.15	+4′	9.52				12.4	+4	9.65		13.6	+4	11.94						13.88	+4	12.60		
			+	.05					+	.05			+	.06							+	.06		
	+4′	8.7	+	4.00				9.1	+	3.70		10.4	+	2.50						11.6	+	2.20		
		9.3	+4	13.57				9.7	+4	13.40		11.3	+4	14.50						12.2	+4	14.76		
			36′	17.0						16.7			4	17.8								17.0		

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	α		δ			α		δ	
	m s		′ ″			m s		′ ″	
June 9	16 7.66		36 7.7	15	July 19	16 7.25	10	36 17.4	8
14	.65	1	9.2	14	24	.15	11	18.2	8
19	.63	2	10.6	13	29	7.04	12	19.0	6
24	.60	3	11.9	12	Aug 3	6.92	12	19.6	6
29	7.55	5	13.1	12	8	6.80		20.2	
July 4	.49	6	14.3	11					
9	.42	7	15.4	10					
14	.34	8	16.4	10					
19	7.25	9	17.4						

July 9 | July 22 | July 21

15 17.7	15 14.22	30.63	15 30.1	15 42.44	15.00	16 33.8	–	–	
19.9	17.42	33.66	33.3	45.46	1.83	36.5	–	–	
22.0	20.25	36.72	35.1	48.33	4.87	38.5	–	–	
25.7	23.32	39.73	38.4	51.46	7.90	41.2	–	–	
28.7	26.30	42.72	40.6	54.45	11.00	44.6	–	–	
	20.32	47.15	16 40.0		15.35	17 10.8	52.56	16 19.55	
	23.25	50.32	42.3		18.42	13.0	55.61	22.63	
	26.33	53.48	45.1		21.46	14.9	58.60	25.72	
	29.30	56.25	47.4		24.42	17.8	1.67	28.68	
	32.30	59.23	49.8		27.40	20.0	4.63	31.72	
	20.30	3.73			31.95		—	36.22	
	36.69	6.66		48.43 21.47	34.90		—	39.32	
	53.29	9.77		4.92 .45	38.00		25.66 25.66	42.00	
	9.75	12.75		21.41 .41	41.00		42.15 .62	45.18	
	26.30	15.85		37.97 .44	44.00		58.61 .57	48.05	
				.17					
15 22.80	26633		15 35.50			16 38.92			
		15 53266	16 44.92		16 21.442	17 15.30		16 25617	
		7.416			7.185			7.145	
		−14.15			+14.26			+18.47	
		−14.25			+14.16			+18.37	
		−14.19			+14.22			+18.43	
		+15.85			−12.58			−16.87	
		−1.69			−1.64			−1.61	
		−3.04			−2.81			−2.77	
		+11.12			−16.99			−21.25	
		4.39			4.45			4.37	

+30.47		+45.94	−23.48	−13.30	−49.68
1.48387		1.66219	1.37070n	1.12385n	1.69618n
1.42816n		1.60648n	1.31375	1.06814	1.64047
692		524		690	3923
50 1		50 1	50 0	50 0	45 4
4.8 +.18		14.6 +.39	13.3 +.27	23.4 +.46	51.4 +.06
5.2 +.22		17.1 +.25	16.4 +.09	25.3 +.04	52.3 +.16
27.1 −.09		37.6 −.28	36.4 −.29	46.2 −.66	12.1 −.24
23.3 +.66		33.3 +.62	31.8 +.50	40.1 +.51	8.7 +.20
15.95 97		26.10 98	57 24.85	34.80 35	18 1.75
51 15.10		51 25.65	50 24.48	50 33.75	50 1.12
−26.80		−40.41	20.59	11.70	43.70
50 48.30 +.08		50 45.24 +.13	45.07	50 45.45 −.03	44.82 −.13
32 0.05		32 3.11	3.28	32 2.90	3.53
31 59.97		2.98		2.93	3.66
−174		−172		−162	
0.6112		0.6114		0.6124	
+4.09		+4.09	+4.10	+4.10	+4.10
−.25		−.58	−.14	−.05	−.68
−.05		−.18	−.02	−.23	−.30
−.24		−.24	−.14	−.09	−.04
+3.55		+3.19	+3.80	+3.93	+2.98
		6.17	7.08	6.86	6.64
3.52		6.62		6.75	
15.4	+4 12.82	17.9	+4 12.29	18.24	+4 12.39
	+ .06		+ .07	11.5	+ .07
+4 11.9	+ 0.70	11.3	− 1.80	12.5	− 2.10
12.5	+4 13.58	11.9	+4 10.56	12.1	+4 10.36
	17.1		17.2		17.1

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(η Draconis – v. end of book)

β Herculis

16h 24m 59s

+21° 45′ 25″

+20 37 23

1878

June 26 | July 2 | July 3 | July 7

	June 26		July 2		July 3		July 7	
	h m s	m s	m s					
16	23 44.9	23 51.40	24 3.60	24 3.10	24 4.7	24 5.20	24 5.6	24 18.36
	47.3	53.60	5.85	5.37	6.6	7.46	7.6	15.70
	48.9	53.87	8.02	7.64	8.8	9.61	9.1	18.00
	50.8	58.16	10.30	9.82	11.0	11.87	11.8	20.12
	52.5	0.32	12.50	12.00	13.0	14.00	13.7	22.86
	24 57.5	4.19	15.90	23 52.8	25 7.0	54.00	25 16.6	2.33
	57.7	4.39	18.17	54.7	7.0	56.22	19.0	4.60
	56.0	4.80	20.32	57.0	11.5	58.40	20.8	6.80
	58.0	47.00	22.54	58.9	12.5	0.72	22.7	9.00
	59.7	49.18	24.75	0.7	14.4	3.00	24.8	11.27
		55.87	28.02	7.56	39.84	9.63	41.82	17.91
		8.05	30.28	9.83	42.00	21.80	44.00	30.18
		20.34	3.250	32.06	44.33	34.01	46.10	42.40
		32.51	34.75	44.29	46.52	46.20	48.37	54.57
		44.71	36.98	56.49	48.77	58.47	50.72	6.80
	23 48.88	10.148		23 56.82	16.026	24 8.82	17.011	24 9.56	21.186
	24 55.78		24 20.296	25 11.92		24 32.052	25 10.74	24 34.022	25 20.78		24 42.372
			25 1.770			1.757		1.753			1.737
			−41.48			−29.70		−27.73			−19.37
			−41.46			−29.68		−27.71			−19.35
			+ 42.02			+ 30.37		+ 28.35			+ 19.91
			− .57			− .64		− .62			− .58
			− 3.22			− 3.21		− 3.20			− 3.19
			+ 38.23			+ 26.52		+ 24.53			+ 16.14
			m s								
			24 58.53			58.57		58.58			58.51
	s	s		s	s						
	+31.42	−35.48		+35.23	−39.87	+25.20	−36.72		+32.81	−38.41	
	1.49721	1.54998n		1.54691	1.60065n	1.40140	1.56490n		1.51601	1.58444n	
	1.57243n	1.62520		1.62213n	1.67587	1.47662n	1.64012		1.59123n	1.65966	
	1 11	896		089	463	538	3888		5999	342	
	40 1	40 0		40 1	40 0	40 1	40 0		40 1	40 0	
ε	46.1 +.22	25.6 +.49		52.3 +.11	22.0 +.45	41.5 +.30	26.8 +.49		48.8 +.16	23.6 +.47	
ζ	51.3 +.42	31.8 +.03		55.2 +.37	27.4 +.04	45.0 +.40	31.1 +.03		53.6 +.40	29.3 +.03	
η	6.2 +.10	46.2 −.66		15.7 −.28	46.4 −.67	3.1 +.14	49.9 −.65		10.8 −.08	46.7 −.67	
H	5.2 +.45	45.8 +.51		12.1 +.49	43.4 +.51	0.6 +.32	47.0 +.51		9.6 +.50	44.3 +.51	
	54.15 119	37.3590		4.00 69	33.3420	52.30 116	38.3835		59.80 98	34.3515	
	41 57.20	40 37.35		42 3.82	40 34.80	41 52.55	40 38.70		42 0.70	40 35.98	
	−34.36	42.19		−41.89	47.41	−29.97	43.66		−39.01	45.67	
	40 19.84 +.10	19.54 −.12		41 21.93 +.12	22.21 −.14	41 22.58 +.09	22.36 −.12		41 21.69 +.11	21.65 −.13	
+21°	41′ 28.″51	28.″81		41 26.42	26.14	41 25.77	25.99		41 26.66	26.70	
	28.41	28.93		26.30	26.28	26.68	26.11		26.55	26.83	
+20°	37′ 10″										
	1.3358										
	−48			−213		−202			−158		
	1.3310			1.3145		1.3156			1.3206		
	−21.43	−21.43		−20.63	−20.63	−20.68	−20.68		−20.89	−20.89	
	−.18	−.24		−.23	−.30	−.12	−.26		−.21	−.28	
	−.14	−.03		−.08	−.03	−.09	−.08		−.08	−.02	
	−.30	−.09		−.17	−.08	−.29	−.10		−.24	−.08	
	−22.51	−21.80		−21.31	−21.03	−21.186	−21.076		−21.42	−21.27	
	41′ 6.40	7.14		5.19	5.25	4.52	5.05		5.13	5.56	
	41 6.77	′ ″		5.22		4.78			5.35		
	45 17.85	+4 9.65		18.98	+4 12.50	19.16	+4 12.77		19.88	+4 13.24	
		−.27			−.29		−.26			−.31	
	+4′ 11.″1	+ 7.16		13.8	+ 5.90	14.4	+ 5.70		14.5	+ 5.00	
	9.7	+4 16.48		12.4	+4 18.11	13.0	+4 18.18		13.1	+4 17.93	
		45′ 23.″2			23.3		23.0			23.3	

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	α m	s		δ ′	″	
June 9	25	1.75	1	45	14.2	11
14		.76	1		15.3	11
19		.77	0		16.4	10
24		.77	0		17.4	10
29		1.77	2		18.4	9
July 4		.75	2		19.3	9
9		.73	4		20.2	8
14		.69	4		21.0	8
19		1.65			21.8	

July 8

24 7.1	24 15.58	27.72
9.0	17.79	30.00
11.3	20.00	32.15
13.2	22.16	34.47
15.0	24.40	36.53
25 20.7	4.36	40.00
22.3	6.63	42.18
23.7	8.85	44.43
25.4	11.12	46.68
27.6	13.33	49.00
	19.99	52.23
	32.17	54.38
	44.46	56.70
	56.62	58.80
	8.86	1.00
24 11.12	22210	
25 23.94		24 44.420
		1.733
		−17.31
		−17.29
		+ 17.90
		− .62
		− 3.18
		+ 14.10
		58.52

+33.30 −39.52
1.52244 1.59682n
1.59766n 1.67204
642 080
40 1 40 0
50.9 +.13 23.2 +.46
54.8 +.37 28.6 +.03
13.1 −.19 46.6 −.67
9.4 +.50 43.9 +.51
2.00 81 34. 33 34.90
42 2.05 40 35.58
−39.60 46.99
41 22.45 +.12 22.57 −.13
41 25.94 25.78
25.78 25.91

−207
1.3151
−20.66 −20.66
− .21 − .30
− .08 (.10) − .03
− .20 − .08
−21.15 −21.076
4.63 4.85
4.74
20.06 +4 13.54
− .31
+4 15.3 + 4.80
13.9 +4 18.03
22.8

July 9

24 33.8	24 17.72	29.86
35.2	19.82	32.00
37.7	22.00	34.20
39.4	24.10	36.58
41.7	26.47	38.80
	6.60	42.10
	8.63	44.30
	11.00	46.49
	13.10	48.70
	15.40	50.83
	22.02	54.26
	34.29	56.48
	46.48	58.76
	58.70	0.90
	10.95	3.10
24 37.56	23244	
		24 46.488
		1.729
		−15.24
		−15.22
		+ 15.83
		− .64
		− 3.18
		+ 12.01
		58.50

+8.93
0.95085
1.02607n
483
40 1
18.9 +.47
24.2 +.20
43.3 −.50
40.1 +.53
31.10 70
41 31.62
−10.62
41 21.00 +.03
41 27.35
27.32

−173
1.3185
−20.82
− .02
− .06 (.08)
− .18
−21.08
6.24
6.24
20.2 +4 12.82
− .32
14.0 + 4.70
12.6 +4 17.20
23.4

July 13

24 27.7	24 26.25	38.42
29.6	28.48	40.70
31.6	30.67	42.87
33.3	33.00	45.15
34.7	35.10	47.43
25 29.3	15.40	50.72
32.0	17.30	53.05
34.5	19.53	55.20
36.2	21.77	57.32
38.0	24.05	59.57
	30.70	2.90
	42.91	5.25
	55.17	7.44
	7.44	9.63
	19.61	12.00
24 31.38	27583	
25 34.00		24 55.166
		1.698 (1.700)
		− 6.53
		− 6.51
		+ 7.11
		− .61
		− 3.15
		+ 3.35
		58.52

+23.79 −38.83
1.37639 1.58917n
1.44161n 1.65489
037 315
40 1 40 0
34.8 +.44 19.3 +.41
40.5 +.28 25.2 +.04
59.0 +.08 44.2 −.62
55.4 +.31 40.7 +.51
46.90 111 34 31.75
41 47.42 40 32.35
−28.29 45.12
41 19.13 +.08 17.47 −.13
41 29.22 30.88
29.14 31.01

−90
1.3268
−21.22 −21.22
− .11 − .29
− .09 (.13) − .03 (.04)
− .28 − .08
−21.70 −21.632
7.44 9.39
8.42
20.88 +4 11.87
− .33
12.5 + 4.00
11.1 +4 15.54
24.0

July 16

24 34.0	24 —		44.68
36.3	36.86	34.63	47.00
38.8	37.00	37.00	49.23
40.6	37.05	39.28	51.48
42.6	36.96	41.42	53.76
		21.37	57.05
		23.73	59.43
		25.95	1.56
		28.05	3.79
		30.37	5.90
	36.97		9.35
	49.23		11.50
	1.55		13.73
	13.77		15.97
	25.93		18.28
24 38.46	745		
			25 1.490
			1.672
			− 0.18
			− 0.16
			+ 0.78
			− .59
			− 3.12
			− 2.93
			58.56

+23.03
1.36229
1.43751n
627
40 1
32.5 +.48
38.3 +.24
56.2 −.10
52.8 +.33
44.35 95
41 44.95
−27.38
41 17.57 +.07
41 30.78
30.71

−90
1.3268
−21.22
− .10
− .15 (.18)
− .24
−21.766
9.05
21.36 +4 12.14
− .34
12.3 + 3.50
10.9 +4 15.30
24.4

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	α m s		δ ′ ″	
July 19	25 1.65		45 21.8	7
24	.60	5	22.5	6
29	.54	6	23.1	6
Aug 3	.48	6	23.7	5
8	1.41	7	24.2	

1878

h	July 22 m s	m s	m s	July 23		July 24		
16	24 36.0	24 46.00	24 58.10	Ch. f.		24 41.2	24 50.30	2.43
	38.0	48.10	0.33			43.3	52.40	4.67
	39.9	50.29	2.57			44.8	54.73	7.00
	42.2	52.53	4.76			46.7	57.00	9.05
	44.0	54.88	7.00			49.1	59.19	11.34
	25 42.5	34.86	10.30			25 44.6	39.00	14.73
	44.4	37.05	12.60			46.5	41.32	16.95
	46.5	39.30	14.83			48.5	43.62	19.05
	48.5	41.50	17.05			49.9	45.80	21.34
	50.3	43.70	19.23			51.7	48.00	23.61
		50.36	[22.60] 23.60				54.72	26.84
		2.55	24.82				6.90	29.00
		14.80	27.05				19.14	31.30
		27.07	29.34				31.28	33.53
		39.28	31.56				43.55	35.72
	24 40.02	7406				24 45.02	9559	
	25 46.44		25 14.812			25 48.24		25 19.118
			1.617					1.597
			+ 13.19					+ 17.52
			+ 13.21					+ 17.54
			− 12.60					− 16.88
			− .61					− .61
			− 3.07					− 3.05
			− 16.28					− 20.54
			m s 24 58.53					58.58

	July 22		July 23			July 24	
	s +34.79	s −31.63				+34.10	−29.12
	1.54145	1.50010 n				1.58275	1.46419 n
	1.61667 n	1.57532				1.60797 n	1.53941
	543	408				673	817
	40 1	40 0	40 1	40 0		40 1	40 0
	46.2 +.22	27.1 +.49	45.4	15.3		46.4 +.21	31.7 +.46
	51.7 +.42	34.1 +.04	50.4	21.2		50.9 +.42	36.3 +.06
	11.0 −.09	52.3 −.58	8.2	39.1		9.8 −.04	55.1 −.38
	6.9 +.48	49.5 +.51	5.5	36.4		5.9 +.47	51.9 +.51
	58.60 103	46 39.70	56.80		27.20	58.10 106	65 43.40
	41 58.95	40 40.75	41 57.38	40 28.00		41 58.25	40 43.75
	− 41.37	37.61				−40.55	34.63
	41 17.58 +.12	18.36 −.11				41 17.70 +.12	18.38 −.10
+21°	41 30.77	29.99				41 30.65	29.97
	30.65	30.10				30.53	30.07
+20°	37 8						
	1.3358						
	−170					−160	
	1.3188					1.3198	
	−20.84	−20.84				−20.88	−20.88
	− .23	− .19				− .22	− .16
	− .13	− .04				− .12	− .04
	− .26	− .12				− .26	− .16
	−21.45	−21.19				−21.48	−21.24
	41 9.20	8.91				9.05	8.83
	41 9.06					8.94	
	45 22.5	+4 12.29				22.5	+4 12.39
		− .35					− .36
	+4 13.2	+ 2.70				13.6	+ 2.40
	11.8	+4 14.64				12.2	+4 14.43
		45 23.7					23.4

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ε Ursae Min.

