1877phae.proj.1487.

KG
11366
v.483

Zones
Fundamental Stars
Observations and Reductions
From $9^h\ 19^m$ to $16^h\ 39^m$
B2 1877

Charles W. Sever, University Bookstore, Cambridge.

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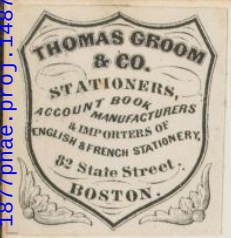

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Constants.

1877		15 tan i
Jan. 13	— Mar 1	0.12416
Mar 4	— May 14	0.12048
May 16	— July 4	0.11768
July 24	— Dec 31	0.12260

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1877phaec.proj.1487

H Draconis

| | | |

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23 H. Ursae Maj. 20

| | | |

1877phae.proj.1487

Venus May 20

| | | |

1877phae.proj.1487

β Cephei

| | | |

1877phae.proj.1487

g. 1564

h m s
9 31 31
+69° 48' 16"
−27 25 28

1877

α
Corr α
dα/dt
δ₀
Corr δ
dδ/dt

m s
31 41.33
+.29
+5.2449
47 43.72
+.9
−16.077

Mar 21 26
31
Apr. 5
10
15
20
25
30

m s
31 46.96
46.78 18
46.59 19
46.39 20
46.18 21
45.95 23
45.78 23
45.47 25
45.21 26

47 54.9
53.0 11
54.0 10
54.9 9
55.7 8
56.4 7
57.0 6
57.5 5
57.8 3

log cos δ 9.53819
1 cos δ tan i 9.65867
tang δ +2.72 290
sin z −.46

X −.65 −.06 April 3
X −.67 −.06 April 12
X −.64 −.04 April 15
X −.70 April 16
X −.67 April 22
X −.82 April 23

9 30 38.1 43.2 49.7 | 31 13.20 16.50 19.44 22.50 25.38
31 40.0 43.6 47.7 | 28.15 31.25 34.20 37.32
22794

6th J.

30 7.3 13.0 17.4 | 31 4.75 7.90 10.87 13.83 16.72 19.60 22.47 25.61 28.67
33
15072

30 7.6 13.1 18.6 | 31 4.10 7.00 10.30 13.35 16.05 19.00 22.05 25.10 27.95
30 13.10
14490

30 12.5 14.9 22.0 | 31 1.80 4.75 7.70 10.45 13.60 16.55 19.43 22.40 25.75
30 17.47
12243

29 56.6 2.0 6.5 | 31 1.30 4.40 7.40 10.60 13.40 16.40 19.20 22.35 25.00
30 1.70
12005

30 43.67
31 45.77 | 31 25.327 31 46.460 − 21.13 − 21.42 | +23.37 −1.76 −.17 −5.43 +16.01 +31 41.34

31 16.747 31 46.738 − 29.19 − 29.48 | +31.40 −1.74 −.12 −4.91 +24.63 +41.38

31 16.100 31 45.892 − 29.79 − 30.08 | +32.00 −1.90 −4.86 +25.24 +41.34

31 13.603 31 45.804 − 32.00 − 32.29 | +34.08 −1.82 −4.58 +27.68 +41.28

31 13.339 31 45.588 − 32.22 − 32.57 | +34.74 −2.23 −4.53 +27.98 +41.32

+41.66 −20.44
1.61972 1.31048n
1.27839 0.96915n
30 0 30 1

+64.12
1.80699
1.46566
30 0

+63.90
1.79934
1.45801
30 0

+56.13
1.74919
1.40786
30 0

+71.64
1.85516
1.51383
30 0

ε 34.5 4.2
η 41.1 9.4
γ 41.2 37.85 8.3 6.25
κ 45.4 15.8
16.2.2 37.7
30 40.35 31 7.43

10.1
27.4
27.2 18.65
36.9
101.6
30 25.40

10.8
25.7
26.4 18.60
38.5
101.4
30 25.35

13.1
28.3
31. 22.10
41.5
111.0
30 28.50

4.5
18.4
23.8 13.65
34.7
80.4
30 20.10

+18.98 − 9.31
30 59.53 31 0.12

+29.82
30 54.62

+28.71
30 54.06

+25.58
30 54.08

+32.65
30 52.75

9
+68 51 48.82 51 48.23

51 53.73

51 54.29

51 54.27

51 55.60

−27 24 57 1,475 10 +2181 1,49691 +31.40 −.32 −.11 +.04 +31.01
24 29 1,47495 +2181 1,47676 +31.39 −.07 −.19 +.07 +31.20

25 13 1,47520 +819 1,48339 +30.44 −.73 −.06 +.02 +29.67

25 13 1,47520 +537 1,48057 +30.24 −.70 −.06 +.02 +29.50

25 10 1,47520 +1073 1,48593 +30.61 −.55 −.06 +.03 +30.03

25 18 1,47520 +217 1,47737 +30.42 −.93 −.04 +.02 +29.07

+69 52 19.83
+69 52 19.63 47 54.6 −4 25.0 24.1
−4 24.17 +0.8 −10.9 −4 34.27
69 +47 45.36

52 23.40
47 56.4 −4 27.0 26.1
−4 26.35 +0.8 −12.7 −4 38.25
+47 45.15

52 23.79
47 56.5 −4 27.3 26.4
−4 26.28 +0.8 −12.8 −4 38.28
+47 45.51

52 24.30
47 57.2 −4 27.1 26.2
−4 26.84 +0.8 −13.5 −4 39.54
+47 44.76

52 24.67
47 57.3 −4 27.4 26.5
−4 26.84 +0.8 −13.6 −4 39.64
+47 45.03

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o Leonis

h m s
9 34 29
+10 27 35
+31 55 13

Corr'd
$\frac{d\alpha}{dt}$
δ_0
Corr'd
$\frac{d\delta}{dt}$

1877

April 3

April 26

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Leonis

α 9 38 45
δ +24° 20' 55"
+18 01 53

Corr α
dα/dt
δ0
Corr δ
dδ/dt

m s
38 51.97 Mar 21
+.03 26
31
Apr 5
10
15
+3.4171 20
" 25
20 22.11 30
"
+.5
−16.394

m s
38 54.48 20
54.43 5
54.38 5
54.32 6
54.26 6
54.20 6
54.13 7
54.06 7
53.98 8

" "
19.1
19.5 4
19.9 4
20.3 4
20.7 4
21.1 4
21.4 3
21.8 4
22.1 3

log cos δ 9.95960
1.5 cos δ tan α 0.08008
tang δ +0.45 1.10
sin z +.31

1877

April 3				April 15				April 16				April 22				April 23				April 26			
		−.65				−.64				−.70				−.67				−.82				−.95	
		−.06				−.04																	
9	38 6.9		38 17.93	37 57.5		38 9.60		37 42.9		38 8.80		37 44.3		38 6.70		37 36.2		38 6.05		37 53.0		38 4.90	
	8.4		20.05	57.8		11.90		51.7		11.20		46.2		9.00		58.0		8.39		54.4		7.16	
	10.8		22.32	1.8		14.10		53.6		13.50		48.2		10.95		0.3		10.65		55.8		9.50	
			24.90			18.58				17.98				15.80				15.25				12.92	
			29.10			20.90				20.20				18.00				17.39				16.20	
	38 5.20		31.30			23.21				22.45				20.39				19.65				18.42	
	53.9		33.50			25.35				24.78				22.60				21.90				20.60	
	56.0		35.70			27.71				27.00				24.80				24.20				23.00	
			40.30			32.28				31.33				29.40				28.78				27.50	
			42.68			34.52				33.90				31.55				30.95				29.75	
			44.82			36.72				36.09				33.85				33.25				32.00	
			34480			25487				24755				22304				21647				20295	
	38 8.70			37 57.70				37 51.73				37 46.23				37 55.17				37 54.40			
	38 53.97		38 31.345			38 23.170				38 22.505				38 20.276				38 19.679				38 18.450	
			38 54.341			38 54.196				38 54.182				38 54.098				38 54.034				38 54.040	
			− 2.300			− 31.03				− 31.68				− 33.82				− 34.40				− 35.59	
	+23.37		− 2.303	+31.40		− 31.06		+32.00		− 31.71		+34.08		− 33.85		+34.75		− 34.43		+36.01		− 35.62	
	−.29			−.29				−.31				−.30				−.37				−.43			
	−.07			−.04																			
	−2.34			−2.20				−2.18		−2.15		−2.10		−2.10		−2.09		−2.08		−2.04		−2.04	
	+20.67			+28.87				29.+31.51		29.51		+31.68				+32.29				+33.64	54.51		
	+38 52.01			+52.04				+54.01		52.01		+51.96				+51.97				+58.09	58.99		
								2												1.96			
	+22.64		−22.63	+23.47				+30.78				+34.05				+21.51				+24.05			
	1.15488		1.15466	1.37061				1.48827				1.53212				1.33264				1.38112			
	1.35488		1.34676	2.17059		1.45059		1.56835				1.61220				1.41272				1.46120			
	55 2		55 3	55 1				55 1				55 1				55 1				5 2			
ε	7.9		2.3	55.2				16.4				39.9				56.6				12.6			
η	14.6		12.8	16.1				6.3				1.2				14.8				24.4			
ψ	17.0	12.45	10.6	6.45 15.7	35.45			6.0	56.20			1.2	50.55			17.1	6.85			28.9	21.25		
ω	22.9		15.7	21.7				16.6				10.2				25.2				6.9			
	67.4		41.4	57.7				15.3				232.5				56.7				73.8			
	57 16.85		58 10.35	57 12.82				57 .383				56 58.13				57 14.18				7 18.45			
	+ 27.22		− .2721	+ 28.22				+ 37.01				+ 40.94				+ 25.87				+ 28.92			
	57 44.07		57 43.14	57 41.14				57 40.84				57 39.07				57 40.05				7 47.37			
4																							
+ 28	25 4.28		25 5.21	25 7.21				25 7.51				25 9.28				25 8.30				15 0.98			
+ 18	1 39		2 32	1 35				1 26.70				1 20				1 36				1 36			
	1.27270		1.27310	1.27270				1.27220				1.27260				1.27270				1.27270			
	+ 2181		+ 2181	+ 853				+ 560				+ 1092				+ 237				− 294			
	1.27451		1.27491	1.28123				1.27830				1.28352				1.27587				1.26976			
	−19.70		−19.72	−19.11				−18.98				−19.21				−18.84				−18.61			
	− .10		− .10	− .11				− .19				− .23				− .09				− .12			
	− .37		− .57	− .31				− .28				− .26				− .29				− .30			
	+ .14		+ .19	+ .13				+ .12				+ .12				+ .13				+ .14			
	−20.03		−20.14	−19.40				−19.33				−19.58				−19.09				−18.89			
+24	24 44.25		45.07	24 47.81				24 48.18				24 49.70				24 49.21				14 42.09			
+24	24 44.66		− 4 24.17			− 4 26.35				− 4 26.28				− 4 26.84				− 4 26.84				+ 5 40.30	
	20 20.2		−0.5	20 21.1		−0.5		20 21.2		−0.5		20 21.6		−0.5		20 21.7		−0.5		20 21.9		−0.5	
	−4 24.5		+1.9	−4 26.7		+1.0		−4 27.0		+0.9		−4 28.1		+0.5		−4 27.5		+0.4		+5 39.8		+0.2	
	24.0			26.2				26.5				27.6				27.0				40.3			
			− 4 22.77			− 4 25.85				− 4 25.88				− 4 26.84				− 4 26.94				+ 5 40.00	
24			+20 21.89			+20 21.96				+20 22.30				+20 22.86				+20 22.27				+20 22.09	

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11 Cephei

α 21h 1m 2s

δ +70° 44' 9"

109 18 51

− 66 53 3

1877

April 15

April 22

April 23

April 26

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5 Ursae Maj.

h m s
9 42 5
+59° 37' 38"
− 14 14 42

1877

α m 42 13.740 s
Corr α + .04 s
dα/dt +4.3248 "
δ₀ 36 56.7 "
Corr δ + 2.0 "
dδ/dt −16.737 "

Mar 21 42 18.07
26 17.96 11
31 17.85 11
Apr 5 17.73 12
10 17.60 13
15 17.46 14
20 17.32 14
25 17.16 16
30 16.99 17

37 1.0
5.0 10
3.0 10
3.9 9
4.7 8
5.4 7
6.0 6
6.5 5
7.0 5

log cos δ 9.70396
15 cos δ tan i 9.82444
tang δ + 1.70 1.98
sin Z − .30

I 4.07

April 3

X −.65 −.06

9	41	10.9	41	31.15	41	24.0	41	22.78	42	1.8	41	—
		14.9		85.28		27.6		26.90		5.3		—
		18.2		89.33		30.5		31.00		9.3		—
				47.60				39.05				—
				51.70				43.25				—
	42	7.0		55.65				47.22	42	53.6		—
		8.9		59.80				51.37		57.0	42	52 46.60
		14.2		8.85				55.38		1.1		.51 50.65
				12.00				3.56				.67 58.95
				16.05				7.61				.63 2.98
				20.00				11.70				.73 7.15
				37241				33982				
	41	14.67		61241	41	27.37		51982	42	5.53		
	42	10.03	41	55.674			41	47.256	42	57.23	41	42.614
			42	17.172			42	17.453			42	17.118
				− 22.10				− 30.20				− 34.50
		+23.38		− 22.14		+31.40		− 30.24		+36.01		− 34.54
		− 1.10				− 1.08				− 1.61		
		− 12				− .08						
		− 4.03				− 3.71				− 3.38		
		+18.13				+26.53				+31.02		
	+42	13.80				+13.79				+13.75		13.63
										6		
		+41.00		−14.36		+19.89				−22.92		−7.62
		1.61278		1.15715n		1.29863n				1.36021n		1.87286n
		1.43722		0.98159n		1.12307n				1.18465n		1.69730n
		40 1		40 1		40 1				50 1		50 2
ε		3.9		41.8		4.8				60.9		33.4
ψ		12.2		48.3		22.8				58.2		31.9
υ		10.4 7.15		47.2 44.50		22.3 13.55				2.0 1.45		34.8 34.10
κ		15.0		51.9		31.0				11.8		15.5
		41.5		189.2		80.9				247.4		115.6
	41	10.38	41	47.30	41	20.23			51	53.72	52	28.90
		+ 27.37		− 9.58		+ 13.28				− 15.30		− 49.81
	41	37.75	41	37.72	41	33.51			51	38.42	51	39.09
9												
+ 58	41	10.60	41	10.63	41	14.84			31	7.93	31	9.26
		14 28		13 51		14 18				13 49		13 13
		1.25210		1.25180		1.25200				1.25180		1.25160
		+ 2181		+ 2181		+ 869				− 280		− 280
		1.27391		1.27361		1.26069				1.24900		1.24880
		+18.49		+18.48		+18.23				+17.44		+17.43
		− .40		− .05		− .09				− .13		− 1.32
		− .19		− .29		− .18				− .25		− .32
		+ .07		+ .11		+ .08				+ .11		+ .15
		+1827		+1855		+1804				+1747		+1624
+59	41	28.87		29.18	41	32.88			31	25.89	25.40	25.50
+59	41	29.02		− 4 24.17			− 4	26.35	31	26.70	25.45	
	37	3.6		+ 0.5	37	5.4		+ 0.5	37	6.6	+ 5	40.30
	− 4	25.4		− 7.4	− 4	27.5		− 9.2	+ 5	39.7	41.2	+ 0.5
		23.4				25.5				39.2		− 10.4
				− 4 31.07			− 4	35.05			+ 5	30.40
59				+36 57.95				+36 57.83				+36 55.85

April 15

X −.64 −.04

April 26

X −.95

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μ Leonis

α 9h 45m 39s

δ +26° 35′ 40″

+15 47 08

$d\alpha$ Corr^n

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

$d\delta$

Corr^n

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

1877

Mar.	21	26
	31	
Apr.	5	
	10	
	15	
	20	
	25	
	30	

log cos δ 9.95148

15 cos Stan 0.07196

tang δ +0.50 1.12

cor z +.27

April 3

-.65
-.06

9	45	30	45	11.55					
		4.9		13.80					
		2.0		16.15					
				20.70					
				23.00					
				25.35					
				27.60					
				29.95					
				34.65					
				36.82					
				39.30					
				27.887					
	45	4.27							

+23.38
-.32
-.07
-3.42
+20.57
+45 45.92

April 12

-.67
-.06

44	56.7	45	5.47						
	58.6		7.78						
	0.3		10.05						
			14.68						
			17.05						
			19.38						
			21.67						
			23.96						
			28.48						
			30.73						
			33.10						
			21.230						
44	58.53								

45 25.352
45 48.278
— 22.93
— 23.01

+29.40
-.33
-.07
-2.32
+26.68
+45.98

45 19.300
45 48.173
— 28.87
— 28.95

April 15

-.64
-.04

44	53.7	45	3.30						
	53.6		5.65						
	57.6		7.95						
			12.48						
			14.86						
			17.23						
			19.57						
			21.73						
			26.36						
			28.65						
			31.00						
			18.872						
44	55.63								

45 17.156
45 48.136
— 30.98
— 31.06

+31.40
-.32
-.04
-2.28
+28.76
+45.92

April 16

-.70

44	52.1	45	2.78						
	52.9		5.00						
	55.4		7.39						
			12.00						
			14.20						
			16.55						
			18.90						
			21.20						
			25.82						
			28.05						
			30.38						
			18.227						
44	53.80								

45 16.661
45 48.122
— 31.55
— 31.63

+32.00
-.35
-2.28
+29.38
+45.95

April 22

-.67

44	37.4	45	0.55						
	38.8		2.85						
	41.0		5.10						
			9.78						
			12.00						
			14.35						
			16.53						
			18.88						
			23.60						
			25.90						
			28.25						
			15781						
44	39.07								

45 14.346
45 48.038
— 33.69
— 33.77

+34.08
-.33
-2.18
+31.57
+45.92

April 23

-.82

44	39.90	44	39.90						
	48.7		2.28						
	50.9		4.50						
			9.15						
			11.50						
			13.70						
			16.05						
			18.28						
			22.95						
			25.28						
			27.50						
			21109						
			15109						
44	48.83								

45 13.735
45 48.024
— 34.29
— 34.37

+34.75
-.41
-2.16
+32.17
+45.91

	+20.38	+20.71	+21.53	+22.71	+35.28	+21.91
	1.30920	1.31744	1.33304	1.35736	1.54753	1.39637
	1.38116	1.38940	1.40500	1.42932	1.61949	1.46833
	40 2	40 2	40 2	40 2	40 1	40 2
E	39.2	16.4	15.5	14.4	56.5	10.6
H	41.3	40.4	37.1	34.1	17.7	28.9
G	34.7 39.45	39.4 27.90	36.8 26.15	34.3 24.35	18.1 37.36	30.9 20.75
K	44.3	45.2	45.7	44.8	27.6	43.3
	164.5	141.4	135.1	127.6	59.9	113.7
	42 41.13	42 35.35	42 33.78	42 31.90	42 14.98	42 28.43
	+ 24.05	+ 24.51	+ 25.41	+ 26.87	+ 41.64	+ 29.40
	43 5.18	42 59.86	42 59.19	42 58.77	42 56.62	42 57.83
+ 25 6	39 43.17	39 48.49	39 49.16	39 49.58	39 51.73	39 50.52
+ 15	47 3	46 57	46 56	46 54	46 37	46 50
	1.21150	1.21150	1.21140	1.21140	1.21130	1.21140
	+2181	+1849	+883	+582	+1111	+261
	1.23331	1.22999	1.22023	1.21722	1.22241	1.21401
	-17.11	-16.98	-16.60	-16.49	-16.69	-16.37
	— .08	— .09	— .10	— .12	— .27	— .14
	— .43	— .36	— .36	— .35	— .29	— .32
	+ .16	+ .16	+ .16	+ .15	+ .13	+ .15
	-17.46	-17.27	-16.90	-16.81	-17.12	-16.68
+26	39 25.71	39 31.22	39 32.26	39 32.77	39 34.61	39 33.84
	-4 24.87	-4 25.24	-4 26.35	-4 26.28	-4 26.84	-4 26.32
	35 5.1	35 5.9	35 6.1	35 6.2	35 6.7	35 6.8
	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
	-4 20.6	-4 25.3	-4 26.32	-4 26.6	-4 27.9	-4 27.0
	+1.8	+1.0	+0.8	+0.7	+0.2	+0.1
	20.5	25.2	26.1	26.5	27.8	26.9
	-4 22.87	-4 24.74	-4 26.85	-4 26.98	-4 27.14	-4 27.24
26	+35 2.84	+35 6.48	+35 6.21	+35 6.69	+35 7.47	+35 6.60

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Gr. 1586

α 47m 10s

δ +73° 28' 20"

μ +31 05 32

α 47m 20s.77 Mar 31 47m 2.36 27' 55".8

Corr α +.17 Apr 5 27.12 24 56.7 9

dα/dt +5.5124 10 26.86 26 57.6 8

δ 27 46.30 15 26.58 28 58.4 7

Corr δ +.6 20 26.29 29 59.1 5

dδ/dt −16.829 25 25.99 30 59.6 4

30 25.68 31 60.0

log cos δ 9.45419

log cos δ tan δ 9.57467

tang δ +.337 3.52

sin 2 −.52

1877

April 3			April 12			April 15			April 16			April 22			April 23		
X	−.65	−.06	X	−.67	−.06	X	−.64	−.04	X	−.70		X	−.67		X	−.82	
9 46 7.2	46 57.95		46 21.3	46 45.49		46 4.7	46 43.10		46 4.0	46 42.45		46 3.7	46 39.85		46 9.0	46 39.49	
11.4	55.55		27.3	49.00		11.5	47.10		10.9	46.20		11.9	43.60		14.0	43.30	
13.2	57.00		36.2	53.00		17.5	50.53		16.2	49.75		15.2	47.30		21.6	46.60	
	2.65			56.27			57.05			53.35			54.00			50.40	
	6.85			0.18			57.77			56.95			54.75			54.35	
47 26.0	10.05		47 38.0	3.51		47 13.3	1.10		47 17.6	0.70		47 13.3	58.20		47 33.5	57.55	
33.6	13.54		39.0	7.18		20.2	5.15		22.9	4.35		22.6	1.40		0.5	1.25	
39.8	17.10		46.2	10.68		25.3	8.53		30.6	8.05		29.6	5.20		6.0	4.80	
	20.80			14.52			12.53			11.55			9.00			8.60	
	23699			23983			27986			27335			31060			30654	
46 12.60	5699		46 28.27	53983		46 11.23	51986		46 10.37	51335		46 10.27	49060		46 14.87	48654	
47 33.13	47 6.232		47 39.40	46 59.981		47 11.60	46 57.762		47 23.70	46 57.039		47 21.83	46 54.511		48 0.00	46 54.060	
	47 27.201			47 26.734			47 26.566			47 26.508			47 26.155			47 26.075	
	5.87			26.75			28.80			29.47			31.64			32.03	
	21.04			26.92			28.97			29.64			31.81			32.20	
+23.38			+29.40			+31.40			+32.50			+34.08			+34.75		
−2.19			−2.26			−2.16			−2.35			−2.26			−2.76		
−.21			−.21			−.14											
−6.68			−6.15			−5.99			−5.93			−5.58			−5.52		
+15.35	14.35		+20.72			+23.14			+23.72			+26.24			+26.47		
+47 21.68	20.68		+20.76			+20.87			+20.76			+20.75			+20.53		

	+53.73		−26.80		+31.71		−39.42		+46.53		−21.84		+46.67		−26.66		+44.24		−27.32		+39.19		−65.94	
	1.73022		1.42813n		1.50120		1.59572n		1.66773		1.33925n		1.66904		1.42586n		1.64582		1.43648n		1.59318		1.81915n	
	1.30489		1.00280n		1.07587		1.17039n		1.24240		0.91392n		1.24371		1.00053n		1.22049		1.01115n		1.16785		1.30382n	
	50 0'		50 1		50 0		50 1		50 0		50 0		50 0		50 0		50 0		50 0		50 0		50 1'	
δ	38".2		9".1		34".8		1".8		27".4		52".9		26".9		55".4		25".3		52".9		27".4		6".7	
	45.6		16.1		52.5		14.9		43.3		9.4		41.4		9.9		41.7		9.6		41.0		20.1	
	44.6	41.40	14.5	11.80	52.0	43.40	18.1	9.95	43.4	35.40	9.6	1.25	42.1	34.50	10.4	3.15	43.0	34.15	9.7	1.30	44.2	35.80	22.7	14.70
	44.4		21.1		59.9		26.7		53.9		19.9		53.9		23.0		53.1		21.0		57.0		36.8	
	17.8		60.8		17.5		66.5		16.8.0		27.1.8		164.3		279.2		165.1		273.2		169.6		86.3	
	50 44.45		51 18.20		50 49.88		51 16.63		50 42.00		51 7.95		50 41.08		51 9.80		50 41.28		51 8.30		50 42.40		51 21.53	
	+ 20.18		− 10.06		+ 11.91		− 14.80		+ 17.47		− 8.20		+ 17.53		− 10.01		+ 16.61		− 10.26		+ 14.72		− 24.76	
	51 4.63		51 5.14		51 1.79		51 1.83		50 59.47		50 59.75		50 58.61		50 59.79		50 57.89		50 58.04		50 57.12		50 56.82	
+ 72	31 43.72		31 43.21		31 46.56		31 46.52		31 48.88		31 48.60		31 49.74		31 48.56		31 50.46		31 50.31		31 51.23		31 51.53	
− 31	4 54		4 23		4 48		4 21		4 56		4 30		4 57		4 28		4 57		4 30		4 56		4 16	
	1.540.30		1.540.20		1.540.30		1.540.20		1.540.30		1.540.20		1.540.30		1.540.20		1.540.30		1.540.20		1.540.30		1.540.20	
	+2181		+2181		+1853		+1853		+894		+874		+589		+589		+1117		+1117		+268		+268	
	1.562.11		1.562.01		1.558.83		1.558.73		1.549.24		1.549.14		1.546.19		1.546.09		1.551.47		1.551.37		1.542.98		1.542.88	
	+36.48		+36.48		+36.21		+36.20		+35.42		+35.41		+35.14		+35.16		+35.60		+35.59		+34.91		+34.90	
	− .43		− .11		− .16		− .22		− .33		− .07		− .33		− .11		− .29		− .19		− .23		− .64	
	− .11		− .21		− .11		− .18		− .10		− .15		− .10		− .17		− .09		− .14		− .09		− .05	
	+ .04		+ .07		+ .05		+ .08		+ .04		+ .07		+ .04		+ .07		+ .04		+ .07		+ .04		+ .08	
	+3598		+3623		+3599		+3588		+3503		+3526		+3478		+3495		+3526		+3541		+3463		+3476	
+73	32 19.70		1944		32 2356		2240		32 2391		2386		32 2452		2351		32 25.72		2572		32 25.86		2569	
+73	32 19.57		− 4 24.17		32 22.48		− 4 25.24		32 23.88		− 4 26.35		32 2402		− 4 26.28		32 25.72		− 4 26.84		32 25.78		− 4 26.84	
	27 56.4		+ 0.9		27 58.0		+ 0.9		27 58.4		+ 0.9		27 58.6		+ 0.9		27 59.3		+ 0.9		27 59.4		+ 0.9	
	− 4 23.2		− 10.1		− 4 24.5		− 11.7		− 4 25.5		− 12.1		− 4 25.4		− 12.3		− 4 26.4		− 13.0		− 4 26.4		− 13.1	
	22.6				23.9				24.9				24.8				25.8				25.8			
			− 4 33.37				− 4 36.04				− 4 37.55				− 4 37.68				− 4 38.94				− 4 39.04	
73			+27 46.20				+27 46.44				+27 46.33				+27 46.34				+27 46.78				+27 46.74	

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19 Leonis Min.

9h 50m 1s
+41° 38' 59"
+ 0 43 49

1877
May 3

	m	s		m	s		m	s					
α	50	8.718	after 30	50	11.19	9	38	30.2	3				
			May 5		11.30	9		30.5	3	log cos δ	9.87356		
Corr α		+ .03	10		11.01	9		30.8	3				
			15		10.92	9		31.0	2	15 cos δ tan i	9.99404		
dα/dt		+ 3.6982	20		10.83			31.2	2			I	2.75
δ		38 25 03								log tang δ	+ 0.89	1.34	
Corr δ		+ .1								log z	+ .01		
dδ/dt		−16.942											

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T. Leonis

α 9h 53m 36s

δ +8° 38' 34"

1877

	April 16	April 22	April 23	April 26	May 3
	× −.70	× −.67	× −.82	× −.95	× −.80
9	53 2.9	53 0.45	52 39.6	52 38.20	52 45.3	52 57.55	52 47.3	52 36.25	52 41.7	52 53.61
	4.8	2.60	41.7	0.24	46.6	57.70	47.2	38.29	43.2	55.70
	6.3	4.60	42.9	2.25	48.9	1.90	57.0	0.40	45.0	57.83
		8.70		6.45		5.95		4.60		2.05
		10.70		8.52		8.00		6.70		4.09
	53 53.2	12.80	58 44.9	10.64	53 8.25	10.05	53 30.4	8.53	53 2.40	6.10
		14.90	46.7	12.72	34.0	12.15	32.0	10.90	59.1	8.25
		16.95	49.0	14.75	36.5	14.28	33.8	12.98	80.8	10.29
		21.15		18.90		18.38		17.12		14.50
		23.25		20.95		20.50		19.28		16.60
		25.34		23.08		22.57		21.80		18.70
		14144		17670		23103		21635		24780
	53 4.70		52 41.40	11670	52 46.93	11103	52 49.17	9635	52 43.30	6780
	53 53.20	53 12858	53 46.87	53 10609	53 34.33	52 10094	53 32.07	53 8759	53 28.97	53 6164
		53 44725		53 44653		53 44641		53 44605		53 44521
		− 3187		− 3404		− 3455		− 3585		− 3836
	+32.00	− 3188	+34.08	− 3405	+34.75	− 3456	+36.01	− 3586	+38.48	− 3837
	−.10		−.10		−.12		−.14		−.12	
	−1.97		−1.90		−1.89		−1.885		−1.77	
	+29.93		+32.08		+32.74		+34.12		+36.59	
	+53 42.79		+42.69		+42.83		+42.88 .78		+42.75	
	+8.16	−40.34	+29.21	−36.26	+23.16	−24.24	+19.59	−23.31	+22.86	−22.81
	0.91169	1.60574n	1.46553	1.55943n	1.36474	1.38453n	1.29203	1.36754n	1.35908	1.35813n
	1.02722	1.72129n	1.58106	1.67496n	1.48027	1.50006n	1.40756	1.48307n	1.47461	1.47366n
	35 4	40 0	35 3	40 0	35 3	40 0	45 4	50 0	45 4	50 0
☉	17.9	20.8	48.6	12.9	59.8	0.1	27.5	20.1	18.9	18.7
☿	39.8	43.0	11.9	37.4	19.6	20.4	36.4	32.2	34.4	33.1
♀	41.5 29.70	45.1 32.95	13.4 31.00	38.9 25.90	22.0 40.90	23.9 12.00	40.8 31.65	38.1 29.10	36.3 27.60	36.4 27.55
♂	48.7	51.8	19.6	46.0	31.3	33.0	16.7	12.9	13.5	14.0
♃	147.9	160.7	33.5	135.2	727	77.4	17.64	183.3	183.1	182.7
	39 36.98	40 40.18	39 8.38	40 33.80	39 18.18	40 19.35	49 44.10	50 45.82	49 45.78	50 46.55
	+ 10.65	− 52.63	+ 38.11	− 47.31	+ 30.22	− 31.63	+ 29.10 25.56	− 25.82 30.41	+ 25.78 29.83	− 25.55 29.76
	39 47.63	39 47.55	39 46.49	39 46.49	39 48.40	39 47.72	49 54.66	49 55.41	49 55.61	49 55.79
8										
+χ	43 0.72	43 0.80	43 1.86	43 1.86	42 59.95	43 0.63	32 53.69	32 52.94	32 52.74	32 52.56
+33	43 59	45 2	43 30	44 36	43 40	44 41	43 47	44 44	43 44	44 44
	1.58470	1.58500	1.58460	1.58492	1.58160	1.58490	1.58460	1.58490	158460	1.58490
	+609	+609	+1133	+1133	+286	+286	−236	−236	−298	−298
	1.59049	1.59109	1.59593	1.59633	1.58746	1.58776	1.58224	1.58254	1.58162	1.58192
	−38.98	−39.00	−39.44	−39.48	−38.68	−38.70	−38.22	−38.24	−38.16	−38.19
	− .01	− .13	− .07	− .10	− .05	− .05	− .04	− .05	− .05	− .05
	− .64	− .10	− .53	− .08	− .56	− .04	− .58	− .05	− .57	− .05
	+ .28	+ .04	+ .25	+ .04	+ .26	+ .02	+ .27	+ .02	+ .26	+ .02
	−39.35	−39.19	−39.79	−39.62	−39.03	−38.77	−38.57	−38.32	−38.52	−38.27
+8	42 21.37	21.61	42 22.07	22.24	42 20.92	21.86	32 15.12	14.62	32 14.22	14.29
+8	42 21.49	−4 26.28	42 22.16	−4 26.84	42 21.39	−4 26.84	32 14.87	+5 40.30	32 14.26	+5 40.46
	37 53.4	−1.0	37 53.7	−1.0	37 53.7	−1.0	37 53.8	−1.0	37 54.1	−1.0
	−4 28.1	+6.9	−4 28.5	+6.6	−4 27.7	+6.6	+5 38.9	+0.5	+5 39.8	+6.2
	27.9		28.3		27.5		39.1		40.0	
		−4 20.38		−4 21.24		−4 21.24		+5 45.80		+5 45.66
8		+38 1.11		+38 0.92		+38 0.15		+38 0.67		+37 59.92

log cos δ	9.99505
15 const tani	0.11553
tang δ	+0.15
sin 2	+.55

1.01

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λ Hydrae

h m s
10 4 29
−11° 44 11
+ 54 06 59

log cos δ 9.99083
15 Cos Stau 0.11131

tang δ −0.21 1.02
sin z +.81

1877

−.93− −.80

April 26 May 3

10	3	33.4	3	48.40	3	32.8	3	45.85
		37.1		50.45		34.6		47.20
		38.0		52.65		36.4		50.05
				56.80				54.20
				58.90				56.33
	4	27.2		1.00	4	18.8		58.45
		28.8		3.05		20.8		0.50
		30.3		5.28		22.8		2.60
				9.49				6.83
				11.59				9.00
				13.65				11.19
				31/26				34290
	3	32.00		1126	3	34.60		64290
	4	29.77	4	1.024	4	20.50	3	58.445

+36.01 +38.48
−.41 −.72
+.20 +.17

−1.63 −1.58
+34.58 +37.10
4 35.60 4 35.52

4 35.570

	+24.02	−27.73	+23.84	−22.36
	1.38057	1.44326n	1.37731	1.34947n
	1.49188	1.55457n	1.48862	1.46078n
	10 1	10 2	10 1	10 2
6	30.8	38.5	32.1	32.6
7	46.0	53.1	46.8	47.1
9	53.5 42.15	1.1 49.80	54.3 43.20	53.1 22.85
11	27.4	34.0	27.1	28.9
	27.7	186.7	270.3	21.7
11	5543	12 4683	5503	12 5543
	39.42		40.08	46.43
	+ 31.04	− 35.86	+ 30.50	− 28.89
	12 1046	12 10.82	12 10.88	12 11.54
1				
−12	49 22.11	49 22.47	49 22.53	49 23.19
+54	5 57	7 05	5 58	6 58
	1.89970	1.90000	1.89970	1.90000
	−.195	−.195	−.258	−.258
	1.89475	1.89805	1.89712	1.89742
	−79.02	−79.08	−79.91	−79.96
	+ .06	+ .09	+ .06	+ .05
	− .22	− .36	− .22	− .35
	+ .10	+ .17	+ .10	+ .16
	−1 19.04	−1 19.18	−1 18.97	−1 19.10
−11	50 41.19	41 65	50 41.50	42 29
	50 41.42	+5 40.30	50 41.89	+5 40.46
		−1.4		−1.5
		+13.3		+13.3
		+5 52.20		+5 52.26
−11		44 49.22		44 49.63

−11° 44′ 49″42

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24 Cephei

22 7 24

+71° 43 32

108 16 28

*-65 53 40

1877

Corr^{s} $\frac{d\alpha}{dt}$

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

Apr 10.8

m s
7 26,373
− .02
+ 1.1676
44 7.15
15 52.35
+ .9
+17.670

Apr 15

15
20
25
30

m s
7 22.71
23.02
23.35
23.69
24.05

43 53.2
52.5
52.0
51.6
51.4

7 5 4 2

log cos δ 9.49615n
15 cos δ tan i 9.61663n
tang δ +3.03 3.18
sin z − .91

I 6.58
½I 3.29

X

X −.67 −.06 April 12

X −.64 −.04 April 15

X −.67 April 22

X −.95 April 26

22 6 32.0 28.3 42.5 44.72 47.71 51.05
7 46.0 52.9 57.6 54.61 57.62 1.05 4.40

6 37.84 41.30
6 7.8 12.3 19.6 13.7 17.1
7 7.0 12.2 21.3

6 36.40 39.56 42.70 46.22 49.32 52.69 56.30 59.52 2.63
8 19.3 23.7 31.2

(30.2 33.5 0.4)
6 34.15 37.48 40.70 44.00 47.30 50.75 54.18 57.29 0.30
7 4.8 13.7 19.2

6 — — — — — — — 44.82 37.40 .61 54.48 .46 57.62

34033 46033
38534 44534
36615 42615

6 37.60 7 51.87
6 13.23 7 13.50
4 34.703 8 25.20
7 12.57

6 51.148 7 22.818 − 31.67 − 31.65 +29.40 +2.03 +.22 19 +3.55 +35.17 +7 26.82
6 49.82 7 23.604 − 3402 3352 − 33.50 +31.40 +1.94 +.13 +3.37 +36.84 −2.64 +26.32
6 47.350 7 23.469 − 3612 − 36.10 +34.08 +2.03 +2.90 +39.01 +26.36
6 44.630 7 23.742 − 39.11 − 39.09 +36.01 +2.58 +2.63 +41.52 +26.15

+13.55 −60.72 +36.25 −24.02 +112.65 −97.85 −27.94

1.13194 0.74857n 1.78333n 1.39996 1.55931 1.17594n 1.38057n 0.99720 2.05173 1.66836n 1.99056n 1.60719 1.44623n 1.06286
0 4 0 3 0 4 0 4 5 0 0 3 10 4

ε 24.7 43.6 38.1 31.40 45.9 152.3 4 38.08 − 3.60 4 32.48
η 55.2 13.2 8.5 1.85 16.0 32.9 4 8.23 + 25.12 4 33.35
ζ 30.4 48.0 43.4 36.90 52.1 173.9 4 43.48 − 14.90 4 28.49
π 5.0 22.4 18.1 11.55 27.2 72.7 4 18.78 + 9.94 4 28.12
1.9 18.9 16.2 9.05 25.5 62.5 5 16.43 − 46.60 4 29.03
33.4 50.9 47.6 44.50 58.8 190.7 3 47.68 + 40.48 4 28.16
18.3 24.8 25.1 21.70 6.8 75.0 14 18.75 + 11.56 14 30.31

+ 108 18 15.87 18 15.00 18 19.76 18 20.23 18 19.32 18 20.19 8 18.04

− 65 51 0 2,10620 +1889 2,12509 +133.38 + .03 − .64 + .28 +2 13.05
51 30 2,10637 +1889 2,12526 +133.43 + .61 − .57 + .25 +2 13.72
50 55 2,10617 +985 2,11602 +130.62 + .22 − .66 + .28 +2 10.46
51 20 2,10630 +985 2,11615 +130.66 + .09 − .60 + .26 +2 10.41
50 22 2,10600 +1170 2,11770 +131.13 + 2.07 − .04 + .02 +2 13.18
51 50 2,10647 +1176 2,11817 +131.27 + 1.64 − .49 + .23 +2 12.65
51 23 2,10634 −183 2,10451 +12721 + .12 − .56 + .14 +2 6.91

+108 20 28.92 20 28.72 20 30.22 20 30.64 20 32.50 20 32.84 10 24.95
+108 20 28.82 16 7.0 −4 21.8 22.7 −4 25.24 −4 27.40 +1.5 −14.2 −4 23.8 20 30.42 16 7.5 −4 22.9 −4 26.70 +1.5 −14.6 −4 25.5 20 32.67 16 8.1 −4 24.6 −4 26.84 +1.5 −15.3 +5 43.4 42.5 +5 40.30 +1.5 −15.6

−4 37.94 −4 39.45 −4 40.64 +5 26.20

108 +15 50.88 +15 50.98 +15 52.03 +15 51.15

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λ Yezdae Maj.

h m s
10 9 33
+43° 32' 14"
− 1 09 26

1877

| | | |

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μ Ursae Maj.