16h 58m 32s
+82° 14′ 6″
−39 51 18
1878

	July 2	July 9	July 16	July 23
α_0	31.654			
corr. α	+.044			
$\frac{d\alpha}{dt}$	+.024			
δ_0	6.″29			
corr. δ	+.50			
$\frac{d\delta}{dt}$				
log ein δ	9.99600			
" cos δ	9.13069			
" 15 cos δ tan^1	9.23868 n			
	676			
tan δ	+7.334			
sin z	−.64			
log R_1, " R_2				1.92469
R_1				6
R_2				8408
I				15.28

h	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s
16	58	20	57	34.7	59	11.7	57	41.3	56	37.5	58	1.6	56	38.5	56	57.1	58	14.7	56	11.5	57	6.0	58	29.3
		19.8	17.0	2.8		19.1		56.0		45.0		9.7		53.0		58.9		22.0		25.0		13.3		36.7
		32.2	16.1	10.1		26.1		11.0		52.7		16.8		10.1		5.6		30.0		43.3		20.6		44.7
		49.1	17.7	18.3		35.2		24.8		0.0		24.0		24.1		13.4		37.1		56.7		28.3		52.1
		4.0	18.3	23.5		4.20		35.7		7.7		32.4		40.9		22.6		45.1		14.8		35.7		59.9
			17.9	33.0		49.6				15.8		39.1				28.8		53.3				43.9		7.4
			17.7	40.6		57.2		59 28.0		23.6		47.6	0	45.3		36.1		06	58	43.3		51.1		15.4
			17.7	48.5		4.3		41.6		30.9		54.8		13.7		41.0		8.7		53.0		59.0		22.2
			17.9		3775	12.3		51.0	714	38.2	2883	2.3		36	1925	52.0	4077	16.2		4.9	3244	6.5	5386	30.9
								9.3						20.9					[21.6]					
								20.2		7.93		25.7		32.3		21.39		39.0		35.3		36.04		53.6
			17.86	17.86						32.03		33.3				45.30		47.0				59.84		0.8
			41.94	.86						56.13		41.0				9.46		54.2				24.09		8.7
												48.2						1.7						16.5
										9.609		56.0				13.615		9.1				17.997		24.4
												3.7						17.3						31.4
												11.7						24.8						39.4
												19.0						32.2						47.0
	58	34.42					58	9.64			5052	26.6	57	9.32			851	39.8	56	42.26			2168	53.0
					58	17.860	59	54.02			58	32.030	1	7.50			58	45.383	59				58	59.99
					58	36.730						36.022						35.186		8.02				34.276
						− 18.87						− 3.99						+ 10.20						+ 25.72
						− 18.01						− 4.03						+ 10.16						+ 25.68
						− 1889						− 401						+ 10.18						+ 25.70
						+ 30.30						+ 15.76						+ 0.74						− 14.84
						− 11.80						− 11.71						− 10.82						− 11.06
						− 5.08						− 4.37						− 3.53						− 2.62
						+ 13.42						− 0.32						− 13.61						− 28.52
					58	31.28						31.71						31.747						31.47
		−16.56						+22.39		−81.99				+96.06		−142.12				+137.73		−8.03		
		1.21906 n						1.35005		1.91376 n				1.98254		2.15265 n				2.13903		0.90472 n		
		0.45706 n						0.58805 n		1.15176				1.22054 n		1.39065				1.37703 n		0.14272		
		582						681		052				1930		5941				579		148		
		10′ 3						10 3		10 3				10 3		10 3				10 3		10 3		
ε		29.1	+.60					34.6	+.53	15.6	+.46			44.5	+.35	2.7	+.18			48.7	+.28	25.1	+.61	
Q		29.2	+.16					35.3	+.14	17.1	+.27			46.2	+.33	4.7	+.29			48.2	+.34	27.2	+.17	
H		46.6	−.49					52.9	−.36	34.6	−.05			2.3	+.18	20.2	−.28			6.2	+.14	42.7	−.41	
		47.7	+.13					53.1	+.06	34.6	+.31			3.8	+.15	21.6	+.34			6.9	+.22	44.0	+.18	
		37.85	.40					43.75	37		99	2610		53.40	101		53	11.45		56.95	108		55	33.90
		13 38.15						13 43.98		13 25.48				13 54.20		13 12.30				13 57.75		13 34.75		34.75
		2.86						− 3.83		14.18				− 16.62		24.58				−23.82		13.39		139
		13 41.01	.00					13 40.11	+.01	39.66	−.04			13 37.58	+.05	36.88	−.07			13 33.93	+.06	4864		3614 −.00
+82°		9′ 7.″24						9 8.24		8.69				9 10.77		11.47				9 14.42		12.21		12.11
								8.23		8.73				10.72		11.54				14.36				
−39°		50′ 30″																						
		1.6814																						
		−202						−169						−84						−128				
		1.6612						1.6645						1.6730						1.6686				
		+45.84						+46.19		+46.19				+47.10		+47.10				+46.62		+46.62		
		− .02						− .04		− .19				− .67		− 1.48				− 1.39		− .01		
		− .14						− .15		− .14				− .33		− .29				− .40		− .36		
		− .10						− .09		− .25				− .25		− .13				− .25		− .14		
		+45.578						+45.891		+45.831				+45.83 95		+45.20 30				+44.58 74		+46.126		
		9′ 52.92						54.14		54.04				56.67		56.84				59.10		58.47		
		9 52.92						54.09						56.75						58.78				
		14 56.00	+4	12.50				7.3	+4	12.82				8.85	+4	12.14				10.35	+4	12.21		
			+	.52					+	.58					+	.62					+	.65		
		+4′ 12.5	+	0.90				13.2	−	1.00				12.1	−	2.60				11.6	−	4.10		
				13.0	+4	13.92		13.7	+4	12.40				12.6	+4	10.16				12.1	+4	8.76		
					14′	6.″8				6.5						6.9						7.5		

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	α		δ			α		δ	
	m s	° ′	′ ″			m s	° ′	′ ″	
June 29	58 37.03	46	13 64.5	14	Aug. 8	58 31.90	83	13 72.9	6
July 4	36.57	52	65.9	13	13	31.07	85	73.5	5
9	36.05	58	67.2	12	18	30.22		74.0	
14	35.47	63	68.4	11					
19	34.84	67	69.5	10					
24	34.17	72	70.5	9					
29	33.45	76	71.4	8					
Aug. 3	32.69	79	72.2	7					
8	31.90		72.9						
	July 24		July 31			Aug. 14			
	54 47.1	57 7.9	58 32.0	57 19.5	57 21.3	58 45.5	58 57.8	57 —	59 15.7
	55 7.0	15.4	39.2		28.9	13.7		22.7 59.8	23.0
	22.1	23.4	47.3		36.3	2.5		21.6 6.3	29.8
	41.0	30.7	54.7		44.5	9.3		21.9 14.3	37.8
	55.0	38.0	2.1		57.8	17.1		21.4 21.4	46.2
	56 10.3	43.6	10.0		0.3	24.4		22.2 29.8	53.2
		53.5	17.1	58 39.1	7.2	32.4	2 52.8	21.9 37.2	0.4
		0.8	25.6		15.5	40.2		21.1 44.0	9.0
		3437 8.4	209 32.9		4695 23.4	1524 47.0		21.7 52.3	4121 16.4
		38.19	53.0		52.17	0 42.6		21.81	0 40.0
		2.32	8.3		16.93	24.7		45.79	47.0
		26.09	10.5		40.26	31.8		10.17	53.0
			18.0			40.6			2.4
		660	26.7		4936	48.7		13777	7.8
			33.9			53.6			17.5
			41.5			2.9			25.3
			48.8			3623 10.5			33.2
	55 22.44		2348 57.1	57 15.50			58 57.80		2715 41.0
	56 10.30		59 2.200	58 35.10		59 16.453	2 52.80		59 48.923
			~~3458~~ 34.135			58 33.11			30.86
			+ 28.06			+ 43.34			+ 1 15.06
			+ 28.02			+ 43.30			+ 1 15.02
			+ 2804			+ 43.32			+ 1 15.04
						31.64			
			— 16.95			— ~~25.32~~			— 1 4.04
			— 11.16			— 11.60			— 0 11.30
			— 2.48			— 1.46			+ 0.79
			— 30.59			— 44.70			— 1 ~~18~~ 55
			31.61			31.75			31.87
	+219.76	+171.90		+120.93	+41.35		+48.12	−18.88	
	234195	2.23528		2.08261	1.61648		1.68233	2.27156 m	
	1.57995 m	1.47328 m		1.31937 m	0.85324 m		0.91909 m	1.50832	
	8.71	2.04							
	10 4	10 3		10 3	10 3		10 3	10 2	
	0.3 +.20	54.1 +.21		44.6 +.35	32.9 +.56		30.9 +.58	47.9 +.24	
	1.8 +.12	55.5 +.26		48.1 +.34	36.2 +.15		31.5 +.15	48.0 +.43	
	18.1 −.30	11.8 −.10		3.9 +.17	51.8 −.41		49.8 −.47	5.2 +.08	
	18.3 +.21	11.8 +.23		4.6 +.18	53.6 +.05		49.8 +.10	6.2 +.39	
	9.20 23	60 2.95		54.25 104	35 42.35		40.35 36	114 56.55	
	14 9.62	14 3.30		13 55.30	13 43.62		13 40.50	12 56.82	
	−38.01	−29.44		— 20.86	— 7.13		— 8.30	1 32.28	
	13 31.61 +.10	13 33.56 −.09		13 34.44	13 36.49		13 32.20	13 29.05	
	9 16.74	9 14.79		13.91	11.86		16.15	19.30	
	16.64	14.88							
			−39	50 35					
				1.68140					
	−152			− 440			−1546		
	1.6662			1.67700			1.66594		
	+46.37	+46.37		+47.53			+46.34		
	− 3.53	− 2.16		− 1.07	− .13		− .17	− 2.55	
	− .42 ~~.26~~	− .40 ~~.24~~		− .16	− .15		− .11	− .09	
	− .16	− .15		− .26	− .09		− .09	− .28	
	+42 ~~.36~~ 53	+43 ~~.66~~ 82		+46.04	+47.16		+45.97	+43.42	
	59.17	58.70		59.95	59.02		2.12	2.72	
	58.64			59.48			10 2.42		
	10.5	+4 12.39		11.76	+4 11.65		13.6	+4 11.29	
		+ .65			+ .66			+ .66	
	+4 11.6	− 4.20		12.3	− ~~4.80~~ 5.50		11.2	− 7.30	
	12.1	+4 8.84		12.8	+4 6.~~76~~ 86		11.7	+4 4.65	
		7.8			6.3			7.1	

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α Herculis

$17^h\ 9^m\ 8^s$

$+14^\circ\ 31'\ 51''$

$+27\ \ 50\ \ 57$

1878

α_0 $5^s.092$

corr. α $+.011$ $+.005$

$\frac{d\alpha}{dt}$

δ_0 $50''.66$

corr. δ $-.53$

$\frac{d\delta}{dt}$

log sin δ 9.89951

" cos δ 9.98588

" 15 constant 0.0933+9m 195

tan δ +.26

sin 2 +.47

log R_1 1.37017

" R_2 1.06950

R_1 23.45

R_2 11.74

I 2.14

~~5 July 31~~

July 2

h	m	s	m	s	m	s
17	8	12.6	8	10.90		22.61
		14.5		13.00		24.70
		16.1		13.78		26.87
		18.0		17.27		29.00
		19.6		19.31		31.10
	9	13.6		57.66		34.20
		13.5		57.92		36.43
		17.5		2.00		38.53
		19.2		4.15		40.70
		21.0		6.35		42.87
				15.13		46.00
				26.86		48.10
				38.55		50.32
				50.27		52.43
				2.02		54.50
	8	16.16	19283			
	9	17.36			8	38.566
						8.450
						−29.88
						−29.89
						−29.88
						+ 30.28
						− .42
						− 3.36
						+ 26.50
					m	s
					9	5.07

July 3

m	s		
8	17.8	8	—
	19.4		—
	20.8	17.23	17.23
	22.8	.09	19.23
	25.0	.22	21.30
9	14.2		57.75
	16.8		.86
	18.6		4.00
	20.4		6.10
	22.0		8.23
			17.180
			28.83
			40.53
			52.27
			3.94
8	21.16	20280	
9	18.40		
		8	40.560
			8.450
			−27.89
			−27.90
			−27.89
			+ 28.27
			− .41
			− 3.36
			+ 24.50
			5.06

July 8

m	s		
8	22.7	8	23.26
	24.8		25.53
	26.7		27.63
	28.5		29.77
	30.2		32.00
9	28.3		10.15
	30.3		12.29
rej.	31.9		14.53
	33.9		16.60
	35.6		18.72
			27.64
			39.32
			51.07
			2.72
			14.46
8	26.58	25521	
		8	51.042
			8.450
			−17.41
			−17.42
			−17.41
			+ 17.81
			− .41
			− 3.36
			+ 14.04
			5.08

July 9

m	s		
8	23.3	8	23.52
	24.7		27.63
	27.1		29.63
	29.1		31.76
	31.0		33.95
9	29.7		12.35
	31.7		14.38
	33.7		16.58
	35.3		18.66
	37.2		20.85
			29.70
			41.41
			53.07
			4.84
			16.56
8	27.04	26558	
		8	53.116
			8.450
			− 15.33
			− 15.34
			− 15.33
			+ 15.74
			− .41
			− 3.36
			+ 11.97
			5.09

	+22.41		−38.79				+19.40		−37.84				+24.46			
	1.350446		1.58672n				1.28780		1.57795n				1.38846			
	1.44363n		1.68191				1.38099n		1.67114				1.48165n			
	239		067				7975		6990				041			
	55 0		50 3				50 4		50 3				55 0			
ε	0.9	+.01	45.1	+.34			57.9	00	47.3	+.30			4.6	+.05		
ζ	5.5	+.06	49.8	+.34			2.2	+.01	51.3	+.32			9.4	+.09		
η	28.8	−.09	11.7	−.10			24.1	−.24	13.7	−.19			30.8	−.08		
Δ	20.8	+.38	6.2	+.19			16.2	+.18	7.2	+.22			23.1	+.41		
	14.85	.36	57	58.40			11.00	−.05	65	55.50			17.70	47		
	55	14.09	53	58.95			55	10.10	53	59.88			55	16.98		
		−27.78		48.08				−24.04		46.90				−36.31		
	54	46.23	+.08	46.03	−.14		54	46.06	+.07	46.78	−.14		54	46.67	+.08	
+14°	28	2.12		2.32			28	2.29		1.57			28	1.68		
		2.04		2.46				2.22		1.71				1.60		
+27°	50	36														
	1.4830															
	−199						−191						−196			
	1.4631						1.4639						1.4634			
	−29.05		−29.05				−29.10		−29.10				−29.07			
	− .07		− .24				− .05		− .19				− .08			
	− .01		− .13				− .31		− .56				− .01			
	− .09		− .19				+ .01		− .16				− .12			
	−29.22		−29.62				29.30	35	−29.61				−29.28			
	27	32.88		32.86				32.87		32.10						
	27	32.85						32.48					32.32			
	31	44.98	+4	12.50				45.16	+4	12.77			46.06	+4	13.84	
				.39						.39					.42	
	+4	12.1	+	5.70				12.7	+	5.56			13.7	+	4.60	
		11.6	+4	17.81				12.2	+4	17.98			13.2	+4	17.72	
				31 50.6						50.4					50.0	

	+26.08		−40.40													
	1.41631		1.60638n													
	1.50950n		1.69957													
	826		833													
	55 0		50 3													
ε	3.4	+.03	41.8	+.40												
ζ	9.2	+.09	46.6	+.34												
η	31.0	−.08	8.7	+.06												
Δ	24.6	+.43	1.6	+.08												
	17.20	47	88	55.25												
	55	17.05	53	54.68												
		−32.32		50.07												
	54	44.73	+.09	44.75	−.14											
	28	3.62		3.60												
		3.53		3.74												
	−168															
	1.4662															
	−29.26		−29.26													
	− .09		− .21													
	− .01		− .13													
	− .12		− .22													
	−29.48		−29.82	35												
		34.05		33.89												
		33.97														
		46.24	+4	12.82												
				.42												
		12.3	+	4.40												
		11.8	+4	16.80												
				50.8												

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	m	s			m	s			m	s
June 29	9	8.45	0		1 31	44.4	9	Aug. 8	9	8.25	6		31	50.4	5
July 4		.45	0			45.3	9	13		.19	7			50.9	4
9		45	0			46.2	9	18		.12	8			51.3	4
14		44	1			47.0	8	23		8.04	8			51.7	3
19		8.42	2			47.8	8	28		7.96				52.0	
24		.39	3			48.5	7								
29		.35	4			49.2	7								
Aug 3		.30	5			49.8	6								
8		8.25	5			50.4	6								

July 15

8	434	8	3831		50.10	9	0.8	9	6.44	9	18.10	10	4.10	9	4013	9	57.81
	45.6		4050		52.38		2.5		8.62		20.30		4.30		42.23		59.31
	47.6		42.78		54.33		3.9		10.40		22.42		4.50		44.40		56.00
	49.2		43.00		56.64		3.5		12.82		24.33		4.70		46.43		58.16
	50.4		47.10		58.77		7.5		15.00		26.65		48.9		48.60		0.37
			25.31		1.86	10	22.2		—		29.82				26.88		—
			27.46		4.00				—		32.00				29.00	7.77	5.63
			29.46		6.45				—		34.22				31.10	8.00	8.00
			31.71		8.40				—		36.27				33.26	7.68	2.82
			33.92		10.50				—		38.41				35.54	7.72	12.00
			42.74		13.53				10.72 34.18		41.70				44.36		15.20
			54.44		15.84				22.40 14		43.82				56.05		17.26
			6.24		18.50				34.16 16		45.87				7.79		19.41
			17.92		20.10				45.92 18		48.00				19.46		21.60
			29.57		22.40				— 25		50.21				31.16		23.78
8	47.24	30.91				9	4.04					10	44.98	38.81			
				9	6.182	10	22.20			9	34.160					10	7.762
					8.435						8.356						8.20
					− 2.25						+25.81					+	59.56
					− 2.26						+25.80					+	59.55
					− 2.25						+ 2.581						+ 5.956
					+ 2.71						− 25.34						− 58.95
					− .42						− .41						− .40
					− 3.34						− 3.26						− 3.11
					− 1.05						− 29.01						−1 2.46
					5.13						5.15						5.30
	+18.94					+30.12		− 48.04				− 37.22					
	1.27738					1.47885		1.68160				1.57078					
	1.37057					1.57206		1.77355				1.66273					
	69 33					080											
	50 4					55 0		50 3				50 3					
	52.1 +.05					6.1 +.08		28.7 +.60				39.3 +.45					
	58.2 +.04					11.4 +.09		33.9 +.14				44.1 +.31					
	19.3 −.39					33.9 −.17		55.6 −.12				6.7 +.13					
	9.4 +.20					24.8 +.44		47.7 +.13				59.0 +.03					
	5.70 −.10					20.00 44		75 42.15				92 53.00					
	55 4.75					55 19.05		53 41.48				53 52.28					
	−23.47					−37.33		57.37				+ 46.00					
	54 41.28	+.06				54 41.72	+.10	40.86				53 6.28					
												54 38.28					
	28 7.07					28 6.63		7.50				29 42.07					
	7.01					6.53						28 10.07					
	− 34					− 130						− 1631					
	1.4796					1.4700						1.46669					
	−30.17					−29.51		− 29.51				−29.29					
	− .05					− .12		− .31				− .18					
	− ~~.07~~					− .02		− .18				− .12					
	+ .02					− .11		− .19				− .23					
	−31.6145					−29.76		−30.19				−29.82					
			36.56				36.77		34.31				40.25				
			47.2	+4	11.45		49.1	+4	12.46				50.8	+4	10.90		
					.45				.48						.48		
		+4	10.6	+	3.50		12.1	+	1.60				10.6	−	0.10		
			10.1	+4	14.50		11.6	+4	13.58				10.1	+4	10.32		
					51.1				50.6						50.6		

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α Ophiuchi

$17^h\ 29^m\ 16^s$	α_0	$16.^s269$	log a sin δ	9.34044	log R_1 1.36672
$+12^\circ\ 39'\ 1''$	Corr. α	+ .019 / + .031	" cos δ	9.98933	" R_2 1.06605
$+29\ \ 43\ \ 47$	$\frac{d\alpha}{dt}$		" 15 cos δ tan	0.09664n / 540	R_1 23.27 s
1878	δ_0	$1.''10$	tan δ	+.22	R_2 11.64
	Corr. δ	−.63	sin z	+.49	I 2.12
	$\frac{d\delta}{dt}$			[illegible]	

July 9 / July 10 / July 13 / July 15

h 17	m s 28 27.5	m s 28 37.00	m s 48.57	28 30.2	28 39.20	50.70	28 49.3	28 45.62	28 57.32	28 43.5	28 50.15	15.8
	29.6	39.12	50.67	32.1	41.27	52.84	51.0	47.95	59.40	45.6	52.26	36.2
	31.0	41.24	52.83	34.0	43.33	55.00	52.7	49.80	1.48	47.2	54.28	60.0
	32.9	43.36	55.00	36.0	45.37	57.15	53.8	52.00	3.65	49.1	56.42	81.0
	35.0	45.46	57.10	37.6	47.56	59.23	55.7	54.10	5.72	50.5	58.53	102.0
	29 32.7	23.40	0.20	29 42.6	25.62	2.34	29 45.5	36.38 34.26	9.00		36.60	131.8
	35.7	25.57	2.32	43.5	27.84	4.40	47.5	.29 36.29	11.00		38.70	153.8
	37.8	27.67	4.36	47.4	30.05	6.57	48.5	.37 38.49	13.10		40.79	174.2
	39.7	29.88	6.53	49.2	32.10	8.70	51.5	.41 40.65	15.26		43.05	195.5
	41.5	32.00	8.70	51.0	34.15	10.77	53.3		17.35		45.20	216.1
		41.24	11.83		43.37	13.90		49.89	20.50		54.33	250.0
		52.83	14.00		54.98	16.00		1.51	22.54		5.90	270.0
		4.42	16.10		6.56	18.30		13.14	24.77		17.43	291.8
		16.07	18.18		18.20	20.82		24.76	26.85		29.21	313.3
		27.70	20.26		29.95	22.46		36.36	29.05		40.87	335.4
	28 31.20	22.26		28 33.98	33.06		28 52.50	65.66		28 47.18	87.74	
	29 37.48		29 4.452	29 47.14		29 6.612	29 49.46		29 13.132			29 17.548
			19.700			19.700			19.700			19.698
			− 15.25			− 13.09			− 6.57			− 2.15
			− 15.27			− 13.11			− 6.59			− 2.17
			− 15.28			− 13.12			− 6.66			− 2.18
			+ 15.70			+ 13.44			+ 6.91			+ 2.69
			− .35			− .35			− .33			− .36
			− 3.43			− 3.43			− 3.43			− 3.43
			+ 11.92			+ 9.66			+ 3.15			− 1.10
			m s 29 16.37			16.27			16.28			16.45

	s +33.25	s −33.03	+32.63	−40.53	+20.63	−36.33	+30.37	
	1.52179	1.51891n	1.51362	1.60778n	1.31450	1.56027n	1.48244	
	1.61843n	1.61555	1.61026n	1.70442	1.41114n	1.65691	1.57908n	
	719	431	0902	318	0990	567	784	
	45′ 3″	45′ 1″	45 3	45 1	45 2	45 1	45 2	
ε	0.″7 +.17	48.″6 +.36	0.1 +.16	28.3 +.53	41.9 +.34	30.1 +.50	53.9 +.16	
ζ	6.4 +.30	44.1 +.38	5.1 +.29	34.2 +.18	49.1 +.43	36.8 +.21	0.3 +.26	
η	27.9 +.02	6.1 +.10	27.8 +.02	55.3 −.20	9.7 −.06	57.2 −.03	20.5 −.28	
θ	20.8 +.35	58.8 +.30	19.7 +.35	49.2 +.39	3.1 +.31	51.6 +.35	13.2 +.39	
	14.30 .84	114	13.95 82	90 41.80	55.80 102	103 43.65	7.20 53	
	48 13.95	46 51.90	48 13.18	46 41.75	47 55.95	46 43.92	48 6.98	
	− 41.54	41.26	− 40.76	50.63	− 25.77	45.38	− 37.94	
	47 32.41 +.12	33.16 −.12	47 32.42 +.11	32.38 −.14	47 30.18 +.07	29.30 −.14	47 29.04 +.11	
$+12^\circ$	35 15.″94 (15.82)	15.″19 (15.31)	35 15.93 (15.82)	15.97 (16.11)	35 18.17 (18.16)	19.05 (19.17)	35 19.31 (19.20)	
$+29^\circ$	43′ 22″							
	1.5167							
	− 165		− 148		− 77		− 32	
	1.5002		1.5019		1.5090		1.5135	
	−31.″64	−31.″64	− 31.76	− 31.76	− 32.28	− 32.28	− 32.62	
	− .13	− .13	− .13	− .20	− .05	− .15	− .16	
	− .16 (13)	− .10 (07)	− .16 (13)	− .08 (07)	− .25 (15)	− .12 (09)	− .15 (13)	
	− .21	− .28	− .20	− .22	− .26	− .26	− .13	
	−32.14 (11)	−32.15 (2)	−32.25 (2)	−32.28 (5)	−32.74 (4)	−32.81 (78)	− 33.N (.02)	
	34′ 42.″71	43.19	43.60	43.86	45.36	46.39		
	34 43.45	′ ″	43.73		45.88		46.18	
	38 57.1	+4 12.82	57.3	+4 12.88	57.8	+4 11.87	58.1	+4 11.45
		− .44		− .45		− .46		− .47
	+4′ 13.″4	+ 4.00	13.6	+ 3.80	11.9	+ 3.30	11.9	+ 3.06
	13.1	+4 16.38	13.0	+4 16.23	11.3	+4 14.71	11.3	+4 13.98
		38′ 59.″8		60.0		60.6		60.2

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α

	m	s	
June 29	29	19.68	1
July 4		.69	
9		.70	−0−
14		.70	1
19		.69	2
24		.67	3
29		.64	
Aug. 3		.60	4
8		.55	5

δ

	′	″	
	38	55.3	9
		56.2	
		57.1	8
		57.9	
		58.7	8
		59.5	7
		60.2	
		60.8	6
		61.4	

July 16

28	30.1	28	—
	52.2		—
	54.2	56.26	56.26
	56.3	.26	58.38
	57.7	.19	0.43

	38.26	13.18
	40.50	17.33
	42.60	19.48
	44.68	21.50
	46.88	23.65

	56.24	26.82
	7.79	28.78
	19.43	31.00
	31.00	33.15
	42.58	35.23

28	54.10	9.704

29	19.408	
	19.69	6
	−0.29	
	−0.31	
	−0.32	

+	0.71
−	.32
−	3.43
−	3.04

16.37

+25.31

1.40329	
1.49993	2
869	
45	2

49.1	+.23
54.9	+.35
15.6	−.29
9.1	+.41
2.35	70
48	2.18
7	−31.62
47	30.56 +.09

35	17.79
	17.70

−	78
1.5089	
−32.28	
−	.07
−	.18
−	.18
−32.71	

	44.99		
	58.26	+4	12.14
		−	.48
+4	13.3	+	2.80
	12.7	+4	14.46
			59.4

July 22

28	58.5	29	37.40
	0.3		7.44
	2.2		9.50
	4.4		11.51
	6.2		13.72

17.50	
19.00	
21.23	
23.30	
25.43	

	51.85
	54.00
	56.10
	58.18
	0.30

28.58	
30.68	
32.78	
34.93	
37.05	

	9.51	
	21.19	
	32.80	
	44.37	
	56.09	

40.10	
42.32	
44.36	
46.48	
48.61	

29	2.32	163.96

29	32.792
	19.677
	+13.11
	+13.09
	+13.08

−	12.73
−	.33
−	3.41
−	16.47

16.32

+30.47

1.48387	
1.58051	2
927	
45	2

53.2	+.17
0.9	+.26
21.2	−.25
13.9	+.39
7.20	57
48	7.30
	−38.06
47	29.24 +.10

35	19.11
	19.01

−	154
1.5013	
−31.72	
−	.11
−	19
−	34
−	.14
−32.16	

	46.85		
	59.2	+4	12.29
		−	.49
	12.4	+	1.90
	11.8	+4	13.70
			60.6

July 23

Chf.

53.1	+.17
59.6	+.27
20.2	−.28
12.8	+.39
6.65	55
48	6.42

− .14

July 24

29	16.2	29	9.60
	17.6		11.67
	19.3		13.77
	20.8		16.00
	22.9		18.00

21.18	
23.28	
25.43	
27.49	
29.73	

	36.05
	38.26
	40.47
	2.50
	4.58

32.80	
34.89	
37.10	
39.27	
41.37	

	13.81	
	25.42	
	37.09	
	48.73	
	0.37	

44.47	
46.63	
48.68	
50.86	
53.00	

29	19.36	18.542

29	37.084
	19.669
	+17.41
	+17.39
	+17.38

−	17.00
−	.34
−	3.40
−	20.74

16.34

+17.72

1.24846	
1.34510	w
386	
45	2

39.6	+.39
43.9	+.39
4.7	+.07
58.7	+.22
52.15	109
47	51.72
	−22.14
47	29.58 +.07

35	18.77
	18.70

−	145
1.5022	
−31.78	
−	.04
−	.29 17
−	.25
−32.36	26

	46.44		
	59.5	+4	12.39
		−	.50
	13.1	+	1.60
	12.5	+4	13.49
			59.9

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1878

	α m s	δ ′ ″
Aug. 8	29 19.55 6	39 1.4 5
13	.49 6	1.9 5
18	.43 7	2.4 4
23	.36 8	2.8 3
28	19.28 8	3.1 3
Sept 2	.20 9	3.4 2
7	.11 8	3.6 1
12	19.03 9	3.7 1
17	18.94	3.8

(Obs. 238 B)

July 28 — July 31 — Aug. 12 — Aug. 14

	July 28				July 31				Aug. 12				Aug. 14			
h	am s	m s	m s		s											
17	29 28.0	29 —	—		29 27.7	29 24.28	35.86		28 46.0	28 58.62	29 10.51		30 44.0	—	—	
	30.3	—	—		29.8	26.40	38.00		47.8	0.73	12.62		46.1	—	—	
	32.2	—	—		31.6	28.60	40.20		50.2	3.00	14.83		48.2	—	—	
	33.6	—	—		33.4	30.70	42.28		51.8	5.10	16.90		50.2	—	—	
	35.9				36.0	32.73	44.40		53.3	7.29	19.00		52.1	—	—	
		45.2	29 4.22											43.18	30 —	
		6.58	43.34			10.82	47.50			—	22.53			45.16	—	
		8.70	45.40			12.83	49.67			—	24.43			47.40	24.00	24.00
		10.82	47.59			15.70	51.87			—	26.60			49.40	23.98	24.10
		13.00	49.68			17.10	53.95			—	28.62			51.56	24.07	24.31
			52.76			19.26	56.05			—	30.83					
		—	53.00			28.54	57.20			2.95	26.22			—		31.41
		—	57.05			40.15	1.35			14.75	37.89			—		33.52
		45.45 45.45														
		57.08 .44	59.20			51.81	3.45			26.60	.60			24.02	24.02	35.65
		8.72 .45	1.40			3.44	5.33			—	—			35.67	.03	37.85
						15.02	7.66			—	—			47.34	.07	39.91
	29 32.01				29 31.50	25.96			[29] 28 49.82				30 48.12			
			29 45.447				29 51.792				[30] 29 26.48			30 24.040		
			29 19.645				19.62				19.50			19.48		
			+ 25.80				+ 32.17				+ 1 6.91			+ 1 4.56		
			+ 25.78				+ 32.15							+ 1 4.54		
			+ 25.77				+ 32.14				+ 1 .88			+ 1 4.53		
			− 25.38				− 31.70			wrong star				− 1 4.11		
			− .35				− .35							− .34		
			− 3.38				− 3.35							− 3.21		
			− 29.11				− 35.40							− 1 7.66		
			16.34				16.39							16.38		
	+ 13.45				+ 20.29				+ 36.54				− 24.08			
	1.12872				1.30728								1.38166			
	1.22536				1.40268								1.47706			
	417															
	45 2				45 2				45 1				45 1			
ε	31.9 +.51				38.1 +.41				29.4 +.51				43.2 +.27			
F	37.1 +.23				45.9 +.42				35.1 +.18				48.1 +.43			
g	58.9 +.02				5.4 +.08				[57.4] 47.4 −.01				10.3 −.06			
H	51.7 +.25				59.3 +.22				50.2 +.38				3.2 +.40			
	45.40 101				51.75 113				106				56.75 104			
	47 44.96				47 52.18				46 43.02				46 56.20			
	− 16.80				− 25.27								3000			
	47 28.10 +.05				47 26.91								47 26.20			
+12°	35′ 20.″25				2144								2215			
	20.20															
+29°	43′ 18″				+29 43 17											
	1.5167				1.51670											
	− 125				− 435								− 1447			
	1.5042				1.51235								1.50223			
	− 31.93				− 32.53								− 31.79			
	− .02				− .05								− .04			
	− .14 .27				− .12								− .08			
	− .25				− .28				− .26				− .26			
	−32.34				−32.98								−32.18			
	34′ 47.″86				48.46								49.97			
	39 0.1	+4 12.46			0.4	+4 11.65							2.0	+4 11.29		
		− .50				− .50								− .55		
	+4′ 12.″2	+ 1.00			12.0	+ 0.60							12.0	− 0.90		
	11.6	+4 12.96			11.4	+4 11.75							11.4	+4 9.89		
		38 60.8				60.2								59.9		

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Aug. 18 / 19

Aug. 27

Sept. 6

Sept. 8

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1878phae.proj.1494.

ι Herculis

$17^h\ 36^m\ 2^s$
$+46°\ 4'\ 18''$
$-3\ 41\ 30$
1878

	July 10	July 13	July 15	July 16
α_0		1.589	log gain δ	9.85746
corr. α		−.242	" cos δ	9.84121
$\frac{d\alpha}{dt}$		−.269	" 15 sec stand	9.948 52m 728
δ_0		18".15		
corr. δ		+1.00	tan δ	+1.04
$\frac{d\delta}{dt}$			sin z	−.06
log R_1				1.51484
log R_2				1.21417
R_1				32.72
R_2				16.37
I				2.97

h	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s	m	s
17	35	1.7	35	14.00	35	30.30	35	9.7	35	20.29	35	36.78	35	21.8	35	41.00	35	57.28	35	38.5	35	—
		4.5		17.00		33.20		12.0		23.37		39.88		23.6		44.00		0.24		87.3		—
		7.2		20.00		36.26		15.0		26.83		42.73		25.5		47.10		3.32		41.0		32.33
		9.5		23.00		39.21		18.3		29.35		45.65		29.2		50.05		6.22		44.1		35.40
		11.5		25.85		42.23		20.9		32.36		48.63		31.6		53.05		9.48		46.3		38.62
	36	5.7		19.40		46.55				26.00		52.32						13.88				32.00
		8.1		22.44		49.70				28.77		55.10						16.95				35.05
		11.5		25.45		52.65				31.90		57.05						19.90				38.05
		13.7		28.46		55.68				34.72		2.00						22.88				41.00
		15.6		31.46		58.58				38.00		5.10						26.00				44.05
				19.97		3.00				26.34		9.50				—						32.45
				36.24		6.00				42.73		12.36				4.04						48.88
				52.63		9.00				59.11		15.46				3.31						5.25
				9.00		12.00				15.46		18.52				19.92						21.63
				25.44		15.00				31.88		21.45				—						38.03
	35	6.88	26328				35	15.18	29552				35	26.34	1027				35	40.64	26243	
	36	10.92			35	52.656					35	59.104					36	3.423				
					36	4.750						4.726						4.708				
						− 12.09						− 5.62						− 1.29				
						− 11.85						− 5.38						− 1.05				
						− 11.82						− 5.35						− 1.02				
						+ 13.42						+ 6.89						+ 2.68				
						− 1.65						− 1.58						− 1.70				
						− 3.16						− 3.14						− 3.12				
						+ 8.61						+ 2.17						− 2.14				
					m	s																
					36	1.27						1.27						1.28				
		+48.78		−18.26				+43.92						+37.08						+24.61		
		1.66068		1.26150n				1.64266						1.56914						1.39111		
		1.60920n		1.21002				1.59118n						1.51766n						1.33963n		
		796		0878				5994						642						839		
		20 3		20 2				20 3						20 3						20 2		
ζ		14".7 +.44		19".1 +.46				11.1 +.35						3.9 +.20						53.9 +.16		
η		16.1 +.28		21.0 +.29				13.2 +.30						6.9 +.30						57.4 +.31		
ι		36.7 −.16		42.2 −.45				33.3 .00						26.1 −.04						16.9 −.31		
ν		31.9 +.33		36.5 +.44				28.9 +.34						22.0 +.34						12.0 +.40		
		25.70 .89		30.6 .74	30.65			22.20 .99						15.00 .80						5.40 .56		
		23 24.85		22 29.70				23 21.62						23 14.72						23 5.05		
		−40.66		16.22				−39.01						−32.94						−21.86		
		22 44.19	+.11	45.92	−.05			22 42.61	+.11					22 41.78	+.10					22 43.19	+.06	
+46°		0 ' 4".16		2".43				0 5.74						0 6.57						0 5.16		
		4.05		2.48				5.63						6.47						6.10		
−3°		41 ' 26"																				
		0.5698																				
		− 147						− 76						− 32						− 76		
		0.5551						0.5622						0.5666						0.5622		
		+ 3".59		+ 3".59				+ 3.65						+ 3.69						+ 3.65		
		− .57		− .09				− .53						− .37						− .17		
		− .18		− .12				− .23						− .26						− .28		
		− .22		− .18				− .25						− .20						− .14		
		+ 2.62		+ 3.28				+ 2.84						+ 2.86						+ 3.06		
		0 ' 6".41		5".70																		
		0 6.20						8.33						9.43						8.26		
		4 18.8		+4 12.88				18.89	+4	11.87				19.4	+4	11.45				19.68	+4	12.14
				+ .05					+	.06					+	.06					+	.06
		+4 ' 11".8		+ 0.20				10.6	−	0.70				10.0	−	1.20				11.4	−	1.50
		12.8	+4	13.13				11.6	+4	11.23				11.0	+4	10.31				12.4	+4	10.70
				1 ' 4 19.3						19.6						19.7						19.0

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	α		δ	
June 29	36m 4.80s		4′ 14.8″	15
July 4	.79	1	16.3	14
9	.76	3	17.7	14
14	.72	4	19.1	13
19	4.67	5	20.4	12
24	.61	6	21.6	12
29	.53	8	22.8	10
Aug 3	.44	9	23.8	10
8	4.34	10	24.8	