α 10 14 53
δ +42° 1' 38"

Corr α +.04
dα/dt +3.5987
Corr δ +.6
dδ/dt −17.980

m s
14 59.24

| | | |

1877phae.proj.1487

μ Hydrae

$10^h\ 20^m\ 2^s$

$-16°\ 11'\ 53''$

$+58\ 34\ 41$

log cos δ 9.98240

1 cos δ tan i 0.10288

tang δ −0.29 104

sin z +.85

1877

	April 15		April 23		April 26		May 3	
	19 15.2	19 26.00	19 12.1	18 22.38	19 11.4	19 21.00	18 4.9	18 18.55
	17.0	28.00	14.1	24.50	13.4	23.29	7.0	20.68
	18.8	30.10	15.6	26.65	14.8	25.30	8.6	24.78
		34.50		30.90		29.75		27.13
		36.60		32.93		31.83		29.29
	19 38.7	38.76		35.30		34.00	19 53.9	31.40
	0.4	40.80		37.40		36.20	55.4	33.60
	2.6	43.00		39.60		38.22	56.9	35.72
		47.37		43.90		42.58		40.00
		49.48		46.00		44.65		42.18
		51.70		48.15		46.80		44.30
		42631		38871		37376		34575
	19 17.00		19 13.93		19 13.20		19 6.83	
	20 6.57	19 38.463		19 35337		19 33978	19 35510	19 31432
	+31.40		+34.76		+36.01		+38.48	
	+.19		+.24		+.28		+.23	
	+.04							
	+31.55							
	−0.5		−1.70		−1.67		−1.58	
	−1.76		+33.30		+34.62		+37.13	
	+29.76							
	20 8.52		20 8.64		20 8.60		20 8.56	
								$10^h\ 20^m\ 8.580^s$
	+21.75	−21.82	+21.41		+20.78		+24.60	−23.97
	1.33746	1.33885 n	1.33062		1.31765		1.39094	1.37267 n
	1.44034	1.44173 n	1.43350		1.42053		1.40382	1.48255 n
	25 3	25 4	25 3		35 4		35 4	40 0
ε	43.2	37.9	45.1		6.6		1.9	3.7
ψ	9.7	8.9	7.1		22.9		18.2	21.4
η	10.9	4.4	1.0		27.0		21.7	24.6
κ	13.8	9.0	18.0		1.6		58.7	1.2
	17.6	23.2	21.2		5.81		140.5	10.9
	29 4.40	29 58.80	29 5.30		39 ~~29.53~~ 14.53		39 ~~73.13~~ 18.13	40 ~~2.73~~ 12.73
	+ 27.56	− 27.65	+ 27.13		+ 26.33		+ 31.18	− 30.38
	29 31.96	29 31.15	29 32.43		39 40.86		39 41.31	39 42.35
−16	6 43.61	6 42.80	6 44.08		16 52.51		16 52.96	16 54.00
+58	33 26	34 21	33 27		33 33		33 28	34 31
	1.97261	1.97286	1.97261		1.97264		1.97264	1.97292
	+1044	+1044	+369		−134		−196	−196
	1.98305	1.98330	1.97630		1.97130		1.97068	1.97096
	−96.17	−96.23	−94.69		−93.61		−93.47	−93.53
	+ .09	+ .09	+ .06		+ .06		+ .09	+ .08
	− .57	− .70	− .53		− .55		− .55	− .03
	+ .25	+ .30	+ .25		+ .25		+ .25	+ .01
	−1 36.42	−1 36.56	−1 34.91		−1 33.85		−1 33.64	−1 33.47
−16	8 20.03	7936 35	8 16.99		18 26.36		−18 26.64	18 27.47
	8 19.69	−4 26.78		−4 26.84		+5 40.30	18 27.05	+5 40.46
		−1.5		−1.5		−1.5		−1.5
		+14.7		+15.1		+15.2		+15.3
		−4 13.15		−4 13.24		+5 54.00		+5 54.26
	−16 12 32.84			12 32.23		12 32.36		12 32.79
								−16 12 32.56

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9 Hr. Draconis

	h	m	s
	10	24	25
	+76°	21	20"
	−33	58	32

α_0 24m 35.538s — Apr 10: 24m 43.49s — 20: 51.6"

Corr^n −.15 — 15: 43.18 — 31: 52.6 (10) — log cos δ 9.37289

$\frac{d\alpha}{dt}$ +5.2926 — 20: 42.86 — 32: 53.5 (9) — 15 cos δ sin t 9.49337

May 5: 42.51 — 35: 54.3 (8)

δ_0 20 43.44 — 10: 42.15 — 36: 54.9 (6) — $\frac{I}{I_2}$ 8.72 / 4.36

Corr^n +.8 — 15: 41.78 — 37: 55.4 (5)

$\frac{d\delta}{dt}$ −18.375" — 20: 41.40 — 38: 55.7 (3) — tang δ +4.12 4.22

Rin 2 −.56

1877

	April 12	April 15	April 26	May 3	May 5
X	−.67 −.06	−.64 −.04	−.95	−.80	−.82 −.05
10	22 82.3 / 89.2 / 45.4	23 57.75 / 3.70 / 8.30 / 12.42 / 16.88	23 21.7 / 29.1 / 38.8	23 56.90 / 1.28 / 5.90 / 10.22 / 14.80	22 [illegible] / 120 / 164
23	41.6 / 48.2 / 54.7	21.30 / 25.58 / 29.70 / 34.78	24 41.6 / 48.7 / 57.2	19.05 / 23.27 / 27.70 / 31.95	23 [illegible] / 57.34 / 1.52 / 5.60 / 10.20
		21241 / 15241		19107 / 13107	21116 / 9116
22	39.07		23 29.87		22 11.20
23	48.17	24 16.934 / 24 43.50 / − 26.42 / − 26.27	24 49.17	24 14.563 / 24 43.64 / − 28.60 / − 28.45	24 10.129 / 24 42.20 / − 32.29 / − 32.14
	+29.40 −2.76 −.25 −7.81 +20.58 +24 37.51	18.58 / 35.51	+31.40 −2.64 −.17 −7.68 +23.91 +5 37.52	20.96 / 38.52	+36.01 −3.91 −6.88 +25.22 +5 35.35
					8
					24 43.2 / 52.0 / 58.6
					23 51.27
					+38.48 −3.29 −6.37 +28.82 +5 35.32
					24 45.17
					+37.29 −3.38 −.21 −6.28 +29.47 +5 35.31
					3
					24 58.10 / 24 41.761 / − 35.92 / − 35.77
					24 [illegible] / 24 [illegible] / 24 [illegible] / 24 [illegible] / 24 [illegible]

1877phno.proj.1487

37 Geminae Maj.

$10^h\ 27^m\ 6^s$

$+57^\circ\ 43'\ 31''$

$-\ 15\ 20\ 43$

α_0 — Corr^a — $\frac{d\alpha}{dt}$ — δ_0 — Corr$^\delta$ — $\frac{d\delta}{dt}$

1877 X

April 9 — April 12 — April 15 — April 26 — May 3 — May 5

log cos δ 9.72763

15 corr tan i 9.84811 I 3.86

tang δ +1.58 1.87

sin Z −.26

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Br. 1458
h m s
10 31 4
+81° 5'
−38 48 2

log sin δ 9.99472
log cos δ 9.19033
15 cos δ tan i 9.31081
tang δ + 6.37 6.46
sin z − .63

1877

April 9				April 12				April 15				April 16				April 22				April 23			
			−.65 −.10				−.67 −.06				−.64 −.04				−.70				−.67				−.82
10	29	48.8	30	37.55	29	8.7	30	35.31	29	18.6	30	32.80	28	47.5	30	32.18	28	48.2	30	28.33	28	56.2	30	28.60
		1.0		44.10		18.9		41.76		32.6		39.33		58.4		38.20		54.0		35.40		2.9		35.00
		13.3		57.20		31.3		48.28		46.2		45.80		9.3		44.80		2.1		41.65		14.9		42.20
				57.95				55.00				52.71				52.08				49.10				48.95
				4.20				1.10				58.72				38.53				36.05				56.00
				11.10				8.10				3.58				4.85				2.25				2.00
				17.30				15.65				11.96				11.89				8.64				9.40
				24.15				21.58				18.75				18.60				15.20				15.80
				31.45				28.22				26.00				25.20				22.00				22.45
				27900				25500				29185				28633				25884				26040
30	1.03			3900	29	19.63		1500	29	32.80		33185	28	58.40		32633	28	54.77		49884	29	4.67		30040
			31	4.333			31	1.667			30	59.094			30	58.481			30	55.427			30	55.600
		+27.23				+29.40				+31.40				+32.00				+34.08				+34.77		
		−4.33				−4.27				−4.08				−4.46				−4.27				−5.22		
		−.65				−.39				−.26														
		−1.77				−11.52				−11.22				−11.11				−10.49				−10.38		
		+10.48				+13.22				+15.84				+16.43				+19.32				+19.17		
31		14.81	31			14.89	31			14.93	31			14.91			31	14.75			31	14.77		
																					10h	31m	3	14843
		+63.81				+102.04				+86.29				+112.08				+120.66				+110.93		
		1.80140				2.00877				1.93596				2.08207				2.08156				2.04505		
		1.11221				1.31958				1.24677				1.39288				1.39237				1.35586		
		10 4				10 4				10 4				10 4				10 4				10 4		
☉		43".6				22".8				24".6				17".1				15".4				14".5		
☿		50.2				41.3				41.4				31.8				32.4				29.9		
♀		43.2	43.40			35.7	29.25			36.3	30.45			27.5	22.30			28.0	21.70			26.5	20.80	
♂		55.4				46.3				50.6				43.9				44.9				44.8		
		192.4				146.1				152.9				120.3				120.7				115.7		
	14	43.10			14	36.53			14	38.23			14	30.08			14	30.18			14	28.93		
		+ 12.95				+ 20.87				+ 17.65				+ 24.71				+ 24.68				+ 22.69		
	15	1.05			14	57.40			14	55.88			14	54.79			14	54.86			14	51.62		
+81	7	47.30			7	50.95			7	52.47			7	53.56			7	53.49			7	56.73		
−38	40	50			41	1			41	0			41	8			41	8			41	9		
	1.66340				1.66350				1.66350				1.66350				1.66350				1.66350			
		+1464				+1932				+1095				+731				+1235				+404		
	1.67804				1.68282				1.67445				1.67081				1.67585				1.66754		
		+47.65				+48.17				+47.26				+46.86				+47.41				+46.51		
		− .33				− .87				− .62				− 1.21				− 1.22				− 1.03		
		− .72				− .64				− .64				− .63				− .58				− .58		
		+ .29				+ .28				+ .28				+ .27				+ .27				+ .27		
		+46.89				+46.94				+46.28				+45.29				+45.88				+45.17		
+81	8	24.19	8	37.89	8	38.75	8	38.85	8	39.37	8	41.90												
	3																							
			−4	22.72			−4	25.24			−4	26.35			−4	26.28			−4	26.84			−4	26.84
				+1.1				+1.1				+1.1				+1.1				+1.1				+1.1
				−8.2				−8.8				−9.4				−9.6				−10.6				−10.8
			−4	29.82			−4	32.94			−4	34.65			−4	34.78			−4	36.34			−4	36.54
+81			4	4.37			4	4.95			4	4.10			4	4.07			4	3.03			4	5.36
																							+81°	4' 4.31

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31 Cephei

α 22h 32m 41s

δ +72° 59' 40"

10° 0' 20

− 64 38 32

× 1877

April 9

April 12

April 15

April 16

April 22

April 23

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42 Leonis

h 10 m 38 s 55.

+31° 20' 23"

+11 2 25

Corr^n

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

δ_0

Corr^n

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

log cos δ 9.93154

15 cos δ tan i 0.05202

tang δ +0.61 ~~1.17~~ ~~2.08~~

sin Z +.19

1877

April 9 X −.68 −.10

April 15 X −.64 −.04

April 22 X −.67

April 23 X −.82

April 26 X −.95

May 3 X −.80

	April 9	April 15	April 22	April 23	April 26	May 3
10	38 0.7 2.6 5.1	87 49.4 37.1 23.2	87 37.2 5.28 34.8	38 1.2 4.4 6.3	38 8.6 11.1 13.3	38 11.30 13.62 16.10 20.99
	38 22.85 25.20 27.65 32.60 34.75	38 18.59 21.00 23.35 28.20 30.55	38 15.75 18.30 20.60 25.45 27.90	38 15.15 17.55 19.90 24.75 27.10	38 14.00 16.40 18.67 23.60 26.05	23.45
	39 19.0 21.8 23.4	39 10.0 11.4 13.9	39 5.6 7.2 9.2	38 55.3 57.2 59.1	38 51.6 53.3 55.4	38 51.4 52.7 54.5
	37.28 39.75 42.20 47.00 49.45	83.10 85.45 87.76 42.56 45.20	80.30 82.67 85.20 40.00 42.32	29.63 32.00 34.42 39.20 41.65	28.45 30.80 33.29 38.15 40.35	23.50 28.25 30.65 35.40 37.80
	57.90 41063	47.35 86331	44.60 33329	44.29 32564	42.90 31288	40.20 28356
	38 28.0	37 51.23	37 52.93	38 3.97	38 11.00	38 21.37
	39 21.40	39 11.87	39 7.33	38 57.20	38 53.43	38 52.57
	38 37.330 39 4.068 − 26.74	38 33.028 39 4.007 − 3.098	38 30.299 39 3.923 − 33.62	38 29.604 39 3.911 − 33.43	38 28.444 39 3.575 − 32.43	38 25.778 39 3.784 − 38.01
	+27.23 −.41 −.12 −2.78 +23.99 +39 1.382	+31.39 −.39 −.05 −2.66 +28.30 +1.33	+34.08 −.41 −2.57 +31.10 +1.40	+34.77 −.58 −2.56 +31.71 +1.31	+36.01 −.58 −2.53 +32.91 +1.35	+38.49 −.48 −2.45 +35.58 +1.36
	+34.53	−44.07	+41.80	−38.84	+31.37	−37.03
	1.53820 1.59022 55 2	1.64414m 1.69616m 55 4	1.62118 1.67320 55 2	1.58928m 1.64130m 55 3	1.62454 55 2	1.60857m 55 3
	42.6	11.4	21.0	51.7	24.6	48.1
H	58.4 25.41	23.5	43.1	12.4	45.1	9.3
G	51.3 46.95	20.6 16.00	43.5 32.25	12.5 32.10	45.8 35.20	10.5 29.30
H	56.9	24.6	51.1	21.5	54.9	19.8
	206.2	80.1	158.7	38.1	170.4	27.7
	57 51.55	57 20.02	57 36.68	57 9.52	57 42.60	57 6.92
	+ 38.92 58 30.47	− 49.68 58 30.34	+ 47.12 58 26.80	− 43.78 58 25.74	+ 42.12 58 24.72	− 41.74 58 25.18
+ 38	24 17.88	24 18.01	24 21.55	24 22.61	24 23.63	24 23.17
+11	2 14 1.05040 +1477 1.06517 −11.62	3 42 1.05140 +1477 1.06617 −11.65	2 2 1.05030 +11 32 1.06162 −11.52	3 32 1.05130 +11 32 1.06262 −11.55	2 5 1.05040 +1256 1.06296 −11.56	3 29 1.05130 +1256 1.06386 −11.58
	− .30 − .43 + .17	− .47 − .64 + .26	− .42 − .38 + .16	− .37 − .59 + .25	− .34 − .36 + .18	− .33 − .53 + .25
	−12.18	−12.50	−12.16	−12.26	−12.08	−12.19
+31	24 5.70	5.51	24 9.39	10.35	24 11.55	10.98
+31	24 5.60	− 4 22.72	24 9.87	− 4 26.35	24 11.26	− 4 26.84
	19 41.6	− 0.3	19 42.4	− 0.3	19 43.3	− 0.3
	− 4 24.0	+ 4.0	− 4 27.5	+ 3.2	− 4 28.0	+ 2.4
	22.9	− 4 18.72	26.4	− 4 23.45	26.9	− 4 24.74
31		+19 46.58 .58 5		+19 46.42		+19 46.52

	April 23	April 26	May 3
	38 15.15 17.55 19.90 24.75 27.10	38 14.00 16.40 18.67 23.60 26.05	38 19.2 21.3 23.6
	29.63 32.00 34.42 39.20 41.65	28.45 30.80 33.29 38.15 40.35	32.7 34.5
	44.29	42.90	
	32564	31288	
	38 11.00		38 21.37
	38 29.604 39 3.911 − 34.31	38 28.444 39 3.575 − 32.43	38 25.778 39 3.784 − 38.01
	+34.77 −.58 −2.56 +31.71 +1.31	+36.01 −.58 −2.53 +32.91 +1.35	+38.49 −.48 −2.45 +35.58 +1.36
	−27.60	+17.44	−24.99
	1.44091m 1.49293m 55 3	1.24155 1.29357 5 3	1.39777m 1.44979m 5 3
	38.5	7.2	56.1
	56.0	18.1	7.1
G	57.1 47.80	22.1 14.65	10.1 33.10
H	9.9	2.1	30.0
	224.5	49.5	3.3
	57 55.38	8 12.38	9 0.82
	− 31.11 58 24.27	+ 19.66 8 32.04	− 28.17 8 32.65
	24 24.08	14 16.31	14 15.70
	3 17 1.05120 +429 1.05549 −11.36	2 30 1.05070 − 62 1.05008 −11.22	3 19 1.05120 − 62 1.05058 −11.24
	− .19 − .51 + .23	− .07 − .42 + .19	− .15 − .52 + .24
	−11.83	−11.52	−11.67
	12.25	4.79	4.08
	− 4 26.84	4.41	+ 5 40.30
	− 0.3	43.7	− 1.3
	+ 2.2	+ 5 39.3	+ 1.9
	− 4 24.94	40.4	+ 5 41.90
	+19 47.02		+19 46.31

	April 26	May 3
	38 14.00 16.40 18.67 23.60 26.05	38 19.2 21.3 23.6
	28.45 30.80 33.29 38.15 40.35	32.7 34.5
	42.90	
	31288	
	38 11.00	38 21.37
	38 28.444 39 3.575 − 32.43	38 25.778 39 3.784 − 38.01
	+36.01 −.58 −2.53 +32.91 +1.35	+38.49 −.48 −2.45 +35.58 +1.36
	+17.44	−24.99
	1.24155 1.29357 5 3	1.39777m 1.44979m 5 3
	18.1	7.1
G	22.1 14.65	10.1 33.10
H	2.1	30.0
	49.5	3.3
	8 12.38	9 0.82
	+ 19.66 8 32.04	− 28.17 8 32.65
	14 16.31	14 15.70
	2 30 1.05070 − 62 1.05008 −11.22	3 19 1.05120 − 62 1.05058 −11.24
	− .07 − .42 + .19	− .15 − .52 + .24
	−11.52	−11.67
	4.79	4.08
	+ 5 40.30	+ 5 40.46
	− 1.3	− 0.3
	+ 1.9	+ 1.3
	+ 5 41.90	+ 5 41.46
	+19 46.31	+19 47.08

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Logers δ 9.98384
15 Coïdtani 0,10432

tang δ − 0.28 1.04
sin z + .85

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	April 9		May 5		May 6		May 12
	−.68 −.10		−.82 −.05		−.85 −.07		−.90
	10 42 36.2	42 53.05	42 35.1	42 42.80	42 30.6	42 42.30	
	37.1	57.20	87.3	44.99	33.2	44.50	
	39.9	59.40	38.5	47.20	35.0	46.60	
		3.65		37.45		50.92	
		5.80		53.60		53.00	
	43 42.8	7.90		55.67		83.20	
	44.4	10.05		57.80		57.40	
	46.3	12.28		59.90		57.13	
		16.30		42.0		3.30	
		18.65		62.8		6.00	
		20.80		84.5		8.10	
		26.28		43.234		42.737	
	42 37.93	8.728	42 36.97	61.234	42 32.93	60.737	
	43 44.50	43 7.936		42 55.667		42 55.215	
	+27.23 +.41	19	+39.29 +.58	.23	+38.71 +.52	24	
	−.10		−.05		−.07		
	−1.96		−1.71		−1.70		
	+25.36		+37.76		+38.18		
	43 33.30		43 33.43		43 33.40		
							10h 13m 23.377
	+30.01	−36.56	+18.70		+27.28		
	1.47727	1.56301 n	1.27184		1.34792		
	1.58159	1.67733 n	1.37616		1.45224		
	45 4	50 0	35 4		55 4		53 4
E	15.6	39.5	40.1		33.9		37.8
H	23.1	47.1	57.2		50.6		53.8
4	30.4	55.2	56.1		54.6		58.6
K	29.9	54.7	56.1		30.7		35.6
	94.0	196.5	192.5		169.8		185.8
	49 12.475	50 46.5 49.12	59 48.13		59 42.45		59 46.45
	+ 38.16	− 46.49	+ 23.78		+ 28.33		
	50 29.1	50 26.3	0 11.91		0 10.78		
−15	27 24.56 14.56	27 14.28	37 23.56		37 22.43		
+57	53.47	55 11	54 6		54 0		54 4
	1.96150	1.96190	1.96159		1.96156		
	+1483	+1483	+411		+698		
	1.97633	1.97673	1.96570		1.96854		
	−94.70	−94.78	−92.41		−93.01		
	+ .12	+ .19	+ .05		+ .07		
	− .66	− .12	− .58		− .56		
	+ .26	− .05	+ .29		+ .28		
	−1 34.98	−1 34.76	−1 32.65		−1 33.22		
−15	28 49.54	49.04	38 56.21		38 55.65		
	2849.29	−4 22.72		+5 40.23		+5 40.21	+5 40.27
		−1.6		−1.6		−1.6	−1.5
		+15.0		+16.1		+16.1	
		−4 9.32		+5 54.73		+5 54.71	
−15		32 58.61		23 1.48		33 0.94	
							−15° 33′ 0″34

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46 Leonis Min.

h 10 +34° 4

m 46 53 29

s 19 18 30

Corr'd +3.3723

Corr'd −19.276

1877

April 9 (−.68, −.10)

April 22 (−.67)

April 23 (−.82)

May 6 (−.85, −.07)

May 13 (−.88)

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Ba. 1508 — 20 — m 50 s 37.35 — Apr 20 — m 50 s 12.56 — 25 — 49.9

10h m 49 s 54 — Corr — − .24 — May 5 — 12.18 — 38 — 50.8 9 — log cos δ 9.30213

+78° ′ 26 ″ 20 — dt/dz — +5.0132 — 10 — 11.77 — 41 — 51.6 8 — 15 cos δ sin i 9.42261

− 36 3 32 — δ0 — 25 41.96 — 15 — 11.34 — 43 — 52.2 6 — tang δ + 4.88 4.97

Corr δ — + .7 — 20 — 10.90 — 44 — 52.7 5 — cos z − .59

dδ/dt — −19.150 — 10.45 — 45 — 53.1 4

1877 — 9.99 — 46 — 53.3 2

X −.67 — X −.82 — X −.85 −.07 — X −.88

April 22 — April 23 — May 6 — May 13

10	48	25.3	49	21.52	49	8.9	49	21.80	49	40.8	49	15.30	47	35.6	49	10.35
		31.4		26.10		16.3		26.10		47.0		20.15		42.6		15.80
		43.8		31.40		26.5		31.29		59.0		25.79		49.3		20.50
				36.63				36.30				31.14				25.65
				41.28				41.30				35.28				31.00
	50	17.7		46.23	50	10.5		46.95	50	57.2		40.20	51	6.8		36.10
		25.0		51.48		19.0		51.70		57.7		46.53		16.3		41.15
		36.2		56.38		28.0		56.88		6.2		51.60		24.8		46.40
				2.05				1.72				56.68				51.35
				31.307				31.354				32.294				27.850
	48	33.60		37.307	49	15.57		37.354	49	48.93			47	42.50		
	50	26.30	49	41.452	50	19.17	49	41.504	50	59.03	49	35.882	51	13.97	49	30.944
			50	12.389			50	12.312			50	11.230			50	10.608
				30.94		7		30.81				35.35				39.66
		+34.08		30.70		+34.78		30.57		+37.72		35.11		+43.56		39.42
		−3.27				−4.00				−4.15				−4.29		
										−.35						
		−8.65				−8.57 8				−7.49				−6.87		
		+22.16				+22.19				+27.73				+32.46		
+50		3.61				+3.69				+3.61				+3.34		
		+6785		−4483		+25.93		−37.67		−13.05		−8315		+108.44		−10503
		1.83155		1.65176n		1.41380		1.57600n		1.11561n		1.91986n		2.03519		2.02131n
		1.25416		1.07437n		0.83641		0.99486n		0.58822n		1.34247n		1.45780		1.44392n
		50 2		50 3		50 2		50 3		0 3		0 3		0 2		0 3
E		41.1		10.9		51.4		8.0		20.3		38.1		42.1		41.4
N		38.0		28.4		6.1		22.9		29.1		46.1		53.4		49.9
E		55.8	48.45	25.5	18.20	4.9	58.15	22.0	15.00	29.1	24.70	47.5	47.60	54.9	49.05	50.1	45.75
N		11.1		40.3		22.1		38.8		14.9		31.8		39.4		35.9
		226.0		105.1		34.5		91.7		93.4		163.5		190.8		172.3
	52	56.50	53	26.28	52	54.13	53	22.93	3	23.35	3	40.88	2	47.70	3	44.33
	+	17.95	−	11.87	53	6.13	−	9.97	−	3.45	−	22.00	+	28.69	−	27.79
	53	14.45	53	14.41	53	12.99	53	12.96	3	19.90	3	18.88	3	16.39	3	16.54
48																
+ 77	29	33.90	29	33.94	29	35.36	29	35.39	19	28.45	19	29.47	19	31.96	19	31.81
											2					
−36	2	42	2	12	2	32	2	15	2	19	3	1	2	54	1	58
	1.62200		1.62190		1.62195		1.62190		1.62190		1.62180		1.62210		1.62180	
	+1284		+1284		+463		+463		+711		+711		−445		−445	
	1.63484		1.63474		1.62658		1.62653		1.62901		1.62891		1.61445		1.61715	
	+43.14		+43.13		+42.32		+42.32		+42.56		+42.55		+41.44		+41.41	
	− .50		− .22		− .07		− .16		− .02		− .73		− 1.25		− 1.16	
	− .38		− .44		− .40		− .44		− .41		− .44		− .34		− .44	
	+ .17		+ .20		+ .19		+ .20		+ .20		+ .22		+ .17		+ .22	
	+42.43		+42.67		+42.04		+41.92		+42.33		+41.60		+40.92		+40.83	
+78	30	16.33	16.61		30	17.40	17.31		20	10.78	11.07		20	11.98	11.84	
+78	30	16.47	− 4	26.84	30	17.36	− 4	26.84	20	10.92	+5	40.21	20	11.91	+5	40.49
	25	50.3		+1.1	25	50.5		+1.1	25	52.3		+1.0	25	53.0		+1.0
	−4	26.2		−8.3	−4	26.9		−8.5	+5	41.4		−10.3	+5	41.1		−11.1
		25.5				26.2				42.1				41.8		
			− 4	34.04			−4	34.24			+5	30.91			+5	30.39
78			+25	42.43			+25	43.17			+25	41.83			+25	42.30

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h 10 m 54 s 17
+57° 3' 6"
− 14 40 18

1877

	April 22	April 23	May 6	May 13
	−.67	−.82	−.85 −.07	−.88
10	53 6.7 9.8 12.4	53 32.65 36.35 40.15 47.65	53 29.4 33.5 36.4	53 32.05 35.95 39.70 47.28
		57.60		57.10
	54 23.3 26.9 29.7	54 55.40 59.10 2.95 10.53	54 26.7 29.6 31.8	54 54.80 58.70 2.35 10.00
		14.40 18.00		13.70 17.50
		36.878 60.878		36.333 60.333
	53 9.63 54 26.63	53 55.344 54 28.320 − 32.98 − 33.01	53 33.10 54 29.17	53 54.848 54 28.298 − 33.45 − 33.48
	+34.78 −1.03		+34.78 −1.26	
	−3.84 +29.21 +54 24.55		−3.82 +29.70 +24.55	

	May 6	May 13
10	53 2.6 3.2 8.7	53 0.1 3.6 7.0
	54 27.8 31.1 34.6	54 30.9 24.3 27.7
	53 5.50 54 31.17	53 3.67 54 24.30
	+39.72 −1.31 −.13	+43.67 −1.36
	−3.51 +34.77 +24.45	−3.32 +38.88 +24.47

	1877 April 22	April 23	May 6	May 13
	+45.71	−31.29	+21.75	−34.32
	1.66001	1.49541 n	1.33746	1.53555 n
	1.51624	1.35161 2	1.19366	1.39175 n
	15 0	15 1	15 0	15 1
ε	15.3	11.4	33.5	12.3
η	33.2	28.8	47.2	28.1
ϑ	34.9 25.10	29.9 20.65	30.4 41.95	29.9 21.10
κ	43.1	40.1	0.9	40.9
	126.5	110.2	192.0	111.2
	15 31.62	16 27.55	15 48.00	16 27.80
	+ 32.83	− 22.47	+ 15.62	− 24.65
	16 4.45	16 5.08	16 3.62	16 3.15
+ 57	6 43.90	6 43.27	6 44.73	6 45.20
− 14	40 6	39 10	39 50	39 10
	1.17810	1.17770	1.17800	1.17770
	+1297	+1297	+475	+475
	1.19107	1.19067	1.18275	1.18245
	+15.53	+15.51	+15.23	+15.22
	− .52	− .25	− .12	− .30
	− .06	− .19	− .10	− .19
	+ .03	+ .09	+ .05	+ .09
	+14.98	+15.16	+15.26	+14.82
+57	6 58.88	58.43	6 59.79	60.02
+57	6 58.66	−4 26.84	6 59.90	−4 26.84
	2 31.0	+.04	2 31.2	+0.4
	−4 27.7	−3.5	−4 28.7	−3.7
	26.5		27.5	
		−4 29.94		−4 30.14
57		+2 28.72		+2 29.76

	May 6	May 13
	+41.49	+41.92
	1.61794 n	1.62242
	1.47414 2	1.47862
	25 1	25 0
ε	35.1	34.5
η	44.1	41.4
ϑ	47.4 41.25	47.9 41.20
κ	27.9	26.9
	154.5	150.7
	25 38.62	25 37.68
	− 29.79	+ 30.10
	26 8.83	26 7.78
	56 39.52	56 40.57
	40 5	40 4
	1.17810	1.17760
	+719	−452
	1.18529	1.17358
	+15.30	+14.91
	− .43	− .44
	− .19	− .07
	+ .10	+ .04
	+1478	+1444
	5430	56 55.01
+5	40.21	56 54.99 +5 40.49
	+0.4	2 33.4 +0.4
	−5.6	+5 38.9 −6.5
		40.1
+5	35.00	+5 34.39
+2	29.78 .13	+2 29.38

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+62° 25' 30"
− 20 2 42

α_0 | Corr α | $\frac{d\alpha}{dt}$ | δ_0 | Corr δ | $\frac{d\delta}{dt}$

m s
56 7.355 | + .04 | +3.7579 | 24 5.64 | + 1.1 | −19.367

Apr 10 15 20 25 30 | May 5 10 15 20

m s
56 12.03
11.91
11.78
11.64
11.50
11.34
11.18
11.01
10.83

12 13 14 14 16 16 17 18

24'
53.7
54.8 11
55.8 10
56.7 9
57.5 8
58.2 7
58.8 6
59.3 5
59.7 4

log cos δ 9.66562
15 cos δ tan 9.78610
tang δ +1.91 2.16
sin z −.34

I 1.45

1877

April 22		April 23		May 5		May 7		May 13	
X −.67		X −.82		X −.82 −.05		X −.88		X −.88	
10 13 47.3	85 80.20	53 24.5	55 29.75	54 47.3	55 24.84	55 11.2	55 3.88	53 1.2	55 2.34
51.3	82.53		31.75	42.5	26.90	14.3	10.60	4.0	7.02
53.6	84.40		34.05	33.9	28.92	17.3	15.10	7.7	11.29
	86.38		36.30		31.69		24.00		20.30
	88.80		38.40		33.79		28.52		24.60
56 40.7	91.10	56 32.8	40.70	56 17.3	36.00	56 12.2	32.58	54 1.6	29.30
45.4	93.40	37.0	42.93	22.5	38.09		37.33	5.6	32.60
49.4	95.90	40.5	45.74	25.9	40.40		41.83	9.6	38.10
	97.80		47.49		42.60		50.85		47.17
							53.20		51.53
							59.65		57.70
	350.71		346.51		303.23		361.76		321.15
55 57.40		55 24.50		54 50.23		55 14.27		53 4.31	
56 45.17	55 389.68	56 36.77	55 388.51	56 21.90	55 336.92	56 15.20	55 328.87	54 5.60	55 291.95
	56 117.17		56 116.89		56 113.32		56 112.68		56 110.70
	− 32.75		− 33.19		− 37.64		− 38.38		− 41.88
	− 32.79		− 33.23		− 37.68		− 38.42		− 41.92
+34.08		+34.78		+37.28		+40.16		+43.52	
−1.28		−1.57		−1.57		−1.68		−1.68	
				−.11					
−4.36		−4.33		−3.98		−3.91		−3.72	
+28.44		+28.88		+33.62		+34.57		+38.16	
+56 7.41		+7.38		+7.31		+7.46		+7.36	