July 22			July 23				July 24			July 28		Ex √
	40.00											
35 37.8	35 43.00	35 56.30	36 15.8	–	36 –	35 31.0	35 44.17	36 06.0	35 47.9	35 52.76	36 9.00
40.5	46.00	59.30	18.2	–	4.45 1.48	34.0	47.24	3.60	50.0	53.64	12.00
42.4	49.00	2.32	20.8	–	.46 4.46	36.3	50.10	6.57	53.0	58.60	15.00
45.1	52.00	5.30	23.3	–	.56 7.53	38.9	53.18	9.43	55.3	1.53	17.82
48.0		8.32	26.1	–	.39 10.33	41.7	56.00	12.46	57.5	4.59	20.92
	45.43										
	48.41	12.76		47.50	14.80		49.20	16.86	37 1.0	—	25.32
	51.38	15.70		50.37	17.90		52.67	19.90	3.4	—	28.26
	54.39	18.67		53.40	20.80		55.57	22.89	5.6	—	31.36
	57.32	21.69		56.48	23.72		58.35	25.87	8.0	—	34.22
		24.58		59.50	26.60		1.63	28.72	11.8	—	37.24
	46.00	29.00	—		31.26	50.14		33.41		58.62 31.34	41.54
	2.31	31.93	4.46	20.83	34.05	6.53		36.10		14.95 .32	44.62
	18.68	35.00	20.76	.76	37.00	22.85		39.32		31.28 .28	47.66
	34.95	37.90	37.10	.73	40.10	39.27		42.26		47.60 .23	50.54
	51.37	40.92	53.45	.73	43.10	55.62		45.25			53.63
35 42.76	93.31		36 20.84			35 36.38	114.41		35 52.74		
		36 18.662			36 20.762			36 22.882	37 5.96		36 31.292
		4.631			4.619			4.606			4.542
		+14.03			+16.14			+18.28			+26.75
		+14.27			+16.38			+18.52			+26.99
		+14.30			+16.41			+18.55			+27.02
		– 12.74			– 14.90			– 17.02			– 25.39
		– 1.57			– 1.57			– 1.58			– 1.65
		– 3.64			– 3.63			– 3.02			– 2.95
		– 17.35			– 19.50			– 21.62			– 29.99
		1.31			1.26			1.26			1.30

July 22	July 23	July 24	July 28	
+35.90	−0.08	+46.50	+38.55	− 34.67
1.55509	8.90309n	1.66745	1.58602	1.53995n
1.50361n	8.85161	1.61597n	1.53454n	1.48847
237	037	473	330	723
20 3	20 2	20 3	20 3	20 1
3.1 +.18	30.4 +.52	12.0 +.38	5.0 +.21	59.6 +.07
5.1 +.29	33.5 +.21	13.2 +.30	5.8 +.30	0.7 +.29
24.9 −.10	53.5 −.40	32.9 +.01	26.9 −.01	21.7 −.24
20.2 +.35	48.9 +.28	29.1 +.34	21.6 +.34	16.7 +.47
14.00 72	41.95 61	22.45 103	15.95 84	59 10.65
23 13.32	22 41.58	23 21.80	23 14.82	22 9.68
−31.89	.07	−41.30	−34.24	30.79
22 41.43 +.09	22 41.65 00	22 40.50 +.12	22 40.58 +.10	40.47 −.08
0 6.92	0 6.70	0 7.85	0 7.77	7.88
5.83		7.73	7.67	7.96
−.152	−.113	−.144	−.139	
0.5546	0.5585	0.5554	0.5559	
+3.59	+3.62	+3.59	+3.60	+3.60
− .35	− .50	− .59	− .40	− .33
− .39	− .16	− .28	− .27	− .17
− .18	− .15	− .26	− .21	− .15
+2.74 87	+3.20 31	+2.41 54	+2.73 82	+2.95 30
8.70	10.01	10.27	10.49	10.97
21.18 +4 12.29	21.4 +4 12.21	21.7 +4 12.39	10.73	
+ .66	+ .06	+ .06	22.6 +4 12.46	
+4 12.5 − 3.00	11.4 − 3.20	11.4 − 3.50	+ .06	
13.5 +4 9.35	12.4 +4 9.07	12.4 +4 8.95	11.9 − 4.40	
			12.9 +4 8.12	
18.0	19.1	19.2	18.8	

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1878

	α	δ
Aug. 8	36m 4.34s	4′ 24.″8
13	4.23	25.7
18	4.11	26.5
23	3.98	27.2
28	3.85	27.7
Sept. 2	.71	28.1
7	.57	28.4
12	.42	28.6
17	3.27	28.7

July 31 — Aug. 12 — Aug 18/19 — Aug. 20

17	36m 13.s5	35m 58.s52	36m 15.23	36 18.0	36 24.00	36 42.37	36 28.3	36 40.67	56.93	36 31.9	36 46.15	37 2.28											
	16.6	1.80	18.11	20.3	29.00	45.41	32.0	43.62	59.80	34.6	48.85	5.31											
	19.3	4.57	21.00	22.0	31.92	48.14	34.0	46.58	2.85	37.2	52.00	8.38											
	21.8	7.47	24.10	24.2	34.99	51.22	36.8	49.45	5.90	39.8	54.72	11.25											
	24.3	10.63	27.20	28.3	37.94	54.23	38.9	52.50	8.73	42.7	57.86	14.25											
		4.25	31.46		31.32	58.13		46.18	13.17		57.29	57.35	18.57										
		7.26	34.43		34.30	1.80		49.18	16.30		.29	57.32	21.58										
		10.10	37.50		37.43	4.53		52.80	19.30		.42	57.42	24.76										
		13.00	40.42		40.57	7.56		55.00	22.22		.31	0.28	27.60										
		16.10	43.40		43.43	10.67		58.00	25.12			—	30.71										
		4.70	47.90		31.97	15.70		46.56	29.83		51.92		35.00										
		21.13	50.85		48.27	18.00		2.84	32.70		8.29		38.00										
		37.44	53.82		4.66	21.05		19.22	35.70		24.64		41.05										
		53.82	56.80		21.03	23.98		35.78	38.85		41.02		44.00										
		10.14	59.72		37.40	27.00		52.07	41.82		57.33		47.05										
	36 19.08	18.693		36 22.56	2333		36 34.00	9647		36 37.24	12320												
			36 37.586			37 4.666			37 19.294			37 24.640											
			36 4.49			4.287			4.10			4.05											
			+ 32.98			1 0.42			1 15.19			1 20.59											
			+ 33.17			1 0.66			1 15.43			1 20.83											
			+ 33.27			1 0.69			1 15.46			1 20.86											
			− 31.71			−0 59.05			−1 14.04			−1 19.37											
			− 1.65			− 1.61			− 1.46			− 1.47											
			− 2.90			− 2.66			− 2.51			− 2.46											
			− 36.26			−1 3.32			−1 18.01			−1 23.30											
			36m 1.17			1.35			1.28			1.34											
		+ 1835			+ 4211			+ 4529			+ 4740												
		1.26864			1.62439			1.65600			1.67578												
		1.21092m			1.57167m			1.60328m			1.62306m												
		20 2′			20 3			20 3			— —												
Eq.		43.″5 +.32			2.6 +.18			[27] 14.7 +.23			6.5 +.24												
Eq.		47.2 +.43			3.8 +.28			6.4 +.30			7.3 +.30												
Eq.		6.6 +.06			24.9 −.10			28.4 +.03			27.7 +.01												
Eq.		2.7 +.30			20.2 +.35			22.2 +.34			24.1 +.34												
Eq.		55.05 111			13.25 71			98			17.10 89												
		22 55.″00			23 12.58			23 15.42			[23] 16.40												
		− 16.25			− 37.30			− 40.11			− 41.98												
		22 38.75			22 35.58			22 35.31			22 34.42												
+46	0′ 9.″60				12.77			13.04			13.93												
− 3	41 31																						
	0.57000																						
	− 435				− 1537			− 1560			− 2043												
	0.56565				0.55463			0.55440			0.54957												
	+3.″68				+3.59			+3.58			+3.54												
	− .09				− .48			− .55			− .61												
	− .12				− .10			− 10			− .10												
	− .28				− .18			− .22			− .22												
	+ 3.19				+ 2.83			+ 2.71			+ 2.61												
	0′ 12.″79				1560			15.75			16.54												
	4 23.25	+4 11.65			2556	+4 10.90		26.5	+4 10.92		26.8	+4 10.22											
		+ .06				+ .06			+ .06			+ .06											
	+4′ 10.5	− 5.10			10.0	− 7.40		10.7	− 8.30		10.3	− 8.60											
	11.5	+4 6.61			~~10.1~~ 11.0	+4 3.56		11.7	+4 2.68		11.3	+4 1.68											
		4′ 19.″4				19.2			18.4			18.2												

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Aug. 22 | Aug. 25 | Aug. 26 | Aug. 27

Aug. 22			Aug. 25			Aug. 26			Aug. 27		
36 40.8	36 51.46	37 7.30	37 27.2	—	37 13.40	37 42.8	—	—	37 29.6	37 —	37 19.57
46.7	54.10	10.33	29.4	—	17.33	45.6	—	—	32.0	—	22.58
48.3	56.90	13.10	33.0	—	20.32	47.5	—	—	34.7	—	25.72
50.8	59.72	15.85	35.7	—	23.37	51.1	—	—	36.7	9.21 12.18	28.71
54.3	2.83	19.05	39.4	—	26.50	53.0	—	—	39.7	.24 15.18	31.60
	36.73	23.63		3.32	30.80		38 6.24	—		8.61	36.50
	52.22	26.80		6.40	33.72		9.05	—		11.62	39.05
	2.05	29.50		9.42	36.79		12.05	—		14.70	42.00
	5.10	32.50		P2.40	39.64		15.27	—		17.56	45.00
	8.36	35.67		15.36	42.62		18.00	—		20.56	47.97
	57.00	40.05		—	47.29		—	—		9.22	52.43
	13.15	43.10		20.58 36.95	50.00		—	—		25.64	53.40
	29.56	46.00		36.72 .72	53.10		—	—		42.01	58.41
	46.05	49.13		53.10 .73	56.10		—	—		58.37	1.32
	2.29	52.10		9.38 .66	59.00		12.23	—		14.61	4.27
36 48.18	148.05		37 32.60			37 48.00			37 34.54	29 19.85	
		37 29.610			37 36.765			37 39.516			37 41.978
		4.80			3.922			3.90			3.87
		1 25.61			1 32.84			1 35.61			1 38.10
		1 25.85			1 33.08			1 35.85			1 38.34
		1 25.88			1 33.11			1 35.88			1 38.37
		−1 24.22			−1 31.51			−1 34.33			−1 36.94
		− 1.68			− 1.53			− 1.47			− 1.46
		− 2.41			− 2.33			− 2.31			− 2.28
		−1 28.21			−1 35.37			−1 38.11			−1 40.67
		1.40			1.39			1.40			1.30
+ 41.43			+ 4.16			− 8.49			+ 7.43		
1.61731			0.61909			0.92891n			0.87099		
1.56459n			0.56637n			0.87619			0.81827n		
20 2			20 2			20 2			20 2		
59.3 +.16			26.4 +.54			15.8 +.39			31.9 +.51		
1.8 +.27			30.2 +.22			18.2 +.82			33.8 +.21		
22.3 −.22			50.2 −.54			38.0 −.28			54.5 −.32		
17.2 +.36			45.3 +.33			32.4 +.47			49.5 +.28		
10.80 57			38.30 55			26.90 90			43.20 68		
23 10.15			22 38.02			22 26.10			22 42.42		
− 36.69			− 3.68			7.52			− 6.58		
22 33.46			22 34.34			22 33.62			22 35.84		
10 1489			1401			1473			1251		
			1144								
− 355			− 960			− 961			− 1252		
0.56645			0.55604 0.55856			0.56039			0.55748		
+ 3.68			+ 3.682			+ 3.63			+ 3.61		
− .47			− .01			− 03			− .021		
− .10			− .10			− .10			− .11		
− .14			− .14			− .22			− .17		
+ 2.97			+ 3.37			+ 3.28			+ 3.31		
17.86			17.38			18.01			15.82		
27.1	+4 10.03		27.4	+4 10.49		27.5	+4 10.93		27.6	+4 11.13	
	+ .06			+ .06			+ .06			+ .06	
+4 9.2	− 8.90		10.0	− 9.20		9.5	− 9.30		11.8	− 9.40	
10.2	+4 1.19		11.0	+4 1.35		10.5	+4 1.69		12.8	+4 1.79	
	19.0			18.7			19.7			17.6	

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γ Draconis

17^h 53^m 47^s
+51° 30′ 13″
−9 7 25
1878

α_0	46.457^s	
Corr. α	−.061 / −.042	
$\frac{d\alpha}{dt}$		
δ_0	13.″16	
Corr. δ	+.51	
$\frac{d\delta}{dt}$		
log sin δ	9.89356	
" cos δ	9.79412	
" 15 cos δ tan i	9.90143n (019) / ~~9.89914n~~	~~to July 31~~ ~~Sept. 2–17~~
tan δ	+ 1.26	
sin z	− .16	
log R₁ / " R₂	1.56193 / 1.26126	
R₁	36.47^s	
R₂	18.25	
I	3.32	

July 15 | July 16 | July 22 | July 23

h	m s	m s	m s	m s		m s				m s	m s	
17	53 16.0	53 −	53 24.00	53 33.2	53 −	53 25.70	51? 52.6	51 56.10	52 14.30	53 6.6	53 23.20	41.53
	19.7	−	27.33	35.0	−	29.22	55.2	59.50	17.64	9.7	26.45	44.72
	23.3	12.52 12.52	30.57	38.2	−	32.70	58.2	2.84	20.85	12.5	29.72	48.00
	25.7	.41 15.73	34.05	40.7	−	35.70	1.0	6.00	24.24	15.0	33.18	51.40
	28.7	.56 19.20	37.40	43.0	−	39.00	5.5	9.23	27.72	18.3	36.48	54.80
	54 40.2	18.72	42.00	54 41.0	20.63	44.50				54 25.1	36.00	59.68
	42.8	22.10	45.53	43.6	23.77	47.40				28.5	39.35	3.00
	45.7	25.27	48.78	46.1	27.00	50.62				30.6	42.70	6.30
	49.4	28.78	52.26	49.3	30.45	54.00				33.1	46.00	9.61
	51.5	32.00	55.51	53.0	33.70	57.47				36.7	49.30	13.00
		12.50	0.43		32.46 50.71	2.20	2.74 2.74				20.81	18.00
		30.67	3.83		50.70 .70	5.70	20.95 .70				48.09	21.10
		48.82	7.00		8.96 .71	8.87					6.32	24.50
		7.14	10.60		27.11 .64	12.38	wrong star				24.49	27.86
		25.37	13.84			15.66					42.67	31.00
	53 22.68	24450		53 38.02			51 58.50			53 12.42	3138	
	54 45.92		53 48.900	54 46.60		53 50.690			52 2.720	54 30.80		54 6.276
			53 49.575			49.563			53 49.484			49.470
			− 0.68			+ 1.13			× + 13.24			+ 16.81
			− 0.62			+ 1.19			+ 13.30			+ 16.87
			− 0.64			+ 1.17			+ 13.28			+ 16.85
			+ 2.66			+ 0.68			−			− 14.93
			− 2.06			− 1.86						− 1.90
			− 3.12			− 3.11						− 3.01
			− 2.52			− 4.29						− 19.84
			m s 53 46.38			46.40						46.44

	July 15		July 16		July 22	July 23	
	$+26.22^s$	−57.02	+12.67	−55.91		+53.86	−24.52
	1.41863	1.75603n	1.10278	1.74749n		1.73127	1.38952n
	1.32006n	1.65746	1.00421n	1.64892		1.63270n	1.29095
	1882	622	297	768		146	8971
	55 2	55 0	55 1	55 0	55 1	55 2	55 1
E	3.″2 +.09	55.″8 +.13	52.9 +.10	56.9 +.13	31.9 +.49	23.0 +.51	21.1 +.50
F	5.1 +.33	57.6 +.21	54.2 +.39	58.8 +.19	34.2	24.9 +.25	22.9 +.21
G	25.9 −.06	17.4 −.42	14.8 −.25	18.7 −.40	54.1	45.6 −.54	43.7 −.51
H	20.6 +.46	13.0 +.72	11.2 +.49	15.1 +.70	49.0	40.6 +.38	38.9 +.55
	14.55 .82	6.6 .64 6.60	3.85 .73	7.8 .62 7.80	43.00	34.30 .60	32.40 .75
	57 13.70	56 5.95	57 3.28	56 7.38	56 42.30	57 33.52	56 31.65
	−20.90	45.44	−10.10	44.56		−42.92	19.54
	56 52.80 +.06	51.39 −.13	56 53.18 +.03	51.94 −.13		56 50.60 +.12	51.19 −.05
+51°	25 55.″55	56.″96	25 55.17	56.41		25 57.75	57.16
	55.49	57.09	55.14	56.54		57.63	57.21
−9°	7′ 18″						
	0.9659						
	− 30		− 73			− 106	
	0.9629		0.9586			0.9553	
	+ 9.″18	+ 9.″18	+ 9.09	+ 9.09		+ 9.02	+ 9.02
	− .18	− .86	− .04	− .84		− .78	− .16
	− .11	− .06	− .15	− .07		− .15	− .09
	− .20	− .16	− .18	− .16		− .15	− .19
	+ 8.69	+ 8.10	+ 8.75	8.02		+ 7.94	+ 8.58
	26 4.18	5.19	3.89	4.56		5.57	5.79
	26 4.68		4.22			5.68	
	30 14.8	+4 11.45	15.1	+4 12.14		17.2	+4 12.21
		+ .15		+ .16			+ .16
	+4 10.1	− 1.60	10.9	− 1.90		11.4	− 3.90
	10.6	+4 10.00	11.4	+4 10.40		11.9	+4 8.47
		30 14.7		14.6			14.2

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	α		δ	
	m s		′ ″	
June 29	53 49.67		30 9.9	16
July 4	.66	1 3	11.5	15
9	.63	4	13.0	15
14	.59	6	14.5	14
19	49.53	7	15.9	14
24	.46	8	17.3	13
29	.38	9	18.6	12
Aug 3	.29	11	19.8	11
8	49.18	12	20.9	10
13	.06		21.9	

July 24			July 28			July 31			Aug. 12		
53 12.9	53 25.47	43.53	53 26.7	53 33.68	–	53 26.0	53 40.20	58.23	53 57.0	54 7.05	54 25.20
16.9	28.61	46.75	30.0	40.32 37.10	–	29.3	43.36	1.60	59.7	10.33	28.46
20.5	32.00	50.00	32.5	.42 40.00	–	35.3	46.76	5.26	2.3	13.46	31.78
23.3	35.36	53.52	35.6	.00 —	–	38.8	49.73	8.50	4.7	16.73	35.00
26.3	38.61	56.85	38.5	.61 47.25	–	41.3	53.50	11.72	8.0	20.33	38.50
54 49.0	38.10	1.70	55 9.0	53.21 46.57	–	55 10.3	52.65	16.46		20.00	43.37
51.9	41.63	5.00	11.2	.32 50.00	–	13.0	56.00	20.00		23.33	46.73
54.2	45.00	8.30	14.3	—	–	16.9	59.60	23.34		26.57	50.00
56.3	48.38	11.74	16.5	—	–	19.8	2.66	26.52		29.82	53.33
58.5	51.57	15.00	20.1	.16 59.80	–	23.1	6.23	29.57		33.23	56.67
	32.01	20.00		40.34 16.81	28.33		46.71	34.65		13.58	1.70
	50.13	23.43		—	31.67		5.06	38.08		31.79	5.00
	8.35	26.66		—	34.72		23.18	44.60		50.02	8.36
	26.70	30.00		34.94 .69	38.30		41.29	47.90		8.33	11.70
	44.94	33.40		53.23 .76	41.67		59.43	8		26.59	14.88
53 19.98	42.13		53 32.66			53 34.14	11.567		54 2.34	25.031	
54 53.98		54 8.426	55 14.22		54 16.787	55 16.62		54 23.134			54 50.062
		49.456			49.392			49.34			49.08
		+ 18.97			+ 27.36			+ 33.79			+ 1 0.98
		+ 19.03			+ 27.42			+ 33.85			+ 1 1.04
		+ 19.01			+ 27.40			+ 33.83			+ 1 1.02
		– 17.05			– 25.43			– 31.75			– 59.13
		– 1.92			– 2.00			– 1.99			– 1.95
		– 3.00			– 2.93			– 2.88			– 2.62
		– 21.97			– 30.36			– 36.62			– 1 3.70
		46.46			46.39			46.51			46.36

July 24		July 28		July 31		Aug. 12	
+ 48.45	– 45.55	+ 44.09	– 57.47	+ 48.99	– 53.49	+ 47.72	
1.68529	1.65849n	1.64434	1.75944n	1.69011	1.72827n	1.67870	
1.58672n	1.55992	1.54577n	1.66087	1.59030n	1.62846	1.57889n	
548	868	453	5963				
55 2	55 1	55 2	55 0	55 2	55 0	55 2	
19.8 + .48	5.9 + .19	15.1 + .37	53.7 + .13	16.9 + .41	64.5 + .13	13.1 + .32	
20.2 + .30	5.8 + .23	16.0 + .33	54.7 + .26	19.7 + .30	57.7 + .21	13.4 + .34	
40.7 – .40	26.6 – .10	57.3 – .24	15.9 – .40	39.1 – .37	17.2 – .42	34.7 – .10	
34.9 + .45	21.9 + .65	30.9 + .48	10.8 + .72	34.8 + .45	13.0 + .72	30.2 + .48	
30.25 83	97 16.25	26.20 94	71 4.80	28.00 79	64 5.85	104 23.90	
57 28.90	56 15.05	57 24.82	56 3.78	57 27.62	56 5.66	57 22.85	
– 38.61	36.30	– 35.14	45.80	– 38.93	42.51	– 37.92	
56 50.29 +.11	51.35 –.10	56 49.68 +.10	49.58 –.13	56 48.69	56 48.11	56 44.93	
25 58.06	57.00	25 58.67	58.77	25 59.36	0.24	3.42	
57.95	57.10	58.57	58.90	6			
				–9 07 22			
				0.96600			
– 140		– 119		– 432		– 1475	
0.9519		0.9540		0.96168		0.95125	
+ 8.95	+ 8.95	+ 9.00	+ 9.00	+ 9.15		+ 8.94	
– .61	– .55	– .52	– .87	– .64	– .76	– .61	
– .25	– .18	– .13	– .16	– .10	– .04	– .07	
– .21	– .24	– .24	– .18	– .20	– .16	– .26	
+ 7.98	+ 8.08	+ 8.12	+ 7.89	+ 8.21	+ 8.19	+ 8.00	
5.93	5.18	6.69	6.79	7.87	8.43		
5.56		6.74		8.15		11.42	
17.4	+ 4 12.39	18.4	+ 4 12.46	19.1	+ 4 11.65	21.7	+ 4 10.90
	+ .16		+ .16		+ .16		+ .16
+ 4 11.8	– 4.20	11.7	– 5.20	10.9	– 5.90	10.3	– 8.50
12.3	+ 4 8.35	12.2	+ 4 7.42	11.4	+ 4 5.91	10.8	+ 4 2.56
	13.9		14.2		14.1		14.0

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	α	δ
Aug 8	53m 49.18	12 30′ 20.9″
13	49.06	13 21.9
18	48.93	14 22.8
23	.79	15 23.6
28	48.64	16 24.2
Sept 2	.48	16 24.8
7	.32	17 25.2
12	48.15	17 25.5
17	47.98	25.7

1878

	Aug. 18			Aug. 22			Aug. 25			Aug. 29		
	h m s	m s	m s									
	17 54 15.1	54 21.57	54 39.90	54 15.7	54 31.74	54 49.93	17 32.8	54 34.10	54 57.20	54 40.4	54 49.49	55 7.72
	18.2	24.90	43.22	20.0	34.81	53.27	35.7	42.27	041	42.7	53.00	10.91
	20.5	28.22	46.48	23.8	38.32	56.57	38.2	45.37	3.82	45.0	56.13	14.44
	23.0	31.50	49.72	27.2	41.63	59.91	41.6	48.90	7.15	48.3	59.45	17.60
	27.0	3482	53.22	28.8	45.31	3.00	44.4	52.30	10.45	51.6	2.68	21.00
		34.68	4.76 58.12		44.77	8.71		—	15.38		2.34	26.00
		37.90	.72 1.40		47.84	12.00		—	18.67		5.66	29.30
		41.10	.80 4.80		51.18	14.84		—	22.00		8.10	32.47
		4440	.68 8.80		54.39	18.27		—	25.32		12.33	35.82
		47.72	—		58.00	21.72		—	28.85		16.35	39.33
		28.20	16.23		38.36	26.31	45.63	22.10 —		56.15		44.12
		46.67	19.52		56.52	29.82	3.81	.06 —		14.33		47.49
		4.74	22.92		15.11	33.00	22.04	.04 —		32.58		50.77
		22.93	26.30		33.07	36.43	—	—		50.75		54.05
		41.16	29.68		51.24	39.78	—	—		9.00		57.30
	54 20.76	2354		54 23.10	74.30		54 38.54			54 45.60	162.81	
			55 4.708			55 14.860			55 22.067			55 32.562
			53 48.92			48.81			48.723			48.60
			+ 1 15.79			1 26.05			1 33.34			1 43.96
			+ 1 15.85			1 26.11			1 33.40			1 44.02
			+1 15.83			1 26.09			1 33.38			1 44.00
			−1 14.10			−1 24.30			−1 31.57			−1 42.18
			− 1.76			− 1.91			− 1.86			− 1.89
			− 2.46			− 2.35			− 2.27			− 2.14
			−1 18.32			−1 28.56			−1 35.70			−1 46.21
			m s									
			53 46.39			46.30			46.37			46.35
	s											
	+4395			+5176			+4353			+4696		
	1.64296			1.71399			1.68879			1.67173		
	1.54315$_2$			1.61418$_2$			1.53898$_2$			1.57192$_2$		
	− −			— —			55 2	55 2		55 2		
6	9.4 +.23			13.7 +.34			5.9 +.15	9.4		9.4 +.23		
7	10.1 +.34			14.8 +.33			8.2 +.34	9.3		9.3 +.35		
9	31.8 +.01			35.7 −.14			28.1 00	30.1		30.1 +.04		
11	26.0 +.47			29.9 +.48			23.8 +.47	25.4		25.4 +.48		
	20.60 105			24.70 101			17.00 96			19.75 110		
	[57] 19.32			[57] 23.52			57 16.50			57 18.55		
	34.93			− 41.13			− 34.59			− 37.32		
	56 44.39			56 42.39			56 41.91			56 41.23		
+51°	1′ 26″ 3.96			5.96			6.44			7.12		
	−1512			−311			−1088			−862		
	0.95088			0.96289			0.95512			0.95738		
	+8.93			+9.18			+9.02			+9.06		
	− .51			− .72			− .50			− .58		
	− .07			− .07			− .09			− .12		
	− .26			− .25			− .24			− .28		
	+ 8.09			+ 8.14			+ 8.19			+ 8.08		
	26′ 12.05″			14.10			14.63			15.20		
	30 22.8	+4′ 10.92″		28.48	+4 10.03		23.87	+4 10.44		24.3	+4 10.47	
	+ .16	+ .16		+ .16			+ .16			+ .16		
	+4′ 10.8	− 9.60		9.4	− 10.30		9.2	− 10.70		9.1	− 11.10	
	11.3	+4 1.48		9.9	+3 59.89		9.7	+3 59.90		9.6	+3 59.53	
		3′ 13.56″			14.0			14.6			14.7	

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Sept. 12

Sept. 13

Sept. 14

Sept. 15

rej.

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o Herculis

$18^h\ 2^m\ 47^s$

$+28^\circ\ 44'\ 48''$

+13 38 0

1878

July 23

$d\alpha$ 47.s002

corr. $d\alpha$ +.018 +.038

$\frac{d\alpha}{dt}$

δ_c 48.″34

corr. δ +.14

$\frac{d\delta}{dt}$

July 24

$\log \sin \delta$ 9.68208

" cos δ 9.94287

" 15 cos δ tan 0.05048n ~~0.04789n~~

tan δ +.55

sin +.23

Aug. 25

Sept. 2 17

$\log R_1$ 1.41318

" R_2 1.11251

~~R_3~~

R_4 25.89

R_2 12.96

I 2.35

Aug. 27

h	m	s	m	s	m	s														
18	3	3.0	2	–	2	–	2	27.9	2	37.60	2	50.47	–	3	51.70	4	4.63	3	48.4	3	57.18	4	10.00
		3.1		–		–		30.6		40.00		52.83	–		54.18		6.90		50.1		59.42		12.33
		7.1		–	53.10	53.10		32.7		42.32		53.32	–		56.50		9.33		52.4		1.80		14.64
		8.7		–	.15	55.50		34.8		44.67		57.53	–		58.43		11.68		54.6		4.23		17.10
		11.2		–	.10	57.80		36.4		46.90		0.00	–		1.18		14.10		56.8		6.42		19.40
				27.28		1.43				29.40		3.50			–		17.62				4.83		23.50
				29.64		3.63				31.77		5.78			–		20.00				51.16		25.33
				31.87		6.05				34.10		8.10			–		22.30				53.58		27.57
				34.33		8.43				36.43		10.57			–		24.70				55.90		30.00
				36.65		10.78				38.90		12.88			–		27.10				58.30		32.30
												16.43											
						14.26				42.30		1643		56.46	22.35		30.60		1.81				35.86
				53.12	6.08	16.68				55.23		18.82		9.33	.29		33.83		14.69				38.30
				6.06	.06	19.00				8.17		21.10		22.34	.34		35.36		27.64				40.80
				19.02	.06	21.40				21.16		23.56		35.29	.33		37.68		40.60				43.50
				31.96	.07	23.78				34.12		25.90					40.00		53.55				45.36
	3	7.02					2	32.48	4.98									3	52.46	13.29			
					3	6.068					3	8.196				4	22.328					4	27.658
					2	50.273						50.268					49.88						49.84
						+15.80						+17.93				+1	32.45					1	37.82
						+15.78						+17.91				+1	32.43					1	37.80
						+15.76						+17.89				+1	32.41					1	37.78
						– 14.94						– 17.07				–1	31.60					–1	37.01
						– .83						– .84				–	.81					–	.77
						– 3.27						– 3.27				–	2.88					–	2.84
						– 19.04						– 21.18				–1	35.29					–1	40.62
					m	s																	
					2	47.03						47.02					47.04						47.04
	s																						
	–0.95						+35.72										+35.20						
	9.97772n						1.55291										1.54654						
	0.02790						1.60309n										1.59548n						
	666						185																
	40′	1′					40	2					Not read.				40	2					
ε	43.″8	+.26					25.5	+.54									16.4	+.39					
Φ	47.1	+.42					27.8	+.23									20.2	+.30					
ζ	5.5	+.11					46.9	–.57									39.3	–.34					
η	2.1	+.36					43.1	+.35									34.7	+.45					
	54.65	11.5					36.20	55									27.85	80					
	41	54.62					42	35.82									42	27.65					
		1.07						–40.10									–	39.40					
	41	55.69	–.01				41	55.72	+.12								41	48.25					
+28°	40′	52.66					40	52.63									41	0.10					
		52.67						52.51															
+13°	37′	45″														+13	37	38					
	1.14490																1.14490						
	–102						– 138										– 1169						
	1.13488						1.13312										1.13321						
	–13.64						–13.53										–13.59						
	00																						
	– .11						– .29										– .28						
	– .29						– .16										– .10						
							– .14										– .20						
	–14.04						–14.26.12										–14.17						
	40′	38.″63	1′	11″				38.39									45.93						
	44	50.5	+4	12.21				50.8	+4	12.39							56.5	+4	11.13				
			–	.23					–	.23								–	.23				
	+4′	11.9	–	2.20				12.4	–	2.50							10.6	–	8.20				
		12.0	+4	9.78				12.5	+4	9.66							10.7	+4	2.70				
			44′	48.4						48.0									48.6				

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α			δ		α		δ				
m s			′ ″		m s		′ ″				
July 19	2 50.29	2	44 49.6	11	Aug. 28	2 49.83	9	44 56.6	5		
24	.27	4	50.7	11	Sept. 2	.74	10	57.1	4		
29	.23	5	51.8	10	7	.64	10	57.5	3		
Aug. 3	.18	5	52.8	10	12	.54	11	57.8	3		
8	50.13	6	53.8	8	17	49.43	11	58.1	1		
13	.07	7	54.6	8	22	.32	11	58.2	0		
18	50.00	8	55.4	6	27	.21	11	58.2	1		
23	49.92	8	56.0	6	Oct 2	.10	11	58.1	2		
28	49.83	9	56.6		7	49.00	10	57.9			
Aug. 29			Sept. 10			Sept. 12				Sept. 14	
3 486			4 241	4 32.00	4482	4 24.3	4 36.75	4968	4 33.0	4 42.05	55.10
50.7			26.3	34.27	47.10	26.5	39.16	52.00	34.8	44.50	57.60
52.8			28.6	36.40	49.51	29.5	41.46	54.36	37.5	46.79	59.66
54.9			30.7	39.00	51.92	31.5	43.81	56.75	39.3	49.18	2.00
56.9			32.4	41.27	54.26	33.4	46.05	59.18	41.3	51.60	4.43
	41.12	15.10		23.72	57.82		28.50	2.64		33.85	7.95
	43.50	17.50		26.00	0.18		30.85	5.00		36.30	10.36
	2 45.97	2 19.83		28.33	2.43		33.15	7.36		38.60	12.75
	48.22	22.24		30.67	4.78		35.56	9.60		41.00	15.00
	50.50	24.64		33.00	7.28		37.86	12.00		43.32	17.48
	—	28.20		36.63	10.72		41.45	15.38		46.82	20.92
	19.86	2 30.52		49.52	13.18		54.39	18.00		59.76	23.32
	32.88	33.00		2.40	15.48		7.32	20.36		12.71	25.72
	45.86	35.20		15.52	18.00		20.31	22.63		25.68	28.00
	—	37.48		28.34	20.24		33.18	25.00		38.61	30.42
3 50.78			4 28.40	1251		4 29.04	3665		4 37.18	6358	
		4 32.867			5 2502			5 7,330			5 12,714
		49.81			49.575			49.54			2 49.498
		1 43.06			2 12.93			2 17.80			+143.22
		1 43.04			2 12.91			2 17.78			+143.20
		1 4302			2 12.89			2 17.76			143.19
		−1 42.20			−2 12.07			−2 17.03			−2 22.44
		− .82			− .78			− .75			− .77
		− 2.81			− 2.57			− 2.53			− 1.49
		−1 45.83			−2 15.42			−2 20.31			−2 25.70
		47.04			47.08			47.02			47.02
+40.04			+34.08		+38.29			+35.54			
1.60304			1.53250		1.58309			1.55072			
1.65198m			1.58144m		1.63203m			1.59861m			
								966			
40 2			40 2		40 2			40 2			
22.3 +.50			13.2 +.33		16.3 +.40			14.3 +.36			
24.7 +.25			17.3 +.32		20.3 +.30			16.9 +.32			
44.0 +.57			36.7 −.20		41.4 −.42			38.5 −.30			
40.0 +.39			29.8 +.48		34.4 +.46			29.8 +.48			
33.15 63			2495 93		28.85 74			2640 +.86			
42 32.75			42 24.25		42 28.10			42 24.88			
− 44.87			− 38.15		− 42.86			− 39.68			
41 47.88			41 46.10		41 45.24			41 45.20	−.10		
41 0.47			2.25		3.11			41 3.15			
									3.25		
								13 37 36			
−.847			−.765		−.1355			1.1449			
1.13643			1.13725		1.13136			−.094			
−13.69			−13.72		−13.53			1.1355			
− .37			− .27		− .33			− 13.66			
− .13			− .24		− .25			− .29			
− .16			− .23		− .18			− .22 24			
−14.35			−14.46		−14.29			− .22			
								−14.3941			
								40 48.76			
46.2			47.9		48.2			84			
56.7	+4 10.47		57.7	+4 10.82	57.8	+4 9.49		40 48.76 84	+4 9.90		
	− .23			− .20		− .20		44 57.93	− .19		
+4 10.6	− 8.40		9.9	− 9.440	9.0	− 9.50			− 9.60		
10.7	+4 1.84		10.0	+4 1.22	9.1	+3 59.79		4 9.21	+4 0.11		
								9.2			
	48.0			49.0		48.6			49.3		

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Sept. 15

h	m	s	m	s	m	s
18	4	39.3	4	45.07		57.92
		41.0		47.38		0.16
		43.1		49.70		2.53
		45.5		52.00		5.00
		47.7		54.32		7.22
				36.70		10.80
				39.10		13.22
				41.42		15.57
				43.78		17.83
				46.20		20.20
			49.69			23.80
			2.57			26.00
			15.52			28.48
			28.48			30.88
			41.44			33.25

4 43.32 7770

5 15.540
2 49.469
+146.07
+146.05
+146.03

−2 25.30
− .76
− 2.47
−2 28.53

m s
2 47.01

+32.22

1.50813
1.55602m
707
40 2

Eight
10".8 +.26
16.1 +.33
35.4 −.13
28.1 +.47
23.10 +.93

42 22.60
− 35.98
41 46.62 −.08

+28° 41′ 1".73
1.81

+13° 37′ 37″
1.1449
− 026
1.1423

− 13.98
− .23
− .22 24
− .23
−14.66 58

28° 40′ 47".07 23
40′ 47".07 23 +4′ 10".45
44 58.0 − .19
″ − 9.70
+4 10.98 +4 0.56
10.9
44′ 47".8

Sept. 16

4	42.7	4 47.73	0.50	
	45.6	49.88	2.78	
	48.0	52.20	5.15	
	50.0	54.73	7.50	
	51.9	57.00	9.87	
		39.32	13.30	
		41.57	15.70	
		43.96	17.90	
		46.48	20.40	
		48.85	22.90	
		52.31	26.32	
		5.16	28.60	
		18.05	30.85	
		30.94	33.16	
		44.04	35.78	

4 47.64 9050

5 18.100
2 49.447
+148.65
+148.63
+14861

−2 27.87
− .73
− 2.44
−2 31.04

47.06

+30.46

1.48873
1.53162m
267
40 2

9.1 +.22
12.9 +.34
31.6 +.02
25.2 +.48
20.35 +1.06

42 19.70
− 34.01
41 45.69 −.08

41 2.66
2.74

17
+ 018
1.1467

− 14.02
− .22
− .21 23
− .26
−14.71 73

40 47.95
48.01

40 47.95 48.01 +4 9.84
44 58.05 − .18
″ − 9.70
4 10.10 +3 59.96
10.01
48.0

Sept. 18

4	39.6	4 52.33	5 5.20
	41.5	54.66	7.56
	43.6	57.00	9.90
	45.7	59.38	12.30
	48.0	1.70	14.65
5	5.20	4.30	18.05
	5.40	4.636	20.54
	5.54	4.875	23.00
	5.71	5.125	25.22
	5.91	5.356	27.65
		5.701	31.10
		9.98	33.45
		22.89	35.85
		(48.78)	38.20
		35.84	40.60