	−12.43	−6.20	+14.00	−58.27	+43.46	−48.21	+18.62	−42.31	+24.89	−36.41
	1.09447n	1.82086n	1.14613	1.76544n	1.63809	1.68314n	1.26998	1.62644n	1.39602	1.56122n
	0.88057n	1.66696n	0.93223	1.55154n	1.42419	1.46924n	1.05608	1.41254n	1.18212	1.34732n
	30 3	30 4	30 3	30 4	0 3	0 4	0 3	0 4	0 3	0 4
E	38.4	10.5	22.1	5.6	21.1	16.7	36.5	11.1	31.3	8.1
F	54.4	27.0	35.9	19.4	28.1	23.1	43.9	19.1	38.1	15.2
G	53.1 46.75	26.5 18.50	38.1 30.10	20.4 13.00	31.1 26.10	26.1 21.40	47.9 42.20	21.8 16.45	42.436 85	18.9 13.50
K	6.8	39.5	51.3	35.5	13.9	9.2	27.9	3.9	24.1	1.4
	214.7	103.5	147.4	80.9	94.2	75.1	156.2	55.0	135.9	43.6
	53 53.68	54 25.88	53 36.85	53 20.22	3 23.55	4 18.78	3 39.05	4 13.98	3 33.98	4 10.90
	− 7.60	− 40.45	+ 8.56	− 35.61	+ 24.56	− 29.46	+ 11.38	− 25.85	+ 15.21	− 22.25
	53 46.08	53 45.43	53 45.41	53 44.61	3 50.11	3 49.32	3 50.43	3 48.13	3 49.19	3 48.65
+62	29 2.27	29 2.92	29 2.94	29 3.74	18 58.24	18 59.03	18 57.92	19 0.22	18 59.16	18 59.70
−20	1 44	1 12	2 1	1 18	2 18	1 23	2 3	1 28	2 8	1 31
	1.32200	1.32180	1.32210	1.32180	1.32220	1.32190	1.32210	1.32190	1.32190	1.32190
	+1302	+1302	+1481	+1481	+1451	+1451	+1324	+1324	−1447	−1447
	1.33502	1.33482	1.32691	1.32661	1.32671	1.32641	1.32534	1.32514	1.31763	1.31743
	+21.63	+21.62	+21.23	+21.21	+21.22	+21.20	+21.15	+21.14	+20.78	+20.77
	− .03	− 98	− .04	− .76	− .42	− .53	− .09	− .41	− .15	− .60
	− .51	− .57	− 47	− .56	− .41	− .52	− .44	− .50	− .43	− .50
	+ .23	+ .26	+ .22	+ .26	+ .20	+ .26	+ .22	+ .25	+ .22	+ .25
	+21.32	+20.33	+20.94	+20.15	+20.59	+20.41	+20.84	+20.48	+20.42	+20.22
+62	29 23.59	23.25	29 23.88	23.89	19 18.83	19.44	19 18.76	20.70	19 19.58	19.92
+62	29 23.42	− 4 26.84	29 23.88	− 4 26.84	19 19.14	+ 5 40.23	19 19.73	+ 5 39.92	19 19.75	+ 5 40.49
	24 56.2	+ 0.6	24 56.4	+ 0.6	24 58.2	+ 0.6	24 58.5	+ 0.6	24 59.1	+ 0.6
	− 4 27.2	− 4.6	− 4 27.5	− 4.8	+ 5 39.1	− 6.6	+ 5 38.8	− 6.8	+ 5 39.3	− 7.5
	26.1		26.4		40.2		39.9		40.4	
		− 4 30.84		− 4 31.04		+ 5 34.23		+ 5 33.72		+ 5 33.59
62		+24 52.58		+24 52.84		+24 53.37		+24 53.45		+24 53.34

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X Leonis

α 10 h 58 m 34 s

δ +8° 0' 40"

λ +34 22 08

α_0 58 40289 s

Corr$_\alpha$ +.01

$\frac{d\alpha}{dt}$ +3.0968 s

δ_0 0 0.86 "

Corr$_\delta$ +1.1 "

$\frac{d\delta}{dt}$ −19.398 "

Apr 10 15 20 25 30 May 5 10 15 20

58 42.89 42.54 42.50 42.46 42.42 42.37 43.32 43.27 42.21

3 4 4 5 5 5 6

59 49.9 50.1 50.3 50.5 50.8 51.1 51.4 51.7 52.0

2 2 2 3 3 3 3

log cosδ 9.99575

15 cosδ tanι 0.11623

tanδ +0.14 1.01

ecc z +.56

1877

X −.67 April 22

X −.82 April 23

X −.88 May 7

	April 22		April 23		May 7	
10	58 06	57 56.05	57 45.7	57 53.88	57 44.8	57 49.90
	2.3	58.20	47.3	57.45	46.5	52.07
	4.6	0.30	49.1	59.55	48.2	54.05
		4.40		3.60		58.25
		6.45		5.75		0.25
		8.45	58 42.1	7.70	58 24.2	2.40
		10.55	43.5	9.90	26.0	4.45
		12.70	45.4	12.07	28.0	6.50
		16.90		16.05		10.70
		18.90		18.25		12.78
		20.95		20.30		14.81
		21385		26620		26618
	38 2.50	9385	37 47.37	8620	57 46.40	2618
		58 8.532	58 4.364	58 7.836	58 26.07	58 23.80
		58 42.482		58 42.474		58 42.348
		− 33.95		− 34.64		− 39.97
	+34.08	− 33.96	+34.78	− 34.65	+44.16	− 39.98
	−.09		−.11		−.12	
	−2.19		−2.18		−2.06	
	+31.80		+32.49		+37.98	
	+58 40.33		+40.33		+40.36	
	+603		+2047	−3583	+1598	−2369
	0.78032		1.31112	1.55425 n	1.20358	1.37456 n
	0.89655		1.42735	1.67048 n	1.31981	1.49079 n
	15 2		15 2	15 3	25 2	25 3
ε	14".8		3".1	15".1	28".4	19".1
η	42.3		23.4	35.4	42.8	34.4
γ	44.6 32.20		25.9 14.50	38.8 26.95	46.5 37.45	37.4 28.25
κ	49.8		35.2	47.8	22.9	14.8
	156.5		87.6	137.1	140.6	105.7
	17 39.13		17 21.90	18 34.28	27 35.15	28 26.42
	+ 7.88		+ 26.75	− 46.83	+ 20.88	− 30.96
	17 47.01		17 48.65	17 47.45	27 56.03	27 55.46
+8	5 1.34		4 59.70	5 0.90 +7	54 52.32	54 52.89
+34	22 1		21 44	22 56	21 53	22 44
	1.59580		1.59490	1.59530	1.59500	1.59520
	+1310		+490	+490	+327	+327
	1.60810		1.59980	1.60020	1.59827	1.59847
	−40.56		−39.79	−39.83	−39.65	−39.67
	− .01		− .03	− .09	− .02	− .04
	− .35		− .31	− .47	− .31	− .41
	+ .16		+ .14	+ .22	+ .16	+ .20
	−40.76		−39.99	−40.17	−39.82	−39.92
+8	4 20.58		4 19.71	20.73	54 12.50	12.97
		−4 26.84	4 20.22	−4 26.84	54 12.74	+5 39.92
	59 50.4	− 1.0	59 50.4	− 1.0	59 51.2	− 0.9
	−4 30.2	+10.5	−4 29.8	+10.5	+5 38.5	+9.7
	29.1		28.7		39.6	
		−4 17.34		−4 17.34		+5 48.72
		+0 3.24		+0 2.88		+0 1.46

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ψ Ursae Maj.

h m s
11 2 38
+45° 10' 33"
− 2 47 45

α₀
Corr α
dα/dt
δ₀
Corr δ
dδ/dt = −19.5"/2

1877

	April 22 (X −.67)	April 23 (X −.82)	May 7 (X −.88)	May 13 (X −.88)	May 16 (X −1.03)
	11 1 24.4 / 26.7 / 29.3	1 36.70 / 39.70 / 42.65 / 8.40 / 11.33	1 37.2 / 39.8 / 42.0	1 36.20 / 39.00 / 42.00 / 8.00 / 10.80	1 46.1 / 48.2 / 51.0
	3 3.8 / 5.7 / 8.8	1 44.0 / 17.20 / 20.15 / 26.25 / 28.94 / 32.00	2 ~~40.0~~ 42.4	1 27.70 / 16.68 / 19.70 / 23.60 / 28.40 / 31.85	2 30.4 / 33.9 / 36.2
		1 27772 / 15772	1 39.67	1 27143 / 15143	1 48.43
	3 6.10	2 14.338 / 2 47628 / − 3329 / − 33.38	2 ~~21.50~~ 42.40	2 13.766 / 2 47614 / − 3385 / − 3394	2 33.50
		+34.08 / −.67	+39.78 / −.82	+40.16 / −.88	
		−3.15 / +30.26 / +2 44.60	−3.13 / +31.82 / ~~+29.69~~ / ~~+45.57~~ 44.59 / 4	−2.91 / ~~+33.37~~ / +36 / +44.51	

	April 22 (X −.67)	April 23 (X −.82)	May 7 (X −.88)	May 13 (X −.88)	May 16 (X −1.03)
	1 24.4 / 26.7 / 29.3	1 36.70 / 39.70 / 42.65 / 8.40 / 11.33	1 37.2 / 39.8 / 42.0	1 36.20 / 39.00 / 42.00 / 8.00 / 10.80	1 46.1 / 48.2 / 51.0
	3 3.8 / 5.7 / 8.8	1 44.0 / 17.20 / 20.15 / 26.25 / 28.94 / 32.00	2 ~~40.0~~ 42.4	1 27.70 / 16.68 / 19.70 / 23.60 / 28.40 / 31.85	2 30.4 / 33.9 / 36.2
		1 27772 / 15772	1 39.67	1 27143 / 15143	1 48.43
	3 6.10	2 14.338 / 2 47628 / − 3329 / − 33.38	2 ~~21.50~~ 42.40	2 13.766 / 2 47614 / − 3385 / − 3394	2 33.50
		+34.08 / −.67	+39.78 / −.82	+40.16 / −.88	
		−3.15 / +30.26 / +2 44.60	−3.13 / +31.82 / ~~+29.69~~ / ~~+45.57~~ 44.59 / 4	−2.91 / ~~+33.37~~ / +36 / +44.51	

	May 7 (X −.88)	May 13 (X −.88)	May 16 (X −1.03)
	1 50.75 / 53.55 / 56.50 / 2.30 / 5.20	1 39.2 / 31.3 / 33.3	1 47.01 / 50.00 / 53.00 / 58.80 / 1.73
	2 8.04 / 33.9 / 11.00 / 13.94 / 16.80 / 22.70 / 25.75	2 34.8 / 37.4 / 40.0	2 46.78 / 49.69 / 7.60 / 10.49 / 16.34 / 19.40 / 22.30
	1 48.43	1 31.27	1 29146 / 5146
	2 33.50	2 37.40	2 46.78 / 2 47282 / − 4260 / − 42.69
	+40.16 / −.88	+43.56 / −.88	+44.64 / −1.03
	−2.91 / ~~+35.37~~ / +3.6 / +44.51	−2.88 1 / +39.87 / +44.55	−2.74 5 / +48.86 / +44.56

	May 16 (X −1.03)
	2 17.4 / 19.7 / 22.2
	2 35.6 / 38.0 / 40.6
	2 19.77
	2 38.07
	2 3.702 / 2 47225 / − 4352 / − 43.61
	+44.64 / −1.03
	−2.74 5 / +48.86 / +44.56

	+.4754	−51.76	+34.10	−.2863	+19.71	−25.36	+33.41	−32.42	−16.07	−34.37
	1.67706	1.71399 n	1.53275	1.45682 n	1.29469	1.40415 n	1.52388	1.51481 n	1.20602 n	1.53618 n
	1.64576	1.68269 n	1.50145	1.42552	1.26339	1.37285 n	1.49258	1.48351 n	1.17192 n	1.50206 n
	5 2	5 4	5 2	5 3	15 3	15 3	15 2	15 3	15 3	15 4
ε	26.5	0.1	40.4	40.4	10.8	53.7	57.5	48.7	43.1	1.1
I	46.4	18.9	56.6	55.3	20.2	1.9	6.6	7.7	52.1	10.1
G	47.4 36.95	19.39.70	58.9 49.65	55.2 49.30	24.1 17.45	5.9 59.80	12.1 4.80	12.15.40	59.1 51.10	16.1 8.60
H	57.1	29.8	11.1	10.8	3.6	46.5	51.9	52.2	37.9	56.0
	1774	68.1	227.0	224.7	58.7	228.0	8.1	10.7	194.2	23.3
	7 44.35	9 17.03	7 56.75	8 54.18	18 14.68	18 57.07	15 2.02	19 2.65	18 48.85	19 5.83
	+ 44.23	− 48.16	+ 31.73	− 2664	+ 18.34	− 23.60	+ 31.09	− 30.44	− 14.86	− 31.77
	8 28.58	8 28.87	8 28.48	8 29.54	18 33.02	18 33.40	18 33.11	18 32.24	18 33.19	18 34.06
+45	14 19.77	14 19.48	14 19.87	14 18.81	4 15.33	4 14.95	4 15.24	4 16.11	4 15.16	4 14.29
− 2	47 54	46 21	47 41	46 42	47 27	46 45	47 46	46 39	46 54	46 36
	0.44940	0.44530	0.44890	0.44630	0.44810	0.44630	0.44890	0.44610	0.44680	0.44610
	+1319	+1319	+1501	+1501	+1332	+1332	−1428	−1428	−1674	−1674
	0.46259	0.45849	0.45391	0.45131	0.45142	0.44962	0.44462	0.44182	0.43006	0.42936
	+ 2.90	+ 2.87	+ 2.84	+ 2.83	+ 2.83	+ 2.82	+ 2.78	+ 2.77	+ 2.70	+ 2.69
	− .61	− .73	− .32	− .21	− .11	− .17	− .31	− .29	− .07	− .32
	− .35	− .56	− .38	− .51	− .38	− .47	− .36	− .48	− .46	− .49
	+ .16	+ .26	+ .17	+ .23	+ .19	+ .24	+ .18	+ .24	+ .23	+ .25
	+ 2.10	+ 1.84	+ 2.31	+ 2.34	+ 2.53	+ 2.42	+ 2.29	+ 2.24	+ 2.40	+ 2.13
+45	14 21.87	21.32	14 22.18	21.22 ~~20.31~~	4 17.86	17.37	4 17.53	18.35	4 17.56	16.42
+45	14 21.60	− 4 26.84	14 ~~21.24~~ 21.70	− 4 26.84	4 17.62	+ 5 39.92	4 17.94	+ 5 40.49	4 16.99	+ 5 41.66
	9 54.1	+ 0.1	9 54.2	+ 0.1	9 56.3	+ 0.1	9 56.9	+ 0.1	9 57.2	+ 0.1
	− 4 27.5	+ 0.3	− 4 27.8	+ 0.1	+ 5 38.7	− 1.9	+ 5 39.0	− 2.5	+ 5 40.2	− 2.8
	26.3		26.3	+ 0.2	39.9		40.2		41.34	
		− 4 26.44		− 4 26.54		+ 5 38.12		+ 5 38.09		+ 5 38.96
45		+ 9 55.16		+ 9 55.16		+ 9 55.74		+ 9 56.03		+ 9 55.95

lg cos δ	9.84522
15 cos δ tan i	9.96870 / 9.96590
tan g δ	+ 1.00
cos i	− .05

this may 14 after II I 2.93
1.42

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S. Leonis

11 h 7 m 27 s

+21° 12' 29"

+ 21 10 19

Corr^a

dδ/dt

δ₀

Corr^d

dΔ/dt

Apr 10: m 7 338.7 s; +.04; +3.2016; 11 49.57; +.8; −19.682

Apr 15 / 20 / 25 / 30

May 5 / 10 / 15 / 20

m 7 3643 / 3640 / 3636 / 3632 / 3627 / 3622 / 3617 / 3611 / 3605

11 41.1 / 41.6 / 42.1 / 42.6 / 43.1 / 43.6 / 44.0 / 44.5 / 44.9

Logers 8 9.96957

15 cos Stanc 0.09005

tang δ +0.39 1.07

sin z +.36

1877

	April 22		April 23		April 26		May 3		May 7		May 12	
	X −.67		X −.82		X −.95		X −.80		X −.88		X −.90	
11	6 22.0	6 49.35	6 35.0	6 48.70	6 34.0	6 47.45	6 32.8	6 44.80	6 30.9	6 43.02	6 26.6	6 40.29
	24.0	57.59	37.2	50.85	36.3	49.63	34.4	47.03	32.5	45.29	28.0	42.53
	26.1	58.70	39.2	52.10	38.5	51.88	36.4	49.20	34.5	47.53	29.8	44.63
		58.10		53.45		56.20		53.68		51.97		49.14
		0.40		53.60		58.40		55.35		54.12		57.38
	7 40.2	2.35	7 24.2	1.85	7 23.0	0.70	7 16.5	58.08	7 24.3	56.33	7 17.4	53.65
	42.5	4.80	26.3	4.10	24.9	2.89	18.3	0.30	26.6	58.44	17.2	55.83
	44.8	6.95	28.3	6.30	27.1	5.00	20.1	2.49	28.6	0.70	19.1	58.00
		11.40		10.70		4.53		6.40		3.25		2.40
		13.65		12.95		11.80		9.00		7.39		4.35
		15.80		15.00		13.98		11.33		9.60		6.90
		26.829		32.060		30.746		33.866		37.964		40.934
	6 24.03	28.29	6 37.13	32.60	6 36.27	30.746	6 34.53	33.866	6 32.63	37.964	6 27.93	40.934
	7 42.50	7 25.72	7 26.27	7 18.73	7 25.00	7 0.678	7 18.30	6 58.060	7 26.50	6 56.331	7 17.23	6 53.576
		7 36.342		7 36.334		7 36.308		7 36.238		7 36.198		7 36.143
		− 33.777		− 34.46		− 35.63		− 38.18		− 39.87		− 42.57
	+34.08	− 33.81	+34.78	− 34.60	+36.00	− 35.67	+38.49	− 38.22	+40.16	− 39.91	+42.95	− 42.61
	−.26		−.32		−.37		−.31		−.34		−.35	
	−2.48 7		−2.45 6		−2.43		−2.36		−2.32		−2.26 7	
	+31.35		+32.60		+33.20		+35.62		+37.50		+40.33	
	+7 33.42		+33.87		+33.88		+33.88		+33.83		+33.918	
	+38.54	−39.93	+24.74	−24.40	+24.41	−24.37	+23.53	−20.24	+23.70	−30.17	+25.645	−23.665
	1.58591	1.60130 n	1.39340	1.38739 n	1.38757	1.38596 n	1.37162	1.30621 n	1.34476	1.47958 n	1.40909	1.37383 n
	1.67596	1.69135 n	1.48345	1.47744 n	1.47762	1.47601 n	1.46167	1.39626 n	1.46480	1.56963 n	1.49914	1.46388 n
	5 0	5 1	5 0	5 1	15 0	15 1	15 0	15 1	15 0	15 1	15 0	15 1
E	8.5	44.4	26.8	27.6	46.9	47.6	47.2	39.9	46.1	52.8	42.9	43.5
F	31.5	6.4	46.1	47.0	58.0	59.4	59.9	54.2	59.1	5.7	55.4	56.3
G	31.3 19.90	7.1 55.75	47.7 37.25	47.9 37.75	2.4 54.65	2.1 54.85	1.9 54.55	54.6 47.25	1.5 53.80	7.8 0.30	59.3 51.10	59.4 51.45
H	41.6	15.7	59.6	0.9	40.1	41.1	41.1	34.9	40.9	47.1	39.2	39.3
	112.9	13.6	180.2	183.4	207.4	210.2	210.1	183.6	207.6	233.4	196.8	198.5
	5 28.3 7 3.40	5 45.05	6 45.85	15 51.85	16 52.55	15 52.52	16 45.90	15 51.90	16 58.35	15 49.20	16 49.62	
	+ 47.42	− 49.13	+ 30.44	− 30.02	+ 30.03	− 29.92	+ 28.95	− 24.90	+ 29.16	− 37.12	+ 31.56	− 29.10
	6 15.65	6 14.27	6 15.49	6 15.83	16 21.88	16 22.63	16 21.47	16 21.80	16 21.06	16 21.23	16 20.76	16 20.52
+ 21	16 32.70	16 34.08	16 32.86	16 32.52	6 26.47	6 25.72	6 26.88	6 27.35	6 27.29	6 27.12	6 27.59	6 27.83
+ 21	9 50	11 25	10 7	11 8	10 10	11 11	10 11	11 4	10 10	11 16	10 7	11 8
	1.34810	1.34870	1.34820	1.34860	1.34830	1.34870	1.34830	1.34860	1.34830	1.34870	1.34820	1.34860
	+1337	+1337	+522	+522	+53	+53	−17	−17	+341	+341	+317	+317
	1.36147	1.36207	1.35342	1.35382	1.34883	1.34923	1.34813	1.34843	1.35171	1.35211	1.35137	1.35177
	−22.99	−23.02	−22.56	−22.58	−22.33	−22.35	−22.29	−22.31	−22.48	−22.50	−22.46	−22.48
	− .27	− .29	− .11	− .11	− .11	− .11	− .16	− .07	− .11	− .16	− .12	− .11
	− .06	− .27	− .10	− .23	− .12	− .25	− .12	− .23	− .11	− .24	− .10	− .22
	+ .03	+ .07	+ .05	+ .11	+ .05	+ .11	+ .05	+ .11	+ .05	+ .12	+ .05	+ .11
	−2329	−2351	−2272	−2281	−2251	−2260	−2246	−2257	−2265	−2278	−2263	−2270
+21	16 9.41	10.57	16 10.14	9.71	6 3.96	3.12	6 4.42	4.85	6 4.64	4.34	6 4.96	5.13
+21	16 9.99	−4 26.84	16 9.92	−4 26.84	6 3.54	+5 40.30	6 4.64	+5 40.46	6 4.49	+5 39.62	6 5.04	+5 40.27
	11 42.3	−0.6	11 42.4	−0.6	11 42.7	−0.6	11 43.4	−0.6	11 43.8	−0.6	11 44.2	−0.6
	−4 27.7	+7.3	−4 27.5	+7.2	+5 39.2	+6.9	+5 38.8	+6.1	+5 39.3	+5.8	+5 39.2	+5.4
	26.9		26.7		400		396		40.1		400	
		−4 20.14		−4 20.24		+5 46.60		+5 45.96		+5 45.12		+5 45.07
21		+11 49.85		+11 49.68		+11 50.14		+11 50.60		+11 49.61		+11 50.11

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1877phae.proj.14877

N.A.

S Hydrae et Crat.

	h	m	s			m	s			′	″		
	11	13	5	α	0	13	11.553	Apr 29		13	13.50		
					s			May 4	.46	−4	3.3 −1	logcosδ	9.98671
				dt/dt			+2.996	9	13.41	5	3.4 0		
	−	14	° 6 ′ 15 ″					14	.36	5	3.4 +1	1Secant i	0.10719 (Zero May 14
				δ	0	6	46.60	19	13.31		3.3		0.10437 after) I 2.12
	+	56	29 03									tang δ	−0.25 1.03
				dδ/dt			−19.44					sin z	+.83

1877

	April 26			May 13			May 16		
	−.95			−.88			−1.03		
	11 12 31.2	12 24.58		12 8.4	12 16.82		12 33.2	12 15.70	
	33.5	26.70		5.0	18.85		34.6	17.80	
	8.58	28.80		6.8	21.03		36.5	20.00	
		33.20			25.35			24.27	
		31.30			27.60			26.30	
	13 1.22	37.30		12 53.2	29.71		12 48.4	28.80	
	14.9	39.40		55.0	31.75		50.3	30.60	
	16.4	41.38		56.8	33.80		52.1	32.88	
		45.82			38.10			37.00	
		47.90			40.20			39.20	
		50.10			42.30			41.34	
		41068			32550			31351	
	12 33.50			12 5.07			12 34.77		
	13 14.83	12 37.35		12 55.00	12 29.591		12 50.27	12 28.501	
		13 13.52			13 13.37			13 13.34	
	+36.00			+43.56			+44.63		
	+.24			+.22			+.26		
	−1.97			−1.82			−1.79		
	+34.27			+41.96			+43.11		
	13 11.60			13 11.55			13 11.61		
								h m s	
								11 13 11.587	
	+3.83	−37.50		+24.52	−25.41		6.27	−21.77	
	0.58320	1.57403n		1.38952	1.40500n		0.79727n	1.33786n	
	0.69039	1.68122n		1.49671	1.51219n		0.90166n	1.44225n	
	30 3	30 4		30 3	30 4		30 3 [4]	30 4	
	52.0	44.5		27.1	29.9		7.5	28.0	
	6.6	39.5		41.0	44.3		22.1	42.9	
51.45	13.1 32.55	5.9 55.20		47.4	31.4		29.9	49.9	
	45.4	38.8		24.3	28.4		6.8	26.9	
	237.1	208.7		139.8	154.0		[134] 66.3	147	
	33 59.28	34 52.18		33 34.95	34 38.50		[25] 16.58	34 36.93	
	+ 4.90	− 48.00		+ 31.38	− 32.52		− 7.97	− 27.69	
	34 4.18	34 4.18		34 6.33	34 5.98		34 8.61	34 9.24	
−14	11 15.83	11 15.83		11 17.98	11 17.63		11 20.26	11 20.89	
+56	28 17	29 10		27 53	28 57		28 35	28 55	
	1.93792	1.93816		1.93781	1.93808		1.93800	1.93808	
	+ 70	+ 70		− 397	− 397		− 1634	− 1634	
	1.93862	1.93886		1.93384	1.93411		1.92166	1.92174	
	−86.82	−86.87		−85.87	−85.92		−83.50	−83.51	
	+ .00	+ .18		+ .08	+ .08		+ .01	+ .06	
	− .52	− .64		− .43	− .55		− .52	− .55	
	+ .24	+ .29		+ .22	+ .28		+ .26	+ .28	
	10								
	−1 27.70	−1 27.04		−1 26.00	−1 26.11		−1 23.75	23.72	
−14	12 42.93	42.87		12 43.95	43.74		12 44.01	44.01	
	12 42.89	+5 40.30		12 43.86	+5 40.49		12 44.31	+5 41.66	
	90	−1.5			−1.4			−1.4	
		+16.5			+16.8			+16.8	
	−7 3.1	+5 55.30		−7 3.4	+5 55.89		−7 3.4	+5 57.06	
−14		6 47.59 .60			6 47.97			6 47.25	
								−14 ° 6 ′ 47.61	

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ν Hydrae et Crat.

h m s
11 18 28
−16° 59 ″
+59 22 34

log cos δ 9.98098
15 cos δ tan i 0.10146 thro' May 14
0.09866 after May 14
tan g δ − 0.30 1.05
sin z + .86

1877

	May 7		May 13		May 14		May 16	
	−.88		−.88		−.90		−1.03	
11	17 38.7	17 52.75	17 33.2	17 49.40	17 29.5	17 48.04	17 53.9	17 48.20
	41.2	54.89	37.0	51.30	31.9	51.20	57.6	50.42
	42.8	57.18	38.9	53.68	34.3	53.58	59.3	52.56
		57.40		53.94		57.80		56.90
		58.60		54.18		59.90		58.00
18	27.8	58.80	18 23.8	55.30	18 25.7	1.90	18 32.7	1.18
	29.3	59.90	25.8	54.10	27.4	4.09	34.2	3.32
	30.9	18 0.10	27.5	56.60	29.0	6.28	35.9	5.50
		14.45		10.90		10.70		9.80
		14.60		18.10		12.85		12.00
		18.80		15.20		15.50		14.20
		24347		26530		32218		31292
	17 40.90	6347	17 37.03	2530	17 31.90	2218	17 57.60	1292
	18 29.33	18 5.770	18 25.70	18 23.00	18 27.37	18 2.016	18 34.27	18 1.175
	+40.17		+43.56		+43.97		+44.63	
	+.26		+.26		+.27		+.31	
	−1.88		−1.82		−1.79 81		−1.81 79	
	+38.55		+42.00		+42.43 3		+43.13 5	
	18 44.32		18 44.30		18 44.25		18 44.38 2	

h m s
11 18 44.348

	+2.487	−23.56	+25.27	−23.40	+30.12	−25.35	+3.57	−33.10
	1.39568	1.37218n	1.40261	1.36922n	1.47885	1.40398n	0.55267	1.51983n
	1.49714	1.47364n	1.50407	1.47068n	1.58031	1.54542n	0.65133	1.61849n
	25 1	25 2	25 2	25 3	25 1	25 3	25 2	25 3
☉	58.″6	59.″9	1.″8	2.″9	58.″4	5.″5	30.″6	16.″9
☿	14.9	16.4	15.9	17.9	13.2	21.1	46.8	33.3
♀	19.0	20.1	22.1	22.6	19.4	26.9	52.3	40.6
♂	55.8	57.1	59.9	0.1	56.4	3.6	29.3	16.4
	28.3	33.5	39.7	43.5	27.4	57.1	15.0	10.72
	27 7.08	28 8.38	28 9.43	28 10.88	27 6.85	28 14.28	27 39.75	28 26.80
	+ 31.41	− 29.76	+ 31.92	− 29.56	+ 38.05	− 38.50 32.02	+ 4.48	− 41.54
	27 38.49	27 38.62	27 41.85	27 41.32	27 44.90	27 42.26	27 44.23	27 45.26
−8 17	4 50.14	4 50.27	4 53.50	4 52.97	4 56.55	4 53.89 91	4 55.88	4 56.91
+59	21 25	22 26	21 28	22 29	21 25	22 32	21 58	22 45
	1.98626	1.98654	1.98629	1.98657	1.98626	1.98657	1.98643	1.98664
	+ 353	+ 353	− 383	− 383	− 994	− 994	− 1616	− 1616
	1.98979	1.99007	1.98246	1.98274	1.97632	1.97663	1.97027	1.97048
	−97.68	−97.74	−96.04	−96.10	−94.69	−94.76	−93.38	−93.83
	+ .10	+ .09	+ .10	+ .08	+ .14	+ .10	+ .01	+ .17
	− .25	− .37	− .26	− .38	− .25	− .38	− .32	− .41
	+ .13	+ .19	+ .13	+ .19	+ .13	+ .19	+ .16	+ .20
−16 17	−1 37.70	−1 37.83	−1 36.07	−1 36.21	−1 34.67	−1 34.85	−1 33.53	−1 33.47
	6 27.84	24.11	6 29.57	29.18	6 31.22	28.76	6 29.41	30.38
	6 27.97	+5 39.92	6 29.37	+5 40.49	6 29.99	+5 40.47	6 29.90	+5 41.66
		−1.5		−1.4		−1.4		−1.4
		+17.7		+17.8		+17.8		+17.9
		+5 56.12		+5 56.89		+5 56.87		+5 58.16
−8 17		0 31.85		0 32.48		0 33.12		0 31.74
								−17° 0′ 32.30

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202 B Camel. = Gr 1782

11 23 1

+81 49

−39 26

log cos δ 9.15333

15 cos Sun 9.27381

tang δ +.6985 7.01

sin z −.63

I 14.48

½ I 7.24

1877

−.88 −.90

May 13 May 14

11 23 20.0 22 — 21 8.0 22 8.88

32.1 — 18.6 3.54 15.70

47.5 — 29.4 .42 23.00

.48 30.88

.60 37.80

.90 48.14

.12 52.20

3802 52.50

37.88 59.60

38.09 7.05

23 33.50 21 18.67

22 37.997 22 37.640

+43.56 +43.97

−6.12 −6.25

−9.91 −9.98

+27.53 +27.94

23 5.53 23 5.58

11h 23m 5.555

−55.50 +98.97

1.744291n 1.897461

1.018102n 1.171274

40 0 40 0

ε 58.9 33.4

π 7.2 43.1

μ 10.3 4.60 44.8 39.10

H 56.0 30.0

12.4 151.3

41 3.10 40 37.83

− 10.43 + 14.83

40 52.67 40 52.66

+81 41 55.68 41 55.69

−39 25 39 25 4

1.674490 1.674480

−.368 −.984

1.671122 1.664496

+46.90 +46.28

− .25 − .48

− .13 − .07

+ .07 + .04

+46.59 +45.72

+81 42 42.27 42 41.41

+5 40.49 +5 40.47

+1.1 +1.8

−9.0 −9.1

+5 32.59 +5 32.37

+81 48 14.86 48 13.78

+81° 48′ 14.32″

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ζ Draconis

α h 11 m 23 s 58
δ +70° 1' 14"
   +27 38 26

Corr α +.114
dα/dt +3.6349
δ₀ δ 34'39"
Corr δ +.8"
dδ/dt −19.842"

Apr 20	m 24	s 4.83									
25		10.72									
30		10.54	18	°	0	'	37.4	"	11		
May 5		10.34	20				38.5		10		
10		10.13	21				39.5		9		
15		9.90	23				40.4		7		
20		9.67	23				41.1		6		
		9.43	24				41.7		5		
							42.2				

log cos δ 9.53370
15 cos δ tan i 9.65418
tang δ +2.715 2.92
ent z −.46

1876 ? X −.95 X −.80 X −.90

April 26

11	23	9.3	23	25.10	23	1.45	23	22.05	23	14.5	23	16.50					
		14.7		28.00		19.0		25.00		20.9		19.82					
		20.1		31.20		23.7		28.00		26.3		22.40					
				34.25				31.00				26.50					
				37.00				34.08				28.83					
	23	34.0		40.30	23	58.3		37.00	23	54.7		31.56					
		37.4		43.16		4.0		39.98		0.2		34.38					
		1.6		46.20		9.8		43.20		5.8		37.40					
				49.25				46.05				40.45					
				33446				30636				25624					
	23	14.70			23	19.07			23	20.57							
	23	59.47	23	37162	24	4.03	23	34.040	24	0.23	23	28471					
			24	10.490			24	10.204			24	9.704					
				3.333				3.616				4.123					
		+36.00		3.347		+3.849		3.630		+43.97		4.137					
		−.261				−.219				−.247							
		−5.63				−5.34				−4.84							
		+27.76				+30.90				+36.66							
	+24	4.92				+5.00				+5.13							

		+22.46		−22.51		+14.97		−29.99		+7.90		−31.76					
		1.351141		1.352382		1.175222		1.476982		0.897632		1.501882					
		1.005599		1.046562		0.829402		1.131162		0.551812		1.156062					
		25 3		25 3		25 3		25 3		25 3		25 3					
ζ		7.5		27.6		9.2		29.2		9.6		26.1					
ψ		13.8		34.1		17.2		37.1		18.7		35.2					
ψ		17.9	12.70	38.5	33.05	19.1	14.15	38.8	34.00	21.4	15.50	39.8	32.95				
H		59.1		19.5		1.4		22.0		4.1		21.9					
		30.3		114.7		46.9		127.1		53.8		123.0					
	28	9.58	28	29.93	28	11.43	28	31.78	28	13.45	28	30.95					
	+	10.13	−	10.15	+	6.75	−	13.53	+	3.56	−	14.32					
	28	19.71	28	19.78	28	18.48	28	18.25	28	17.01	28	16.63					
+ 69	54	28.64	54	28.57	54	29.87	54	30.10	54	31.34	54	31.92					
−27	37	32	37	12	37	30	37	10	37	29	37	11					
	1.47	900	1.47	890	1.47	900	1.47	890	1.47	900	1.47	890					
		+111		+111		+40		+40		−1082		−1082					
	1.48	011	1.48	001	1.47	940	1.47	930		−982		−982					
		+30.21		+30.20		+30.16		+30.15	1.46	918	1.46	908					
										+29.46		+29.46					
		−.08		−.08		−.04		−.16		−.02		−.18					
		−.42		−.45		−.42		−.45		−.38		−.42					
		+.19		+.21		+.19		+.21		+.19		+.21					
		+2990		+2988		+2989		+2985		+2925		+2906					
+69	54	58.54		58.45	54	59.76		59.85	55	0.59		0.98					
+69	54	38.50	+5	40.30	54	59.80	+5	40.46	55	0.78	+5	40.47					
	0	38.8		+0.8	0	40.1		+0.7	0	41.6		+0.7					
	+5	33.3	40.3	−8.4	+5	40.3		−5.7	+5	40.8		−7.2					
		41.1				41.1				41.6							
			+5	36.70			+5	35.46			+5	33.97					
70			+0	35.20			+0	35.26			+0	34.75					

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V Leonis

α 11 m 30 s 33

δ − 0° 8' 2"

μ + 42 30 50

− 1877

April 26 — X −.95

May 3 — X −.80

May 6 — X −.85 −.97

May 7 — X −.88

May 14 — X −.90

May 28 — X −1.00

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Cephei

α₀ Corrα dα/dt

δ₀ Corrδ dδ/dt

1877

April 26 — May 3 — May 6 — May 28 — May 29 — May 30

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X Glaisher Maj'

11h 39m 27s

+48° 28' 20"

− 6 5 32

X 1877

April 26 −.95

May 2 −.60

May 6 −.85 −.07

May 7 −.88

May 14 −.90

May 28 −1.00

Corr^{n} + .01 (May 5, 10, 15, 20, 25, 30; June 4, 9)

$\frac{d\alpha}{dt}$ + 3.1955

α_0 27 39.87 (20, 25, 30)

Corr^{n} + .9

$\frac{d\delta}{dt}$ − 19.979

log cos δ 9.82155

15 cos δ sin i 9.94203 thro' May 14; 9.93923 after May 14

tang δ + 1.13 1.51

sin z − .11

| | | |

1877phae.proj.1487

β Virginis

α 11 44 11
δ +2° 28' 8"
+39 54 40

Corr α
dα/dt
δ₀
Corr δ
dδ/dt

1877

April 26 — × −.95
May 3 — × −.80
May 6 — × −.85 −.07
May 7 — × −.88
May 13 — × −.88
May 28 — × −1.00

log cos δ 9.99960
15 cos δ tan i 0.12008 (tri' May 14; 0.11728 after) "I 2.06
tan δ +0.04 1.00
sin z +.64

	April 26	May 3	May 6	May 7	May 13	May 28
	43 40.47	43 31.73	43 30.97	43 34.23	43 17.16	43 43.60
	+36.00 −.04	+38.49 −.03	+39.75 −.03 −.07	+40.18 −.04	+43.56 −.04	+51.12 −.04
	−2.298 +33.68 +44 17.30	−2.25 +36.21 +17.32	−2.23 +37.42 +17.30	−2.232 +37.92 +17.35	−2.18 +41.34 +17.34	−2.06 +49.02 +17.30
	+3.15	+9.38	−42.42	+8.91	−16.39	+5.20	−39.07	+18.89	−15.32
	0.49831 0.61839 0 0	0.97220 1.09228 0 0	1.62757m 1.74765m 0 1	0.94988 1.06996 0 0	1.21458m 1.33466m	0.71600 0.83608 0 0	1.59184m 1.71192m 0 1	1.27623 1.39631 55 4	1.18526m 1.06813m 0 0	1.30254m
ε	13.5	14.7	12.4	3.6		9.4	7.9	53.7	34.5	
ζ	26.7	19.8	27.9	17.9		23.1	24.0	8.1	49.9	
η	32.2 22.85	23.1 13.90	30.1 21.25	22.4 13.00		27.3 18.35	26.4 17.15	11.4 2.85	56.4 45.45	
H	55.6 28.0	1.1 48.7	9.5 76.9	0.5 44.4		5.9 65.7	4.0 62.3	50.9 4.1	39.6 180.4	
0	3200	0 12.78	1 16.98	0 11.10		0 16.43	1 15.58	0 1.03	0 45.10	
	+ 4.15	+ 12.37	− 55.93	+ 11.75	− 21.61	+ 6.86	− 51.51	+ 24.91	− 20.07	
0	2345	0 24.55	0 24.05	0 22.85		0 23.29	0 24.07	0 25.94	0 25.03	
+2	22 27.20 24.70	22 23.80	22 24.30	22 25.50		22 25.06	22 24.28	22 22.41	22 23.32	
+39	54 35	54 30	54 38	54 29		54 34	54 34	54 19	54 03	
	1.68240 +189 1.68429 −48.31	1.68235 +116 1.68351 −48.25	1.68260 +116 1.68376 −48.28	1.68235 +817 1.69052 −49.04		1.68240 +387 1.68627 −48.56	1.68260 +387 1.68647 −48.58	1.68230 −306 1.67924 −47.78	1.68250 −855 1.67395 −47.20	
	− .00 − .04 + .02	− .00 − .03 + .01	− .05 − .17 + .08	− .00 − .02 + .01		− .00 − .04 + .02	− .04 − .16 + .08	− .01 − .60 + .30	− .01 − .09 + .05	
	−4836	−4827	−4842	−4905		−4858	−4870	−4809	−4725	
+2	21 38.43 34.34	21 36.53	36.88	21 36.45		21 36.48	35.58	21 34.32	21 36.07	
	+5 40.30	21 35.70	+5 40.46	+5 40.21		21 36.62	+5 39.92	+5 40.49	+5 41.15	
	27 135 −1.1	27 13.8 −1.1	27 139 −1.1	27 140 −1.1		+5 38.0 38.4	−1.1	27 142 −1.1	27 15.1 −1.0	
	+5 34.7 37.2 +1.40 35.1 37.6	+5 38.1 38.5	+13.7 +5 37.5 39.9	+13.6			+13.5	+5 39.9 40.3	+13.3 +5 39.0 39.4	+12.4
	+5 53.20		+5 53.06	+5 52.71			+5 52.32		+5 52.69	+5 52.5
2	+27 49.54 29.54		+27 28.74	+27 29.16			+27 28.35		+27 27.01	+27 28.62

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γ Cassae Maj.

h m s
4 7 47 15

+54 23 22

− 12 00 34

Corr 2

dr/dt

δ0

Corr δ

dδ/dt

m s
47 21.25
− .03
+ 3.1868
22 42.41
+ .5
− 20.26

May 30
May 5
10
15
20
25
30
June 4
9

m s
47 24.98
24.88
24.78
24.67
24.56
24.45
24.33
24.21
24.08

10 10 11 11 11 12 12 13

22

42.0 10
43.0 9
43.9 7
44.6 7
45.3 6
45.9 4
46.3 3
46.6 3
46.9

log cos δ 9.76519

1 cos δ sin i 9.88567 Here May 14
9.88287 After May 14

tang δ +1.40 1.72

sin z −.21

1877

May 3 −.80

May 6 −.85 −.07

May 7 −.88

May 14 −.90

May 28 −1.00

May 29 −1.13

| | | |

1877phae.proj.1487.