4 43.68 11442

5 55.58

5 22.884
49.40
+2 33.49
+2 33.47
+2 33.45

−2 32.75
− .41
− 2.40
−2 35.86

47.03

+39.21 − 3269

1.59340 1.51441m
1.64234m 1.56335

40 2 40 0

19.5 +.47 59.6 +.13
23.5 +.26 3.2 +.19
43.8 −.50 23.0 −.28
34.9 +.45 17.0 +.68
31.65 +.68 +.72 11.30

42 30.42 41 10.70
− 43.89 36.59
41 46.53 41 47.29

41 1.82 1.06

− 1597
1.12893

− 13.46
− .35 − .25
− .25 − .12
− .17 − .18
− 14.23 − 1401

45.759 45.705

40 57.32 +4 10.93
58.1 − .18
″ − 9.80
10.8 +4 0.95
10.9
48.3

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η Serpentis

18^h 15^m 0^s

$-2°$ 55′ 44″

+45 18 32

1878

α_0	59.794	
Corr. α	+ .045	+ .036
$\frac{d\alpha}{dt}$		
δ_0	44.23	
Corr. δ	+.01	
$\frac{d\delta}{dt}$		

log sin δ	8.70839 n
" cos δ	9.99943
" 15 cos tan i	0.10550 n
	~~0.10445 n~~ Sept 2-17
tan δ	−.05
sin Z	+.70

log R_1	1.35662
" R_2	1.05595
R_1	22.73
R_2	11.38
I	

Aug. 27 — Sept. 10 — Sept. 12 — Sept. 14

Aug. 27				Sept. 10			Sept. 12				Sept. 14		
18 16 22.2	16 13.57	16 24.98	17 0.3	–	–	16 47.0	16 53.38	17 4.62	16 49.2	16 58.70	10.10
23.7	15.63	27.00	2.1	–	–	49.4	55.41	6.73	51.4	0.72	12.10
25.8	17.69	29.00	3.8	–	–	51.0	57.46	8.82	53.0	2.77	14.21
27.5	19.71	31.00	5.3	–	–	52.9	59.51	10.86	54.6	4.73	16.28
29.2	21.86	33.05	7.4	–	–	54.2	1.54	13.00	56.8	6.80	18.20
	58.90	36.20	17 48.6	33.90	17 11.17	17 56.7	38.72	16.00	17 58.5	44.00	21.38
	1.00	38.36	50.5	36.00	13.20	58.3	40.77	18.10	0.3	46.10	23.52
	3.00	40.40	52.3	37.88	15.27	08	42.90	20.17	2.3	48.10	25.56
	5.10	42.40	54.0	40.00	17.33	16	45.00	22.23	4.6	50.15	27.68
	7.30	44.46	55.7	42.18	19.33	.37	47.05	24.25	6.2	52.40	29.80
	17.69	47.66	—		22.45		57.46	27.46		2.74	30.53
	29.01	49.60	—		24.48		8.81	29.56		14.18	34.70
	40.36	51.73	15.26	15.26	26.50		20.15	31.52		25.59	36.80
	51.73	53.80	26.56	.18	28.60		31.57	33.65		36.76	38.80
	3.06	55.88	37.99	.26	30.77		42.89	35.68		48.15	40.97

16 25.68 20185 — 17 3.78 — 16 50.90 10088 — 16 53.80 12742

Aug. 27	Sept. 10	Sept. 12	Sept. 14
16 40.370	17 52.22	17 15.233	18 0.22	17 20.176	18 2.38	17 25.584
15 3.33		3.13		3.096		15 3.064
+1 37.04		+2 12.10		2 17.08		+142.42
+1 36.99		+2 12.05		2 17.03		+142.33
+1 37.00		+2 12.06		2 17.04		+142.38
16 25.68	17 3.78 / 17 52.22		16 50.90 / 18 0.22			
−1 37.04		−2 12.09		−2 17.06		−2 22.47
+ .07		+ .07		+ .07		+ .07
− 3.54		− 3.34		− 3.30		− 3.27
−1 40.51		−2 15.36		−2 20.29		−2 25.67
14 59.86		59.87		59.89		59.81

Aug. 27	Sept. 10		Sept. 12		Sept. 14	
+ 14.69	+ 11.45	− 36.99	+ 29.28	− 40.04	+ 32.48	− 36.90
1.16702	1.05881	1.56808 n	1.46657	1.60249 n	1.51162	1.56703 n
1.27252 n	1.16431 n	1.67358	1.57207 n	1.70799	1.61607 n (712)	1.67148 (253)
20 1	20 1	20 0	20 2	20 0	20 2	20 0
ε 49.8 +.14	45.0 +.24	41.9 +.30	7.1 +.17	38.6 +.36	10.2 +.25	41.9 +.30
ζ 55.8 +.36	51.2 +.42	47.6 +.30	13.9 +.33	45.8 +.28	17.1 +.32	48.3 +.30
♄ 18.2 −.31	14.4 −.24	10.5 −.19	37.1 −.23	9.0 −.13	42.2 −.45	13.1 −.30
♃ 10.2 +.50	4.9 +.45	2.0 +.62	27.9 +.47	59.9 +.57	28.8 +.48	0.4 +.58
4.00 69	59.70 87	103 56.20	22.10 74	108 53.80	27.20 +.60	~~57.50 +.88~~ 57.50
22 3.50	21 58.88	20 53.50	22 21.50	20 53.32	22 24.58	20 55.92
− 18.73	− 14.60	47.16	− 37.33	51.05	− 41.31	46.93
21 44.77	21 44.28	21 42.66	21 44.17	21 44.37	21 43.27 +.10	21 42.85 +.12
−2° 58′ 56.42″	55.93	54.31	55.82	56.02	58 54.92 / 54.82	58 54.50 / 54.62

Aug. 27	Sept. 10		Sept. 12		Sept. 14		
+45 17 35					45 17 34		
1.76420					1.7642		
− 1130	− 760		− 1336		− 091		
1.75290	1.75660		1.75084		1.7551		
− 56.61	− 57.10		− 56.34		− 56.90		
+ .01	+ .01	+ .01	+ .02	+ .04	+ .03	+ .03	
− .08	− .20	− .09	− .24	− .09	− .22	− .08	
− .17	− .21	− .26	− .18	− .27	− .15	− .22	
~~− 56.35~~ − 56.85	~~− 56.68~~ − 57.50	~~− 56.44~~ − 57.44	~~− 55.90~~ − 56.74	~~− 55.94~~ − 56.66	−57.26 ~~− 56.50~~	~~− 56.57~~ − 57.18	
	53.43	51.75	52.56	52.68	59 51.42 / 52.08	51.07 / 51.80	
59 53.27 +4′ 11.13	52.59	+4 10.82	52.62	+4 9.49	59 51.94 −.70	+4	9.90
55 43.4 − .70	43.0	− .62	43.0	− .60	55 42.96	−	.60
∓ 0.80		∓ 1.20		∓ 1.20		∓	1.30
−4 9.9 +4 9.63	9.6	+4 9.00	9.6	+4 7.69	4 8.3 / 9.0	+4	8.00
55′ 43.6		43.6		44.9			43.9

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	α m s		δ ′ ″	
Aug. 8	15 3.52		55 44.6	
13	.48	4	44.2	4
18	.44	4	43.9	3
23	.38	6	43.6	3
28	3.32	6	43.4	2
Sept. 2	.25	7	43.2	2
7	.18	7	43.1	1
12	.10	8	43.0	1
17	3.02	8	42.9	

Sept. 15

16	54.5	17	1.40	12.80	17	11.3	17	4.18	15.50	16	58.6	17	8.90	20.20
	56.2		3.48	14.73		13.3		6.15	17.52		0.4		11.00	22.35
	57.5		5.55	16.90		14.6		8.20	19.60		2.2		13.00	24.37
	59.4		7.63	18.90		16.4		10.30	21.63		4.3		15.00	26.40
	1.7		9.66	21.00		18.1		12.30	23.70		6.2		17.24	28.43
17	55.5		47.00	24.10	17	59.7		49.42	26.70	18	6.7		54.43	31.63
	57.2		48.90	26.28		2.0		51.70	28.80		8.1		56.44	33.72
	59.3		51.00	28.34		3.6		53.60	30.82		10.4		58.44	35.76
	1.1		53.12	30.38		5.6		55.80	32.94		12.1		0.56	37.80
	2.9		55.30	32.45		7.3		57.85	34.98		14.2		2.60	39.86
		5.54		35.60			8.23		38.10			13.03		43.00
		16.87		37.67			19.59		40.20			24.37		45.00
		28.31		39.70			30.85		42.37			35.75		47.10
		39.75		41.85			42.31		44.45			47.12		48.15
		51.06		43.93			53.67		46.45			58.49		51.33
16	57.86	14.53			17	14.74	15.465			17	2.34	17.876		
17	59.25		17	28.316	18	3.64		17	30.930	18	10.30		17	35.752
			15	3.048				15	3.032					3.00
				+145.26					+147.90				+2	32.75
				+145.26					+147.86				+2	32.70
				+145.22					+147.82				+2	32.71
			−2	25.33				−2	27.89				−2	32.77
			+	.07				+	.07				+	.06
			−	3.25				−	3.24				−	3.21
			−2	28.51				−2	31.06				−2	35.92
				59.80					59.87					59.83
	+30.45	−30.89				+16.19	−32.71				+33.41	−34.55		
	1.48359	1.48982				1.20925	1.51468				1.52388	1.53845		
	1.58804	1.59427				1.31370	1.61913				1.62938	1.64395		
	909	532				475	2018							
	20 2	20 0				20 1	20 0				20 2	20 0		
	7.8 +.19	48.8 +.19				49.7 +.15	46.4 +.23				13.5 +.34	46.6 +.23		
	15.2 +.33	66.9 +.22				56.2 +.36	53.0 +.28				18.9 +.31	52.7 +.28		
	38.2 −.29	19.2 −.40				18.5 −.31	15.9 −.40				42.8 −.47	16.6 −.41		
	27.1 +.47	8.7 +.73				8.4 +.49	5.8 +.71				33.1 +.47	7.1 +.72		
	23.00 +.70	2.0 +.74	2.00			4.10 +.69	+.82	1.15			28.15 65	+60 82	1.60	
	22 22.08	21 3.40				22 3.20	21 0.28				22 27.08	21 0.75		
	−38.73	39.35				−20.59	41.60				− 42.60	44.05		
	21 43.35 −.09	42.75 +.03				21 42.61 −.05	41.88 +.10				21 44.48	21 44.80		
	58 55.00	58 54.80				54.76	53.53				56.13	56.45		
	54.91	54.43				54.21	53.63							
	− 022					+ 020					−1564			
	1.7620					1.7662					1.74856			
	−57.81					−58.37					−56.05			
	+ .02	+ .02				+ .61	+ .03				+ .01	+ .01		
	−✱ .22 24	−✱ .10 11				−✱ .19 21	−✱ .09 10				−✱ .25	−✱ .10		
	−✱ .18	−✱ .18				−✱ .17	−✱ .20				−✱ .16	−✱ .20		
	−57.21 −57.39	−57.51 −57.88				−58.10 −58.74	−58.05 −58.64				−5563	−5574		
	59 52.39	57.91				59 52.26	57.88				−56.45	−56.34		
	53.12	52.51				95	52.24				52.58	52.79		
	59 52.15 82 −.71	+4	10.45			59 52.92 −.68	+4	9.84				+4	10.43	
	55 42.94	=	.58			55 42.92	=	.57			5268	−	.55	
		✱	1.30				✱	1.30			42.9	✱	1.30	
	+4 9.2	+4	8.57			4 9.0	+4	7.97			9.8	+4	9.08	
	9.9		44.2			9.7		44.6					43.6	

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109 Herculis

18^h 18^m 30^s

$+21°$ 42′ 55″

+20 39 53

1878

α₀	29.937	log sin δ	9.56819	log R₁	1.38802
corr. α	+ .001 / + .035	" cos δ	9.96803	" R₂	1.08735
dα/dt		" 15 cos δ tan i	0.07 ~~534~~ 419 n ~~0.07305 n~~	~~to July 31 / Sept 2–17~~	R₁ 24.44
δ₀	55.08				R₂ 12.23
					I 2.23
corr. δ	+ .40	tan δ	+ .40		
dδ/dt		sin z	+ .35		

July 23 / July 28 / subtract 1ˢ / Aug. 12 / Aug. 13

h	m s	m s	m s	m s	m s	m s						
18	18 45.1	–	18 32.24	18 22.6	18 31.78	18 43.73	20 0.1	19 –	19 16.52	19 28.7	19 –	19 19.00
	46.3	–	34.45	25.1	34.00	46.00	1.3	8.65 6.42	18.60	30.6	–	21.22
	48.6	–	36.63	27.0	36.05	48.27	3.8	.81 8.81	20.86	32.6	–	23.43
	50.3	–	39.00	28.7	38.18	50.39	5.9	.77 11.00	23.00	34.3	–	25.71
	52.4	–	41.22	30.6	40.42	52.84	8.3	.52 13.18	25.38	36.9	–	28.00
	19 21.3	8.93	44.58		–	56.00		53.00	28.60		55.32	31.21
	24.7	11.12	46.65		25.00 22.77	58.33		55.18	30.82		57.81	33.33
	26.6	13.33	49.00		24.87 24.87	0.56		57.53	33.20		0.10	35.72
	28.2	15.68	51.18		.87 27.10	2.78		59.70	35.42		2.30	37.90
	29.7	17.88	53.43		.88 29.26	5.00		2.00	37.65		4.48	40.00
		—	56.72		36.09	8.20		8.69	41.00		—	43.39
		36.71 48.94	59.00		48.25	10.46		20.87	43.30		23.47 35.70	45.67
		48.97 .97	1.15		0.53	12.73		33.14	45.40		35.63 .63	47.87
		1.19 .96	3.43		12.71	15.00		45.38	47.39		47.84 .61	50.00
		13.39 .95	5.66		24.889	17.18		57.48	49.80		0.04 .60	52.26

18 48.54 · 18 ~~26.80~~ 25.60 · 24.7 · 18 59 · 20 3.88 · 16556 · 19 32.62

19 26.10 / 18 48.958 / 18 33.332 / + 15.62 / + 15.58	18 59 8.494 / 18 33.313 / + 25.18 / + 26.14	19 33.112 / 33.20 / + 59.91 / + 59.87	19 35.635 / 33.187 / +1 2.45 / +1 2.41
– 14.97 / – .60 / – 3.40 / – 18.97	– 25.48 / – .64 / – 3.38 / – 29.50	– 59.22 / – .62 / – 3.26 / –1 3.10	–1 1.77 / – .62 / – 3.25 / –1 5.64
m s 18 29.99	29.99	30.01	30.00

+0.42	–37.14	+33.69	–30.77	+3.01
9.62325	1.56984 n	1.52750	1.48813 n	0.47857
9.69859 n	1.64518	1.60284 n	1.56223 n	0.55267 n
735	394	160		
40 3	40 2	40 4	40 2	40 3
e 29.1 +.60	44.0 +.31	9.1 +.30	47.3 +.25	27.4 +.61
f 34.7 +.14	49.6 +.42	12.9 +.19	51.7 +.40	31.9 +.15
g 52.4 –.38	6.9 +.05	31.6 +.01	11.7 –.14	51.2 –.42
H 48.5 +.12	5.2 +.37	27.2 +.22	6.8 +.40	48.1 +.13
40.75 .48	55.45 115	20.35 72	59.50 91	39.30 47
43 41.18	42 56.42	44 20.20	42 59.38	43 39.65
– .50	44.18	– 40.07	36.50	– 3.57
43 40.68 +.00	40.60 –.13	43 40.13 +.11	43 35.88	43 36.08
+21° 39 7.67	7.75 / 7.88	39 8.22 / 8.11	39 12.47	12.27

+20° 39 30 · +20 39 26

1.3366		1.33660	
– 96	– 113	– 1391	– 1410
1.3270	1.3253	1.32269	1.32250
– 21.23 / 00 / – .37 22 / – .12 / – 21.57 · – 21.23 / – .26 / – .29 17 / – .29 / – 22.07 21.95	– 21.15 / – .22 / – .33 / – .18 / – 21.90 77	– 21.02 / – .18 / – .09 / – .23 / – 21.52	– 21.01 / – .00 / – .11 / – .12 / – 21.24
38 46.10 · 45.93			
38 46.02	46.34	50.95	51.03
42 57.0 +4 12.21	58.0 +4 12.46	43 0.7 +4 10.90	0.8 +4 11.16
– .36	– .36	– .36	– .36
+4 11.0 – 1.90	11.7 – 2.90	10.4 (9.7) – 5.60	9.8 – 5.70
11.4 +4 9.95	12.1 +4 9.20	10.1 +4 4.94	10.2 +4 5.10
42 56.0	55.5	55.9	56.1

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	α		δ			α		δ	
	m s		′ ″			m s		′ ″	
July 19	18 33.34		42 56.2	10	Aug. 28	18 32.99	8	42 62.7	5
24	.33	1	57.2	10	Sept. 2	.91	9	63.2	4
29	.31	2	58.2	9	7	.82	9	63.6	3
Aug. 3	.28	3	59.1	9	12	.73	9	63.9	3
8	33.24	4	60.0	8	17	32.64	9	64.2	1
13	.19	5	60.8	7	22	.55	10	64.3	1
18	.13	6	61.5	6	27	.45	10	64.4	0
23	33.06	7	62.1	6	Oct. 2	.35	10	64.4	1
28	32.99	7	62.7		7	32.25		64.3	

Sept. 6

20 59.4 — 3.0 — 8.2

— — — — —

— — — — —

— — 35.28 35.28 47.81 .58

20 30.90 33.00 35.28 37.48 39.72 43.53 45.53 47.72 50.20 52.05

21 3.53

20 35.430 32.83 2 2.60 +2 2.56

−2 1.78 — .57 — 2.89 −2 5.24

30.19

− 2810
1.44871n
1.52281

40 2

45.4 +.29
50.4 +.42
9.9 −.07
4.2 +.35
57.65 99
42 57.48
33.33
43 30.81

39 17.54

− 872
1.32788
− 21.28
− .15
− .23
− .25
− 21.91

5563
3.5 +4 9.68
— .32
7.9 — 8.40
+4 8.3 +4 0.96

56.6

Sept. 7

18? 6.5 — 10.2 — 15.1

18? 9.16 11.33 13.64 16.00 18.26

58.00 0.05 2.30 4.53 6.63

13.68 25.61 37.95 50.15 2.30

[20] 18 10.60 18969

21.00 23.42 25.62 28.00 30.00 33.38 35.71 38.00 40.28 42.40 45.72 48.00 50.10 52.34 54.61

[20] 18 37.938 32.816 2 5.12 2 5.08

−2 4.50 — .59 — 2.88 −2 7.97

29.97

+ 2734
1.43680
1.51090n

40 3

51.7 +.23
59.3 +.17
16.4 −.28
11.1 +.23
4.05 35
44 4.62
— 32.43
43 32.19

39 16.196

+ 458
1.34118
− 21.94
− .14
− .33
− .09
− 22.50

5366
3.6 +4 10.85
— .32
9.9 — 8.50
10.3 +4 2.03

55.7

Sept. 8

21 2.60 — 30.9 — 35.2

20 11.79 14.10 16.26 18.33 20.58

0.58 2.67 5.00 7.25 9.37

16.21 28.32 40.47 52.75 4.97

21 30.70 20272

20 23.95 26.10 28.30 30.53 32.74 36.00 38.24 40.47 42.63 45.00 48.43 50.57 52.70 55.00 57.07

20 40.544 32.798 2 7.75 2 7.71

−2 7.10 — .55 — 2.86 −2 10.51

30.03

− 5016
1.70036n
1.77446n

40 2

18.9 +.46
25.7 +.25
44.4 −.52
38.8 +.41
31.65 60
42 31.95
59.49
43 31.44

16.91

+ 214
1.33874
− 21.81
− .47
− .22
− .15
− 22.65

5426
3.7 +4 9.72
— .32
9.4 — 8.60
9.8 +4 0.80

55.1

Sept. 12

20 13.0 15.0 16.5 18.6 20.7

20 21.56 23.76 26.00 28.20 30.45

10.13 12.64 14.85 17.05 19.36

25.99 38.19 50.41 2.62 14.81

20 16.76 25202

33.86 36.00 38.12 40.34 42.62 46.00 48.10 50.46 52.66 54.83 58.22 0.42 2.64 4.73 7.10

20 50.404 32.726 2 17.68 2 17.64

−2 17.06 — .55 — 2.79 −2 20.40

30.00

+ 3364
1.52686
1.60096n

40 3

59.7 +.20
4.4 +.18
24.2 −.13
18.0 +.21
11.95 46
44 11.58
— 39.90
43 31.68

16.67

− 1384 (32)
1.32276 328
− 21.085
− 22
− 42
− .12
− 21.81

5486
3.9 +4 9.49
— .30
9.0 — 8.80
9.4 +4 0.39

55.2

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Sept. 13 | Sept. 14 | Sept. 15 | Sept. 16

rej.