Virginis

α 11 58 50
δ +9° 25 38
τ 32 57 10

Corr α +.01
dα/dt +3.0594
δ 24 57.89
Corr δ +.3
dδ/dt −20.018

1877

Apr 30
May 5
10
15
20
25
30
June 4
9

log cos δ 9.99411
15 cos δ tan i 0.11459 thru May 14
0.11179 after May 14
tan δ +0.17 1.01.
corr z +.54

	May 3		May 5		May 6		May 7		May 29	
	−.80		−.82 −.05		−.85 −.07		−.88		−1.00	
11 58 11	58 8.08	57 38.3	58 7.48	57 54.4	58 6.95	57 53.1	58 6.45	57 42.4	57 35.30	
27	10.14	52.4	9.48	56.4	8.65	37.6	8.50	44.2	37.42	
45	12.29	53.8	11.53	58.3	11.02	52.5	10.60	46.4	39.53	
	16.49		15.75		15.20		14.92		3.62	
	18.50		17.90		17.30		16.88		5.70	
	20.60		20.00		19.50		18.84		7.83	
	22.65		22.08		21.53		20.95		9.94	
	24.74		24.09		23.55		23.00		12.20	
	29.00		28.30		27.88		27.30		16.22	
	31.00		30.25		29.90		29.40		18.20	
	33.20		32.40		32.00		31.48		20.40	
	22672		21926		21368		20812		26636	
58 2.77		57 52.37		57 36.37		57 57.40		57 44.33	8636	
	58 20.611		58 19.933		58 19.425		58 18.920		58 .7851	
	58 58.960		58 58.948		58 58.940		58 58.932		58 58.774	
	− 38.35		− 39.02		− 39.52		− 40.01		− 50.92	
+38.79	− 38.36	+39.28	− 39.03	+39.76	− 39.53	+40.18	− 40.02	+51.11	− 50.93	
−.13		−.14		−.14		−.15		−.17		
		−.05		−.07						
−2.36		−2.35		−2.34		−2.33		−2.17		
+36.01		+36.74		+37.25 37.21		+37.71		+48.77		
+58 56.62		+56.67		+56.67 56.63		+56.63		+56.62		

	+17.84		+27.56		+23.05		+21.52		+23.57	
	1.25139		1.44028		1.36267		1.33284		1.37144	
	1.36598		1.55487		1.47726		1.44743		1.48323	
	0 2		0 2		0 2		0 2		0 2	
ε	34.5		21.2		24.6		28.5		23.9	
η	49.0		36.2		40.1		42.9		39.2	
ζ	51.9 43.20		38.5 29.85		43.3 33.95		46.6 37.55		45.1 34.50	
κ	29.1		15.0		19.8		23.1		26.5	
	64.5		110.6		137.8		141.1		134.7	
2	31.3 41.12	2	22.43	2	2695 31.95	2	35.28	2	33.68	
	+ 23.23		+ 35.88		+ 30.01		+ 28.02		+ 30.43	
	3 4.35		3 3.61		3 1.96		3 3.30		3 4.11	
+9	19 44.00		19 44.74		19 46.39		19 45.05		19 44.24	
+82	56 59		56 46		56 50		56 53		56 52	
	1.57180		1.57170		1.57170		1.57180		1.57180	
	+ 170		+ 649		+ 846		+ 406		− 793	
	1.57350		1.57819		1.58016		1.57586		1.56387	
	−37.45		−37.86		−38.03		−37.66		−36.63	
	− .08		− .07		− .04		− .04		− .05	
	− .35		− .30		− .30		− .31		− .29	
	+ .16		+ .15		+ .15		+ .16		+ .16	
	−37.67		−37.08		−38.22		−37.85		−36.81	
+9	19 6.93		19 6.66		19 8.17		19 7.20		19 7.43	
		+5 40.46		+5 40.23		+5 40.21		+5 39.92		+5 40.15
	24 45.6	− 0.9	24 45.7	− 0.9	24 45.8	− 0.9	24 45.9	− 0.9	24 47.4	− 0.9
	+5 39.3	+12.3	+5 39.0	+12.2	+5 37.6	+12.1	+5 38.7	+12.0	+5 40.0	+10.5
	39.6		39.3		37.9		39.0		40.3	
		+5 51.86		+5 51.53		+5 51.41		+5 51.02		+5 50.75
9		+24 58.19		+24 58.19		+24 59.58		+24 58.22		+24 58.18

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Ga 1852 — Do — Corr a — da/dt — Do — Corr δ — dδ/dt

11 h 58 m 52 s — +77° 36′ 16″ — −35 13 28

m s: 58 58.10 / May 5: 59 6.67 / 10: 6.35 / 15: 6.00 / 20: 5.63 / 25: 5.24 / 30: 4.84 / 4.42

″: + .08 / + 3.1442 / 35 35.89 / + 1.6 / −20.168

32 35 / 35 / 37 / 39 / 40 / 42

38.9 / 40.0 / 40.9 / 41.6 / 42.3 / 42.8 / 43.3

11 9 7 7 5 5

log cos δ 9.33190 — log R 1.68239

15 Corr Stan 9.45238 / 9.44958 — then May 14 / after May 14 — R 48.050

tang δ +4.54 — 4.66

sin z −.58

1877

May 3: X −.80 — 59 24 / 13.0 / 20.7 — 0 3.0 / 13.3 / 19.0 — 59 19917 − 48050 — 59 12.13 — 0 11.77 — +38.50 −3.63 — −8.15 +26.72 +58 58.59

May 6: X −.85 −.107 — 59 4.6 — A-1 59 10.50 / 19.85 / 29.40 — 59 46.3 / 55.3 / 4.7 — A-1 59 9.10 / 18.49 / 28.10 — 18563 − 48.050 — 59 4.60 — 58 31.87 / 59 6.462 / 34.60 / 34.68 — 59 35.43 — +39.76 −3.86 −.33 −7.95 +27.62 +58.13

May 12: X −.90 — 57 6.1 / 14.7 / 24.3 — 58 +.80 / 5.8 / 15.9 — 58 30.513 / 59 6.265 / 35.75 / 35.83 — 59 6.57 — 58 27.224 / 59 5.838 / 38.61 / 38.69 — +42.86 −4.08 — −7.53 +31.28 +58.50

May 14: X −.90 — 58 7.82 / 13.00 / 17.30 / 22.90 / 27.40 / 32.05 / 36.53 / 41.53 / 46.27 — 24502 — 59 8.3 / 17.9 / 26.3 — 59 17.50 — 0 0.73 — +43.96 −4.08 — −7.39 +32.50 +58.40

May 28: X −1.00 — 58 6.49 / 11.49 / 16.34 / 21.30 / 25.80 / 30.70 / 35.38 / 40.40 / 45.19 — 23309 — 58 35.40 / 2.8 / 10.6 — 59 2.37 — 0 11.43 — +51.11 −4.54 — −6.26 +40.31 +58.41

May 29: X −1.13 — 57 16.2 / 25.6 / 33.9 — 58 47.4 / 58.0 / 6.7 — 58 18.10 / 59 4.567 / 4.647 / 4.655 — +52.42 −5.13 — 57 5.08 / 3.50 / 7.54 / 12.80 / 17.35 / 21.88 / 26.75 / 31.70 / 36.40 — 21500 / 15500 — 58 17.22 / 59 4.483 / 4.724 / 4.734 — −6.17 +41.12 +58.34

−4026 — −9.990 — −34.09 — −84.92 −84.92 — +72.19 — −39.35 — −51.60 — −94.83 — −44.27 — −113.83 — +51.99 — −39.81

1.60487n / 1.00572n / 50 3 — 1.99957n / 1.45495n / 50 3 — 1.53263n / 0.98501n / 50 3 — 1.92901n / 1.38139n / 50 3 — 1.85847 / 1.31086 / 50 3 — 1.59494n / 1.04732n / 50 3 — 1.71265n / 1.16503n / 50 3 — 1.97695n / 1.42933n / 50 3 — 1.64611n / 1.08869n / 50 3 — 2.05626n / 1.50584n / 50 3 — 1.71592 / 1.16550 / 50 3 — 1.59999n / 1.04957 / 50 3

E 38.1 — 54.9 — 34.7 — 19.4 — 3.8 — 35.6 — 37.9 — 48.9 — 30.9 — 14.1 — 3.7 — 28.9

F 45.8 / 2.1 — 44.2 — 57.9 — 12.4 — 43.1 — 46.1 — 57.1 — 42.0 — 0.2 — 14.1 — 39.6

G 45.9 42.00 / 1.45 58.15 — 45.0 39.85 — 58.65 54.50 — 12.5 8.15 — 44.9 40.25 — 46.9 42.35 — 57.6 53.25 — 44.9 37.90 — 3.15 6.10 — 16.9 10.30 — 43.7 36.30

H 31.1 / 160.9 — 47.9 / 226.3 — 29.2 / 153.1 — 44.0 / 198.9 — 57.9 / 26.6 — 30.4 / 154.0 — 32.6 / 163.5 — 43.9 / 207.5 — 33.1 / 150.9 — 51.0 / 223.4 — 5.0 / 39.7 — 31.8 / 144.0

53 40.23 — 53 56.58 — 53 38.28 — 53 45.48 52.48 — 53 6.65 — 53 38.50 — 53 40.88 — 53 51.88 — 53 32.73 — 53 55.35 — 53 [illegible] — 53 [illegible]

— 11.41 — — 8.31 — — 9.66 — 24.06 — + 20.46 — 11.15 — 14.62 — 26.87 — 12.46 — 32.05 — + 14.64 — 11.21

53 28.82 — 53 28.27 — 53 28.62 — 53 28.42 — 53 27.11 — 53 27.36 — 53 26.26 — 53 25.01 — 53 25.27 — 53 23.80 — 53 24.57 — 53 24.79

+76 7

29 19.53 — 29 20.08 — 29 19.73 — 29 19.93 — 29 21.24 — 29 21.00 — 29 22.09 — 29 23.34 — 29 23.08 — 29 24.55 — 29 23.78 — 29 23.56

−35

12 2 / 1.60850 / +170 / 1.61020 / +40.76 — 11 45 / 1.60840 / + 170 / 1.61010 / +40.75 — 12 4 / 1.60850 / +846 / 1.61696 / +41.40 — 11 50 / 1.60840 / +846 / 1.61686 / +41.39 — 12 35 / 1.60870 / +497 / 1.61367 / +41.08 — 12 3 / 1.60850 / +497 / 1.61347 / +41.06 — 12 1 / 1.60850 / − 905 / 1.59945 / +39.96 — 11 50 / 1.60840 / − 905 / 1.59935 / +39.95 — 12 4 / 1.60850 / − 793 / 1.60057 / +39.86 — 11 46 / 1.60840 / − 793 / 1.60047 / +39.85 — 12 32 / 1.60865 / − 1060 / 1.59805 / +39.63 — 12 6 / 1.60850 / −1060 / 1.59790 / +39.62

— .19 — 1.15 — .14 — .83 — .60 — .18 — .31 — 1.03 — .23 — 1.48 — .31 — .19

— .48 — .51 — .43 — .47 — .37 — .43 — .44 — .47 — .40 — .43 — .35 — .40

+ .22 — + .23 — + .22 — + .23 — + .19 — + .22 — + .22 — + .23 — + .22 — + .23 — + .19 — + .22

+40.31 — +39.32 — +41.05 — +40.32 — +40.30 — +40.47 — +39.23 — +39.48 — +39.45 — +39.17 — +39.16 — +39.25

+77 29 59.84 — 59.40 — 30 0.78 — 0.25 — 30 1.54 — 1.67 — 30 1.32 — 1.82 — 30 2.53 — 2.72 — 30 2.94 — 2.81

+77 29 59.62 — +5 40.46 — 30 0.52 — +5 40.21 — 30 1.60 — +5 40.27 — 30. 1.57 — +5 40.47 — 30 2.62 — +5 41.15 — 30. 2.88 — +5 40.08

35 39.6 — +1.0 — 35 40.2 — +1.0 — 35 41.2 — +1.0 — 35 41.5 — +0.9 — 35 43.1 — +1.0 — 35 43.2 — +1.0

+5 40.0 — −3.7 — +5 39.7 — −4.3 — +5 39.6 — −5.3 — +5 39.9 — −5.6 — +5 40.5 — −7.2 — +5 40.3 — −7.3

41.6 — 41.3 — 41.2 — 41.5 — 42.1 — 41.9

+5 37.76 — +5 36.91 — +5 35.97 — +5 35.77 — +5 34.95 — +5 34.38

77 — +35 37.38 — +35 37.43 — +35 37.57 — +35 37.34 — +35 37.07 — +35 37.26

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Hg Draconis

α 12h 6m 19s
+78° 18' 39"

−35 55 55 51

Corr α
dα/dt
δ₀
Corr δ
dδ/dt

m s
6 24.98
− .11
+2.9082
17 59.25
+ .4"
−20.33"

Mar 30
May 5
10
15
20

m s
6 38.81
33.47
33.11
32.72
32.31

34 18 1.7
36 2.1 10
39 3.7 10
41 4.5 8
5.3 4

log cos δ 9.30704
log cos δ 9.42752
tang δ +4.83
sin z −.59

I 10.18
½I 5.09
493

1877

May 3 X −.80
May 5 X −.82 −.05
May 6 X −.85 −.07
May 7 X −.88
May 12 X −.90
May 14 X −.90

	May 3	May 5	May 6	May 7	May 12	May 14
12	4 34.3 40.6 50.3	5 38.50 43.60 48.49 53.06	5 18.6	5 37.70 43.35 48.29 53.20	4 54.3 25 104	5 37.43 42.10 48.23 53.65
	6 25.0 35.1	58.78 3.95 8.95 14.08 19.45	6 29.7 38.3 47.7	58.60 3.50 8.12 13.45 18.40	6 38.2 47.0 54.5	57.67 3.05 8.40 13.25 18.55
	4 41.73	28986 52986	5 18.60	28461 52461	5 2.40	28173 52173
	6 30.05	5 58.873 6 33.589 34.72 − 34.61	6 38.57	5 58.290 6 33.452 − 35.10 − 35.05	6 46.57	5 57.970 6 33.580 − 35.41 − 35.30
		+38.50 −3.86		+39.27 −3.56 −.25		+39.27 −4.11 −.35
		−8.60 +26.04 +6 24.91		−8.46 +26.60 +24.89		−8.39 +26.92 +24.89

	May 7	May 12	May 14
	5 24.23	5 17.77	5 0.77
	6 ~~24.59~~ 36.96		6 21.20
	5 57.252 6 33.308 − 36.08 − 35.95	5 54.275 6 32.939 − 38.66 − 38.55	5 32.90 6 32.77 − 39.88 − 39.77
	+40.19 −4.25	+42.88 −4.34	+43.96 −4.34
	−8.32 +27.62 +24.87	−7.95 +30.59 +24.87	−7.79 +31.83 ~~+24.04~~ +24.79

	May 3	May 5	May 6	May 7	May 12	May 14
	+7.14	−31.18	+39.69	−40.28	+55.57	−48.60
	1.88728	1.49388 w	1.59868	1.60509 w	1.74484	1.68664 w
	1.31480	0.92140 w	1.02620	1.03261 w	1.17236	1.11416 w
	10 0	10 1	10 0	10 1	10 0	10 1
6	45.1	12.6	56.9	16.7	50.6	18.9
7	53.0	21.3	4.4	25.6	0.2	27.9
9	53.0 4.05	21.4 17.00	4.8 0.85	24.7 20.70	1.1 55.85	28.8 23.85
11	48.3	16.2 ~~21.35~~ ~~1.984~~	50.6	10.9	44.7	13.8
	199.4		236.7	72.9	216.6	89.4
	10 46.85	11 ~~19.34~~ 8.34	10 59.18	11 15.48	10 54.15	11 22.35
	+ 20.64	− ~~7.04~~ 9.54	+ 10.62	− 10.78	+ 14.87	− 13.01
	11 10.49		11 9.80	11 8.70	11 9.02	11 9.34
+78	11 37.86	11 ~~28.81~~ 3	11 38.55	11 39.65	11 39.33	11 39.01

	May 7	May 12	May 14
	+33.02	−39.65	+34.50
	1.57878	1.59824 w	1.56229
	0.94630	1.02576 w	0.98981
	10 0	10 1	10 0
6	56.3	16.0	55.5
7	4.6	24.7	29
9	4.9 0.60	23.6 19.80	4.9 0.20
11	50.5	10.1	48.5
	236.3	74.4	231.8
	10 59.08	11 18.60	10 52.95
	+ 8.84	− 10.61	+ 9.77
	11 7.92	11 7.99	11 7.72
	11 40.43	11 40.36	11 40.63

	May 12	May 14
	10 1	10 0
6	13.9	48.2
7	21.9	55.9
9	22.9 18.10	57.35 27.75
11	8.1	43.8
	66.8	205.2
	11 16.70	10 57.30
		+ 13.95
		11 5.25
	11 43.10	11 42.87

	May 3	May 5	May 6	May 7	May 12	May 14
−35	54 52	54 24	54 43	54 23	54 48	54 20
	1.62000	1.61980	1.61990	1.61980	1.61990	1.61980
	+196	+196	+672	+672	+860	+860
	1.62196	1.62176	1.62662	1.62652	1.62850	1.62840
	+41.88	+41.86	+42.33	+42.32	+42.51	+42.50
	− .64	− .11	− .17	− .17	− .34	− .26
	− .10	− .17	− .12	− .16	− .11	− .17
	+ .05	+ .08	+ .06	+ .08	+ .05	+ .08
	+41.19	+41.66	+42.10	+42.07	+42.11	+42.15
+78	12 19.05	20.47	12 20.65	21.72	12 21.44	21.16
+78	12 19.76	+5 40.46	12 21.18	+5 40.23	12 21.30	+5 40.21
	18 2.3	+1.0	18 2.7	+1.0	18 2.9	+1.0
	+5 42.5	−3.1	+5 41.5	−3.4	+5 41.6	−3.7
	42.9		41.9		42.0	
		+5 38.36		+5 37.83		+5 37.51
78		+17 58.12		+17 59.01		+17 58.81

	May 7	May 12	May 14
	54 43	54 23	54 44
	1.61990	1.61980	1.61990
	+416	+416	+523
	1.62406	1.62396	1.62513
	+42.08	+42.07	+42.18
	− .12	− .17	− .14
	− .12	− .16	− .12
	+ .06	+ .08	+ .06
	+41.90	+41.82	+41.98
	12 22.33	22.18	12 22.61
	12 22.26	+5 39.92	+5 40.27
	18 3.1	+1.0	+1.0
	+5 40.8	−3.8	−4.9
	41.2		
		+5 37.12	+5 36.37
		+17 59.38	+17 58.98

	May 12	May 14
	~~54 25~~	54 51
		1.61990
		−895
		1.61095
		+40.83
		− .09
		− .11
		+ .05
		+40.48
		12 23.58
	12 23.56	+5 40.41
	18 44	+1.0
	+5 40.8	−5.1
	41.2	
	+5 36.37	+5 36.37
	+17 58.98	+17 59.93

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δ Ursae Maj. 20

12h 9m 14s Corr 2

+57° 43' 37" dα/dt

− 15 20 49 δ₀

Corr δ

dδ/dt

1877

May 3 | May 5 | May 6 | May 7 | May 12 | May 13

log cos δ 9.72763

15 cos tan 9.84811

tang δ +1.58

corr 2 −.26

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Virginis

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2 13 31
δ ° ′ ″
+10 1 41
+42 21 07

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Corr^n
$\frac{d\alpha}{dt}$
δ_0
Corr^d
$\frac{d\delta}{dt}$

m s
13 36.763 — +.03 — +3.0678 — 0.65 — −.2 — −20.039

After 30
May 5
10
15
20
25
30
June 4
9

m s
13 39.10 — 39.08 — 39.05 — 39.02 — 38.99 — 38.95 — 38.91 — 38.87 — 38.83

0 1 2 3 4

″
45.3 — 45.5 — 45.7 — 45.9 — 46.1 — 46.3 — 46.6 — 46.9 — 47.2

2 2 2 2 2 3 3 3 3

log cos δ 0.88500
15 cos δ sin 1 0.12048 then May 14
0.11768 after May 14
tang δ +0.80 1.00
sin z +.67

1877

May 3 — X −.80 — 12 12 37.1 38.5 40.4 — 12 48.29 50.39 52.40 56.30 58.55 — 13 22.5 24.3 26.0 — 0.62 2.73 4.80 8.90 10.98 13.00 — −307.16 667.16 — 12 38.67 — 13 24.27 — 0.651 39.087 — 38.99 — 38.47 — +38.50 −.00 — −2.33 — +36.17 — +13 #36.82

May 5 — X −.82 −.05 — 12 3.53 36.2 37.9 40.1 — 12 47.65 49.60 51.73 53.82 57.23 — 13 22.7 24.6 26.4 — 0.00 2.10 4.00 8.12 10.29 12.25 — 299.49 659.49 — 12 37.37 — 13 24.37 — 39.087 — 39.12 — 39.15 — +39.27 −.00 −.05 — −2.32 — +36.90 — +36.85

May 30 — X −1.19 — 12 29.8 31.8 33.6 — 12 33.39 35.35 37.39 41.60 43.55 45.70 47.73 49.90 53.92 56.00 58.05 — 502.58 — 12 31.73 — 12 45.689 — 13 38.988 — 53.22 — 53.25 — +53.30 −.00 — −2.15 — +51.15 — +36.84

June 2 — X −1.35 — 12 19.6 21.2 23.1 — 12 31.00 33.00 35.22 39.25 41.30 43.41 45.49 47.53 51.68 53.69 55.79 — 477.39 — 12 21.30 — 12 43.399 — 13 38.824 — 55.48 — 55.51 — +55.51 −.00 — −2.12 — +53.39 — +36.79

+21.98 — 1.342203 — 1.346251 — 25 1 — 13.1 — 28.5 — 31.4 22.25 — 9.2 — 82.2 — 26 20.55 — + 29.01 — 26 49.56 — 4 1.21 — 55 58.79 — 20 39 — 1.71960 — +222 — 1.72182 — −52.70 — .00 — −.17 — +.08 — −52.79 — 56 51.58 — 54.00 — 56 51.96 — 53.70 — 0 45.4 — +5 39.1 — 38.9 — +5 54.46 — +0 48.16 — 1 0.76

−23.62 — 1.373289n — 1.393762 — 25 2 — 13.4 — 27.2 — 31.0 22.20 — 8.6 — 80.2 — 27 20.05 — − 31.17 — 26 48.88 — 4 0.53 — 55 59.47 — 21 38 — 1.71980 — + 222 — 1.72202 — −52.72 — .00 — − .30 — + .14 — −52.88 — 56 52.35 — 53.41 — +5 40.46 — −1.2 — +15.2 — +5 54.46 — +0 48.16 — 1 0.76

+22.58 — 1.35372 — 1.47420 — 25 1 — 12.2 — 27.5 — 31.5 21.85 — 9.3 — 80.5 — 26 20.13 — + 29.80 — 26 49.93 — 4 1.58 — 55 58.42 — 20 38 — 1.71960 — +695 — 1.72655 — −53.28 — .00 — − .16 — + .08 — −53.36 — 56 51.78 — 53.94 — 0 45.5 — +5 39.4 — 39.2 — +5 54.23 — +0 48.17 — 1 0.29

−24.62 — 1.39129n — 1.51177n — 25 2 — 12.8 — 28.1 — 31.6 22.20 — 8.9 — 81.4 — 27 20.35 — − 32.49 — 26 47.86 — 3 59.51 — 56 0.49 — 21 38 — 1.71981 — +695 — 1.72675 — −53.30 — .00 — − .28 — + .14 — −53.44 — 56 52.93 — 53.95 — +5 40.23 — −1.2 — +15.2 — +5 54.23 — +0 48.17 — 1 0.24

+13.96 — 1.14469 — 1.26257 — 25 1 — 22.6 — 38.4 — 46.5 34.55 — 26.7 — 134.2 — 26 33.55 — + 18.30 — 26 51.85 — 4 3.50 — 55 56.50 — 20 52 — 1.71970 — −420 — 1.70550 — −50.76 — .00 — − .18 — + .10 — −50.84 — 56 47.34 — 54.34 — 4 54.34 — 0 46.6 — +5 40.9 — 40.7 — +5 54.39 — +0 48.73 — 1 0.05

+22.10 — 1.34439 — 1.46267 — 25 1 — 12.3 — 30.7 — 39.5 25.90 — 15.4 — 100.9 — 26 25.23 — + 28.98 — 26 54.21 — 4 5.86 — 55 54.14 — 20.43 — 1.71960 — −1801 — 1.70159 — −50.30 — .00 — − .15 — + .08 — −50.37 — 56 44.51 — 56.23 — 4 56.23 — 0 46.8 — −1.1 — +14.0 — +5 42.88 — 4 56.23 — +5 42.88 — 0 46.8 — −1.1 — +13.8 — 5 43.0 — 42.8 — +5 55.58 — +0 51.81 — 0 59.15

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5 Vesae Min. = B.A.C. 4150

0h 13m 5s 20.

+87° 24' 30"
17 9
92 42 61
− 44 54 21

log cos δ 8.67535
15 cos δ tan i
tang δ

log I 1.63894
I 43.54
½ I 21.77

1877

	May 6	May 28	May 29	May 30	June 2
	−.85 −.07	−1.00	−1.13	−1.19	−1.35
	12 10 44.9	11 10.0	10 2.7	13 37.4	14 45.5
	11 59.29	11 43.78	38.5	—	—
	12 20.00	12 4.75	11 43.50	—	—
	41.04	24.50	12 4.45	—	—
	13 2.70	45.88	24.30	—	—
	22.00	13 5.16	45.35	—	—
	14 7.7	—	13 6.28	13 27.40	—
	42.38	—	—	47.30	—
	14 4.00	—	—	14 6.90	14 4.50
	24.24	—	—	27.60	27.20
	44.89	—	—		
	10 44.90	11 10.00	10 19.10	13 37.40	14 45.50
	14 7.70				
	+39.77	+57.11	+52.42	+53.30	+55.51
	+28.99	+20.25	+19.82	+19.37	+18.04

	20′ 2		20′ 2		20′ 1		20′ 1		20′ 1		20′ 2		20′ 2							
E	0″.1		13″.7		54″.9		49″.6		51″.7		4″.8		7″.9		16″.0					
F	9.1		22.0		6.4		0.0		1.8		15.3		21.1		28.9					
G	10.4	5.25	23.8	18.75	10.5	2.70	4.4	57.00	6.7	59.20	10.6	7.70	24.2	16.05	33.2	24.60				
H	52.8		5.9		54.6		44.3		51.2		4.2		9.1		17.8					
	12.4		6.54		6.4		223.3		231.4		34.9		62.3		95.9					
	22 3.10		22 16.35		22 1.60		21 55.83		21 57.85		22 8.73		22 15.58		22 23.78					
	43 39		43 26		43 40		43 46		43 44		43 33		43 26		43 18					
			+5 40.21		+5 41.15		+5 40.68		+5 41.49		+5 42.88									
			+48		+7.6		+7.7		+7.7		−7.9									

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Collinear Mire - B.A.C. 4165

	h	m	s
	12	14	26
	88°	14'	12"
	91	33	52
	46	00	24

log cos δ 8.45104

tang δ

log I 1.86325
I 72.98
½ I 36.49

1877

May 6		May 13		May 28		May 29		May 30		May 31	
	−.85 −.07		−.88		−1.00		−1.13		−1.19		−1.20
12 17 16.6	—	14 0.5	—	14 54.5	—	15 56.0	—	14 56.7	—	15 43.5	—
	—		—	13 31.80	—	13 32.25	—		—		—
	—		—	14 6.65	—	14 7.65	—		—		—
	—	14 16.55	—		—		—		—		—
	15 49.0	52.53		44.00		44.80		14 44.10		14 44.35	
17 33.5	41.60	15 30.60	—	15 20.95	16 38.7	15 21.35	13 55.9	15 23.30	17 32.2	15 18.86	
	16 14.70		—	55.30		57.60		58.80		55.57	
	52.98		—	16 32.10		16 34.45		16 38.38		16 34.05	
	17 30.35		—	17 8.10		17 10.74		17 10.70		17 10.45	
17 16.60		14 0.50		14 54.50		15 56.00		14 56.70		15 43.50	
17 55.80				16 38.70		13 55.90		17 30.20		17 32.20	
+39.78		+43.56		+51.11		+52.42		+53.30		+54.07	
−49.72		−45.50		−35.23		−34.50		−33.77		−33.04	

	5' i	5' i	5' i	5' i	5' i	5' i	5' i	5' i	5' i	5' i	5' i	5' i
E	36".1	36".5	24".7	23".1	26".2	19.0	23".7	22".8	26".4	25".8	27".1	
H	43.9	44.5	32.0	32.4	36.3	28.5	33.2	33.0	38.0	34.4	38.0	
G	44.9	40.50 45.9	41.20 35.1	29.90 36.4	29.75 40.0	33.10 34.1	26.55 38.2	30.95 36.8	29.80 41.4	34.15 37.9	30.35 42.0	34.55
R	27.8	27.7	17.9	22.6	26.8	19.4	23.6	21.8	26.5	22.9	26.5	
	152.7	154.6	109.7	114.5	129.3	104.0	118.7	114.4	132.8	118.0	133.6	
	6 38.78	6 38.65	6 27.43	6 28.63	6 32.33	6 25.75	6 29.68	6 28.60	6 33.20	6 29.50	6 33.40	

	59 4.	59 3	59 15	59 13	59 10	59 17	59 12	59 13	59 09	59 13	59 09	
	+5 40.21		+5 40.49		+5 41.15		+5 40.68		+5 41.49		+5 41.12	
	+4.6		+5.8		+7.5		−7.5		−7.6		−7.7	

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1877phae.proj:14877

Sforzi

	h	m	s
	12	23	24
	− 15°	49′	5″
	+58	11	53

log cos δ 9.98324
15 cos δ sin z 0.10372 Hors May 14
0.10092 after May 14
tang δ −0.28 1.04
sin z +.85

1877

May 6			May 13			May 29			May 31			June 2
			−.85 −.07			−.88			−1.13			−1.20			−1.35
12	22	30.6	22	39.53	22	29.5	22	35.65	22	17.2	22	26.65	22	11.6	22	24.90	Ch f.
		32.7		41.53		31.3		37.79		18.7		28.75		13.0		27.10	
		34.4		43.90		33.3		39.95		20.5		31.00		15.0		29.15	
				48.18				44.10				35.20				33.45	
				50.30				46.35				37.40				35.68	
	23	14.6		52.40				48.48	22	8.6.0		39.48	22	89.3		37.80	
		16.5		54.64				50.58		37.8		41.70		1.5		40.02	
		18.4		56.76				52.77		39.7		43.75		8.0		42.05	
				1.00				55.80				48.10				46.35	
				3.20				59.25				50.25				48.40	
				3.40				1.45				52.35				50.60	
				396.88				473.37									
	22	32.60		576.88	22	31.37		533.37	22	18.80		444.63	22	13.20		445.50	
	23	16.60	22	52.444			22	48.488	22	5.783	22	39.512	23	1.27	22	37.773	
				+37.78				+43.56				+52.42				+54.07	
				+.24				+.25				+.32				+.33	
				∓.07													
				−2.25				−2.21				−2.10				−2.09	
				+37.70				+41.60				+50.63				+52.31	
			23	32.14			23	30.09	23	30.14			23	30.08			

12 23 30.112

			+19.84		−24.16		+17.12				+20.71		−18.32		+24.57		−23.50	
			1.29754		1.38310n		1.23350				1.31618		1.26293n		1.39041		1.37107n	
			1.46126		1.48682n		1.33722				1.41710		1.36385n		1.49138		1.47149n	
			15 1		15 2		15 1				15 1		15 2		15 1		15 2	
		E	27.6		22.4		35.3				27.5		16.8		25.4		25.9	
		F	44.4		38.5		49.7				44.9		35.6		44.4		44.6	
		G	48.5		42.4		53.5				54.9		44.1		53.1		52.2	
		H	23.8		17.4		33.5				34.3		22.9		30.4		30.5	
			144.3		120.7		174.0				161.6		119.4		153.3		153.2	
			16 36.08	17	30.18	16	45.50			18	00.40	17	29.85	16	38.33	17	38.30	
			+ 25.19		− 30.68		+ 21.74				+ 26.13		− 23.11		+ 31.00		− 28.97 29.65	
			17 1.27		16 59.50		17 5.24				17 6.58		17 6.74		17 9.33		17 8.65	
			54 12.92		54 11.15		54 16.89				54 18.18		54 18.39		54 20.98		54 20.30	
	+58		10 54		11 48		11 1				10 58		11 48		10 56		11 56	
			1.96629		1.96654		1.96632				1.96632		1.96654		1.96629		1.96657	
					+894		−193				−938		−938		−1719		−1716	
			1.97523		1.97548		1.96439				1.95694		1.95416		1.94910		1.94938	
			−94.46		−94.51		−92.13				−90.56		−90.61		−88.94		−89.00	
			+ .06		+ .08		+ .04				+ .06		+ .05		+ .09		+ .08	
			− .19		− .30		− .20				− .19		− .27		− .18		− .29	
			+ .10		+ .21		+ .10				+ .10		+ .15		+ .10		+ .16	
			−1 34.49		−1 34.52		−1 32.19				−1 30.59		−1 30.68		−1 28.93		−1 29.05	
	−15		55 47.41		43.67		55 49.08				55 48.77		49.07		55 49.91		49.35	
			55 46.54		+5 40.21					+5 40.49	55 48.92		+5 40.68		55 49.63		+5 42.14	
					− 1.5					− 1.4			− 1.4				− 1.4	
					+19.0					+19.1			+19.2				+19.2	
					+5 57.71					+5 58.19			+5 58.48				+5 59.92	
	−15				49 48.83					49 50.89			49 50.44				49 49.71	
																	−15° 49′ 49.97″	