20	19.5	20	26.95		39.00	20	26.4	20	29.70		41.94	20	21.7	20	—		44.35
	21.8		29.10		41.30		28.5		31.82		44.00		24.2		36.83	3.60	46.65
	23.4		31.40		43.59		30.1		34.25		46.22		26.1		.58	36.58	48.92
	25.6		33.56		45.84		32.2		36.40		48.50		28.1		.57	38.80	51.10
	27.3		35.90		48.00		34.8		38.50		50.72		30.1		.54	41.00	53.30
21	30.8		15.72		51.38	21	33.5		18.60		54.00	21	38.3			20.72	56.57
	32.3		18.00		53.52		35.3		20.70		56.25		40.2			23.15	58.78
	34.3		20.10		55.77		36.8		23.00		58.50		42.6			25.50	0.84
	36.0		22.30		58.00		38.4		25.12		0.70		44.0			27.76	3.30
	38.1		24.55		59.26		40.6		27.40		2.88		45.9			30.00	5.60
			31.38		3.60				34.13		6.30				36.63		8.82
			43.55		5.85				46.28		8.48				48.86		11.00
			55.59		8.00				58.47		10.80				1.02		13.20
			8.04		10.38				10.75		12.92				13.25		15.50
			20.13		12.52				22.96		15.25				25.43		17.75
20	23.50	27	872			20	30.40	29	259			20	26.04		589		
21	34.30			20	55.744	21	36.92			20	58.518	21	42.20			21	1.088
				18	32.690					18	32.672					18	32.654
					+ 143.05						+ 145.85						+ 148.38
					+ 143.01						+ 145.81						+ 148.34
					−2 22.48						−2 25.34						−2 27.90
					− .56						− .53						− .53
					− 2.75						− 2.73						− 2.72
					−2 25.79						−2 28.62						−2 31.15
				18	29.95						29.91						29.89
			+ 32.24		− 38.56		+ 28.12		− 38.40				+ 35.00		− 41.16		
			1.50840		1.58614 n		1.24902		1.58433 n				1.54407		1.61448 n		
			1.58145 n		1.65919		1.52207 n		1.65738				1.61712 n		1.68753		
			2.50		6 2 14		3 1/2		8 48				8 17		8 58		
	40 3		40 3		40 2		40 3		40 2				40 4		40 2		
	43.7 +.37		58.3 +.20	363	46.3 +.27		53.6 +.21		34.0 +.48				0.6 +.20		30.1 +.52		
	48.2 +.34		27 +.15		38.8 +.27		59.9 +.16		41.1 +.31				5.5 +.20		35.8 +.22		
	9.5 +.01		22.5 −.20		59.3 +.03		17.8 −.30		59.2 +.03				23.9 −.15		53.8 −.38		
	2.1 +.09		14.1 +.23		51.1 +.26		10.9 +.23		52.7 +.24				18.6 +.21		48.2 +.30		
	56.60 .81		10.40 +.38		+.83		5.20 +.30	46.66	+1.06	46.60			12.25 +.46		+.66	41.95	
	43 55.88		44 9.40		42 46.38		44 5.55		42 46.75				44 12.15		42 41.98		
			−38.15		45.62		−33.27		45.43				−41.41		48.70		
			43 31.25	−.09	32.00 +.11		43 32.28	−.08	32.18 +.11				43 30.74	−.10	30.68 +.12		
			39 17.10		16.35				16.07		16.17				17.61		17.67
				17.19	16.24			16.15		16.06				17.71		17.55	
		20	39 22														
			1.3365														
			−.090				− 022						+ 021				
			1.3275				1.33478						1.3386				
			−21.26				−21.89						−21.81				
			− .19		− .28		− .14		− .28				− .23		− .32		
			− .38 42		− .25 28		− .37 41		− .25 28				− .38 42		− .24 27		
	− .20		− .10		− .21		− .08		− .26				− .12		− .16		
			−21.93 37		− 22.083		− 22.18 23		− 22.38 42				− 22.54 28		− 22.53 6		
			38 55.17		54.35		38 53.89		53.79				38 55.07		55.14		
				2/2	.21			92		64				13		54.99	
			38 54.76	72	+4 9.90		38 53.84	78	+4 10.45				38 55.76	06	+4 9.84		
			42 64.0		− .29			64.1	− .29					64.1	− .28		
					− 8.90				− 9.50						− 9.00		
			+4 9.23		+4 0.71		4 10.3		+4 1.16				4 9.0		+4 0.56		
			9.7				10.7						9.4				
					42 55.4				54.9						55.6		

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Sept. 18

20	26.6	20	37.00		49.26
	28.4		39.23		51.50
	30.3		41.46		53.77
	31.8		43.73		56.00
	34.0		45.96		58.10
21	33.3		25.84		1.60
	35.2		28.10		3.80
	36.8		30.38		6.00
	38.0		32.56		8.10
	40.8		34.77		10.34
			41.48		13.63
			53.73		16.00
			5.97		18.26
			18.18		20.40
			30.33		22.60
20	30.28		29.69		
21	37.02			21	5.938
					32.618
				+2	33.32
				+2	33.28
				−2	32.74
				−	.52
				−	2.68
				−2	35.97
					29.97

+3506 − 3108

1.55218 1.49248

1.62628 1.56658

40	4	40	2
3.6	+.22	43.8	+.31
7.2	+.19	48.8	+.43
26.7	−.03	7.8	+.02
20.7	+.21	2.7	+.30
15.15	59	~~55~~	106 55.80
44	14.55	42	58.78
−	42.29		36.86
43	32.26	43	32.64
~~39~~	1609		1571

−1556

1,321.04

−20.94

−	.24	−	.18
−	.42	−	.29
−	.15	−	.26
−21	.75	−21	.67
	54.34		54.04

38	54.19	+4	10.93
43	4.2	−	.27
		−	9.10
+4	10.0	+4	1.56
	10.4		
			55.8

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α Lyrae

18h 32m 48s

+38° 40′ 16″

+ 3 42 32

1878

July 28

				α_0		$48^s.469$		log ρ sin δ	9.79577			log R_1	1.146354						
				corr. α		−.076		" cos δ	9.89251			log R_2	1.16287						
				$\frac{d\alpha}{dt}$		+.018		" 15 constant	9.99 858 782			R_1	29.″08						
									9.99753	Sept. 2-17		R_2	14.55						
				δ_0		15.″70						I	2.65						
				corr. δ		+.12		tan δ	+.80										
				$\frac{d\delta}{dt}$				sin Z	+.06										
	July 28				Aug. 12				Aug. 13				Aug. 14						
	h m s	m s	m s																
18	32 38.60	32 44.10	38.60	33 11.1	33 17.65	33 32.10	34 12.6	—	—	33 34.1	33 22.48	33 37.00							
	38.0	46.65	1.21	13.2	20.33	34.72	15.2	—	—	36.1	25.16	39.60							
	39.6	49.28	3.86	16.4	22.83	37.23	17.7	—	—	38.7	27.91	42.46							
	41.4	51.88	6.50	19.0	25.50	40.00	20.0	—	—	40.9	30.59	45.00							
	44.5	54.57	9.15	21.4	28.00	42.67	22.3	—	—	44.0	33.27	47.50							
	33 53.3	42.16	13.25		15.89	46.63		18.30	33 49.20		20.78	51.53							
	53.4	44.88	15.73		18.37	49.23		21.00	52.00		23.50	54.25							
	58.0	47.63	18.33		21.00	51.99		23.52	54.62		26.00	57.00							
	00	50.29	21.00		23.71	54.52		26.10	57.18		28.63	59.50							
	1.8	52.82	23.66		26.34	57.31		28.81	59.74		31.42	2.18							
		49.30	27.76		22.86	1.24		—	3.77		27.88	6.29							
		3.86	30.30		37.38	3.82		—	6.38		42.31	9.05							
		18.39	32.84		51.94	6.51		54.55 54.55	9.00		56.89	11.56							
		32.93	35.46		6.47	9.00		9.06 .51	11.63		11.58	14.20							
		47.56	38.27		21.06	11.80		23.55 .47	14.50		26.06	16.78							
	32 39.90	9204		33 16.22	25971		34 17.56			33 38.76	28472								
	33 57.70		33 18.408			33 51.942			33 54.510			33 56.944							
			32 51.656			32 51.49			51.480			51.46							
			+ 26.75			+1 0.45			1 3.03			1 5.48							
			+ 26.77			+1 0.47			1 3.05			1 5.50							
			+ 26.73			+1 0.43			1 3.01			1 5.46							
			− 25.50			− 59.28			−1 1.80			−1 4.26							
			− 1.27			− 1.24			− 1.24			− 1.23							
			− 3.19			− 3.02			− 3.01			− 2.97							
			− 29.96			−1 3.53			−1 6.05			−1 8.46							
			m s																
			32 48.45			48.41			48.46			48.46							
	s	s			s														
	+38.51	−39.29			+ 35.72				− 23.05			+ 18.18							
	1.58557	1.59428m			1.55291				1.36267m			1.25959							
	1.58539m	1.59410			1.55149m				1.36125			1.25817m							
	415	286																	
	45′ 2	45′ 0			45 1				45 0			45 1							
log	2.″9 +.09	45.″0 +.25			54.9 +.09				56.6 +.13			38.9 +.35							
log	5.1 +.33	47.4 +.29			56.4 +.36				59.1 +.19			40.8 +.29							
log	268 −.03	7.3 −.07			17.5 −.30				20.5 −.36			1.3 +.13							
log	21.3 +.46	4.9 +.70	6		14.2 +.49				17.1 +.68			58.2 +.30							
	14.85 .85	11 57.15			6.20 64				8.55 64			50.10 107							
	47 14.02	45 56.15			47 5.575				46 8.32			46 49.80							
	− 38.49	39.27			− 35.60				22.97			− 18.12							
	46 36.53 +.11	46 35.42 −.11			46 30.15				46 31.29			46 31.68							
+ 38°	36′ 12.82	36′ 12.93			18.20				17.06			16.67							
	12.71	13.04																	
+ 3°	42′ 25			+3	42 20														
	0.57188				0.57160														
	− 110				− 1340				− 1365			− 1243							
	0.56078				0.55820				0.55795			0.55917							
	− 3.64	− 3.″64			− 3.62				− 3.61			− 3.62							
	− .40	− .41			− .35				− .14			− .09							
	− .11	− .05			− .06				− .03			− .05							
	− .21	− .29			− .16				− .16			− .27							
	− 4.36	− 4.39			− 4.19				− 3.94			− 4.03							
	36′ 8.35	8.65																	
	36 8.50	″			14.01				13.12			12.64							
	40 21.2	+4 12.46			24.7	+4	10.94		24.9	+4	11.16	25.1	+4	11.29					
	′ ″	− .06			−		.06		−		.06	−		.06					
	+4 12.7	− 5.50			10.7	−	9.00		11.8	−	9.20	12.5	−	9.40					
	12.8	+4 6.90			10.8	+4	1.84		11.9	+4	1.90	12.6	+4	1.83					
		40′ 15.4					15.8				15.0			15.5					

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	m	α s		δ ′ ″	
July 19	32	51.71		40 18.7	14
24		.69	2	20.1	13
29		.65	4	21.4	12
Aug. 3		.61	4	22.6	12
8		51.55	6	23.8	11
13		.48	7	24.9	10
18		.40	8	25.9	9
23		.31	9	26.8	8
28		51.22	9	27.6	

~~Aug. 19~~ 18

Ch. f.

Aug. 20

33	36.1	33	37.70	33	52.28	33	39.9	33	49.72	34	4.31	33	48.1	33	52.45	34	7.01
	38.0		40.34		53.00		41.7		52.34		6.89		50.3		53.10		9.64
	40.8		42.85		53.60		44.0		53.70		[9.82] 8.52		52.0		54.81		12.30
	42.5		45.17		0.13		46.0		57.63		12.20		54.3		0.30		14.90
	45.8		48.23		2.76		48.7		0.27		14.80		56.6		3.00		17.65
			35.74		6.73				45.00		18.80				50.70		21.46
			38.53		9.42				50.97		21.50				53.22		24.25
			41.05		12.10				53.23		24.17				55.67		26.62
			43.72		14.70				55.80		26.77				58.30		29.35
			46.43		17.37				58.50		29.40				1.18		32.05
			42.96		21.87				65.01		33.42				57.73		36.00
			57.55		23.91				9.54		36.00				12.33		38.63
			12.06		26.52				24.13		38.63				26.75		41.30
			26.59		29.30				38.67		41.30				41.50		43.00
			41.09		31.86				53.22		44.00				55.81		46.57
33	40.64	6025				33	44.06	12.057				33	52.26	13.412			
				34	12.050					34	24.114					34	26.824
					51.36						51.27						51.25
				1	20.69					1	32.84					1	35.57
				1	20.71					1	32.86					1	35.59
				1	20.67					1	32.82					1	35.55
				−1	19.53					−1	31.70					−1	34.43
				−	1.13					−	1.18					−	1.13
				−	2.89					−	2.80					−	2.78
				−1	23.55					−1	35.68					−1	38.34
					48.50						48.43						48.48
		+ 31.41				+ 40.05						+ 34.56					
		1.49707				1.60260						1.53845					
		1.47565m				1.60118m						1.53703m					
												15					
45	1	45	1			45	1					45	1				
53.2	+.10	46.3	+.21			55.0	+.09					51.8	+.13				
54.3	+.38	48.7	+.43			0.6	+.29					53.9	+.39				
16.8	−.30	9.9	−.04			19.4	−.30					14.3	−.24				
12.5	+.49	7.1	+.48			16.2	+.47					10.8	+.49				
5.00	67	58.10	108			7.20	55					2.05	77				
47	4.20	46	58.00			47	7.80					47	2.45				
		−	31.31			−	39.92					−	34.44				
		46	26.69			46	27.88					46	28.01				
			21.66				20.41						20.34				
			−1922				−969						−804				
			0.55238				0.56191						0.56356				
			−3.57				−3.65						−3.66				
			− .26				− .43						− .32				
			− .06				− .08						− .08				
−	.19		− .27				− .14						− .19				
			−4.186				−4.30						−4.25				
			17.50				16.17						16.09				
			26.3	+4	10.22		27.2	+4	10.49				27.3	+4	10.93		
			−		.06		−		.06				−		.06		
			8.8	−	10.60		11.0	−	11.50				11.2	−	11.60		
			8.9	+3	59.56		11.1	+3	58.93				11.3	+3	59.27		
					17.1				15.1						15.4		

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Aug. 29 | Sept. 1 | Sept. 6 | Sept. 7

	α	δ	α	δ	α	δ	α	δ
Aug. 28	32m 51.22	40′ 27.6	Oct. 27	32m 49.79		40′ 28.9		
Sept. 2	.12	28.3	Nov. 1					
7	51.01	28.9	Nov. 6	49.59		27.5		
12	50.89	29.5	11	.50		26.6		
17	50.77	29.9	16	49.42		25.7		
22	.65	30.2						
27	.52	30.3						
Oct. 2	.39	30.4						
7	50.26	30.3						

	Aug. 29				Sept. 1						Sept. 6				Sept. 7					
	m	s	m	s	m	s														
18h	34	16.6	34	—	34	14.82	34	(0.0)	34	6.63	34	21.00	34	4.6	34	19.45	34	34.00	32?	4.6
		19.3		—		17.50		3.7		9.21		23.71		—		22.00		36.53		—
		21.8		—		20.00		5.8		11.86		26.28		9.2		24.76		39.15		9.0
		24.0		—		23.00		8.2		14.50		29.00		—		27.37		41.87		—
		24.1		—		25.38		10.3		17.11		31.64		14.8		30.05		44.55		14.0
								12.8												
				58.35		29.43				4.64		34.78				17.42		48.50		
				1.00		32.00				7.30		38.21				20.05		51.23		
				3.72		34.64				10.00		40.83				22.72		54.00		
				6.40		37.24				12.56		43.35				25.36		56.43		
				9.00		40.00				15.30		46.20				28.26		59.20		
			20.14	34.69		43.95				11.86	58.45	50.15				24.73		3.10		
			34.66	.66		46.56				26.33	.36	52.71				39.22		5.73		
			49.23	.68		49.14				40.71	.42	55.—				53.87		8.25		
			3.69	.61		52.00				55.~~37~~41		—				8.34		11.00		
						54.50				89.96		0.72				22.76		13.64		
	34	21.56					34	8.16	20424				34	9.83	26892				[34]	9.20
			34	34.660							34	40.848					34	53.784		
			32	51.20								51.135						51.027		
			+1	43.46							1	49.72					2	2.76		
			+1	43.48							1	49.74					2	2.78		
			+1	43.44							1	49.70					2	2.74		
			−1	42.25							−1	48.65					−2	1.82		
			—	1.20							—	1.15					—	1.14		
			—	2.73							—	2.67					—	2.56		
			−1	46.18							−1	52.47					−2	6.52		
			m	s																
			32	48.48								48.38						48.26		
		+13.10				+32.69						+44.25						+47.45		
		1.11727				1.51441						1.64591						1.67624		
		1.11585m				1.51299m						1.64449m						1.67482m		
		1′ 1																		
		45 1				45 1						45 1						45 1		
		29.0 +.52				48.1 +.18						56.8 +.07						59.2 +.07		
		31.4 +.17				50.2 +.43						59.9 +.29						4.4 +.32		
		51.8 −.48				12.7 −.18						21.7 −.24						23.5 −.18		
		48.3 +.40				8.4 +.49						15.1 +.48						17.2 +.47		
		49.00 ″.61				50.40 .92						59.25 .60						11.35 .68		
		46 40.12				46 59.85						47 8.38						47 11.08		
		— 13.06				— 32.58						— 44.10						— 47.30		
		46 27.06				46 27.27						46 24.28						46 23.78		
		′ ″																		
+38°	36	21.29				21.08						24.07						24.57		
		−.793				−1.943						−.817						+.480		
		0.56367				0.55217						0.56343						0.57640		
		−.366				−.357						−.366						−.377		
		−.04				−.30						−.53						−.60		
		−.08				−.12						−.17						−.18		
		−.15				−.23						−.15						−.17		
		−3.93				−4.22						−4.51						−4.72		
	′	″	′	″																
	36	17.36	+4	10.47		16.86	+4	10.81				19.56	+4	9.68				19.85	+4	10.85
	40	27.8	—	.06		28.2	—	.06				28.8	—	.06				28.9	—	.05
		″	—	12.10			—	12.50					—	13.10					—	13.20
	+4′	10.4	+3	58.31		11.3	+3	58.25				9.2	+3	56.52				9.1	+3	57.60
		10.5				11.4						9.3						9.2		
			40′	15.7				15.1						16.1						17.4