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h m s
12 27 9
+33° 56'
+ 8 26.7

log cos δ 9.91891
15 cos δ tan i 0.03939 thru May 14
0.03659 after May 14
tan δ +0.67 1.20
sin z +.15

1877

	May 6	May 13	May 16	May 28	May 29	May 30
	-.85 -.07	-.88	-1.03	-1.00	-1.13	-1.19
	12 26 28.2	26 44.10	26 40.28	26 30.8	26 39.32	26 21.7	26 32.68	26 17.8	26 31.50	26 16.3	26 30.45
	30.9	46.65	42.65	33.8	41.80	24.0	35.13	19.8	34.00	18.6	33.80
	32.8	49.15	45.20	35.3	44.30	26.2	37.60	21.6	36.40	20.9	35.45
		54.20	50.07		49.30		42.80		41.40		40.50
		56.35	52.62		51.68		44.90		43.88		42.85
		59.00	55.10		54.20		47.55		46.30		45.38
		1.50	57.30		56.40		50.00		48.85		47.98
		3.95	0.08		59.00		52.50		51.30		50.30
		9.05	5.05		4.19		57.50		56.35		55.35
		11.30	7.50		6.54		59.95		58.80		57.82
		14.04	10.00		9.05		2.39		1.30		0.30
		349.49	366.05		415.98		462.70		450.08		439.35
	26 30.63	649.49	606.05	26 33.00	595.98	26 23.97	522.70	26 19.73	510.08	26 18.60	499.33
		26 59.045	26 55.098		26 54.180		26 47.518		26 46.371		26 45.394
		+39.78	+43.56	+44.63	+51.11	+52.41	+53.30
		-.57	-.59	-.69	-.67	-.76	-.80
		-.08					
		-2.89	-2.83	-2.80	-2.67	-2.65	-2.64
		+36.24	+40.14	+41.14	+47.77	+49.00	+49.86
	27 35.28	27 35.24	27 35.32	27 35.29	27 35.37	27 35.25
						12h 27m 35.292
	+28.41		+21.18	+23.55	+26.4	+26.79
	1.45347		1.32593	1.37199	1.42553	1.42797
	1.49286		1.36252	1.40858	1.46212	1.46456
	30 2		30 2	30 2	30 2	30 2
E	11."9	A.K.	18."9	13."1	8."9	9."2
F	23.2		31.1	24.5	20.3	21.4
G	27.2 19.55		38.8 28.85	31.4 22.25	29.5 19.20	28.1 18.65
K	7.0		16.4	15.9	12.7	11.3
	69.3		105.2	84.9	71.4	70.0
	32 17.33		32 26.30	32 21.23	32 17.85	32 17.50
	+ 31.11		+ 23.04	+ 25.62	+ 28.98	+ 29.14
	32 48.44		32 49.34	32 46.85	32 46.83	32 46.64
+33	49 59.91		49 59.01	50 1.50	50 1.52	50 1.71
+8	26 35		26 44	26 39	26 36	26 35
	0.93180		0.93190	0.93180	0.93180	0.93180
	+901		-1360	-673	-921	-1362
	0.94081		0.91830	0.92507	0.92259	0.91818
	-8.73		-8.28	-8.41	-8.37	-8.28
	-.20		-.11	-.14	-.18	-.18
	-.28		-.29	-.26	-.25	-.25
	+.14		+.14	+.14	+.14	+.14
	-9.07		-8.54	-8.67	-8.66	-8.57
+33	49 50.84		49 50.47	49 52.83	49 52.86	49 53.14
	+5 40.21	+5 40.49	+5 41.66	+5 41.15	+5 40.68	+5 41.49
	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2
	+7.3	+6.1	+5.7	+4.0	+3.9	+3.7
	+5 47.21	+5 46.29	+5 47.06	+5 44.95	+5 44.38	+5 44.99
+33	55 38.05		55 37.53	55 37.78	55 37.24	55 38.13
						+33° 55' 37.75

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K Draconis

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γ Virginis for

12 35 20

1 0 45 50

+ 43 8 38

1877

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1877phae.proj.1487

21 Cassiopeiae 28. α_0 — Corr$^{\alpha}$ — $\frac{d\alpha}{dt}$ — δ_0 — Corr$^{\delta}$ — $\frac{d\delta}{dt}$

α_0 = 0h 37m 26s

Corr$^{\alpha}$ = + .18

$\frac{d\alpha}{dt}$ = +3.8402

δ_0 = +74° 18′ 14″

Corr$^{\delta}$ = + 1.2

$\frac{d\delta}{dt}$ = + 19.739

105° 43′ 46″

− 63 29 58

1877

| May 10 | | |

1877phae.proj.1487

h m s
12 43 12
+61 0
+18 38

log cosδ 9.68557
15 const'n 9.80605 this May 14
9.80325 after May 14
tangδ +1.80 2.06
sin z − .32

1877

	May 12	May 13	May 30	May 31	June 2	June 4
	−.90	−.88	−1.19	−1.20	−1.35	−1.30 −.04
12	42 18.4	42 15.30	42 3.1	42 31.80	41 56.5	42 4.85
	22.0	17.45	8.2	33.65	59.4	9.15
	25.4	23.93	12.9	35.90	3.3	13.45
		32.30		38.10		21.90
		36.50		40.10		26.15
43	3.0	40.80		42.10	43 9.7	30.40
	5.6	45.70		44.34	13.3	34.63
	10.4	49.40		46.34	17.0	38.90
		53.80		48.60		47.30
		2.00				51.75
		6.23				53.90
		329.01				
	42 21.93	449.01	42 8.73	360.93	41 59.78	334.38
	43 6.33	42 40.819		42 40.103	43 13.33	42 30.398
	+42.84		+43.50		+53.31	
	−1.62		−1.58		−2.14	
	−4.18		−4.16		−3.72	
	+37.04		+37.82		+47.45	
	43 17.86		43 17.92		43 17.85	

	June 2	June 4
12	42 19.80	42 39.0
	21.85	43.1
	24.03	46.9
	26.05	
	28.25	
43	30.32	43 8.1
	32.85	11.8
	34.58	14.8
	36.90	
	42 9.13	42 43.00
	254.33	249.90
	42 27.748 28.259	43 11.57
	+55.52	+56.13
	−2.48	−2.34
		−.08
	−3.63	−2.57
	+49.46	+50.14
	43 17.72	43 17.91

	May 12	May 13	May 30	May 31	June 2	June 4
	+18.89	−25.51	+30.67	−42.93	+18.79	−16.11	+19.13	−24.11	−15.23	−43.80
	1.27623	1.40671n	1.49651	1.48671	1.63276n	1.27393	1.20710n	1.28171	1.38220n	1.18270n	1.64147n
	1.08228	1.21276n	1.30256	1.28996	1.43601n	1.07718	1.01035n	1.08496	1.18545n	0.98595n	1.44172n
	25 4	25 4	25 3	25 3	25 4	25 4	25 4	25 4	25 4	25 4	25 4
ε	5.7	34.7	57.6	54.8	41.5	0.5	23.2	1.4	27.9	22.5	40.9
ψ	12.4	40.9	5.0	3.4	50.6	11.0	33.0	11.2	38.8	33.1	51.1
ϑ	17.0 11.35	45.6 10.15	10.2 4.80	10.4 2.60	54.9 48.20	16.8 8.65	39.9 31.55	18.2 9.80	46.5 37.20	39.9 31.30	56.7 48.80
H	58.4	26.8	52.3	51.9	38.8	58.9	22.4	1.6	28.9	21.2	38.9
	33.5	118.0	7.1	0.5	185.8	27.2	118.5	32.4	142.1	116.7	18.2
	29 8.38	29 7.00	29 1.78	29 0.13	29 46.45	29 6.80	29 29.63	29 8.10	29 35.53	29 29.18	29 4.60
	+ 12.09	− 16.32	+ 20.07	+ 19.50	− 27.29	+ 11.94	− 10.24	+ 12.16	− 15.33	− 9.68	− 27.84
	29 20.47	29 20.68	29 21.85	29 19.63	29 19.16	29 18.74	29 19.39	29 20.26	29 20.20	29 19.50	29 19.06
59 60	53 27.88	53 27.67	53 26.50	53 28.72	53 29.19	53 29.61	53 28.96	53 28.09	53 28.15	53 28.85	53 29.29
−18	36 34	36 5	36 40	36 42	35 56	36 35	36 12	36 34	36 6	36 13	35 55
	1.28750	1.28730	1.28760	1.28760	1.28730	1.28750	1.28746	1.28780	1.28730	1.28740	1.28730
	+.657	+.657	−.136	−1294	−1294	−1559	−1559	−1693	−1643	−1640	−1640
	1.29407	1.29387	1.28624	1.27466	1.27436	1.27191	1.27181	1.27057	1.27037	1.27100	1.27090
	+19.68	+19.67	+19.33	+18.82	+18.81	+18.70	+18.70	+18.65	+18.64	+18.66	+18.66
	− .08	− .15	− .23	− .22	− .43	− .08	− .06	− .07	− .13	− .05	− .45
	− .49	− .55	− .48	− .44	− .53	− .45	− .50	− .45	− .51	− .49	− .53
	+ .25	+ .28	+ .24	+ .24	+ .29	+ .25	+ .27	+ .25	+ .28	+ .27	+ .29
	+19.36	+19.25	+18.56	+18.40	+18.14	+18.42	+18.41	+18.38	+18.24	+18.39	+17.97
59 60	53 47.24	46.92	53 45.36	53 47.12	53 48.33	53 48.03	47.37	53 46.47	46.43	53 47.24	47.26
	53 47.18	+5 40.27		53 47.72 .22	+5 41.49	53 47.70	+5 42.12	53 46.45	+5 42.88	53 47.25	+5 42.69
		+0.5			+0.5		+0.5		+0.5		+0.5
		+1.2			−2.0		−2.2		−2.4		−2.7
		+5 41.97			+5 39.99		+5 40.42		+5 40.98		+5 40.49
+60		59 29.05			59 27.74 .21		59 28.12		59 27.43		59 27.74
											+60 59 27.98

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E

2 Vegae Maj.

| | | |

1877phae.proj.1487.

2 Cygnum Ven. foll.

	h	m	s
	12	50	8
	+38°	59′	38″
+	3	23	10

1877

| | | |

1877phae.proj.1487

ε Virginis

α 12 m 55 s 57

δ +11° 37' 53"

+30 44 55

Corr α +.044

dα/dt +2.9873

δ₀ 37 14' 23"

Corr δ −.1

dδ/dt −19.431"

1877

Apr 30
May 5
10
15
20
25
30
June 4
9

m 56 32.09 s

m 56 57.8 s
57.1
56.9
56.7
56.4
56.2
55.9
55.7
55.4
55.2
54.9

36 59.5
60.0
60.5
61.0
61.5
62.0
62.5
63.0
63.5

log cos δ 9.99101
15 cos δ sin 1 0.11149
0.10868
tang δ +0.21
cos z +.51

Hav. May 14 after I" 2.10
1.02

X −.90 May 12

12	54	38.5	55	10.48															
		33.3		12.62															
		37.1		14.70															
				18.85															
				21.00															
				23.18															
				25.32															
				27.40															
				31.60															
				33.65															
				35.78															
	54	55.30		254.58	55	4.73		246.54	54	58.07			54	45.27		190.51		790.51	
			55	21.44			55	22.413			55	21.66			55	11.865			55	9.891
			56	5.751			56	5.747			56	5.735			56	5.652			56	5.628
				4.261				4.333				4.417				5.379				5.574
		+42.84		4.265		+43.56		4.337		+44.63		4.421		+53.07		5.383		+56.13		5.578
		−.19				−.18				−.22				−.25				−.27		
																		−.04		
		−2.54				−2.54				−2.53				−2.44				−2.42		
		+40.09				+40.84				+41.88				+52.38				+53.40		
		+563.23				+ 3.25				+ 3.45				+ 4.24		3.24		+ 3.29		

		+24.824				+17.68				+23.50				+26.59				+25.62	
		1.44467				1.24748				1.37107				1.42472				1.40858	
		1.55611.6				1.35897				1.47956				1.53341				1.51727	
		30 0				50 0				50 0				50 0				50 0	
ε		9".5				23".9				18".5				9".0				10".3	
H		23.2				36.4				30.6				26.1				26.2	
G		28.2	18.85			42.3	33.10			40.4	29.45			33.7	21.35			35.1	22.70
R		6.1				20.8				15.7				13.8				12.3	
		67.0				123.4				105.2				86				83.9	
	50	16.75			50	30.85			50	26.30			50	21.65	20.65		50	20.98	
		+ 35.99				+ 22.85				+ 30.18				+ 34.15				+ 32.91	
	50	52.74			50	53.70			50	56.48			50	54.80			50	53.89	
+11	31	55.61			31	54.65			31	51.87			31	53.55			31	54.96	
+30	44	35			44	49			44	44			44	39			44	39	
		1.53450				1.53460				1.53450				1.53450				1.53450	
		+703				− 99				−1253				−1456				−1602	
		1.54153				1.53351				1.52197				1.51994				1.51848	
		−34.80				−34.16				−33.26				−33.11				−33.00	
		− .09				− .04				− .06				− .08				− .08	
		− .04				− .06				− .05				− .03				− .03	
		+ .02				+ .03				+ .02				+ .02				+ .02	
		−34.91				−34.23				−33.35				−33.20				−33.09	
+11	31	20.70			31	20.42			31	18.62			31	20.35			31	21.37	
			+5	40.27			+5	40.49			+5	41.66			+5	42.12			+5	42.69
	37	0.7		− 0.9	37	0.8		− 0.9	37	1.1		− 0.9	37	2.6		− 0.8	37	3.0		− 0.8
	+5	40.0		+13.5	+5	40.4		+13.4	+5	42.6		+13.1	+5	42.2		+11.7	+5	41.6		+11.2
		39.9				40.3				42.5				42.1				41.5	
			+5	52.87			+5	52.99			+5	53.86			+5	53.82			+5	53.89
11			+37	13.57			+37	13.41			+37	12.38			+36	13.37			+36	13.46

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h m s
12 56 54
+64° 14'
− 21 54

log cos δ 9.63741
15 cos δ tan i 9.75789 then May 14
9.75509 after May 14
tang δ +2.08 2.31
sin z − .37

1877

	May 12		May 16		May 29		May 31		June 4	
		−.90		−1.03		−1.13		−1.20		−1.30 −.04
12	56 3.0	56 12.43	56 22.0	56 10.75	55 18.5	56 29.5	56 13.8	56 1.00	56 9.2	55 59.28
	6.6	1.70	26.0	13.35	22.4	8.29	15.6	3.65	13.3	1.60
	11.0	17.20	29.3	15.62	26.5	7.55	19.6	6.00	16.8	3.95
		19.35		18.09		10.00		8.25		6.80
		21.80		20.60		12.28		10.70		8.89
	56 49.1	24.29	57 11.2	22.80	56 3.3	14.80	56 33.0	13.12		11.20
	57.4	26.60	15.4	25.35	6.8	17.55	55.7	15.40		13.35
	58.6	28.95	19.4	27.65	11.0	19.50	58.8	17.70		16.00
		31.30		30.00		21.92		20.08		18.20
										138.97
	56 6.87	196.82	56 25.77	184.21	55 22.47	111.44	56 16.23	95.90	56 13.00	61.897
	56 53.63	56 21.869	57 15.33	56 20.48	56 7.03	56 12.382	56 55.83	56 10.656		56 8.774
	+42.82		+44.63		+52.41		+54.07		+56.13	
	−1.87		−2.14		−2.35		−2.49		−2.70	
									−.09	
	−4.56		−4.46		−4.07		−4.01		−3.87	
	+36.39		+38.00		+45.99		+47.57		+49.47	
	56 58.26		56 58.47		56 58.37		56 58.23		56 58.241	
										12 56 58.314
	+15.00	−31.16	−5.30	−54.82	+49.91	+5.35	−5.57	+45.14	+4.23	
	1.17609	1.49360n	0.72428n	1.73926n	1.69819	0.72835	0.74586n	1.65485n	0.62634n	
	0.93398	1.25149n	0.47937n	1.49438n	1.45328	0.48344	0.50096n	1.40994n	0.38143n	
	10 2	10 2	10 2	10 3	10 1	10 2	10 2	10 2	10 2	
ε	25.6	53.1	32.1	4.6	59.9	24.9	31.5	53.8	30.3	
η	31.7	58.2	42.0	10.7	7.2	32.9	41.4	2.5	40.1	
ϑ	35.8 30.70	1.53 37.30	49.5 40.80	17.3 10.95	12.7 6.30	38.6 31.75	45.3 38.40	7.7 0.75	47.1 38.70	
μ	19.6	46.2	31.9	54.8	0.7	25.9	31.1	54.7	30.2	
	112.7	219.0	155.5	32.4	20.5	122.3	149.3	238.7	147.7	
	12 28.18	12 54.75	12 38.88	13 8.10	12 5.13	12 30.58	12 37.33	12 59.68	12 36.93	
	+ 8.59	− 17.84	− 3.02	− 31.21	+ 28.40	+ 3.04	− 3.17	− 25.70	− 2.41	
	12 36.77	12 36.91	12 35.86	12 36.89	12 33.53	12 33.62	12 34.16	12 33.98	12 34.52	
+64	10 11.58	10 11.44	10 12.49	10 11.46	10 14.82	10 14.73	10 14.19	10 14.37	10 13.83	
−21	53 14	52 47	53 3	52 34	53 37	53 11	53 5	52 42	53 5	
	1.36420	1.36400	1.36410	1.36390	1.36430	1.36420	1.36410	1.36400	1.36410	
	+ 707	+ 707	− 1248	− 1248	− 774	− 774	− 1446	− 1446	− 1599	
	1.37127	1.37107	1.35162	1.35142	1.35656	1.35646	1.34964	1.34954	1.34811	
	+23.51	+23.50	+22.47	+22.46	+22.73	+22.72	+22.37	+22.36	+22.29	
	− .05	− .21	− .01	− .64	− .53	− .01	− .01	− .54	− .01	
	− .30	− .35	− .31	− .37	− .23	− .27	− .29	− .33	− .29	
	+ .15	+ .17	+ .16	+ .14	+ .13	+ .15	+ .16	+ .18	+ .16	
	+23.31	+23.11	+22.31	+21.64	+22.10	+22.59	+22.23	+21.77	+22.15	
+64	10 34.89	34.55	10 34.80	33.10	10 36.82	37.33	10 36.42	36.14	10 35.98	
	10 34.72	+5 40.27	10 33.95	+5 41.66	10 37.18	+5 40.68	10 36.28	+5 42.12		+5 42.69
		+0.6		+0.6		+0.6		+0.6		+0.6
		+1.8		+0.9		−1.6		−1.9		−2.4
		+5 42.67		+5 43.16		+5 39.68		+5 40.78		+5 40.89
+64		16 17.39		16 17.11		16 16.75		16 17.06		16 16.87

+64° 16' 17.05

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1877phae.proj.1407

44 Herculis

2 m 8

1 1 33

+79° 0' 26"

101 0

100 59 34

− 58 36 46

α m s m s m s m s

Corr α + .00 + .00 + .00 + .00

dα/dt + 4.9339 + 4.9339 + 4.9339 + 4.9339

δ₀ ′ ″ ′ ″ ′ ″ ′ ″

58 55.00

Corr δ + .7

dδ/dt + 19.380

May 10.9

15 3688 44 34 10

20 3732 48 24 8

25 3780 51 16 7

30 3831 55 09 5

38.86 0.4

log cos δ 9.27995n

15 cos δ tan i 940043n this May 14

9.39763n after May 14

tang δ + 5.16 5.24

cos i z − .85

1877

+ −.90 × −.88 (−1.03 × −1.20

May 12 May 13 May 16 May 31

1 0 6.6 0 27.82 | 59 8.7 0 27.67 | 59 15.0 0 28.78 | 59 0.8 0 17.50

13.0 33.04 | 6.6 32.78 | 22.4 31.18 | 11.7 22.77

25.7 38.55 | 16.1 38.35 | 33.0 36.90 | 22.0 27.77

43.98 43.40 41.95 32.30

49.18 48.85 46.67 38.78

55.10 0 23.4 54.53 52.65 0 48.6 44.20

0.50 31.3 59.70 58.84 57.7 49.88

5.90 40.6 3.20 3.50 10.8 54.75

11.40 10.80 8.77 0.60

0 1557 265.47 445.47 | 59 7.80 321.88 441.38 | 59 23.47 305.91 425.91 | 59 11.50 288.95 348.95

0 49.447 | 0 31.77 | 0 49.042 37 | 0 47.323 | 0 59.03 | 0 38.772

1 37.034 | 1 37.26 | 1 37.392 | 1 38.744

− 47.54 | − 48.10 | − 50.07 | − 60.17

+42.83 − 47.54 | +43.56 − 48.10 | +44.63 537 − 50.07 | +59.07 − 60.17

+6.64 | +6.54 | + 6.19 | + 6.19

+5.79 | +5.69 | +5.43 | +3.88

+53.25 | +53.74 | +55.37 | +1 4.14

+1 42.75 | +42.82 | +42.69 | +42.91

+33.93 | +101.23 | +17.26 | +83.85 | +87.27 | −20.26

1.53058 | 2.00531 | 1.23704 | 1.92350 | 1.94086 | 1.30664n

0.93101n | 1.40574n | 0.63747n | 1.32113n | 1.33849n | 0.76427

30 1 | 30 1 | 30 1 | 30 1 | 30 1 | 30 0

E 17.1 | 32.7 | 10.6 | 26.9 | 22.1 | 54.0

F 23.9 | 38.4 | 17.4 | 32.8 | 33.5 | 3.8

G 24.5 24.80 | 42.4 37.65 | 19.1 14.85 | 37.8 32.35 | 35.4 28.75 | 7.5 00.75

H 6.9 | 22.9 | 1.4 | 18.3 | 19.2 | 51.1

72.4 | 136.4 | 48.5 | 113.8 | 110.2 | 236.4

31 18.10 | 31 34.10 | 31 12.13 | 31 28.95 | 31 27.55 | 30 59.10

− 8.53 | − 25.45 | − 4.34 | − 20.95 | − 21.80 | + 5.06

31 9.57 | 31 8.65 | 31 7.79 | 31 8.00 | 31 5.75 | 31 4.16

+100 51 38.78 | 51 39.70 | 51 40.56 | 51 40.35 | 51 42.60 | 51 44.19

−58 34 24 | 34 8 | 34 30 | 34 13 | 34 14 | 34 43

1.97289 | 1.97281 | 1.97292 | 1.97284 | 1.97284 | 1.97299

+ 725 | − 82 | − 82 | − 1230 | − 1418 | − 1418

1.98014 | 1.97199 | 1.97210 | 1.96054 | 1.95866 | 1.95881

+93.53 | +93.75 | +93.78 | +91.31 | +90.92 | +90.95

+ .12 | + 1.04 | + .03 | + .72 | + .78 | + .04

− .16 | − .19 | − .14 | − .18 | − .16 | − .11

+ .08 | + .10 | + .07 | + .09 | + .09 | + .06

+1 3557 | +1 3470 | +1 3374 | +1 3194 | +1 3163 | +1 3894

+100 53 12.35 | 53 14.40 | 14.30 | 53 12.29 | 53 14.23 | 15.13

+5 40.27 | 53 14.35 | +5 40.49 | +5 41.66 | 53 14.68 | +5 42.12

58 57.0 +1.6 | 58 57.2 +1.6 | 58 57.7 +1.6 | 58 59.7 +1.6

+5 42.6 −2.0 | +5 42.8 −2.2 | +5 45.4 −2.7 | +5 45.0 −4.7

41.9 | 42.1 | 44.7 | 44.3

+5 39.27 | 39.87 | +5 39.89 | +5 40.56 | +5 39.02

100 +58 53.62 | 54.22 | +58 54.24 | +58 51.85 | 52.85 | +58 53.70 | 53

422 | 2

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α Virginis

α 13h 3m 29s

δ − 4° 52′ 15″

+ 47 15 3

α_0 — m 3 34.945 — 3 37.41 — 3 37.40 — 3 37.39 — 3 37.57 — 3 37.85 — 3 37.33 — 3 37.30 — 3 37.27

Corr α — − .01

$\frac{d\alpha}{dt}$ — +3.1084

δ_0 — ″ 52 55.43

Corr δ — + .9

$\frac{d\delta}{dt}$ — −19.325

Sept 30 — 53 — 13.1
Oct 5 — 52 — 13.0
10 — 51 — 12.9
15 — 50 — 12.8
20 — 49 — 12.6
25 — 48 — 12.4
30 — 47 — 12.2
June 4 — 46 — 11.9
9 — 45 — 11.6

log cos δ 9.99842

15 cos tan 0.11890 true May 14
0.11610 after May 14

tan δ − 0.09 1.00

sec z + .73

1877

May 12 — −.90

May 13 — −.88

May 31 — −1.20

13	2	29.0	2	42.07	2	28.7	2	41.38	2	24.4	2	30.70	
		30.6		44.23		30.7		43.40		25.8		32.80	
		32.4		46.25		32.4		45.45		27.8		34.90	
				50.48				49.70				39.00	
				52.49				51.80				41.15	
	3	20.5		54.30	3	15.6		53.84	3	2.8		43.15	
		22.0		56.55		17.0		55.90		4.5		45.18	
		23.4		58.70		18.9		58.00		6.9		47.32	
				2.83				2.10				51.44	
				4.90				4.08				53.50	
				7.00				6.20				55.70	
				420.00				41.185					
	2	30.67		600.00	2	30.60		591.85	2	26.00		474.84	
	3	22.03	2	54.545	3	17.17	2	53.805	3	4.13	2	43.167	
			3	37.396			3	37.394			3	39.322	
				4285				4359				5416	
		+42.84		4284		+43.56		4358		+54.07		5415	
		+.08				+.08				+.11			
		−2.485				−2.45				−2.38			
		+40.45				+41.19				+51.80			
	+3	34.99				+34.99				+34.97			
		+23.87		−7.49		+23.20		−23.37		+17.17		−21.56	
		1.37785		1.43917n		1.36549		1.36866n		1.23477		1.33365n	
		1.46675		1.55807		1.48439		1.48756		1.35367		1.44975	
		15 4		20 1		20 0		20 1		20 0		20 0	
ε		57.9		4.1		1.3		2.6		7.9		58.5	
η		9.6		15.3		13.8		15.2		23.3		15.1	
ϑ		17.9		22.4		21.5		22.1		33.9		24.1	
κ		53.2		55.6		58.9		59.9		11.2		2.9	
		18.6		37.4		35.5		39.8		76.3		40.6	
	20	46.5	21	6.35	20	8.88	21	9.95	20	19.08	21	10.15	
	+	3.39	−	36.15	+	30.51	−	30.73	+	22.58	−	28.17	
	20	36.04	20	33.20	20	39.39	20	39.22	20	41.66	20	41.98	
−4	57	47.69	57	44.85	57	51.04	57	50.87	57	53.31	57	53.63	
+47	14	23	15	27	14	27	15	28	14	37	15	28	
		1.79370		1.79400		1.79370		1.79400		1.79380		1.79400	
		+731		+731		−78		−78		−1415		−1415	
		1.80101		1.80131		1.79292		1.79322		1.77965		1.77985	
		−63.24		−63.29		−62.08		−62.12		−60.21		−60.24	
		+.03		+.04		+.03		+.03		+.01		+.02	
		−.61		−.14		−.01		−.14		−.03		−.13	
		+.31		+.07		+.01		+.07		+.02		+.07	
				Ref									
	−1	351	−1	332	−1	245	−1	216	−1	021	−1	028	
−4	58	51.20		48.187	58	53.09		53.03	58	53.52		53.91	
−4	58		+5	40.27	58	53.06	+5	40.49	58	53.72	+5	42.12	
	53	129		+1.2	53	128		−1.2	53	121		−1.2	
	+5	383		+17.5	+5	40.3		+17.4	+5	41.6		+16.7	
		392				412				42.5			
			+5	56.57			+5	56.69			+5	57.62	
−4				54.63			−52	56.37			−52	56.10	

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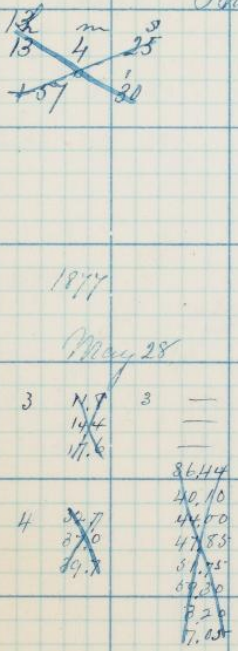
This star to be rejected

1877

May 28



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1877phae.proj.1487.

This star to be rejected

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ζ Ursae Maj.

h m s
13 18 53
+55° 30' 45"
− 13 7 57

X

1877

June 17

13	17 36.6	17	4200		
	39.1		4335		
	42.3		4930		
			1658		
			030		
18	34.2		390		
	39.2		745		
	43.2		1.00		
			1840		
			2205		
			2380		
			282.33		
17	39.33		702.33		
18	39.53	18	3,848		
		19	1862		
			5751		
	+57.26		54.46		
	−1.75				
	−.09				
	−3.10				
	+54.31				
+18°	58.18				

	+2452	−3568
	1.38952	1.55242 n
	1.26954	1.42249 n
	50 4	50 4
E	11.7	5.2
H	22.1	7.7
G	33.1 22.40	17.5 7.35
H	10.1	54.9
	770	173
54	19.25	55 14.33
	+ 18.18	− 24.45
54	37.43	54 37.88
+55	28 10.92	28 10.47
−13	11 23	10 38
	1.13020	1.12980
	−1421	−1421
	1.11599	1.11559
	+13.06	+13.05
	− .16	− .32
	− .43	− .51
	+ .26	+ .31
	+12.73	+12.53
+55	28 23.65	23.00
+55	28 23.32	+5 43.35
	34 5.2	+ 0.4
	+5 41.9	− 1.2
	43.3	
		+5 42.55
55		+34 5.87

Corr α
dα/dt
δ₀
Corr δ
dδ/dt

	m	s			m	s		′	″		
20	18	58.263	June	9	19	1.56	12	34	4.3	6	
		s		14		1.44	12		4.9	5	
		−.05		19		1.32	13		5.4	5	
		s		24		1.19	14		5.9	4	
		+2.4316		29		1.05			6.3		
	′	″									
	34	4.02									
		+1.14									
		−18.929									

log cos δ 9.75239
15 Constant 987007

tang δ +1.46 1.77
Corr 2 −.23

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Gr. 2001

h m s
13 22 57
0 1 m
73 2 27
30 39 39

α_0 — m 22 s 59.678
Corr α — +.32
$\frac{d\alpha}{dt}$ — +1.5177

δ_0 — ′ 49.80″
Corr δ — +.14″
$\frac{d\delta}{dt}$ — −18.477″

May 30 d
d
4
9
14
19

m s
23 508
4.81
4.54
4.25
3.95

d
21
27
29
30

′ ″
51.0 9
51.4 7
52.6 6
53.2 5
53.7

log cos δ 9.46511
15 cos δ tan i 9.58279

tan g δ +3.28 3.42
sin Z −.51

1877

X −1.20 — May 31

X −1.20 −.05 — June 17

X −1.12 −.05 — June 19

21	37.0	22	1.00	22	5.0	21	53.00	21	28.0	21	54.20
	42.0		4.40		10.8		58.75		34.0		58.05
	47.8		8.00		14.9		2.25		40.0		1.53
			11.58				5.60				5.06
			15.15				9.40				8.45
23	10.6		18.58	22	49.9		12.80	22	29.0		11.80
	15.9		21.95				16.15		35.6		15.33
	19.4		25.80				19.65		42.4		18.80
			29.45				23.20				22.44
							202.80				195.76
21	42.7		135.91	22	10.23		82.80	21	34.00		75.76
23	15.30	22	15.101	22	49.90	22	9.200	22	35.67	22	5.418
		28	5.012			23	4.055			23	3.935
			49.91				54.80				55.52
	+54.07		−50.23		+59.26		−55.18		+59.66		−55.84
	−3.93				−3.53				−3.67		
					−.17				−.17		
	−5.33				−4.38				−4.26		
	+44.81				+50.78				+51.56		
+22	59.91				+59.98				+59.98		

	+32.83	−60.20	−1.03	−40.70	+34.42	−27.25
	1.51627	1.77960n	0.01284n	1.60959n	1.53681	1.43537n
	1.09966	1.36230n	9.59456n	1.19238n	1.11960	1.01816n
	25 1	25 2	25 2	25 2	25 1	25 2
E	52.8	28.8	4.9	19.8	49.4	13.1
H	4.4	40.3	15.2	30.4	1.1	25.9
G	9.8 1.30	43.7 36.25	25.5 15.20	41.5 30.65	11.6 0.60	34.3 23.70
K	54.7	24.1	2.4	18.9	48.4	11.9
	1.7	141.9	48.0	110.6	230.5	85.2
27	0.43	27 35.48	27 12.00	27 27.65	26 57.63	27 21.30
	+ 12.56	− 23.04	− 0.39	− 15.57	+ 13.17	− 10.43
27	12.99	27 12.44	27 11.61	27 12.08	27 10.80	27 10.87
+72	55 35.36	55 38.91	55 36.74	55 36.27	55 37.55	55 37.48

−30	38 42	38 7	38 30	38 14	38 44	38 21
	1.53260	1.53260	1.53275	1.53270	1.53280	1.53270
	−1370	−1370	−1400	−1400	−2335	−2335
	1.51910	1.51890	1.51875	1.51870	1.50945	1.50935
	+33.04	+33.03	+33.02	+33.01	+32.32	+32.31
	− .17	− .55	− .00	− .25	− .18	− .11
	− .22	− .29	− .22	− .25	− .20	− .24
	+ .12	+ .16	+ .13	+ .15	+ .12	+ .14
	+32.77	+32.35	+32.93	+32.66	+32.06	+32.10
+72	56 8.13	8.26	56 9.67	8.93	56 9.61	9.58
+72	56 8.20	+5 42.12	56 9.30	+5 43.35	56 9.60	+5 43.29
	1 5.12	+0.8	1 5.35	+0.8	1 5.37	+0.8
	+5 43.0	−1.4	+5 49.2	−3.7	+5 44.1	−3.9
	43.4		44.6		44.5	
		+5 41.52		+5 40.45		+5 40.19
73		+1 49.72		+1 49.75		+1 49.79

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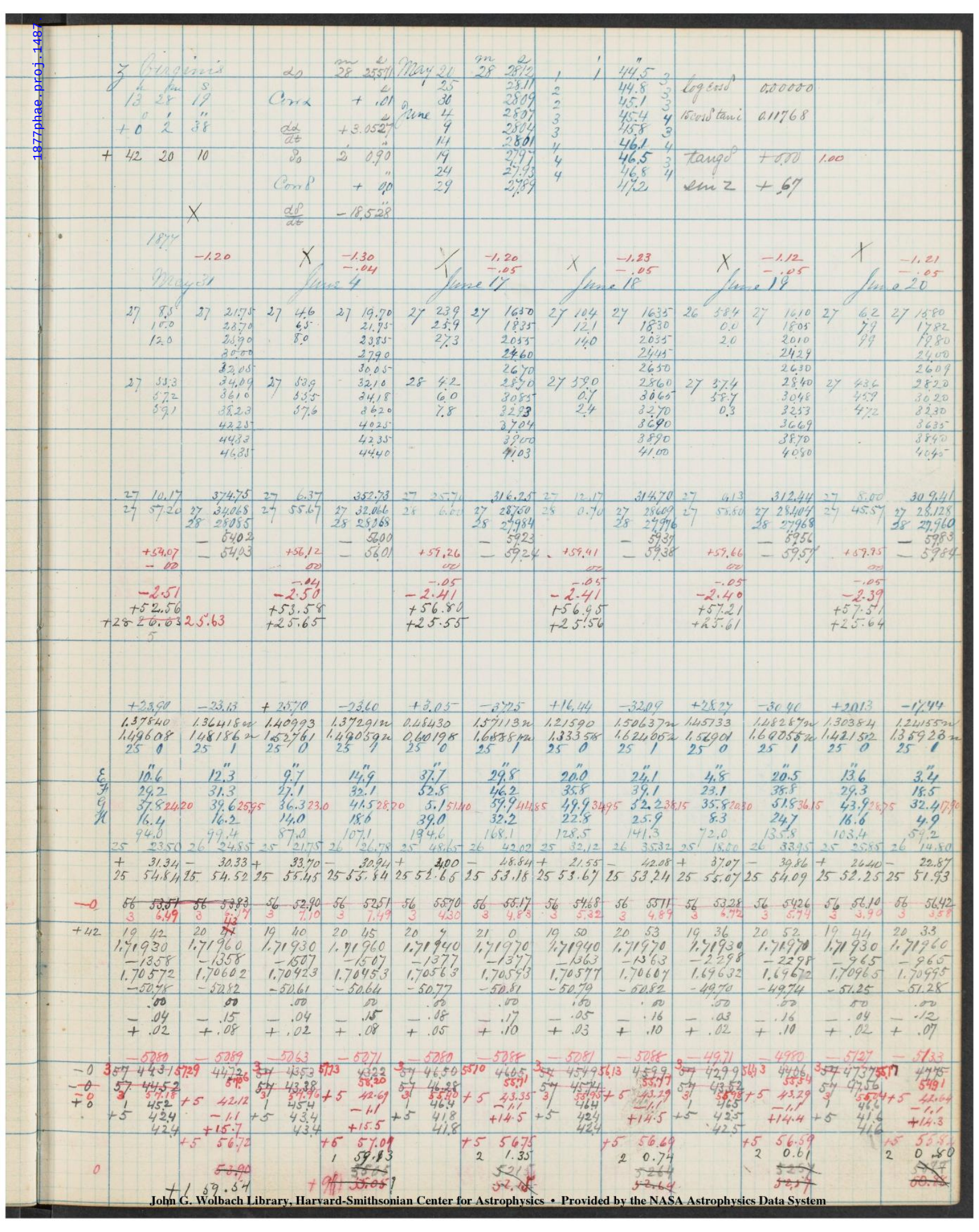