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Sept. 8                                   Sept. 17                                     Nov. 10

34 12.1    34 24.77   39.27   34 39.5   34 48.00    2.20    28.3    40.48   55.00
   —          27.22   42.00      41.6      50.46    5.00    30.5    43.17   57.58
   16.7       29.92   44.58      43.6      53.00    7.62    32.9    45.80    0.33
   —          32.68   47.21      46.7      55.62   10.28    35.0    48.40    3.00
   25.9       35.24   49.77      49.5      58.32   12.85    37.3    51.10    5.58

              23.00   53.82   35 50.3      45.96   16.75            38.50    9.50
              25.47   56.33      52.3      48.68   19.50            41.22   12.18
              28.12   59.00      54.7      51.28   22.13            43.90   14.70
              30.80    1.53      57.0      53.88   24.78            46.50   17.44
              33.50    4.47      59.3      56.56   27.50            49.10   20.12

           29.97       8.47             53.08      31.50    45.79           24.00
           44.57      11.00              7.59      34.00     0.30           26.63
           59.03      13.61             22.13      36.72    14.78           29.35
           13.66      16.28             36.68      39.28    29.32           32.00
           28.18      18.95             51.26      41.90    43.84           34.60

34 18.23   29541          34 44.18   11074              [36] 32.80   7403
                 34 59.082  35 54.72             35 22.148                [37] 14806
                    50.98                        32 50.764                  32 49.584
                  2  8.10                          +151.38                  +4 25.28
                  2  8.12                          +151.40                  +4 25.36
                  2  8.08                          +151.36                  +4 25.27

                 −2  7.13                        −2 30.31                   −4 24.47
                 —   1.10                        —   1.03                   —    .87
                 —   2.51                        —   2.30                   —   1.05
                 −2 10.74                        −2 33.64                   −4 26.39

                    48.34                           48.51                      48.42

+ 40.85              + 37.97    − 32.57          + 42.01
1.61119              1.57944    1.51282 n        1.62335
1.60977 n            1.57697 n  1.51035          1.62193 n
                        802        140
45  1                45  1      45  0            45  2

52.4 +.11            51.4 +.12  40.7 +.33        3.2 +.09
55.3 +.37            54.3 +.38  44.6 +.26        7.3 +.34
17.1 −.30            15.9 −.24   4.0 −.01       19.3 −.30
10.2 +.50             9.5 +.54  59.7 +.56       18.0 +.47
4.75  68             7.365 +.76     +1.14 52.35  11.25  60
47  3.75             45  2.78   45  52.25        47  11.95
  − 40.72             − 37.75       32.39        −   41.87
46  23.03            46 25.03 −.10  24.64 +.07   46  30.08

36 25.32             36 23.32       23.71            18.27
                        23.42       23.64

                   3 42 15
                     0.5715
+244                 − 063                        +753 / +870
0.57904              0.5652                       0.58130  0.57913
− 3.75               − 3.67                       − 3.79
− .45                −  .38      −  .27           − .47
− .18                −  .18 20   −  .08 09        − .29
− .17                −  .19      −  .28           − .15
− 4.55               − 4.42 4    − 4.31           − 4.70
                     36 18.98    19.44 33         36 13.57
                                                  36 13.57
20.77 +4  9.72       36 19.16 +4 10.82            40 26.7  +4 12.98
29.05 −    .05       40 29.92 −    .05                     −    .05
      −  13.30                −  14.20            4 13.1   −  11.00
+4 8.3 +3 56.37      4 10.8   +3 56.57              13.2   +4  1.93
   8.4                 10.9                         13.3
          17.1                   15.7                           15.5
```

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η Draconid

α_0 16h 22m 21s

δ_0 +61° 47′ 27″

Corr. α / $\frac{d\alpha}{dt}$: 20s.652 ; −.157 ; −.008

Corr. δ / $\frac{d\delta}{dt}$: 26″.86 ; −.59

log sin δ 9.94509 ; " cos δ 9.67458 ; " 15 cos δ sin 1 9.78189 (065)

tan δ +1.86 ; sin z +.33

log R_1 1.68147 ; log R_2 1.38080

R_1 48s.03 ; R_2 24.03 ; I 4.37

1878 − 19 24 39

(Eph. 21B)

	June 24		June 25		June 26		July 1	
h	m s	m s	m s					
16	20 20.4	20 43.12	21 7.30	20 44.0	20 45.70	21 9.58	20 45.5	21 12.00	21 18.6	21 37.00
	25.3	47.50	11.70	49.0	50.25	13.90	49.5	16.18	20.6	39.10
	28.8	51.95	16.02	54.9	54.30	18.40	52.8	20.69 20.70	22.6	41.24
	33.0	56.30	20.28	57.8	58.80	22.67	56.8	25.17	24.1	43.25
	36.6	0.72	24.95	0.8	3.03	27.17	0.2	29.40	25.7	45.30
	21 45.8	19.40	31.20	22 54.6	21.50	33.62		35.92	22 15.1	48.43
	51.0	23.70	35.60	0.6	25.90	37.70		40.35	16.9	50.50
	54.0	28.04	40.00	3.3	30.21	42.23	4460	44.35	18.8	52.48
	58.0	32.27	44.60	7.0	34.60	46.60		48.98	20.4	54.59
	1.8	36.62	48.72	9.8	39.00	51.00		53.38	22.7	56.67
		51.92	55.12		54.42	57.60		59.97		59.90
		16.05	59.69		18.34	2.04		4.60		1.58
		40.02	4.10		42.43	6.35	8.54	8.51		4.00
		4.01	8.36		6.36	10.60		12.78		6.05
		28.01	12.80		30.24	15.22	8383	17.44		8.15
	20 28.82	20.01		20 53.30	21.79		20 52.96		21 22.32	
	21 54.12		21 40.002	23 3.06		21 42.388		21 44.610	22 18.78	
			22 24.094			24.075		24.055		
			− 44.09			− 41.76		− 39.44		
			− 43.94			− 41.61		− 39.29		
			− 44.08			− 41.75		− 39.43		
			+ 46.50			+ 44.10		+ 42.07		
			− 2.51			− 2.53		− 2.66		
			− 3.44			− 3.42		− 3.40		
			+ 40.55			+ 38.15		+ 35.96		
			m s							
			22 20.55			20.47		20.57		
	+71.18	−14.12		+49.02	−80.74		+51.65			
	1.85236	1.14983n		1.69037	1.80709n		1.71307			
	1.63425n	0.93172		1.47226n	1.68898		1.49496n			
	301	048		102	774		372			
	40 0	35 4		40 0	35 3		40 0			
ε	27.2 +.49	37.5 +.36		14.7 +.30	56.3 +.20		16.0 +.33			
η	27.3 +.04	37.1 +.03		14.1 +.09	54.9 +.26		15.2 +.09			
ρ	46.1 −.66	54.4 −.38		31.6 −.10	10.9 −.06		33.2 −.15			
H	42.9 +.51	53.2 +.01		28.8 +.49	10.2 +.23		31.6 +.50			
	36.65 38	48.95 02		23.15 78	63 3.60		24.60 77			
	40 35.88	39 46.65		40 22.30	39 3.08		40 24.00			
	−43.08	6.57		−29.67	48.86		−31.26			
	39 52.80 +.12	54.10 −.03		39 52.63 +.09	51.94 −.14		39 52.74 +.09			
+61°	42 55.55	54.25		42 55.72	56.41		42 55.61			
	55.43	54.28		55.63	56.27 55		55.52			
−19°	24 18									
	1.3071									
	−134			−100			−49			
	1.2937			1.2971			1.3022			
	+19.67	+19.67		+19.82	+19.82		+20.05			
	−1.14	−.04		−.54	−1.48		−.60			
	−.04 3	−.34 4		−.02	−.28 0		−.03 2			
	−.10	00		−.20	−.16		−.19			
	+18.39 40	+19.29 39		+19.06	+17.986		+19.284			
	43 13.83	13.67		14.69	14.53					
	43 13.75	+4 9.90		14.61	+4 9.52		14.76	+4 9.65		
	47 240	+ .25		2428	+ .25		245	+ .26		
	+4 10.2	+ 2.90		9.6	+ 2.60		9.9	+ 2.40		
	9.6	+4 12.05		9.0	+4 12.37		9.1	+4 12.31		
		47 26.8			27.0			27.1		

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	α m	α s		δ ′	δ ″	
June 9	22	24.29	5	47	19.4	16
14		.24	6		21.0	15
19		.18	8		22.5	14
24		.10	10		23.9	14
29		24.00	11		25.3	13
July 4		23.89	13		26.6	12
9		.76	14		27.8	11
14		.62	16		28.9	10
19		23.46			29.9	

	α m	α s		δ ′	δ ″	
July 19	22	23.46	17	47	29.9	9
24		.29	19		30.8	7
29		23.10	19		31.5	7
Aug 3		22.91	20		32.2	5
8		22.71			32.7	

July 2	(Oph. 21 B)	July 3	(Oph. 21 B)	July 9	21	22	July 10	(Oph. 21 B)	July 13	(Oph. 21 B)	July 15 21 21	
21 17.9	21 38.73	21 39.0	21 40.68	21 16.0	38.00 38.47	2.00 2.40	21 54.3	21 55.48	21 43.9	22 19.0	35.2 50.60	14.47 23.21
20.1	40.70	41.1	42.51		40.00 40.43	4.00 4.30	56.2	57.63	45.7	4.00	39.1 52.68	17.00 .56
21.8	42.84 42.77	42.6	44.82 44.90	21 18.0	42.26 42.58	6.30 6.58	58.0	59.63 59.62	47.4	6.03 6.00	42.0 55.00	19.10 .47
23.7	45.00	44.0	47.00		44.55 44.90	8.60 8.86	0.0	1.70	49.0	8.10	46.6 57.26	21.30 .48
25.3	47.00	46.1	49.00		46.68 47.00	10.82 11.00	1.1	3.70	51.0	10.15	51.0 59.45	23.50 .50
					48.72 49.00	12.85 13.10					1.57	25.71 .53
	50.00		52.00		51.00 51.33	15.00 15.10	22 37.8	6.70	22 42.5	13.20	23 6.6 3.57	28.23 .86
	52.05		54.20		53.30 53.50	17.22 17.43	39.7	8.82	44.1	15.37	10.3 6.00	~~31.~~ .91
	54.13 54.10		56.23 56.23		55.46 55.68	19.49 19.78	41.0	10.92 11.00	46.4	17.40 17.50	14.6 8.10	32.65 452
	56.27		58.30				43.5	13.00	48.0	19.43	17.3	
	58.25		0.42		41997 42289	25.90 26.30	44.7	15.10	50.0	21.52	21.1 8423	38.80
					9628 9855	28.26 28.60						41.10
	1.43		3.42		31231 31539	30.26 30.50		18.23		24.55	42872	43.31
	3.50		5.45			32.42 32.72		21.30		26.61		45.45
	5.53 5.55		7.52 7.48		46.66 46.99	34.65 35.00		22.28 22.25		28.75 28.73	59.36	47.57
	7.56		9.60		10.70 10.95	37.00 37.32		24.30		30.85	23.56	49.75
	16250 9.63		16857 11.63		34.70 35.04	39.00 39.43		3283 26.30		5218 33.00	47.64	51.90
						41.32 41.62					13056	54.41
21 21.76				21 16.00	3206 3298	43.50 43.90					21 4238	56.43
	21 54.167		21 56.190	21 18.00	22	10.687 10.993		22 10.943		22 17.393	23 13.98	22 23.520
						23.753 23.753						22 23.580
					−	13.07 −12.76						− 0.060
					−	12.92 −12.61						+ 0.09
					−	13.06 −12.75						−.005
						+ 15.83						+ 2.76
						− 2.97						− 3.04
						− 3.10						− 2.93
						+ 9.76						− 3.21
						20.45 } 20.75						20.31

+54.69	+52.99	+40.74	−50.46
1.73791	1.72419	1.61002	1.70285n
1.57980n	1.50608n	1.39191n	1.48484
856	484	067	360
—	—	40 0	35 4
[13.1] 28.1 +.26		7.2 +.11	11.1 +.34
12.2 +.10		6.8 +.07	11.6 +.19
33.3 −.15		27.4 −.12	31.0 −.08
30.1 +.50		22.1 +.39	38.1 +.22
71		17.30 45	21.05 67
[40] 23.42	23.42	40 15.88	39 20.45
− 33.10	−32.07	−24.66	30.54
39 50.32 +.10	51.35 +.09	39 51.22 +.08	39 50.99 −.09
42 58.03	57.00	42 57.13	57.36
57.93	56.91	57.05	57.45
− 173		− 39	
1.2898		1.3632	
+19.49	+19.49	+20.10	+20.10
− .67	− .63	− .38	− .58
− .02	− .02	− .02	− .33
− .18	− .18	− .11	− .17
+18.62	+18.66	+19.59 60	+19.02 13
1655	1557	1665	1658
16.62			
1606 +4	12.82	1662 +4	11.45
27.9 +	.30	291 +	.32
11.8 −	1.00	125 −	2.20
11.2 +4	12.12	11.9 +4	9.57
[illegible]	28.2		26.2

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July 16 | July 22 | July 23 | July 24

July 16

h m s
16 21 20.3
23.9
27.1
30.8
34.5

m s
21 28.60
33.00
37.33
41.66
46.05

52.55
57.00
1.10
5.72
10.28

4.70
8.85
13.47
17.82
22.00

16.37
20.68
25.10
29.72
34.00

37.33
1.33
25.17
49.25
13.37

40.20
44.85
49.38
53.74
58.10

21 27.32 12.645

22 25.290
22 23.548
+ 1.74
+ 1.89
+ 4.75

+ 0.78
− 2.75
− 2.90
− 4.87

m s
22 20.42

+57.97
1.76320
1.54509 m
385
40′ 0″

16.6 +.35
16.3 +.09
37.1 −.34
34.4 +.51
24.85 .61

40 26.10
− 35.08
39 51.02 +.10

+6° 42′ 57.33
57.23

+19° 24′ 18″
1.3071
− 89
1.2982

+19.87
− .76
− .04
− .15
+18.92

43′ 16.17 +4′ 12.14
47 29.35 + .32
4′ 15.2 − 2.50
12.6 +4 9.32
47′ 25.5

July 22

21 25.4 21 41.70 42.40 50.97
32.2 46.16 46.68
39.9 50.45 50.87 50.80
54.82 55.28

21 25.5 5.76 6.15
32.8 10.18 10.72
40.8 14.49 14.48 15.00 15.03
18.83 19.43
23.20 23.87

38.48 29.85 30.46 39.00
52 34.22 34.72 .06
38.57 38.46 39.00 39.11
42.90 43.37
47.43 48.00

21 32.50 38.523 39.057

22 25.290 21 33.03 22 14.583 15.037
22 23.548 22 23.349 23.349
+ 15.17 + 15.71
+ 15.32 + 15.86
+ 15.18 + 15.72

− 12.60
− 2.82
− 2.70
− 18.12

20.40 20.94

+66.02 +66.03
1.81968 1.81974
1.60157 m 1.60163 m
033 039
40 0 40 0

18.6 +.39 20.8
19.1 +.09 20.9
41.0 −.52 42.1
36.4 +.52 35.6
29.80 48

40 28.78 28.78
− 39.95 − 39.96
39 48.83 +.11 48.82 +.11

42 59.52 42 59.53
59.41 59.42

− 170
1.2901

+19.50
− .98 − .98
− .03 − .03
− .12
+18.35
17.78

17.78 +4 12.29
30.5 + .33
12.7 − 3.60
12.1 +4 9.02
26.8

July 23

21 31.3 21 44.00 44.56
41.2 48.35 49.88
48.9 52.88 52.89 53.32 53.65
57.00 57.50

2.48 2.97
8.00 8.58
12.44 13.00
16.83 17.00 17.47 17.37
21.15 21.70
25.56 26.10

44.91 — — 41.68
.86 — — .40
— —
— —
— —

21 40.47 40.885 41.540

22 16.870 17.525
23.315 23.315
+ 17.57 + 18.22
+ 17.72 + 18.37
+ 17.58 + 18.23

− 14.78
− 2.81
− 2.66
− 20.25

20.63 21.29

rej. rej.
+60.41 +60.41
1.78111 1.78111
1.56300 m 1.56306 m
176 176
40 0

20.8 +.44
20.9 +.07
42.1 −.55
38.6 +.52
31.45 48

40 30.60
− 36.56 − 36.56
39 54.04 +.10

42 54.31
54.21

− 143
1.2928

+19.62
− .82 − .82
− .03 − .03
− .12
+18.685

1286 +4 12.21
30.9
17.8
17.2
rej.

July 24

21 31.7 21 46.05 10.20
36.3 50.35 14.47
40.3 54.84 18.72
43.3 59.26 23.20

47.9 3.55 27.45

22.05 34.00
26.50 38.43
30.77 42.66
35.21 47.05
39.42 57.50

64.81 58.10
18.81 2.30
42.73 6.74
6.75 11.10
30.79 16.50

21 39.90 21389

+62.88
1.79851
1.58040 m
7916
40 0

17.4 +.37
16.5 +.09
38.1 −.39
33.2 +.51
27.75 58

40 26.30
− 38.05
39 48.25 +.10

43 0.10
0.00

− 160
1.2911

+19.55
− .90
− .04
− .14
+18.478

18.48 +4 12.39
30.8 + .34
12.3 − 3.90
11.7 +4 8.83
27.3

22 42778
23.281
+ 19.50
+ 19.65
+ 19.51

− 16.88
− 2.83
− 2.63
− 22.34

20.44

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