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Gr. 2029

h m s
13 34 11
0 ' "
+ 71 52 43
− 29 29 55

α_0

Corr$_\alpha$

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

δ_0

Corr$_\delta$

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

1877

May 20	m	s
	34	18.38
25		17.13
30		18.92
June 4		18.69
9		18.44
14		18.18
19		17.91

+ .12

+1.4317

52 6.64 ~~7 55.76~~

− .1

−18.372

	′	″
20	52	4.8
21		6.0
23		7.0
25		7.9
26		8.4
27		9.4
		9.9

12
10
9
8
7
5

log cos δ 9.49308
15 cos δ tan i 9.61076
tan δ + 8.05
sin Z − .49

3.22

I 664
½I 3.321

May 28	May 29	May 30	June 2	June 4	June 14
−1.00	−1.13	−1.19	−1.35	−1.30 −.04	−1.20 −.05

32 19.7 26.4 31.6
33 17.95 21.00 24.30 28.50 31.29
32 36.6 43.8 48.9
33 17.00 20.30 23.60 26.70 30.08
33 3.2 7.0 14.9
33 16.20 19.40 22.75 26.32 29.50
33 2.3 8.6 14.4
33 14.00 17.35 20.70 24.10 27.72
33 37.8 41.1 47.6
33 ~~13.48~~ 16.80 19.85 23.35 26.95
32 53.6 59.9 6.1
33 9.35 12.70 16.06 19.20 22.52

33 31.7 38.8 43.4
33 34.75 38.08 41.28 44.43
33 55.3 59.8 6.34
33 45.7 49.2 55.5
33 33.35 36.68 40.25 43.30
33 54.3 58.4 5.6
34 6.8 11.0 16.0
33 31.00 34.28 37.47 40.88
33 39.0 42.7 49.8
33 23.60 26.60 30.05
33 20.30 23.60 26.90 30.03
33 26.03 29.40 32.70 35.85

32 25.40 28.88 ~~12~~
32 43.10 27.26
33 8.37 26.75
33 8.43 24.50
33 42.17 24.98
32 59.87 20.31

33 37.97
33 31.98 34 16.994 47.74 47.86
34 0.17
33 30.14 34 18.952 48.81 48.93
33 50.13
33 29.417 34 18.908 49.49 49.61
33 39.43
33 27.500 34 18.770 51.27 51.39
34 11.27
33 26.776 34 18.698 51.90 52.02
33 43.83 34 18.004 51.26 51.39
33 22.646 34 18.004 50.36 50.48

+51.09 − 3.05
+52.40 − 3.45
+53.32 − 3.63
+55.54 − 4.12
+56.12 − 3.96 − .13 − 4.94 +47.09 +13.87
+56.26 − 3.66 − .16 − 4.26 +51.18 +13.83

− 5.25 +42.79 +34 14.04
− 5.21 +43.76 +13.88
− 5.17 +44.52 +13.94
− 5.03 +46.39 +13.89

+1535
1.81525 1.42601 35 1 ″ 22.1 32.1 38.9 22.9 116.0 29 00
−4.72
0.82737n 0.43813n 35 1 ″ 52.9 2.3 6.8 53.3 23.53 58.33 + 26.67 36 55.67 − 2.74 36 56.09 45 52.26 29.50 6.85 59.85
+4.04
1.67247 1.28323 35 1 ″ 28.3 38.6 44.3 31.0 142.2 33.50 + 19.20 36 54.75 45 53.60 36.30
−30.03
1.47756n 1.08832n 35 2 ″ 1.4 11.6 15.4 2.1 30.5 7.63 − 12.26 36 ~~45.27~~ 55.31 45 52.98 15.48 4.40
+21.05
1.32325 0.93401 35 1 ″ 40.3 51.9 56.1 40.6 188.9 47.23 + 8.59 36 55.82 45 52.53 48.20
−20.71
1.31618n 0.92694n 35 1 ″ 58.6 9.2 13.0 58.2 19.0 4.75 − 8.45 36 56.30 45 52.05 5.90
+19.07
1.28035 0.89111 35 1 ″ 40.0 52.0 57.1 41.3 190.4 47.60 + 7.78 36 55.38 45 52.97 48.55
−31.93
1.50420n 1.11496n 35 2 ″ 0.9 12.3 17.7 3.1 34.0 8.50 − 13.03 36 55.47 45 52.88 9.30
−15.39
1.18724n 0.79800n 35 1 ″ 55.1 5.9 12.5 55.9 9.4 2.35 − 6.28 36 56.07 45 52.28 3.80
−44.49
1.64826n 1.25902n 35 2 ″ 6.9 17.6 24.2 [6.2] 54.9 ~~85.6~~ 18.16 36 55.74 45 52.61 15.55
+22.78
1.35755 0.96831 35 1 ″ 37.9 48.1 58.3 36.3 180.6 45.15 + 9.30 36 54.45 45 53.90 48.10
−2.118
1.32593n 0.93669n 35 1 ″ 55.9 6.4 17.1 54.4 13.5 3.45 − 8.64 36 54.81 45 53.54 6.70

− 29	29 13	28 43	29 6	28 34	28 55	28 37	28 54	28 34	28 40	28 28	28 57	28 39
	1.51260	1.51240	1.51250	1.51240	1.51250	1.51240	1.51250	1.51240	1.51240	1.51235	1.51250	1.51240
	− 385	− 385	− 706	− 706	− 1137	− 1137	− 1513	− 1513	− 1489	− 1489	− 1352	− 1352
	1.50875	1.50855	1.50544	1.50534	1.50113	1.50103	1.49737	1.49727	1.49751	1.49746	1.49898	1.49888
	+32.27	+32.25	+32.02	+32.01	+31.70	+31.70	+31.43	+31.42	+31.44	+31.44	+31.55	+31.54
	− .69	− .01	− .35	− .14	− .07	− .07	− .06	− .16	− .24	− .31	− .08	− .07
	− .16	− .22	− .18	− .23	− .20	− .23	− .20	− .23	− .22	− .24	− .18	− .21
	+ .09	+ .12	+ .10	+ .13	+ .11	+ .13	+ .11	+ .13	+ .12	+ .13	+ .11	+ .13
	+31.51	+32.14	+31.59	+31.77	+31.54	+31.53	+31.28	+31.16	+31.30	+31.02	+31.40	+31.39
+ 71	46 23.19 24.19	24.49	46 25.19	24.75	46 24.07	23.58	46 24.25	24.04	46 23.58	23.63	46 25.30	24.93
+ 71	46 24.30	+ 5 44.15	46 24.97	+ 5 40.68	46 23.82	+ 5 41.49	46 24.14	+ 5 42.88	46 23.60	+ 5 42.69	46 25.12	+ 5 43.35
	52 66	+ 0.8	52 68	+ 0.8	52 70	+ 0.8	52 7.6	+ 0.8	52 7.9	+ 0.8	52 9.7	+ 0.8
	+ 5 42.3	+ 0.0	+ 5 41.8	− 0.2	+ 5 43.2	− ~~0.2~~ − 0.4	+ 5 43.5	− 1.0	+ 5 44.3	− 1.3	+ 5 44.6	− 3.0
	42.2		41.7		43.1		43.4		44.2		44.5	
		+ 5 41.95		+ 5 41.28		+ 5 41.89		+ 5 42.68		+ 5 42.19		+ 5 41.15
71		+ 52 6.25		+ 52 6.25		+ 52 5.71		+ 52 6.82		+ 52 5.79		+ 52 6.27

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log cos δ 9.93061
15 cos δ tan i 0.04829
tang δ +0.61 1.17
sin z +.19

1877

	May 28	May 29	June 2	June 4	June 17	June 18
	−1.00	−1.13	−1.35	−1.30 −.04	−1.20 −.05	−1.23 −.05
	39 29.9	39 38.9	39 38.30	39 16.8	39 24.70	39 18.4	39 31.40	39 14.0	39 31.15
	32.4	41.1	37.70	18.5	37.20	2.05	33.80	16.2	33.70
	34.3	42.9	40.10	20.3	39.53	22.3	36.15	18.0	36.10
			43.00		44.48		41.00		40.90
	39 32.20	39 40.97	39 39.72	39 18.53	39 20.10	39 38.40	39 16.07
	39 54.024		39 52.854	40 12.40	39 49.93	40 19.83	39 49.269		39 45.863		39 43.720
	+51.09 −.61	+52.40 −.69	+55.34 −.82	+56.12 −.79 −.05	+59.26 −.73 −.06	+59.41 −.75 −.06
	−2.86 +47.62	−2.86 +4885	−2.82 +5190	−2.81 +52.47	−2.68 +5579	−2.67 +5593
	40 41.64	40 41.70	40 41.69	40 41.74	40 41.65	40 41.65
											13 40 41.678
	+21.82	+11.88	+19.82	−22.61	+30.74	−30.56	+35.41	+29.65
	1.33885	1.07482	1.29710	1.35430n	1.48770	1.48515n	1.40586	1.47202
	1.38714	1.12311	1.34539	1.40259n	1.53599	1.53344n	1.45415	1.52031
	55 1'	55 2	55 1	55 2	55 1	55 2	55 1	55 1
E	53.1	3.9	55.7	43.6	42.9	54.7	46.5	43.0
H	6.9	17.7	10.4	57.2	57.9	5.9	1.5	57.2
G	14.1 3.60	23.9 13.90	17.4 36.55	4.5 54.05	4.3 53.60	13.6 2.65	13.5 30.00	8.9 55.95
K	56.5	6.5	59.9	46.7	45.8	53.9	48.1	43.4
	10.6	52.0	23.4	21.20	21.07	5.1	29.6	21.25
	57 2.65	57 13.00	57 6.85	57 53.00	57 52.73	58 1.28	56 54.40	56 53.13
	+ 24.39	+ 13.28	+ 22.15	− 25.27	+ 34.36	− 34.15	+ 28.45	+ 33.14
	57 27.04	57 26.28	57 28.00	57 27.73	57 27.09	57 27.13	57 25.85	57 26.27
+31	25 21.31	25 22.07	25 20.35	25 20.62	25 21.26	25 21.22	25 22.50	25 22.08
+10	51 21	51 31	51 24	52 11	51 11	52 19	51 15	51 11
	1.04300	1.04315	1.04310	1.04360	1.04290	1.04370	1.04290	1.04290
	− .363	− .697	− .493	− .1493	− .172	− .1472	− .1326	− .1286
	1.03937	1.03618	1.02817	1.02867	1.02818	1.02898	+.01344	1.02964	1.03004
	−10.95	−10.87	−10.67	−10.68	−10.67	−10.69	−10.71	−10.72
	− .12	− .03	− .10	− .13	− .23	− .23	− .16	− .22
	− .22	− .24	− .23	− .32	− .21	− .33	− .20	− .19
	+ .12	+ .13	+ .13	+ .17	+ .11	+ 18	+ .12	+ .11
	−11.17	−11.01	−10.87	−10.96	−11.00	−11.07	−10.95	−11.02
+31	25 10.14	25 11.06	25 9.48	9.66	25 10.26	10.15	25 11.55	25 11.06
		+5 41.15	+5 40.68	25 9.57	+5 42.88	25 10.20	+5 42.69	+5 43.35	+5 43.29
		−0.3	−0.3		−0.3		−0.3	−0.4	−0.4
		+8.2	+8.0		+7.4		+7.0	+5.2	+5.0
		+5 49.05	+5 48.38		+5 49.98		+5 49.39	+5 48.15 .05	+5 47.89
+31		30 59.19	30 59.41		30 59.55		30 59.59	30 59.76 .60	30 58.95 +31° 30′ 59.39

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1877phae.proj.1487

29 Ursae Majoris

| | | |

1877phae.proj.1487

| | | |

1877phae.proj.:1487.

50 Cassiopeiae

h m s
1 52 48
° ′ ″
+71 48 54

+108 11 5

−65 48 17

1877

−1.00

May 28

Cor 2

dα/dt

δ0

Corr δ

dδ/dt

Obs. 1

June 9

June 17

June 18

June 20

June 24

June 25

log r sin p 9.49424

log r cos p sin(z+p) 9.61192

log ρ 1.51819
ρ 32.97
I 660
½I 330

tang p ±3.05 3.20

sin z −.91

−1.20 −.05

−1.23 −.05

−1.21 −.05

−1.16

−1.14

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1877phae.proj.1487

?

		S
4	13	52
me	54	59
	+65	18
	−23	35

log cos δ 9.60988
15 Cos δ tan i 9.72756
tang δ +2,24
sin Z −.40

I 5.06
½ I 2,53
2.46

1877

June 4			June 19	
	−1.30			−1.12
	−.04			−.05
51 34.2	52 28.0		52 37.0	52 —
38.8	5.38		41.8	—
42.7	7.90		47.0	—
	10.40			—
	13.00			—
52	15.70		8.82	11.35
	18.10		8.64	13.70
	20.45		.71	16.30
	23.15		.65	18.77
51 38.57	116.88		52 41.93	
	52 12.97			52 8.715
	+56.11			+59.66
	−3.29			−2.51
	−.10			−.12
	−4.21			−3.64
	+48.89			+53.36
53	1.88		53	2.06

13 53 1.970

	+34.42	−33.23
	1.53681	1.52153 n
	1.26437	1.24909 n
	30 0	30 1
	51.0	23.3
	0.1	33.9
	9.6 0.30	46.8 35.05
	51.8	21.7
	23.25	12.57
30	58.13	31 31.43
	+ 18.38	− 17.75
31	16.51	31 13.68
+65	51 34.84	51 34.67
−23	34 44	34 11
	1.40020	1.40000
	− 1434	− 2128
	1.38586	1.37872
	+24.31	+23.92
	− .24	− .22
	− .10	− .15
	+ .06	+ .09
	+24.03	+23.64
+65	51 55.87	51 54.31
	+5 42.69	+5 43.29
	+0.6	+0.6
	+0.7	−1.8
	+5 43.99	+5 42.09
+65	57 39.86	57 40.40

+65° 57′ 40.13″

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T Virginis

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h m s
14 0 54

+31 27

+ 10 56

log cos δ 9.93100
15 cos δ tan i 0.04768
tang δ +0.61 1.17
sin z +.19

I 2.42

1877

	June 17		June 18		June 19	
		−1.20 −.05		−1.23 −.05		−1.12 −.05
13	59 28.7	59 48.90	59 30.3	59 48.60	0 22.9	59 —
	31.0	51.20	32.3	37.40	25.4	—
	33.4	53.57	34.4	53.35	27.4	—
		58.40		58.30		2.84 58.00
		0.90		0.60		.82 0.40
		3.36		3.00		.75 2.75
		5.62		5.30		.83 5.25
		8.12		7.98		.71 7.53
		13.00		12.72		.69 12.37
		15.45		15.20		.75 14.85
		17.63		17.60		.73 17.25
		276.15	3	274.25		
	59 31.03	0 36.15	59 32.38	0 34.25	0 25.23	
		59 3.286		58 3.114		0 2.765
		+59.25		+59.39		+59.66
		−.73		−.75		−.68
		−.06		−.06		−.06
		−2.78 4		−2.74 3		−2.72
		+ 55.47 2		+ 55.845		+ 56.20
		0 59.00 1		0 58.956		0 58.96

14 h 0 m 58.977 s

	+32.26	+30.78	−22.47
	1.50866	1.48827	1.35160n
	1.55734	1.53695	1.40028n
	0 1	0 1	0 2
ε	20.5	23.0	20.4
η	35.0	36.1	36.8
θ	47.1 38.80	48.1 35.55	48.3 34.35
ι	20.1	23.4	22.9
	122.7	130.6	128.4
	1 30.68	1 32.65	2 32.10
	+ 34.09	+ 34.43	− 25.13
	2 6.77	2 7.08	2 6.97
+31	20 41.58	20 41.27	20 41.38
+10	55 49	55 51	56 50
	1.04620	1.04620	1.04680
	−12.40	−11.55	−20.78
	1.03380	1.03465	1.02602
	−10.81	−10.83	−10.62
	− .26	− .23	− .12
	− .15	− .15	− .25
	+ .09	+ .09	+ .15
	−11.13	−11.12	−10.84
+31	20 36.45	20 30.15	20 30.54
	+5 43.35	+5 43.29	+5 43.29
	−.04	−0.4	−0.4
	+5.8	+5.6	+5.5
	+5 48.75	+5 48.49	+5 48.39
+31	26 19.20	26 18.64	26 18.93

+31° 26′ 18.92″

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α Draconis

| | | |

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K Cygni

| | | |

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4 Ursae Min

	h	m	s
	14	9	22
	°	′	″
+	78	8	5
−	35	45	17

α_0 9 21.609 (May 30)
Corrα − .26
$\frac{d\alpha}{dt}$ − 0.3324
δ_0 77 31.07
Corrδ + .8
$\frac{d\delta}{dt}$ − 16.926

	m	s
June 4	9	28.68
9		28.34
14		27.98
19		27.58
24		27.16
29		26.72
		26.26

	′	″	
34	77	29.6	10
36		30.6	10
40		31.6	8
42		32.4	8
44		33.2	6
46		33.8	5
		34.3	

log cosδ 9.31310
15 cosδ tanζ 9.43078
tanζ +4.75 4.85
sin z − .58

I 9.94
II 4.97

1877

	June 2	June 20	June 24	June 25	June 27
	T	X	X	X	X
	−1.35 Add 5	−1.21 −.05	−1.16	−1.14	−1.20
	7 26.2	8 16.3	8 12.67	8 22	8 12.10
	34.0	26.6	17.30	8.7	16.30
	41.2	34.1	22.78	19.8	22.00
			28.00		27.00
			32.90		31.95
			37.80		36.80
			42.75		42.10
			47.98		47.00
			53.00		52.30
	7 33.81	8 25.47	8 10.23	8 1.37	7 50.77
	8 31.262	8 32.820	8 32.017	8 31.60	8 31.486
	9 28.459	9 27.050	9 26.697	9 26.605	9 26.421
	− 5.320	− 5.423	− 5.468	− 5.500	− 5.494
	+55.56	+53.91	+59.96	+1 + 0.18	+1 − 0.38
	− 6.41	− 5.75	− 5.51	− 5.41	− 5.70
		− .24		5.00	
	− 6.85	− 5.44	− 5.09	− 4.99	− 4.81
	+42.30	+48.48	+49.36	+49.77	+49.87
	+9 21.56	+21.30	+21.38	+21.37	+21.36
	+65.46	+7.15	+21.79	+20.23	+40.72
	1.81598	0.854317	1.33826	1.30600	1.609817
	1.24676	0.285099	0.769044	0.78678	1.040599
	20 1	20 1	20 1	20 1	20 1
E	16.0	30.4	34.4	21.4	18.4
F	26.9	41.2	37.2	35.5	31.8
G	32.5 24.25	48.6 39.50	45.9 35.15	45.3 33.35	42.4 30.4
H	18.6	30.2	26.1	25.3	21.4
	94.0	150.4	137.6	127.5	114.6
21	23.50	21 37.60	21 25.90 33.40	21 31.88	21 28.50
	+ 17.65	+ 1.93	+ 5.87	+ 5.45	+ 10.98
21	41.15	21 39.53	21 41.77 39.27	21 37.33	21 39.48
+78	1 7.20	1 8.82	1 6.58 9.08	1 11.02	1 8.87
−35	44 19	44 4	44 6	44 10	44 13
	1.61710	1.617000	1.617000	1.617100	1.617100
	− 1391	− 739	− 1485	− 2385	− 571
	1.60319	1.609661	1.602215	1.593250	1.611390
	+40.10	+40.70	+40.01	+39.20	+40.87
	− .47	− .01	− .05	− .04	− .19
	− .15	− .16	− .16	− .15	− .15
	+ .08	+ .10	+ .10	+ .09	+ .09
	+39.56	+40.63	+39.91	+39.10	+40.62
+78	1 46.76	1 49.45	1 48.98	1 50.12	1 49.49
	+5 42.88	+5 42.64	+5 43.06	+5 42.86	+5 42.58
	7 30.2	7 33.3	7 33.8	7 33.9	7 34.1
	+1.0	+1.0	+1.0	+1.0	+1.0
	+5 43.4	+5 43.9	+5 44.8	+5 43.8	+5 44.6
	+0.9	−2.2	−2.7	−2.9	−3.0
	44.2	44.7	45.6	44.6	45.4
	+5 44.78	+5 41.44	+5 41.36	+5 40.96	+5 40.58
78	+7 31.54	+7 30.89	+7 30.34	+7 31.08	+7 30.07

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C. Bodis

h m s
14 11 44

+ 1 51 36 39

− 9 33 51

1877

Lo
Corr
dL/dt
Bo
Corr
dB/dt

m s
11 48590 June 9
14
19
24
29
July 4
9
14
19

− 16.758"

m s
11 5187
51.78
5168
51.58
5147
5136
51.24
51.11
50.98

56 2.8"
3.7
4.6
5.3
6.0
6.5
7.0
1.03
7.5

log cos δ 9.78999
1 cos δ sin i 9.90767
tang δ + 1.28
cos i − .17

I 3.34
½ I 1.67
1.62

+ −1.35 | + −1.21 −.05 | X −1.141 | X −1.20 | X −1.25

June 2 | June 20 | June 25 | June 27 | July 4

10	10.3	10	38.07	10	11.6	10	33.36	10	58.7	10	46.20	10	23.8	10	45.80	11	9.10	10	—
	13.4		41.45		14.9		53.40 36.65		1.4		47.80		26.5		47.75		13.0		—
	17.0		44.70		17.8		.35 33.97		4.7		49.50		30.5		49.42		15.8		—
			51.38				.33 46.70				51.17				51.00				—
			54.62				.64 50.80				52.45				52.95				—
11	26.8		57.03	10	56.3		.32 53.32	11	19.5		54.49	11	25.3		54.55			52.48	53.15
	29.2		1.45		58.0		.26 56.60		21.7		56.07		28.3		56.20				.44 53.78
	33.0		4.90		1.2		.22 59.90		24.9		57.80		30.7		57.70				.49 53.30
			11.45				.50 —				59.53				59.40				.57 59.25
			14.80				31 10.20												
			18.29				13.35												
			339.16																
10	13.57		639.16	10	14.77			18	1.70		47.541	10	26.93		474.77	11	12.63		
11	29.67	10	58.105	10	58.83	10	53.371	11	22.03	10	52.812	11	28.10	10	52.452			10	52.495
		11	51.978			11	51.6 .55			11	51.552			11	51.508			11	51.354
			− 53.87				− 58.28				− 58.74				− 58.76				− 58.86
	+53.56		− 53.87		+58.91		− 58.28	+1	0.18		− 58.74	+1	0.38	+1	− 0.34				− 58.86
	−1.73				−1.55				−1.46				−1.53		−1.60				
					−.08														
	−3.39				−3.07				−2.96				−2.92		−2.76				
	+50.44				+55.21				+55.76				+55.93		+56.18				
41	48.54				+48.58				+48.57				+48.68		+48.68				

	+4454		−31.56		+38.60		−5.46		−8.89 −57.17		−29.21		+25.82		−35.35		−20.14				
	1.64875		1.49914n		1.58659		0.73 39.8n		1.72 53.0n		1.46568n		1.41196		1.54839n		1.30406n				
	1.55642		1.40681n		1.49426		0.64 31.8n		1.61 61.8		1.37335n		1.31963		1.45606n		1.21173n				
	30	1	30	2	30	1	30	2	30	2	30	2	30	2	30	2	30	2	30	3	
E	53.1		54.3		55.0		32.7		31.9		47.4		3.1		50.7		41.1		14.0		
H	5.0		6.1		4.7		41.6		45.2		1.4		15.8		4.2		52.1		24.1		
G	13.5	3.30	14.9	4.60	17.4	1.20	53.3	13.00	56.5	44.20	12.1	59.75	28.9	16.00	7.4	4.05	6.1	53.60	37.8	25.90	
K	54.3		56.1		53.2		29.1		31.9		48.4		4.7		52.9		38.1		38.1		
	5.9		11.4		10.3		15.6.7		16.5.5		22.9.3		5.2.5		5.2		19.7.4		11.4.0		
	32	1.48	33	2.85	32	2.58	32	39.18	32	41.38	32	57.33	32	13.12	33	1.30	32	49.35	33	28.50	
	+ 36.01		− 25.52		+ 31.21		− 4.41		+ 41.32		− 23.62		+ 20.88		− 28.58		− 16.28				
	32 37.49		32 37.33		32 33.79		32 34.77		32 42.70		32 33.71		32 34.00		32 32.72		32 33.07				
									32 34.19												
+51	50 10.86		50 11.02		50 14.56		50 13.62		50 14.16		50 14.64		50 14.35		50 16.63		50 15.28				
−9	33 41		32 39		33 39		33 3		33 1		32 45		33 29		32 41		32 57 53		32 14		
	0.98680		0.98590		0.98680		0.98620		0.98620		0.98600		0.98660		0.98600		0.98610				
	− 1379		− 1379		− 723		− 723		− 2361		− 2361		− 558		− 558		− 1374				
	0.97301		0.97211		0.97957		0.97897		0.96259		0.96239		0.98102		0.98042		0.97236				
	+9.40		+9.38		+9.54		+9.53		+9.17		+9.17		+9.54		+9.56		+9.38				
	− .52		− .26		− .39		− .01		− .82		− .22		− .18		− .33		− .11				
	− .22		− .33		− .20		− .27		− .27		− .30		− .22		− .30		− .28				
	+ .12		+ .18		+ .12		+ .16		+ .16		+ .18		+ .13		+ .18		+ .17				
	+ 8.78		+ 8.97		+ 9.07		+ 9.42		+ 9.04		+ 8.83		+ 9.30		+ 9.11		+ 9.16				
+51	50 19.64		19.99		50 23.63		22.99		50 23.20		23.47		50 23.65		24.74		50 24.44				
+51	50 1982	+5	42.86	50	2331	+5	42.64	50	2334	+5	42.86	50	2420	+5	42.58			+5	43.37		
	56 1.5		+ 0.3	56	4.8		+ 0.3	56	5.5		+ 0.3	56	5.8		+ 0.3	56	6.5		+ 0.2		
+5	41.7		+ 4.4	+5	41.5		+ 1.1	+5	42.2		+ 0.4	+5	41.6		+ 0.1	+5	42.1		− 0.6		
	42.5				42.3				43.0				42.4				42.9				
		+5	47.58			+5	44.84			+5	43.56			+5	42.98			+5	42.97		
51		+56	7.42			+56	7.35			+56	6.90			+56	7.18			+56	7.41		

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☿ Bootis

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h m s
14 19 1
+61 32
−19 09

log cos δ 9.67820
15 cos δ tan i 9.79588

tang δ +1.84 2.10
sin z −.33

1877

	June 4		June 20		June 25	
	−1.30		−1.21		−1.14	
	−.021		−.05			
14	18 30.5	18 3.20	17 20.9	18 1.12	17 37.5	18 0.40
	34.8	7.45	24.0	3.27	0.9	2.60
	38.5	9.65	26.9	5.31	3.6	4.70
		11.80		7.48		6.75
		13.90		9.80		9.00
		16.05		11.80		11.20
		18.40		13.84		13.20
		20.50		16.00		15.40
		22.75		18.40		17.40
	18 34.60	135.70	17 23.93	87.02	18 0.67	80.95
		18 13.567		18 9.669		18 8.994
	+56.10		+59.90		+1 0.18	
	−2.39		−2.23		−2.10	
	−.08		−.10			
	−3.87		−3.45		−3.29	
	+49.76		+54.12		+54.79	
	19 3.73		19 3.79		19 3.78	

14 19 3.767

	−20.63	+45.74	+8.32
	1.81450n	1.66030	0.92012
	1.14038 30	1.45618	0.71609
	55' 2'	55 1	55 1'
E	19.0	34.9	53.4
D	28.5	43.2	6.1
E	37.9 28.45	54.1 44.50	18.2 5.80
R	48.7	31.5	53.9
	104.1	112.7	11.6
	57 26.03	57 40.93	57 2.90
	− 12.89	+ 28.59	+ 5.20
	57 13.14	57 9.52	57 8.10
+61	25 35.21	25 38.83	25 40.25
−19	8 16	9 1	8 39
	1.30060	1.30090	1.30070
	−1354	−679	−2300
	1.28706	1.29411	1.27770
	+19.37	+19.68	+18.95
	− .16	− .48	− .02
	− .26	− .18	− .20
	+ .14	+ .10	+ .12
	+19.15	+19.12	+18.85
+61	25 54.36	25 57.95	25 59.10
	+5 42.69	+5 42.64	+5 42.86
	+0.5	+0.5	+0.5
	+2.9	−0.2	−0.9
	+5 46.09	+5 42.94	+5 42.46
+61	31 40.45	31 40.89	31 41.56
			+61° 31' 40.97"

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36 Ho Cassiop. L.C. 20

h	m	s				m	s			m	s						
2	26	11	Corr^{n} $\frac{d\alpha}{dt}$			26	22.38	June 9.8		26	21.02			16	41.7	6	
							+ .27	14			21.37	35			41.1	5	
								19			21.74	37			40.6		
°	′	″															
+72	16	9					+5.5525										
107	43	51	δ_0				16 41.72								log cosδ	9.48332	9
							43 18.28										
−65	21	3	Corr^{n} $\frac{d\delta}{dt}$				+ .14								15 cos Stan^{d}	9.60100	10
							+16.099										
															tangδ	−3.13	3.29
															sin z	−.91	

1877

	+	−1.23					×	−1.12															
		−.05						−.05															
	June 18						June 17																
2	23	37	25	4.90			24	36.9	25	3.05													
		8.7		8.32				03		8.53													
		16.0		11.70				9.0		11.75													
				15.38						15.70													
				18.48						18.60													
				21.30						22.10													
				25.00						25.30													
				28.60						28.70													
				31.90						32.10													
25	10.03	165.58				25	2.13	167.25															
		25 18.398						25 18.583															
		26 21.648						26 21.722															
				− 63.25						− 63.14													
	+59.37			− 63.52			+59.66			− 63.41													
	+ 3.85						+ 3.51																
	−2.26						−2.06																
	+ .16						+ .16																
	+0.73						+0.66																
+1	4.11						+3.99																
+26	22.51						+ 21.57	22.57															
							2																

	+ 8.37						+ 6.45																
	0.92273						1.21617																
	0.52373n						0.81717n																
	45 2						45 2																
E	15.3						13.8																
F	24.2						25.1																
G	32.1	23.70					34.6	24.20															
K	9.3						11.1																
	80.9						84.6																
47	20.23						47	21.15															
	− 3.34						− 6.56																
47	16.89						47	14.59															
+107	35	31.46					35	33.76															
−65	18	22					18	21															
	2.09538						2.09535																
	− 1049						− 1948																
	20849						2.07587																
	+121.59						+119.09																
	+ .02						+ .04																
	− .23						− .24																
	+ .14						+ .14																
	+2 1.52						+1 59.03																
+107	37	32.98					37	32.79															
			+5	43.29					+5	43.29													
	43	193		+1.6			43	194		+1.4													
	+5	463		−1.0			+5	466		−1.1													
		459						462															
			+5	43.89					+5	43.79													
107			+43	16.87					+43	16.58													

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β Bootis

1877

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N.Y.

5 Horsae Mine

h m s
14 27 49
+76 15 4
-33 52 16

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

1877

June 8

m	s		
27	48.365		
	2		
	-0.205		
14	32.31		
	-16.05		

m	s		
27	54.18		
	53.86	-.32	
	53.53	.33	
	53.17	.36	
	52.80	.37	

14	31.4	+10	
	32.4	9	
	33.2	7	
	34.0	7	
	34.7	7	

log cos δ 9.37600
15 cos tan 9.49368
tang +4.09 4.22
sin z -.56

I 868
½I 4.34

June 17

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	h m s		
	14 30 58		
	+ 65° 57′		
	− 23 34		
		log cos δ	9.61016
		15 cos δ tan i	9.72784
		tang δ	+ 2.24 2.45
		sin Z	− .40

1877

−1.21
−.65

June 20

14	29 19.0	29 57.28	
	23.2	59.75	
	28.0	2.38	
		4.80	
		7.40	
	30 85.1	9.90	
	39.0	12.43	
	44.3	14.80	
		17.55	
		186.39	
	29 23.40	64.39	
	30 39.47	30 7.37	

+59.89
−2.71
−.12
−3.74
+53.32
31 0.70

h m s
14 31 0.700

	+43.98	−32.09
	1.64326	1.50637
	1.37110	1.23421 m
	30 2	30 3
E	28.9	8.5
F	35.7	15.7
G	48.9 3870	27.1 1780
H	24.9	6.3
	138.4	57.6
	32 34.60	33 1.40
	+ 23.50	− 17.15
	32 58.10	32 57.25
+65	49 50.25	49 57.10
−23	33 7	32 28
	1.39960	1.39935
	−623	−623
	1.39327	1.39312
	+24.73	+24.72
	− .39	− .21
	− .26	− .32
	+ .16	+ .19
	+24.24	24.34
+65	50 14.49	1548
	50 14.99	+5 42.64
		+0.6
		−0.2
		+5 43.04
+65		55 58.03
		+65° 55′ 58.03″

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h m s
14 38 56
+ 61 48
− 19 25

log cos δ 9.67445
15 cos δ tan i 9.89213

tang δ + 1.86 2.12
sin z − .33

1877

	June 17		June 18		June 19		June 20		June 24		July 4	
	−1.20 −.05		−1.23 −.05		−1.12 −.05		−1.21 −.05		−1.16		−1.25	
14	37 45.9	37 57.30	37 41.5	37 57.00	37 8.4	37 56.75	37 20.8	37 56.60	37 22.4	37 56.05	38 34.3	37 53.65
	48.9	59.40	45.3	59.50	11.0	58.60	25.2	58.70	23.4	58.30	38.8	57.81
	52.2	1.70	48.0	1.80	15.4	1.00	28.4	1.05	29.5	0.40	43.3	0.05
		4.00		8.82		3.18		3.18		2.70		2.45
		6.00		6.08		5.45		5.20		4.72		4.30
		8.30		8.20		7.35		7.15		7.00	38 56.5	6.29
		10.30		10.37		9.80		9.60		9.20	0.8	8.77
		12.40		12.44		11.80		11.82		11.40	5.5	10.80
		14.80		14.80		14.05		14.00		13.55		13.00
		174.20		174.01		168.38		167.60		163.32		159.12
	37 49.00	54.20	37 44.93	54.01	37 11.60	48.38	37 24.87	47.60	37 25.77	43.32	38 38.80	39.12
		38 6.022		38 6.001		38 5.376		38 5.289		38 4.813	39 0.93	38 4.847
	+59.25		+59.36		+59.66		+59.88		+59.94		+1 0.52	
	−2.23		−2.29		−2.08		−2.25		−2.16		−2.32	
	−.11		−.11		−.11		−.11					
	−3.58		−3.56		−3.53		−3.50		−3.39		−3.06	
	+53.33		+53.40		+53.94		+54.02		+54.39		+55.14	
	38 59.35		38 59.40		38 59.32		38 59.31		38 59.20		38 59.49	
										14 38 59.345		
	+17.02		+21.07		+53.78		+40.42		+39.04		−34.45	−56.58
	1.23096		1.32366		1.73062		1.60660		1.59151		1.53719 n	1.75266 n
	1.02309		1.11579		1.52275		1.39873		1.38364		1.32932	1.54479 n
	40 1		40 1		40 0		40 1		40 1		40 1	40 2
ε	23.1		21.6		59.5		8.6		7.4		53.4	7.2
ζ	24.3		31.2		9.9		17.6		18.1		2.7	15.1
η	46.1 34.60		43.0 32.30		21.9 10.70		29.1 18.85		29.9 18.65		14.7 4.85	28.1 17.65
H	20.8		19.1		51.7		6.0		6.1		47.1	1.7
	11.43		11.49		29.0		61.3		61.5		237.9	52.1
	41 28.58		41 28.73		41 7.25		41 1.533		40 1.538		41 56.48	42 13.03
	+ 10.55		+ 13.05		+ 33.32		+ 25.05		+ 24.19		− 21.35	− 35.06
	41 39.13		41 41.78		41 40.57		41 40.38		40 39.57		41 38.13	41 37.97
+61	41 9.22		41 6.57		41 7.78		41 7.97		41 8.78		41 10.22	10.38
−19	24 13		24 13		24 35		24 27		24 27		23 43	23 29
	1.30710		1.30710		1.30720		1.30720		1.30720		1.30690	1.30680
	−1072		−998		−1885		−573		−1364		−1252	−1252
	1.29638		1.29712		1.28835		+29147 1.30147		1.29356		1.29438	1.29428
	+19.70		+19.82		+19.42		+20.02		+19.66		+19.70	+19.69
	− .37		− .10		− .65		− .37		− .34		− .27	− .72
	− .15		− .15		− .11		− .13		− .13		− .20	− .22
	+ .09		+ .09		+ .07		+ .08		+ .08		+ .12	+ .13
	+ 19.66		+ 19.66		+ 18.73		+ 19.60		+ 19.27		+ 19.35	+ 18.89
+61	41 28.88		41 26.23		41 26.51		41 27.57		41 28.05		41 29.57	29.26
		+5 43.35		+5 43.29		+5 43.29		+5 42.64		+5 43.06	41 29.41	+5 43.37
		+0.5		+0.5		+0.5		+0.5		+0.5		+0.5
		+1.2		+1.0		+0.8		+0.6		−0.1		−1.5
		+5 45.05		+5 41.79		+5 41.59		+5 43.74		+5 43.46		+5 42.37
+61		47 13.93		47 11.02		47 11.10		47 11.31		47 11.51		47 11.78
											+61 47 11.78	

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	June 14	June 17	June 19	June 20	June 24	June 25
α	2164	m s 48 19.109	m s 48 22.77	"		
h m s	14 48 16	Corr α	+ .03			
	° ′ ″		s			
δ	+39 48 10	$\frac{d\alpha}{dt}$	+1.5165			
	−17 25 22	δ_0	47 40.53			
		Corr δ	− .6			
		$\frac{d\delta}{dt}$	−14.715			
1877						
	−1.19 −.65	−1.20 −.05	−1.12 −.05	−1.21 −.05	−1.16	−1.14
	14 46 49.8 52.7 56.3	47 1.80 3.75 10.00 18.20	46 41.4 44.5 48.7	47 — — —	46 43.4 47.4 54.3	47 16.75 18.78 20.80 22.90
		22.30 26.39 30.52 34.49 42.65 46.85 50.90		2559 17.39 .60 21.50 .60 25.60 .50 29.60 .60 33.80 .60 42.00 .60 46.10 .52 50.12		23.00 26.90 29.10 31.10 33.20
	48 00 3.8 6.5					48 13.3 17.2 20.9
	46 52.93	289.85	46 44.87		46 47.37	224.33
	48 3.43	47 26.350 48 22.654 — 56.30 — 56.33		47 25.596 48 22.588 — 57.01 — 57.04		47 ~~24.894~~ 48 ~~24.948~~ ~~22.854~~ — 57.60 — 57.63
		+59.51 −2.05 − .10 −3.54 +52.82 +48 19.17	+59.24 −2.06 − .10 −3.48 +53.60 + 19.18		+59.66 −1.93 − .10 −3.43 +54.20 +19.15	
		+33.42	−37.08	+40.71	+37.59	
		1.52401 1.34328 40 0	1.56914n 1.38841n 40 1	1.60970 1.42897 40 0	1.57496 1.39423 40 0	
		41.1 51.3 3.5 52.30 38.6 19.45 40 48.63	26.9 38.2 49.4 38.15 25.3 139.8 41 34.95	36.8 46.4 58.1 47.45 34.4 175.7 40 43.93	37.1 47.9 1.4 49.25 35.9 182.3 40 45.58	
		+ 22.08 41 10.67	− 24.46 41 10.49	+ 26.85 41 10.78	+ 24.79 41 10.37	
+59		41 37.68	37.86	41 37.57	41 37.98	
−17		24 53 1.25670 −1098 1.24572 +17.61 − .26 − .08 + .05 +17.32	24 7 1.25630 −1098 1.24532 +17.59 − .32 − .16 + .10 +17.21	24 58 1.25680 −1033 1.24647 +17.64 − .39 − .07 + .04 17.22 + 17.46	24 56 1.25670 −1841 1.23829 +17.31 − .33 − .08 + .05 +16.95	
+59 +59		41 55.00 41 55.04 47 38.1 +5 43.1 42.5	55.07 +5 42.75 +0.5 +2.4 47 38.7 +5 43.9 43.3	41 54.79 +5 43.35 +0.5 +1.8 47 39.1 +5 44.2 43.6	41 54.93 +5 43.29 +0.5 +1.4 47 39.3 +5 43.7 43.1	
		+5 45.65 +47 40.69	+5 45.65 +47 40.44	+5 45.19 +47 40.12	+5 44.44 +47 40.04	
59						

	June 9	June 19	June 20	June 24	June 25
	14	11	11		
	19	11	11		
	24	13	9		
	29	13	9		
	47	47	47	47	47
		16.75 18.78 20.80 22.90	24.3 29.7 33.8	47.4 50.2 52.8	40.0 43.8 52.2
		23.00 26.90 29.10 31.10 33.20	47 16.30 18.60 20.60 22.70 25.00 26.80 29.00 31.00 33.00	47 53.2 0.0 3.9	47 30.2 33.0 37.4
		224.33	223.20	220.11	226.28
	47 ~~24.894~~ 48 ~~24.948~~ ~~22.854~~ — 57.60 — 57.63	48 12.13	47 24.800 48 22.518 — 57.72 — 57.75	47 59.70	47 24.457 48 22.414 — 57.96 — 57.99
		+59.87 −2.08 − .10 −3.41 ~~+54.49~~ 54.28 +19.29 +19.08 08	+59.94 −2.00 − 3.30 +54.64 +19.10 07		+1 0.18 −1.96 −3.28 +54.94 +19.15
		− 4.47	−52.33	+34.33	−35.24
		0.65031n 0.46958n 40 1	1.71875n 1.53802n 40 1	1.53567 1.35494 40 0	1.54704n 1.36631n 40 1
		6.4 16.0 27.1 16.75 4.9 5.4 ~~13.60~~ 41 ~~46.25~~	37.9 46.5 57.5 47.70 35.1 177.0 41 46.25	37.0 49.0 0.6 38.80 36.9 183.5 40 45.88	24.1 35.8 47.2 35.65 24.4 131.5 41 32.88
		− 2.95 41 10.65	− 34.52 41 ~~+10.73~~ 9.73	+ 22.64 41 8.52	− 23.24 41 9.64
		41 37.70	38.62	41 39.83	38.71
		24 28 1.25655 −523 1.25132 +17.84 − .01 − .12 + .07 +17.78	23 58 1.25630 −523 1.25107 +17.83 − .65 − .17 + .10 +17.11	24 56 1.25670 −1327 1.24343 +17.52 − .28 − .08 + .05 +17.21	24 9 1.25640 −1327 1.24313 +17.50 − .29 − .15 + .09 +17.15
		41 55.48 41 55.60 47 39.3 +5 43.7 43.1	55.73 +5 42.64 +0.5 +1.3 47 40.0 +5 43.6 43.0	41 57.04 41 56.45 47 40.0 +5 43.6 43.0	55.86 +5 43.06 +0.5 +0.5 47 40.2 +5 43.5 42.9
		+5 44.44 +47 40.04	+5 44.06 +47 40.51		

	June 9	June 19	June 20	June 24	June 25
	48 19.109	48 22.77	"		
	+ .03				
	s				
	+1.5165				
	47 40.53				
	− .6				
	−14.715				
	2559 17.39				
	.60 21.50				
	.60 25.60				
	.50 29.60				
	.60 33.80				
	.60 42.00				
	.60 46.10				
	.52 50.12				
	46 44.87	46 47.37			
	47 25.596 48 22.588 — 57.01 — 57.04	47 ~~24.894~~ 48 ~~24.948~~ ~~22.854~~ — 57.60 — 57.63	47 24.800 48 22.518 — 57.72 — 57.75	47 59.70	47 24.457 48 22.414 — 57.96 — 57.99
	+59.24 −2.06 − .10 −3.48 +53.60 + 19.18	+59.66 −1.93 − .10 −3.43 +54.20 +19.15	+59.87 −2.08 − .10 −3.41 ~~+54.49~~ 54.28 +19.29 +19.08 08	+59.94 −2.00 − 3.30 +54.64 +19.10 07	+1 0.18 −1.96 −3.28 +54.94 +19.15
	+40.71	+37.59	− 4.47	−52.33	+34.33
	1.60970 1.42897 40 0	1.57496 1.39423 40 0	0.65031n 0.46958n 40 1	1.71875n 1.53802n 40 1	1.53567 1.35494 40 0
	36.8 46.4 58.1 47.45 34.4 175.7 40 43.93	37.1 47.9 1.4 49.25 35.9 182.3 40 45.58	6.4 16.0 27.1 16.75 4.9 5.4 ~~13.60~~ 41 ~~46.25~~	37.9 46.5 57.5 47.70 35.1 177.0 41 46.25	37.0 49.0 0.6 38.80 36.9 183.5 40 45.88
	+ 26.85 41 10.78	+ 24.79 41 10.37	− 2.95 41 10.65	− 34.52 41 ~~+10.73~~ 9.73	+ 22.64 41 8.52
	41 37.57	41 37.98	41 37.70	38.62	41 39.83
	24 58 1.25680 −1033 1.24647 +17.64 − .39 − .07 + .04 17.22 + 17.46	24 56 1.25670 −1841 1.23829 +17.31 − .33 − .08 + .05 +16.95	24 28 1.25655 −523 1.25132 +17.84 − .01 − .12 + .07 +17.78	23 58 1.25630 −523 1.25107 +17.83 − .65 − .17 + .10 +17.11	24 56 1.25670 −1327 1.24343 +17.52 − .28 − .08 + .05 +17.21
	41 54.79	41 54.93	41 55.48 41 55.60 47 39.3 +5 43.7 43.1	55.73 +5 42.64 +0.5 +1.3 47 40.0 +5 43.6 43.0	41 57.04 41 56.45 47 40.0 +5 43.6 43.0
	+5 43.35 +0.5 +1.8 47 39.1 +5 44.2 43.6	+5 43.29 +0.5 +1.4			
	+5 45.65	+5 45.19	+5 44.44	+5 44.06	
	+47 40.44	+47 40.12	+47 40.04	+47 40.51	

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β Ursae Min.

α 14h 31m 5s

δ +74° 39' 3".8

−32 17 10

α 37m 48s.34 June 19 37m 9h.66 30 39 28".2

Corr α +.10 24 9.36 32 29.1

dα/dt −0.2429 29 9.04 29.9

δ 39 28".34

Corr δ +1".1

dδ/dt −14".62

log cos δ 9.42278

1 cos δ tan δ 9.54046

tang δ +3.64 3.77

sin z −.53

1877

X −1.21 −.05 June 20

X −1.16 June 24

X −1.14 June 25

X −1.20 June 27

	14	49	42.7	49	58.00	49	12.2	49	58.35	49	20.6	49	57.88	50	11.2	49	58.05		
			47.2		2.80		1.78		2.22		2.80		1.62		1.87		2.10		
			56.0		6.80		24.7		5.85		3.32		3.60				5.80		
					10.50				9.70				9.38				9.30		
					14.60				13.80				18.44				12.60		
		50	41.4		18.48				17.90	50	40.4		17.40	50	29.0		17.00		
			47.5		22.30				21.85		46.3		21.42		35.3		21.18		
			53.7		26.30				25.45		53.0		25.35		41.1		25.65		
					30.15				29.35				29.00				28.70		
					19.093				184.47				181.09				180.38		
		49	48.63		19.093	49	18.23		184.47	49	27.27		181.09	50	14.95		180.38		
		50	47.53	50	14.548			50	14.497	50	46.57	50	14.446	50	36.13	50	14.487		
				51	9.585			51	9.544			51	9.280			51	9.152		
					5.504				5.551				5.583				5.578		
			+59.87		55.14		+59.94		55.61	+1	0.18		55.93	+1	0.35		55.88		
			−4.40				−4.22				−4.15				−4.37				
			−.19																
			−4.75				−4.51				−4.45				−4.32				
			+50.53				+51.21				+51.58				+51.66				
		+51	5.08				+5.04				+5.03				+5.04				
			+25.92		−32.98		+55.60				+46.18		−33.12		−1.57		−21.75		
			1.41363		1.51825n		1.74507				1.66445		1.52009n		0.19590n		1.33746n		
			0.95409		1.05871n		1.28553				1.20491		1.06955n		9.73636n		0.87792n		
			45 4		45 4		45 4				45 4		45 4		45 4		45 4		
	E		24".2		44.1		9".3				16".1		38".8		31.6		39".5		
	F		32.9		52.4		19.8				22.1		49.1		43.2		30.9		
	G		41.1	32.65	1.6	52.85	29.9	19.60			32.5	21.30	59.1	48.95	53.1	42.35	0.5	20.00	
	H		20.9		40.4		8.6				10.1		38.2		32.7		40.1		
			11.9.1		198.5		67.6				74.8		185.2		166.6		191.0		
		49	26.78	49	49.63	49	16.90			49	18.70	49	46.30	49	40.15	49	47.75		
			+9.00		−11.45		+19.30				+16.03		−11.50		−0.54		−7.55		
		49	38.78	49	38.18	49	36.20			49	34.73	49	34.80	49	39.61	49	40.20		
	+74	33	9.54		10.17	33	12.15			33	13.62		13.55	33	8.74		8.15		
	−32	16	12	15	52	16	25			16	23	15	56	16	2	15	54		
			1.56050		1.56040		1.56050				1.56050		1.56040		1.56040		1.56040		
			−.507		−.507		−1315				−2060		−2060		−397		−397		
			1.55543		1.55533		1.54735				1.53990		1.53980		1.55643		1.55643		
			+35.93		+35.92		+35.27				+34.67		+34.66		+36.01		+36.01		
			−.09		−.15		−.42				−.30		−.16		−.50		−.07		
			−.45		−.48		−.43				−.43		−.48		−.47		−.48		
			+.27		+.29		+.26				+.26		+.29		+.28		+.29		
			+35.66		+35.58		+34.68				+34.20		+34.31		+35.82		+35.75		
	+74	33	45.23		45.75	33	46.83			33	47.82		47.86	33	44.56		43.90		
	+74	33	45.49	+5	42.64			+5	43.06	33	47.84	+5	42.56	33	44.23	+5	42.58		
			39 28.7		+0.9	39	29.1		+0.9	39	29.3		+0.9	39	29.6		+0.9		
			+5 42.9		−0.1	+5	42.3		−0.8	+5	41.5		−0.9	+5	45.4		−1.3		
			44.0				43.4				42.6				46.5				
				+5	43.44			+5	43.16			+5	42.86			+5	42.18		
	74			+39	28.93			+39	29.93			+39	30.70			+39	26.41		

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B Boötis

h	m	s
14	57	14
°	′	″
+40	53	4
+1	29	44

Corr^{n} to

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

δ_0

Corr^{n} to

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

1877

June 14 — $\frac{d\alpha}{dt}$ −1.19, $\frac{d\delta}{dt}$ −.05

56	42.2	56	—		
	44.3		—		
	46.6		—		
			—		
			—		
		24.25	24.25		
		.37	27.10		
		.44	29.80		
		.33	35.25		
		.35	38.00		
		.42	40.80		
56	44.37				
		56	24360		
		57	21.798		
			57.44		
			57.47		
	+58.51				
	−1.04				
	−.07				
	−3.04				
	+54.36				
+57	18.72				

June 17 — $\frac{d\alpha}{dt}$ −1.20, $\frac{d\delta}{dt}$ −.05

56	12.4	56	7.30		
	13.0		10.10		
	17.3		12.70		
			18.28		
			21.00		
			23.70		
			26.45		
			29.10		
			34.67		
			37.35		
			40.04		
56	14.90		260.69		
		56	23.699		
		57	21.768		
			58.07		
	+59.24		58.10		
	−1.04				
	−.07				
	−3.01				
	+55.12				
	+18.82				

June 18 — $\frac{d\alpha}{dt}$ −1.23, $\frac{d\delta}{dt}$ −.05

55	51.6	56	7.23		
	54.4		10.05		
	56.9		12.65		
			18.07		
			20.78		
			23.60		
			26.21		
			29.00		
			34.40		
			37.20		
			39.90		
55	57.30		259.09		
		56	23.584		
		57	21.758		
			58.20		
	+59.35		58.23		
	−1.07				
	−.07				
	−3.00				
	+55.21				
	+18.76				

June 19 — $\frac{d\alpha}{dt}$ −1.12, $\frac{d\delta}{dt}$ −.05

55	52.0	56	6.78		
	54.4		9.35		
	56.5		12.25		
			17.68		
			20.47		
			23.20		
			25.95		
			28.55		
			34.10		
			36.80		
			39.50		
55	54.30		254.83		
		56	23.166		
		57	21.747		
			58.58		
	+59.66		58.61		
	−0.97				
	−.07				
	−2.98				
	+55.64				
	+18.85				

June 24 — $\frac{d\alpha}{dt}$ −1.16

56	22.3	56	6.42		
	24.7		2.15		
	27.0		11.92		
			17.30		
			20.00		
			22.75		
			25.48		
			28.37		
			33.70		
			36.40		
			39.14		
56	24.67		250.63		
		56	22.785		
		57	21.656		
			58.90		
	+59.94		58.93		
	−1.01				
	−2.92				
	+56.01				
	+18.79				

log cos δ 9.87855

1 sin t tan δ 9.99623

tan δ +0.87 1.32

sin z +.03

June 27 — $\frac{d\alpha}{dt}$ −1.20

55	52.7	56	6.20		
	54.5		8.99		
	56.4		11.70		
			16.60		
			19.70		
56	43.4		22.37		
	46.3		25.00		
	49.7		27.90		
			33.22		
			36.00		
			38.65		
55	54.60		246.33		
		56	22.394		
		57	21.644		
			58.25		
	+1 0.35		59.28		
	−1.04				
	−2.88				
	+56.42				
	+18.81				

	−20.01		+8.80		+29.25
	1.30125 m		0.94448		1.46613
	1.29748 m		0.94071		1.46236
	35 1		35 0		35 0
ε	11.1		42.0		22.5
H	23.6		53.8		34.4
ψ	35.3	23.20	8.2	25.10	47.7	35.10
K	11.3		43.1		22.3
	81.3		20.71		126.9
	36 20.33		35 51.78		35 31.73
	− 19.84		+ 8.72		+ 29.00
	36 0.49		36 0.50		36 0.73
+40	46 47.86		46 47.85		46 47.62
+1	30 38		30 10		29 50
	0.18130		0.17940		0.17740
	−1086		994		−988 926
	0.17054	0.17044	0.16946		0.16814
	−1.48		−1.48		−1.47
	− .11		− .03		− .23
	− .13		− .09		− .05
	+ .08		+ .05		+ .03
	−1.64		−1.55		−1.72
+40	46 46.22		46 46.30		46 45.90
		+5 42.75		+5 43.35		+5 43.29
	52 28.9	−0.1	52 29.5	−0.1	52 29.7	−0.1
	+5 42.7	+6.0	+5 43.2	+5.4	+5 43.8	+5.2
	43.5		44.0		44.6	
		+5 48.65		+5 48.65		+5 48.39
40		+52 34.87		+52 34.95		+52 34.29

	+2.87		−1.88		+2.79	−2.408
	1.46045		0.27416 m		1.44389	1.38166 m
	1.45868		0.27039 m		1.44012	1.37789 m
	35 0		35 0		35 0	35 1
ε	21.2		49.6		17.9	10.9
H	35.0		3.1		32.9	25.2
ψ	48.4	34.80	17.2	3.40	46.9	32.40	38.8	24.85
K	22.1		52.1		21.5	13.5
	126.7		820		1192	884
	35 31.48		36 ~~7.50~~ 950		35 25.80	36 12.10
	+ 28.62		− 1.86		+ 27.55	− 23.87
	36 0.30		35 58.64		35 57.35	35 58.23
	46 48.05		46 49.71		46 51.00	50.12
	29 50		30 18		29 48	30 40
	0.17740		0.17980		0.17740	0.18180
	−1812 1797		−1803 1291		−1886	−1895
	0.15943		0.16689		0.15868	0.16285
	−1.44		−1.47		−1.42	−1.51
	− .23		− .00		− .21	− .16
	− .05		− .10		− .05	− .14
	+ .03		+ .06		+ .03	+ .08
	−1.69		−1.51		−1.72	−1.73
	46 46.36		46 48.20		46 49.28	48.39
		+5 43.29		+5 43.06	46 48.84	+5 42.58
	52 29.9	−0.1	52 30.8	−0.1	52 31.4	−0.1
	+5 43.5	+5.0	+5 42.6	+4.1	+5 42.6	+3.5
	44.3		43.4		43.4	
		+5 48.19		+5 47.06		+5 45.98
		+52 34.53		+52 35.26		+52 34.82

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γ Librae

h m s
14 59 29
−15° 46′ 9″

+58 8 57

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	June 19	June 24	June 25	June 27	July 4
	−1.12 −.05	−1.16	−1.14	−1.20	−1.25
	58 38 32.2	58 37.6	58 36.00	58 19.4	58 35.77
	33.8	39.7	38.03	21.2	37.80
	35.6	42.0	40.20	23.0	39.98
			44.44		44.20
			46.92		46.60
	59 15.6	59 21.2	49.00	58 11.7	48.70
	17.0	22.7	51.20	13.4	50.85
	18.0	24.7	53.29	11.5	53.05
			57.63		57.37
			59.90		57.47
			1.92		1.65
			479.44		476.36
	58 33.87	58 39.77	534.44	58 21.20	536.36
	59 17.20	59 22.87	58 48.760	57 13.53	58 48.351
	+1 59.66	+57.73	+1 0.18		
	+.31	+.32	+.32		
	−.05				
	−2.95	−2.98	−2.93		
	+56.97	+57.32	+57.57		
	59 46.01	59 46.08	59 46.12		

	June 24	June 25	June 27	July 4
	58 19.4	58 35.77	58 18.2	58 35.37
	21.2	37.80	19.7	37.40
	23.0	39.98	21.5	39.53
		44.20		43.90
		46.40		46.00
	58 11.7	48.52	59 23.0	48.08
	13.4	50.64	25.0	50.33
	11.5	52.95	24.7	52.50
		57.20		56.78
		59.28		58.80
		1.30		0.95
		474.06		469.64
	58 21.20	534.06	58 19.82	529.64
	57 13.53	58 48.351	59 24.90	58 48.149
	+1 0.18		+1 0.35	+1 0.51
	+.32		+.33	+.35
	−2.93		−2.92	−2.88
	+57.57		+57.76	+57.98
	59 46.12		59 46.01	59 46.13

h m s
14 59 46.070

	June 24	June 25	June 27	July 4
	+15.17	−24.98	+28.45	−19.85
	1.18099	1.39759n	1.45408	1.29776n
	1.28261	1.49861n	1.55540	1.39878n
	10 3	10 4	10 3	10 4
E	36.7	19.9	7.6	15.0
F	49.1	38.5	27.4	33.2
G	1.44605 56.7	51.2 5.55	40.0 23.80	46.1 30.55
H	32.8	22.8	11.9	14.4
	174.0	132.4	86.9	108.7
	13 43.50	14 33.10	13 21.73	14 27.18
	+ 19.14	− 31.52	+ 35.90	− 25.05
	14 2.64	14 1.58	13 57.63	14 2.13
−15	51 14.29	51 13.47	51 9.28	51 14.31

	June 24	June 25	June 27	July 4
	26.0	14.0	29.6	25.9
	45.1	34.8	48.6	46.8
24.85	56.7 41.35	46.9 30.45	1.6 45.60	0.1 44.50
	28.1	19.8	33.2	28.9
	155.9	115.5	173.0	164.7
	14 38.98	13 28.88	14 42.25	13 41.18
	+ 35.54	+ 34.51	− 46.25	+ 21.48
	14 3.44	14 3.39	13 57.00	14 2.66
	15.09	14.31	13.23	8.65

	June 24	June 25	June 27	July 4
+58	8 57	7 47	8 51	7 40
	1.96576	1.96542	1.96570	1.96540
	−1782	−1991	−1991	−360
	1.94794	1.94551	1.94579	1.96180
	−88.70	−88.21	−88.27	−91.58
	+ .11	+ .11	+ .09	+ .11
	− .46	− .35	− .46	− .34
	+ .28	+ .21	+ .28	+ .20
	−1 24.77	−1 24.24	−1 24.36	−1 31.61
−15	52 43.86	52 43.28	41.59	52 40.89
	+5 43.29	52 42.43	+5 42.56	52 40.59
	−1.5		−1.5	+5 42.58
	+18.2		+18.0	−1.5
				+18.0
	+5 59.99	59.56	+5 59.36	+5 59.08
−15	46 43.47		46 43.07	46 41.51

	June 24	June 25	June 27	July 4
	9 4	8 51	9 1	7 59
	1.96579	1.96570	1.96576	1.96548
	−1279	−1991	−360	−1157
	1.95300	1.94579	1.96216	1.95391
	−89.74	−88.27	−91.66	−89.93
	+ .17	+ .09	+ .20	+ .04
	− .48	− .46	− .47	− .37
	+ .29	+ .28	+ .28	+ .22
	−1 29.76	−1 24.36	−1 31.65	−1 30.04
	52 44.07	52 41.59	40.30	52 44.34
	+5 43.06	+5 42.56	+5 42.58	44.10
	−1.5	−1.5	−1.5	+5 43.37
	+18.0	+18.0	+18.0	−.44
	+5 ~~6.06~~ 59.56	+5 59.36	+5 59.08	+17.8
	46 ~~43.62~~ 44.12	46 43.07	46 41.51	+5 59.77
				46 44.33
				−15 46 43.30

	July 4
	8 45
	1.96568
	−1157
	1.95411
	−89.97
	+ .06
	− .44
	+ .27
	−1 30.04
	52 43.86
	+5 43.37
	−.44
	+17.8
	+5 59.77
	46 44.33

Logarithms 4.98334
15 constant 0.10102

Tang δ −0.28 1.04
Sin z +.85

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48 Hc Cephei 2.6. Lo

Corr'n $\frac{d\lambda}{dt}$ $\frac{d\beta}{dt}$ Corr'd $\frac{d\beta}{dt}$

June 9.8

log cosβ 9.34268n

1.5 cosβ tanλ 9.46036n

tangβ ✕ 4.43 4.55

sin 2 − .87

1877

	June 14	June 17	June 18	June 19	June 24	June 27
	X −1.19 −.05	X −1.20 −.05	X −1.23 −.05	X −1.12 −.05	X −1.16	+ −1.20
	3 2 35.0 43.0 51.7	3 2.222 2660 31.55 36.06 40.85	3 11.6 19.3	3 21.53 25.70 30.65 35.80 39.73	3 22.5 27.4 31.9 36.6	3 21.00 26.15 30.40 35.30 39.67
	4 8.2 14.4 23.5	4 45.50 50.00 53.00 57.38		4 44.33 49.45 54.75 57.00	4 4.1 10.1 21.5	4 44.60 49.28 54.05 58.45
	2 43.23	36 7.36	3 15.45	36 0.68	3 29.60 4 11.90	35 8.90
	4 15.37	3 40.818 4 44.749 − 6.393 − 6.390		3 40.076 4 45.806 − 6.493 − 6.490		3 39.878 4 45.892 − 6.521 − 6.518
		+58.51 +5.27 +.23 +2.09 +1 6.10 +4 46.92		+59.24 +5.32 +.23 +1.88 +1 6.63 +4 46.71		+59.34 +5.45 +.23 +1.75 +1 6.77 +4 46.65
		+ 57.59		− 34.55		+ 24.63
		1.76035 1.22071n 45 2		1.53845n 0.99881 45 1		1.39146 0.85182n 45 1
ε		8.9		41.9		59.6
η		21.4		54.4		11.3
g		28.1 18.50		1.05 45.45		18.9 9.25
K		6.2		36.8		56.2
		6.6		194.1		26.0
		47 16.15		46 48.53		47 6.50
		− 16.62		+ 9.97		− 7.11
		46 59.53		46 58.50		46 59.39
+102		35 48.82		49.85		35 48.96
−60		18 26		18 53		18 36
		2.00272 −.1076 1.99196 +98.14		2.00286 −.1076 1.99210 +98.20		2.00277 −.964 1.99313 +98.43
		+ .39 − .23 + .14		+ .15 − .18 + .11		+ .07 − .21 + .13
		+1 38.47		+1 38.28		+1 38.42
+102		37 27.29		28.13		37 27.38
+102		37 27.71 43 12.6 +5 44.9 44.1		+5 42.75 +1.6 +1.2		43 13.0 +5 45.6 44.8
				+5 45.55		
102				+43 13.26		

	June 9.8											
	4 46.847	14	4 44.35	42	16 48.2	8						
	− .03	19	49.97	44	47.4	8						
	+7.3652	24	45.21	48	46.6	6						
		29	45.69	50	46.0	6						
	16 46.19		46.19		45.4							
	43 13.81											
	+ .8											
	+13.814											
	4 40.076		3 39.878		3 40.224		3 40.430		3 40.473		3 40.163	
	4 45.806		4 45.892		4 45.180		4 45.666				4 45.960	
	− 6.493		− 65.21		− 64.96		− 65.23				− 65.80	
	− 6.490		− 65.18		− 64.93		− 65.20		+1 0.35		− 65.77	
	+59.34		+59.66		+59.93				+5.32			
	+5.45		+4.96		+5.14							
	+.23		+.23									
	+1.75		+1.66		+1.178				+.088			
	+1 6.77		+1 6.51		+1 6.25				+1 6.55			
	+46.65		+46.73		+46.68				+46.71			
	+ 10.28		− 32.02		+ 55.42		− 18.35		+ 15.16		− 30.74		− 14.94		− 114.51	
	1.01199		1.50542n		1.74367		1.26364n		1.18070		1.48770n		1.17435n		2.05884n	
	0.47235n		0.96578		1.20403n		0.72400		0.64106n		0.94806		0.63471		1.51920	
	45 1		45 1		45 2		45 1		45 1		45 1		45 1		45 1	
ε	57.9		46.1		7.4		44.2		53.9		41.9		46.9		19.7	
η	8.7		36.2		18.6		36.4		7.9		54.3		0.3		33.4	
g	15.1 16.50		3.4 22.75		26.5 16.95		4.2 44.30		14.5 4.20		2.9 52.40		9.9 58.40		42.1	30.90
K	51.6		41.5		3.9		41.9		53.1		40.3		46.8		18.4	
	13.3		207.2		56.4		206.9		9.4		199.4		223.9		113.4	
	47 3.33		46 51.80		47 14.10		46 51.73		47 2.35		46 49.85		46 55.98		46 28.40	
	− 2.97		+ 9.24		− 16.00		+ 5.30		− 4.38		+ 8.87		+ 4.31		+ 33.05	
	47 0.36		47 1.04		46 58.10		46 57.03		46 57.97		46 58.42		47 0.29		47 1.45	
+102	35 47.99		47.31		35 50.25		51.32		35 50.38		49.63		35 48.06		46.90	
−60	18 39		18 50		18 28		18 50		18 40		18 52		18 46		19 14	
	2.00277 −.897 1.99370 +98.56		2.00283 −.897 1.99376 +98.57		2.00274 −.1767 1.98507 +96.62		2.00283 −.1767 1.98516 +96.64		2.00281 −.1263 1.99064 +97.74		2.00286 −.1263 1.99114 +97.75		2.00283 −.343 −.350 1.99933 +99.85		2.00295 −.343 −.350 1.99945 +96.87	
	+ .01 − .21 + .13		+ .12 − .19 + .11		+ .38 − .22 + .13		+ .04 − .19 + .11		+ .03 − .20 + .12		+ .12 − .18 + .11		+ .03 − .19 + .11		+ 1.38 − .15 + .09	
	+1 38.49		+1 38.61		+1 38.91		+1 38.60		+1 38.69		+1 38.80		+1 39.89		+1 41.35	
+102	37 26.8	25.92	26.92		37 27.16		27.92		37 28.07		27.43		37 27.86		28.25	
	37 26.20		+ 5 43.29		37 27.54		+ 5 43.29		37 27.75		+ 5 48.06		37 28.06		+ 5 42.58	
	43 13.2		+1.6		43 13.4		+1.6		43 14.0		+1.6		43 14.3		+1.6	
	+5 47.0		+0.6		+5 45.9		+0.4		+5 46.2		−0.2		+5 46.2		−0.5	
	46.2				45.1				45.4				45.4			
			+5 45.49				+5 45.29				+5 44.46				+5 43.68	
			+43 11.69				+43 12.83				+43 12.21				+43 11.74	

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β Librae

α 14h 10m 17s
δ −8° 33′ 13″

α_0 14h 10m 23.365s
Corr^n +.01
$\frac{d\alpha}{dt}$ +3.2209
δ_0 −8° 55′ 40.14″
Corr^n −.1
$\frac{d\delta}{dt}$ −13.542″

June 9 10h 26.631s 1° 55′ 56.4″
14 26.30 56.7
19 26.29 56.5
24 26.28 56.2
29 26.28 55.9

log cos δ 9.99470
15 cos δ tan δ 0.11238
tan δ −0.16
Lin 2 +.78

1877

June 14 × −1.19 −.05
June 18 × −1.23 −.05
June 19 × −1.12 −.05
June 24 + −1.16
June 27 × −1.20
July 4 + −1.25

	June 14	June 18	June 19	June 24	June 27	July 4
	15 9 24.9	9 15.6	9 14.3	9 13.0	9 14.00	9 0.1
	26.8	17.0	14.7	16.6	16.05	1.6
	28.9	18.9	16.6		18.18	3.1
	1940	1850			2235	
	23.60	2270			22.05	
	2365	2480			2440	
	10 1.5					
	2760	9 52.2	9 46.0		2649	9 47.9
	29.85	54.0	47.6		28.33	49.3
	31.95	55.7	50.0		30.60	51.4
	3605				3485	
	38.20				8698	
	40.30	3726			8702	
		3939				
	9 26.87	9 17.17	9 14.77		9 1.60	
	10 3.23	9 53.97	9 47.87		9 49.53	
		10 26.867	10 26.292		10 26.290	
		−58.57	−59.42		−59.80	
	+58.57	−59.43	+59.66		+59.93	
	+.19		+.18		+.19	
	+.05	+.05	−.05			
	−2.94	−2.93	−2.93		−2.92	
	+56.71	+56.56	+56.86		+58.20	
	+10 24.444 23.44	+23.43	+23.36		+24.42 23.42	
	3		3		3	

	June 14	June 18	June 19	June 24	June 27	July 4
	9 26.87	9 17.17	9 14.77	9 1.60	9 2.80	9 1.93
	305.06	295.54	291.45	288.40	283.00	281.89
	+0.86	+9.70	−27.10	+11.73	−21.37	+24.62
	−35.50					−23.31
	9.93450	0.98677	1.43297n	1.06930	1.32980n	1.39129
	1.55023n	1.09915	1.54535n	1.18168n	1.44218n	1.50367
	1.66261n	1.54535n	1.18168n	1.44218n	1.50367	1.47992n
	20 2 (3)	20 3	20 2	20 3	20 2	20 3
	3.1	51.2	39.8	49.9	32.6	31.6
	49.6					33.9
	19.3	6.2	54.8	5.7	48.1	48.4
	6.3					50.4
	34.6	20.0	8.3	21.6	3.8	2.1
	19.4					5.6
	16.0	52.8	40.1	51.2	34.1	33.8
	52.8					36.8
	63.0	10.2	203.0	8.4	178.6	175.9
	8.1					186.7
	22 15.75	24 2.02	23 50.75	23 2.10	23 44.65	22 43.98
	23 2.55					23 46.68
	+ 1.11	+ 12.57	− 35.10	+ 15.19	− 27.68	+ 31.80
	− 45.99					− 30.19
	23 16.86	23 15.12	23 15.65	23 17.29	23 16.97	23 15.84
	23 16.03					23 16.49
	−8 59 3149	59 3323	3270	59 3106	3138	59 3248
	9 0 28.51	0 26.77	27.30	0 25.94	25.62	0 27.52
						3486
						25.14

	June 14	June 18	June 19	June 24	June 27	July 4
	9 22.9	9 13.6	9 13.0	9 13.0	9 13.20	9 0.2
	17.34	17.0	14.7	15.70	15.30	2.0
	19.40	18.9	16.6	17.85	17.30	3.6
	23.60	22.70		22.05	21.30	
	2765	2480		2415	2360	
	10 1.5					
	2760	9 52.2	9 46.0	26.20	25.70	9 45.0
	29.85	54.0	47.6	28.30	27.90	46.9
	31.95	55.7	50.0	30.40	29.90	49.0
	3605			3460	3410	
	38.20			3465	3620	
	40.30	3726		38.75	38.30	
		39.39				
	9 26.87	9 17.17	9 14.77	9 1.60	9 2.80	9 1.93
	305.06	295.54	291.45	288.40	283.00	281.89
	+0.86	+9.70	−27.10	+11.73	−21.37	+24.62
	−35.50					−23.31
	9.93450	0.98677	1.43297n	1.06930	1.32980n	1.39129
	1.55023n	1.09915	1.54535n	1.18168n	1.44218n	1.50367
	1.66261n	1.54535n	1.18168n	1.44218n	1.50367	1.47992n
	20 2 (3)	20 3	20 2	20 3	20 2	20 3
	3.1	51.2	39.8	49.9	32.6	31.6
	49.6					33.9
	19.3	6.2	54.8	5.7	48.1	48.4
	6.3					50.4
	34.6	20.0	8.3	21.6	3.8	2.1
	19.4					5.6
	16.0	52.8	40.1	51.2	34.1	33.8
	52.8					36.8
	63.0	10.2	203.0	8.4	178.6	175.9
	8.1					186.7
	22 15.75	24 2.02	23 50.75	23 2.10	23 44.65	22 43.98
	23 2.55					23 46.68
	+ 1.11	+ 12.57	− 35.10	+ 15.19	− 27.68	+ 31.80
	− 45.99					− 30.19
	23 16.86	23 15.12	23 15.65	23 17.29	23 16.97	23 15.84
	23 16.03					23 16.49
	−8 59 3149	59 3323	3270	59 3106	3138	59 3248
	9 0 28.51	0 26.77	27.30	0 25.94	25.62	0 27.52
						3486
						25.14

	June 14	June 18	June 19	June 24	June 27	July 4
	+57 17 34	18 20	17 20	18 9	18 3	17 2
	1.85570	1.85590	1.85570	1.85580	1.85580	1.85560
	− 1068	− 1068	− 897	− 1750	− 1750	− 1263
	1.84502	1.84522	1.84673	1.83830	1.83830	1.84297
	−69.90	−70.02	−70.26	−70.28	−68.90	−68.91
	+ .00	+ .10	+ .01	+ .06	+ .01	+ .04
	− .33	− .40	− .30	− .38	− .30	− .37
	+ .20	+ .24	+ .18	+ .23	+ .18	+ .22
	−1 1012	−1 1008	−1 1037	−1 1037	−1 901	−1 902
	−9 1 3863	37.76	1 37.14	37.67	1 37.95	37.64
	−9 1 38.20	+5 42.75	1 37.40	+5 43.29	1 37.80	+5 43.29
	55 56.7	− 1.3	55 56.5	− 1.3	55 56.5	− 1.3
	+5 41.5	+16.6	+5 40.9	+16.4	+5 41.3	+16.3
	41.4		40.8		41.2	
		+5 58.05		+5 58.39		+5 58.29
	−8	−55 40.15		−55 39.01		−55 39.51

	June 14	June 18	June 19	June 24	June 27	July 4
	14 17 59	17 4	18 2			
	1.85580	1.85560	1.85580			
	− 338	− 1111	− 1111			
	1.85242	1.84449	1.84469			
	−71.16	−69.90	−69.93			
	+ .04	+ .05	+ .04			
	− .37	− .28	− .37			
	+ .22	+ .17	+ .22			
	−1 1130	−1 996	−1 1004			
	38.48	1 38.53	38.10			
	+5 42.58	1 38.32	+5 43.37			
	− 1.3	55 55.6	− 1.3			
	+15.9	+5 42.7	+15.4			
		42.6				
	+5 57.18		+5 57.47			
	−55 39.00		−55 40.85			

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h m s
15 20 34
° '
+63 48

−21 25

log cos δ 9.644494
15 cos δ tan δ 9.76262

tang δ +2.03 2.26
dist z −.36

1877
11

−1.19
−.65

−1.20

June 14 June 27

15 18 53.1 19 13.12 19 11.2 19 32.10
57.2 19.80 17.7 34.06
0.6 24.49 22.3 36.20
34.40 38.70
38.45 41.00
20 1.00 43.30 19 58.3 43.60
14.0 47.90 4.4 45.80
19.8 52.60 8.6 48.08
1.95 50.40
6.60
11.25

29.8.46
18 56.97 47.5.46 19 17.07 369.94
20 14.60 19 43.224 20 3.77 19 42.104

+58.67
−2.99 47
−.11
−3.81
+52.17
20 35.39

+1. 0.34
−2.94 44
−3.46
+34.44
20 35.54

h m s
15 20 35.465

+46.25
+43.75 −31.38 +24.03 −22.67

1.66511 1.49665n 1.38075 1.35545n
1.42773 1.25927n 1.14337 1.11807n
40 1 40 2 40 1 40 2

ε 31.5 16.3 39.9 8.9
ψ 40.4 25.3 51.8 18.9
ξ 52.0 41.75 36.26.45 3.45 1.65 30.41 9.65
η 29.6 16.1 41.2 4.6
153.5 94.3 196.3 67.8
41 38.38 42 23.58 41 42.18 42 16.95

+ 26.77 − 18.17 + 13.91 − 13.12
42 5.15 42 5.41 42 2.99 42 3.83

+63 40 43.20 42.94 40 45.36 44.52

−21 24 4 23 18 23 53 23 25
1.35340 1.35310 1.35340 1.35320
−.1056 −.1056 −.317 −.317
1.34284 1.34254 1.35023 1.35003
+22.02 +22.01 +22.40 +22.39
− .47 − .22 − .18 − .12
− .16 − .24 − .18 − .23
+ .10 + .14 + .11 + .14
+21.49 + 21.69 +22.20 + 22.14

+63 41 4.69 4.63 41 7.56 6.70
41 4.66 +5 42.75 41 7.13 +5 42.58
+0.6 +0.6
+3.6 +0.6

+5 46.95 +5 43.78

+63 46 51.61 46 50.91
+63 46 51.26

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γ Persei

	h	m	s
	15	20	57
	°	′	″
	+72	16	44
	−29	53	56

α_0	m 20	s 56.46	June 19	m 21	s 0.80
Corrα		−.18	24		0.70
			29		0.45
$\frac{d\alpha}{dt}$		−0.1317			
δ_0	° 16	′ 18″.02			
Corrδ		+.1			
$\frac{d\delta}{dt}$		−12.814			

	22	16	16″.3	11	
			17.4	10	
	25		18.4		

log cos δ 9.48371 log R 1.52972
15 cos δ tan i 9.60139 R 33.89
tang δ +3.13 3.29.
sin z −.50

1877

\+ −1.16

June 24

15 20 30.2 20
35.5
42.5

31.20
38.00
44.78

37.99

20 36.10

20 4.100
21 0.688
— 56.59
— 56.41

+59.93
−3.63

−4.23
~~52.07~~
+52.07
+20 56.17

−32.00
1.50515n
1.10654n
10 2

ε 51.6
ζ 2.9
η 13.1 2.35
κ 51.9
239.5
12 54.88
−12.78
12 47.10

+72 10 1.25

−29 52 42
1,519.50
−1247
1,50703
+32.14
−.17
−.30
+.18
+31.85

+72 10 33.10

+5 43.06
+0.8
+0.5

16 17.5
+5 44.4
44.5

+5 44.36

72 +16 17.46

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2.972
89

h m s
15 25 27
+ 02 42
− 20 19

log cos δ 9.66148
15 cos δ tan i 9.77916
tang δ +1.94 2.18
sin z − .35

1877

June 14 −1.19 −.05

15	24	18.4	24	28.40					
		22.9		30.66					
		27.2		32.80					
				35.10					
				37.35					
				39.70					
				41.90					
				44.15					
				46.40					
	24	22.83		33.46					
			24	37.384					

June 17 −1.20 −.05

	23	46.8	24	27.60					
		49.8		29.80					
		53.2		32.20					
				34.30					
				36.63					
				38.80					
				41.00					
				43.30					
				45.70					
	23	49.93		329.83					
			24	36.392					

June 18 −1.23 −.05

June 27 −1.20

	24	9.3	24	26.10					
		12.8		28.57					
		18.2		30.80					
				33.25					
				34.84					
				37.30					
				39.78					
				42.06					
				44.40					
	24	13.43		317.10					
			24	35.283					

		+58.57		+59.24		+57.5		+1 0.34	
		−2.31		−2.32		−2.39		−2.32	
		− .11		− .11		− .11			
		−3.73		−3.67				−3.41	
		+52.36		+53.14				+54.61	
	25	29.74	25	29.73			25	29.84	

h m s
15 25 29.770

		+14.55		+46.66				+21.80	
		1.16286		1.66894				1.33846	
		0.94202		1.44810				1.11762	
		45 1		45 1		45 1		45 1	
E		34.7		15.4		35.2		26.4	
F		44.0		24.7		42.9		36.6	
G		54.6	44.65	37.0	26.20	54.6	44.90	(48.9) 38.9	32.65
H		34.3		13.2		32.9		27.7	
		167.6		90.3		165.6		129.6	
	46	41.90	46	22.58		46	41.40	46 ~~32.40~~	34.90
		+ 8.75		+28.06				+ 13.11	
	46	50.65	46	50.64				46 45.51	48.01
+62	35	57.70	35	57.71				36 ~~28.4~~	0.34
−20	19	0	19	19				19 10	
		1.32870		1.32880				1.32880	
		− 1048		− 872				− 305	
		1.31822		1.32008				1.32575	
		+20.81		+20.90				+21.17	
		− .05		− .49				− .11	
		− .17		− .14				− .15	
		+ .30		+ .08				+ .09	
		+20.69		+20.35				+21.00	
+62	36	18.39	36	18.06				36 ~~23.84~~ 21.34	
			+5	42.75	+5	43.35	+5	43.29	+5 42.58
				+0.6		+0.6		+0.6	+0.6
				+3.9		+3.2			+0.9
			+5	47.25	+5	47.15			+5 44.08
+62			42	5.74 .64	42	5.21			42 ~~7.92~~ 5.42

+62 ° 42 ′ 542 ″

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ν Bootis

| | | |

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ρ Bootis

	h	m	s
	15	33	20
	°	′	″
	+40	45	42
	+1	37	6

| | | |

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δ Ursae Min.

h m s
15 35 9
+77° 45' 54"
− 35 23 6

log cos δ 9.32612
15 cos δ tang 9.44380 Hind July 44
9.44872 after II 9.68
I 484

tang δ + 46.1 4.73

sin z − .58

1877

	June 14	June 17	June 24	June 27 ?	July 24
	−1.19 −.05	−1.20 −.05	−1.16	−1.20	−1.38
15	33 26.5	33 59.0	33 25.4	33 59.0	33 30.6	33 57.3	34 24.4	—	34 40.2	34 59.0
	32.8	46.0	32.6	39.7	39.1	46.3	36.9	—	48.4	39.0
	43.2	92.0	41.3	54.0	46.3	69.5	47.1	—	56.4	85.0
		140.5		83.0		118.0	34 16.4 12.10			134.0
		187.5		139.8		169.5	16.80			184.8
	34 57.3	23.65	34 16.1	23.50	34 41.3	48.6	17.05	25 47.3		232.0
	2.7	28.60	23.8	28.20		57.6	26.25	56.9		281.0
	13.2	33.36	32.0	33.30			31.25	4.6		329.0
		38.08		38.00			36.30			378.2
		22.970		227.55		212.58				
	33 34.17	4 16.49	33 33.16	4 14.03	33 38.47	4 15.255	34 36.13		34 48.33	22.58.0
	35 4.40	34 18.66	34 23.97	34 16.61 39	34 49.17	33 16.953		34 16.98	35 56.27	34 18.368 5
	+58.51		+59.23		+57.92		+1 0.33		−3.63	
	−5.14		−5.53		−5.35		−5.53		−6.36	
	−.24		−.24							
	−5.82		−5.64		−5.18		−4.96		−2.58	
	+46.96		+47.82		+49.39		+49.84		−12.57	
	35 6.83		35 6.46		35 6.34		35 6.54		35 5.80	

h m s
15 35 6.194

	+44.70	−45.53	+45.54	−5.33	+38.28	−32.22	−19.43	+30.64	−37.90
	1.65031	1.65830n	1.65839	0.72673n	1.58297	1.50813n	1.28847n	1.47770	1.57864n
	1.09411	1.10210n	1.10219	0.17053n	1.02647	0.95198n	0.73027n	0.92642	1.02736n
	40 3	40 3	40 3	40 3	40 3	40 3	40 3	40 3	40 3
ζ	26.1	52.1	26.8	41.1	23.9	44.2	41.9	0.1	18.9
34	36.3	2.0	36.3	49.9	36.0	55.1	52.1	7.3	26.2
4	43.9 35.00	9.0 0.55	44.6 35.70	57.6 49.35	44.0 33.95	2.9 53.55	0.0 50.95	4.7 2.40	23.1 21.00
H	25.1	49.5	25.4	39.0	25.7	44.9	42.9	6.3	25.9
	131.4	232.6	133.1	187.6	129.6	207.1	196.9	18.4	94.1
	43 32.85	43 58.15	43 33.28	43 46.90	43 32.40	43 51.78	43 49.23	43 4.60	43 23.53
	+ 12.42	− 12.65	+ 12.65	− 1.48	+ 10.64	− 8.95	− 5.40	+ 8.44	− 10.65
	43 45.27	43 45.50	43 45.93	43 44.42 48.42	43 43.04	43 42.83	43 43.83	43 13.04	43 12.88
+77	39 3.08	2.85	39 2.42	2.93	39 5.31	5.52	39 4.52	39 35.31	35.47
−35	22 9	21 44	22 9	21 55	22 10	21 50	21 53	22 13	21 54
	1.61120	1.61110	1.61120	1.61120	1.61130	1.61110	1.61120	1.61130	1.61120
	−1453	−1453	−829	−829	−1223	−1223	−283	−1878	−1878
	−1037	−1037							
	1.60083	1.60073	1.60291	1.60291	1.59907	1.59887	1.60837	1.59252	1.59242 242
	+39.69	+39.88	+40.08	+40.08	+39.73	+39.71	+40.59	+39.13	+39.12
	− 23	− 24	− .24	− .01	− .11	− .11	− 04	− .10	− .16
	− .35	− .40	− .36	− .38	− .35	− .39	− .38	− .31	− .34
	+ .21	+ .24	+ .22	+ .23	+ .21	+ .23	+ .23	+ .19	+ .20
	+ 39.52	+ 39.44	+ 39.70	+ 39.92	+ 39.42	+ 39.48 4	+ 40.40	+ 38.91	+ 38.82
+77	39 42.60	42.33	39 42.12	42.85	39 44.73	44.96	39 44.92	40 14.22	14.29
	39 42.46	+5 42.78	39 42.48	+5 43.35	39 44.82 4	+5 43.06	+5 42.58	40 14.25	+5 18.36
		+1.0		+1.0		+1.0	+1.0		+0.7
		+3.3		+2.5		+0.9	+0.2		−3.6
		+5 47.05		+5 46.85		+5 44.96	+5 43.78		+5 15.46
+77		45 29.51		45 29.33		45 29.76 80	45 28.70		45 29.71
									+77 45 29.41

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β Serpentis

	h	m	s
	15	40	25
	°	′	″
	+15	48	31

+26 33 57

1877

	m	s
40	36	73

June	9	
	14	
	19	
	24	
	29	
July	4	
	9	
	14	
	19	
	24	
	29	
Aug	3	
	8	

	m	s
40	23	62
	33	62
	33	62
	33	61
	33	59
	33	56
	33	53
	33	49
	33	44
	33	39
	33	33
	33	26
	33	19

0	48	16.2 9
0		17.1 8
1		17.9 8
2		18.7 7
3		19.4 7
3		20.1 6
4		20.7 6
5		21.3 6
5		21.9 5
6		22.4 4
7		22.8 4
7		23.2 3
		23.5

log cos δ	9.98327	
15 cos δ tan i	0.10095	then July 4
	0.10587	after July 4
tan δ	+0.28	1.04
cos z	+.45	

| | | |

1877phae.proj.1487

μ Serpentis

	h	m	s
	15	43	6
	− 3	2	46
	+45	25	34

1877

	June 24	July 4	July 14	July 24	July 25
α_0	43 12.51	43 15.17			
Corr^{n}	− .03				
$\frac{d\alpha}{dt}$	+3.1261				
δ_0	3 8.28				
Corr^{n}	− .5				
$\frac{d\delta}{dt}$	−11.301				
	X −1.16		X −1.38		X −1.39

	June 24		July 24		July 25	
15	41 50.3	42 2.80	42 53.4	43 6.20	42 55.0	43 6.65
	51.7	4.85	59.9	8.20	0.3	8.75
	53.7	6.98	56.5	10.30	1.6	10.82
		11.00		14.52		14.80
		13.00		16.52		17.10
	42 32.2	15.10	43 4.9	18.60	43 4.3	19.00
	33.6	17.15	5.8	20.70	4.7	21.05
	35.3	19.30	5.23	22.70	4.70	23.20
		23.45		26.80		27.32
		25.50		28.96		29.28
		27.55		31.00		31.40
	41 51.90	166.68	42 54.93	204.50	42 59.87	209.37
	42 33.70	42 16.753	43 5.077	43 18.591	43 4.567	43 19.034
		43 15.170		43 15.028		43 15.018
		− 6002		+ 3.56		+ 4.02
	+59.91	− 5.999	−3.63 +5.41	+ 3.59	− 4.14	+ 4.05
	+ .06		+ .07		+ .07	
	−3.052		−2.88		−2.87	
	+56.95		−5.44 −6.44		− 6.94	
	+43 12.10		+13.15 +12.15		+12.09	
	2		2			

	+23.25	−18.55	+23.66	−32.18	+19.16	−26.64
	1.36642	1.26834n	1.37401	1.50759n	1.28240	1.42553n
	1.48348	1.38540n	1.49509	1.62957n	1.40438	1.54751n
	30 0	30 1	25 4	30 1	25 4	30 0
ξ	12.9	6.5	50.6	3.1	56.5	56.9
η	30.5	25.2	3.4 57.75	15.3 10.50	10.1	10.6
ψ	46.0	39.2	4.9	17.9	10.2 3.35	12.4 4.65
H	16.0	10.4	58.5	12.8	5.1	7.2
	10.54	81.3	23.74	49.1	21.9	27.1
	30 26.35	31 20.33	29 59.35	31 12.28	30 5.48	31 6.78
	+ 30.44	− 24.29	+ 31.27	− 42.62	+ 25.37	− 35.28
	30 56.79	30 56.04	30 30.62	30 29.66	30 30.85	30 31.50
−3	8 8.44	7.69	7 42.27	41.31	7 42.50	43.16
+45	24 44	25 38	24 17	25 30	24 47	25 49
	1.76600	1.76630	1.76600	1.76625	1.76610	1.76630
	− 1210	− 1210	− 1850	− 1850	− 1788	− 1788
	1.75390	1.75420	1.74750	1.74775	1.74822	1.74842
	−56.74	−56.78	−55.91	−55.94	−56.00	−56.03
	+ .02	+ .01	+ .02	+ .03	+ .01	+ .02
	− .04	− .13	− .50	− .12	− .51	− .11
	+ .02	+ .08	+ .30	+ .07	+ .31	+ .07
	−5674	−5682	−5609	−5596	−5619	−5605
−3	9 5.18	4.51	8 38.36	37.27	8 38.69	39.20
−3	9 4.84	+5 43.06	8 37.82	+5 18.36	8 38.94	+5 18.82
	3 21.9	− 1.2	3 19.8	− 1.0	3 19.9	− 0.9
	+5 42.9	+13.6	+5 18.0	+11.5	+5 19.0	+11.6
	42.4		17.5		18.5	
		+5 56.46		+5 29.86		+5 29.52
−3		−3 6.38 9.38		−3 7.96 8.96		−3 9.42
		9		8		9

0	3	219	4					
2		21.5	4	log cos$^{\delta}$	9.99937			
2		21.1	4					
3		20.8	3	15 cos$^{\delta}$ sin^{z}	0.11706	time	July 4	
3		20.4	4		0.12198	after	July 4	
4		20.1	3					
5		19.8	3	tang$^{\delta}$	− 0.05	1.00		
6		19.5	3					
6		19.2	2	sin z	+ .71			
		19.0						

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ζ Ursae Min

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N. A.

S Serpii

	h	m	s
	15	52	57
	0		
− 22	15	49	
+64	38	37	

α 53 3.746 — dα/dt +3.537 — δ 16 9.78 — dδ/dt −10.54

	m	s		
July 18	53	6.97	−4	−16 27.0
23		.93	5	27.0
28		6.88	6	26.9
Aug 2		.82	6	26.8
7		6.76		26.7

log cos δ 9.96634
15 cos δ sin 1" 0.08894
tang δ −0.41 1.08
sin z +.90

1877

July 24 — −1.38

h	m	s	m	s
14	52	49.7	52	56.7
		49.4		58.0
		51.4		1.03
				5.60
				7.75
				10.70
	50	29.0		12.24
		30.7		14.58
		32.2		19.03
				21.20
				23.40
				230.37
	52	49.57		210.37
	53	30.63	53	10.034
			53	6.92
		−3.64		
		+4.91		
		+.57		
		−3.17		
		−6.24		
	53	3.79	53	3.81

July 25 — −1.39

m	s
52	43.0
	45.2
	46.8
53	33.4
	35.1
	37.3
	236.11
	116.11
52	45.08
53	35.27
	−4.16
	+.57
	−3.16
	−6.75
53	3.81

Aug. 8 — −1.30 −.06

m	s
52	55.4
	57.0
	58.7
53	5.79
	5.99
	2.2
	228.40
52	57.83
53	0.00
	−14.44
	+.53
	+.06
	−3.01
	−16.86
53	3.90

h	m	s		m	s
14	52	49.7		52	56.7
		49.4			58.0
		51.4			1.03
					5.60
					7.75
					10.70
	50	29.0			12.24
		30.7			14.58
		32.2			19.03
					21.20
					23.40
					230.37
	52	49.57			210.37
	53	30.63		53	10.034
				53	6.92
		−3.64			
		+4.91			
		+.57			
		−3.17			
		−6.24			
	53	3.79		53	3.81

m	s
52	43.0
	45.2
	46.8
53	33.4
	35.1
	37.3
	236.11
	116.11
52	45.08
53	35.27
	−4.16
	+.57
	−3.16
	−6.75
53	3.81

m	s
52	55.4
	57.0
	58.7
53	5.79
	5.99
	2.2
	228.40
52	57.83
53	0.00
	−14.44
	+.53
	+.06
	−3.01
	−16.86
53	3.90

h	m	s
15	53	3.833

	+20.46	−20.60	+25.56	−24.71	+23.73	−39.21
	1.31091	1.31387 n	1.40756	1.39287 n	1.37530	1.59373 n
	1.39985	1.40281 n	1.49650	1.48181 n	1.46424	1.68267 n
	40 2	40 2	40 1	40 3	40 1	40 3
ε	4.4	55.1	58.1	0.9	59.7	15.4
η	18.9	9.1	12.1	15.7	13.9	28.6
ϑ	21.1	11.1	15.2	17.2	16.9	30.9
κ	13.8	3.9	7.9	10.9	9.5	23.9
	58.2	17.2	33.3	44.7	30.0	98.8
	42 14.55	43 4.80	42 8.33	43 11.18	42 7.50	43 24.70
	+25.11	−25.28	+31.37	−30.33	+29.12	−48.16
	42 39.66	42 39.52	42 39.70	42 40.85	42 39.12	42 36.54
−22	19 51.31	51.17	19 51.35	52.50	19 50.74	48.19
+64	36 58.7	37 4.7	36 50	37 5.3	36 52	38 7
	2.08184	2.08213	2.08181	2.08217	2.08184	2.08223
	−.496	−.496	−.583	−.583	−.1808	−.1808
	−18.15	−18.18	−1.33	−12.35		
	2.06369	2.06398	2.06446	2.06482	2.06376	2.06415
	−115.79	−115.87	−116.00	−116.10	−115.81	−115.92
	+ .08	+ .08	+ .13	+ .12	+ .11	+ .29
	− .22	− .31	− .21	− .32	− .22	− .34
	+ .13	+ .19	+ .13	+ .19	+ .13	+ .20
	−1 55.80	−1 55.91	−1 55.95	−1 56.11	−1 55.79	−1 55.77
−22	21 47.11	47.08	21 47.30	48.61	21 46.56	43.96
	21 47.09	+5 18.36	21 47.95	+5 18.82	21 45.26	+5 18.18
		−1.3		−1.2		−1.2
		+17.2		+17.2		+16.9
		+5 34.26		+5 34.82		+5 33.88
	−16 27.0		16 27.0		16 26.7	
−22		16 12.83		16 13.13		16 11.38

−22° 16′ 12.45″

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N.A.

β Scorpii

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α Draconis

	h	m	s
15	59	33	
+58	53	38	
−16	31	10	

α_0 Corr $\frac{d\alpha}{dt}$ δ_0 Corr $\frac{d\delta}{dt}$

	m	s					
	39	35.87					
		+ .14					
		+1.1137					
	53	38.48					
		+ .8					
		−9.729					

+1.70 3.25

July	19	m	s									
	24	59	37.81	14	53	10.7						
	24		37.65	14		11.4	7					
	29		37.49	14		12.0	6					
Aug	3		37.31	18		12.5	5					
	8		37.12	19		12.9	4					

log cos δ 9.71310
15 cos δ tan i 9.83570
tang δ +1.66 1.94
sin z −.18

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July 24				July 25				Aug. 1				Aug. 8			
		−1.38				−1.39				−1.36				−1.30 −.06	
h	m	s		m	s			m	s			m	s		
15	59	32.3		59	19.54	59	8.2	59	2020	59	25.6	59	40.50	59	22.8
		36.0			23.60		11.8		24.10		30.5		42.55		26.6
		40.1			27.55		15.0		28.05		32.6		44.59		29.5
					35.70				36.05				46.43		
					39.63				40.00				48.28		
					43.40				44.05	0	42		50.37	0	8.3
					47.50				48.25		7.3		52.55		11.8
					51.45				52.05		11.2		54.33		15.4
					59.70				0.00				56.20		
					3.40				4.00						
					7.40				8.01						
					358.87				404.55						
	59	36.13			478.87	59	11.67		484.55	59	29.57		435.85	59	26.20
				59	435.34			59	44.050	0	7.63	59	48.428	0	11.83
				59	39.642			59	37.610			59	37.373		
					+ 589				+ 6.44				+ 11.06		
		−3.64			+ 5.72		−4.17		+ 6.27		−8.81		+ 10.89		−14.44
		+59.71									−3.26				−2.15
		−2.29					−2.31								−.12
		−2.55					−2.52				−2.28				−2.02
		−8.48					−9.00				−13.35				−18.73
		+52.07					+35.05				+35.08				+35.11
		+59 35.05													
		+7.40					+32.38				+18.86		−19.20		+27.54
		0.86923					1.51028				1.27554		1.28330n		1.43996
		0.70493					1.34598				1.11124		1.11900		1.27566
		30 4					30 4				30 4		30 4		30 4
ε		30.9					13.7				20.2		46.6		14.9
ζ		38.2					21.1				29.1		54.9		22.2
η		38.6	34.75				21.1	17.40			28.2	24.20	53.8	50.20	22.1
H		35.8					18.9				28.1		54.1		20.9
		23.5					74.8				25.6		20.94		80.1
	34	35.88				34	18.70			34	26.40	34	52.35	34	20.03
		+ 5.07					+ 22.18				+ 12.92		− 13.15		+ 18.87
	34	40.95				34	40.88			34	39.32	34	39.20	34	38.90
+58	48	7.40				48	7.47			48	9.03		9.15	48	9.45
−16	30	42				30	59			30	52	30	26	30	58
		1.23220					1.23240				1.23230		1.23210		1.23240
		−1184					−1526				− 635		− 635		−1783
		−1996					−1268								
		1.21430					1.21840				1.22595		1.22575		1.21457
		+16.38					+16.42				+16.82		+16.82		+16.39
		− .01					− .26				− .09		− .09		− .19
		− .46					− .43				− .44		− .49		− .43
		+ .28					+ .26				+ .26		+ .27		+ .26
		+16.19					+15.99				+16.55		+16.53		+16.03
+58	48	23.59				48	23.46			48	25.58		25.68	48	25.48
			+5	18.36				+5	18.82	48	25.63	+5	18.16	48	25.66
	53	41.4		+0.3		53	42.5		+0.3	53	42.3		+0.3	53	42.9
	+5	1.48		−2.9		+5	18.6		−3.0	+5	16.7		−3.8	+5	17.2
		18.6					18.8				17.5				18.0
			+5	15.76				+5	16.12			+5	14.66		
58			+53	39.35				+53	39.58			+53	40.29		

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ζ Herculis

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S Ophiuchi

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ε Ophiuchi

	h	m	s
	16	11	42
	0	'	"
−	4	23	10
+	46	45	58

1877

		July 19			Aug 3			23		
α_0	11 48.816		11 51.90	4		39.8	3			
Corr^a	+ .03	24	51.86	4		39.5	3	log cos δ_0	9.99873	
		29	51.81	5		39.2	3			
$\frac{d\alpha}{dt}$	+3.1687	Aug 3	51.76	5		38.9	3	15 cos δ tan δ_0	0.12133	
		8	51.70	6		38.6	3			I 2.07
δ_0	23 28.67	13	51.64	6		38.4	2			
		18	51.57	7		38.2	2	tang δ_0	−0.8X8	100
Corr^a	− .1	23	51.50	7		38.0	2			
		28	51.43			37.8	2	sin z	+.73	
$\frac{d\delta}{dt}$	−9.089									

	July 24	July 25	Aug 1	Aug 16
	−1.38	−1.39	−1.36	−1.32
h	m s	m s	m s	m s
16	11 32.6	11 29.3	11 40.7	11 46.35	12 6.5	12 2.00
	35.4	32.0	42.1	50.30	7.7	4.85
	37.2	33.6	43.9	52.34	8.8	6.12
	51.32	54.88		56.40		10.29
	53.55	53.35		56.45		12.40
	55.54	52.17		0.56		14.50
12	2.28	57.69	58.05	12 33.0	2.53	12 50.5		16.50
	2.43	59.65	0.24	35.8	4.70	52.0		18.60
	2.60	3.80	4.29	37.7	8.90	54.0		22.70
		5.90	6.28		10.80			24.80
		7.80	8.45		12.70			26.85
		43.967	376.11		306.24			45.881
	11 35.07	6 10.67	11 31.63	6 16.11	11 42.33	6 6.24	12 7.67		45.881
	12 24.37	11 55.516	12 18.33	11 56.110	12 3.50	12 0.567	12 52.17	12 14.57
		11 51.858		11 51.848		11 51.778		11 51.394
		+ 3.66		+ 4.16		+ 8.79		+ 2.284
	−3.65	+ 3.63	−4.19	+ 4.13	− 3.82	+ 8.76	−22.90	+ 2.281
	+ .11		+ .11		+ .11		+ .11	
	− 3.04		−3.03		− 2.96		− 2.78	
	− 6.58		−7.11		− 11.67		− 25.57	
+11	48.94		+48.90		+48.96		+48.84	

	+26.45	−28.85	+24.38	−22.32	+18.24	−34.93	+6.77	−37.73
	1.31069	1.46015 n	1.38703	1.34869 n	1.26102	1.54320 n	0.83059	1.57669 n
	1.43262	1.58148 2	1.50836	1.47002 2	1.38235	1.66453 4	0.95792	1.69802 n
	50 0	50 1	50 0	50 1	50 0	50 1	50 0	50 1
E	10".4	15".0	4".1	6".3	8".3	19".3	26".2	25".6
F	23.1	28.5	17.9	19.9	22.1	34.8	38.0	37.1
G	25.8	30.9	20.4	21.9	24.1	36.4	42.8	41.4
K	18.3	24.2	13.4	16.0	19.2	31.1	35.9	35.0
	77.6	98.6	55.8	64.1	73.7	121.6	142.9	139.1
	52 19.40	51 24.65	50 13.95	51 16.03	50 18.43	51 30.40	50 35.73	51 34.78
	+ 27.04	− 38.15	+ 32.24	− 29.51	+ 24.12	− 46.19	+ 8.95	− 49.89
	50 46.44	50 46.50	50 46.19	50 46.52	50 42.55	50 44.21	50 44.68	50 44.89
−4	27 58.09	58.15	27 57.84	58.17	27 54.20	55.86	27 56.33	56.54
+46	45 1	46 7	44 56	45 58	45 0	46 12	45 18	46 17
	1.78630	1.78650	1.78630	1.78650	1.78630	1.78660	1.78640	1.78660
	−1750	−1750	−1650	−1650	−1605	−1605	−2281	−2281
	1.76880	1.76900	1.76980	1.77000	1.78025	1.78055	1.76359	1.76379
	−58.72	−58.75	−58.86	−58.89	−60.29	−60.33	−58.02	−58.05
	+ .02	+ .03	+ .02	+ .02	+ .01	+ .05	+ .00	+ .05
	− .03	− .14	− .02	− .13	− .03	− .15	− .06	− .16
	+ .02	+ .08	+ .01	+ .08	+ .02	+ .09	+ .04	+ .10
	−58.71	−58.78	−58.85	−58.92	−60.29	−60.34	−58.04	−58.06
−4	28 46.80	54.693	28 46.69	54.709	28 54.49	56.20	28 54.37	54.60
−4	28 56.86	+5 18.86	28 56.89	+5 18.82	28 55.34	+5 18.16	28 54.48	+5 16.57
	23 39.5	− 1.1	23 39.4	− 0.9	23 39.0	− 0.9	23 38.3	− 0.9
	+5 17.4	+10.8	+5 17.5	+10.7	+5 16.3	+10.3	+5 16.2	+9.6
	17.3		17.4		16.2		16.1	
		+5 28.16		+5 28.62		+5 27.56		+5 25.27
−4		−23 28.70		−23 28.27		−23 27.78		−23 29.21

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K = 19 Ursae Minn

	h	m	s
	16	14	22
+76	9	51	
−33	47	3	

1877

	m	s		m	s			m	s
α_0	14	21.23	July 19	14	24.38	40	11	13.2	8
			24		23.98	42		14.0	6
Corr^d		−.07	29		23.56	44		14.6	5
			Aug. 3		23.12	46		15.1	4
$\frac{d\alpha}{dt}$		−1.7960	8		22.66			15.5	
δ_0		11 10.53							
Corr^d		+ .6							
$\frac{d\delta}{dt}$		−8.927							

log cosδ	9.37806	
15 cosδ tanφ	9.50066	
tangδ	+.407	4.19
sin z	−.56	

−1.38 −1.39 −1.32 −1.30 −.06

July 24		July 25		Aug 6		Aug 8	
h m s	m s	h m s	m s	h m s	m s	h m s	m s
16 11 12.8	14 16.16	13 46.9	14 16.22	14 6.5	14 23.50	15 2.04	14 25.15
19.0	20.30	53.3	20.38	13.0	27.50	35.9	29.00
25.5	24.55	6.0	24.41	19.0	31.80	43.4	33.65
	28.60		29.52		36.17		37.90
	32.89		33.36		40.65		42.15
15 4.6	37.37	14 58.4	37.60	14 52.0	45.20		46.30
13.0	41.72	6.6	42.05	59.5	49.40		50.50
18.3	46.20	13.6	46.70	7.5	53.60		54.80
	50.30		50.76		58.00		59.60
14 18.93	298.32	13 53.23	301.27	14 12.33	26.562	15 36.57	379.35
15 11.97	14 33.147	15 6.20	14 33.474	14 59.67	14 40.624		14 42.150
	14 23.959		14 23.875		14 22.821		14 22.637
	+ 9.19		+ 9.60		+ 17.80		+ 19.51
−3.65	+ 9.26	−4.19	+ 9.67	−12.74	+ 19.87	−14.45	+ 19.58
−5.62		−5.66		−5.37		−5.29	
						−.25	
−2.78 3		−2.65 4		−1.89 5		−1.41	
−12.00		−12.49		−19.70		−21.40	
+14 21.15		+20.98		+20.92		+20.75	

	+14.22	−38.82	+40.24	−32.73	+27.79	−19.05	−54.42
	1.15290	1.58906n	1.60466	1.51495n	1.44389	1.27989n	1.73576n
	0.65356	0.08972n	0.10532	0.01561n	0.94145	0.78055n	0.23642n
	15 2	15 2	15 2	15 2	15 2	15 2	15 2
ε	20.3	37.4	11.9	34.9	13.1	28.5	39.6
η	27.6	43.7	18.9	42.8	20.2	36.6	47.2
ζ	26.1 23.20	44.0 40.70	18.9 15.40	43.1 39.80	19.4 16.25	33.7 31.10	46.5 43.05
π	26.8	43.6	19.8	41.8	20.3	33.9	47.9
	20.8	168.7	29.5	162.6	73.0	132.7	181.2
	17 25.20	17 42.18	17 17.38	17 40.65	17 18.25	17 33.38	17 45.36
	+ 45.07	− 12.95	+ 17.75	− 10.36	+ 8.01	− 6.33	− 14.23
	17 29.70	17 29.89	17 30.12	17 30.29	17 27.05	17 27.15	17 28.07
+76	5 18.65	18.46	5 18.23	18.06	5 2.30	2.20	5 20.28

−33	47 53	47 36	48 1	47 37	48 0	47 45	47 33
	1.58580	1.58570	1.58580	1.58570	1.58580	1.58570	1.58570
	−1740	−1740	−1638	−1638	−1887	−1887	−1753
	1.56840	1.56830	1.56942	1.56932	1.56693	1.56683	1.56817
	+37.02	+37.01	+37.10	+37.10	+36.89	+36.88	+37.00
	− .03	− .19	− .21	− .14	− .10	− .05	− .38
	− .24	− .27	− .23	− .27	− .23	− .27	− .28
	+ .14	+ .16	+ .14	+ .16	+ .14	+ .16	+ .17
	+36.89	+36.71	+36.80	+36.85	+36.70	+36.72	+36.57
+76	5 55.54	55.17	5 55.03	54.91	5 58.00	57.92	5 56.79
+76	5 55.36	+5 18.36	5 54.97	+5 18.82	5 57.96	+5 17.79	+5 18.18
	11 14.0	+ 0.7	11 14.2	+ 0.7	11 15.4	+ 0.6	11 15.5	+ 0.6
	+5 18.6	− 3.5	+5 17.2	− 3.7	+5 17.4	− 4.9	+5 18.7	− 5.0
	19.2		19.8		18.0		19.3	
		+5 15.56		+5 15.82		+5 13.49		+5 13.78
76		+11 10.92		+11 10.79		+11 11.45		+11 10.57

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γ Draconis

h m s
16 22 18
° ′ ″
+61 47 57

−19 25 · 3

20

Conv

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

α_0

Corr

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

1877

1983.5
m −.010

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B Hercules

| h | m | s | | m | s | | |

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α Draconis

h m s
16 28 14
+69 2 18
−26 39 30

Co
Cos z
dz/dt
δ₀
Cos δ
dδ/dt

m s
28 13.72
+.05
−0.1467
2 2.73
+.6
−7.783

July 19 / 24 / 29 / Aug 3 / 8 / 13 / 18 / 23 / 28

m s
28 16.65
16.40
16.13
15.88
15.60
15.31
15.02
14.71
14.39

25 25 27 28 29 27 31 32

2 1
5.2
6.0
6.8
7.5
8.0
8.4
8.7
8.2
8.9

8 8 7 5 4 3 1 1

log cos δ 9.55367
15 cos δ tan i 9.67627
tang δ +2.61 2.79
sin z −.45

1877

July 26 −1.37 −.05
Aug 1 −1.36
Aug 6 −1.32
Aug 8 −1.30 −.06
Aug 16 −1.32

h m s
16 27 57.8 28 13.58
43.8 16.22
47.4 19.05
22.00
24.80
27.90
30.70
33.30
36.50

27 57.6 28 17.27
12 20.98
8.1 22.28
25.45
28.45
31.40
34.12
37.00
39.80

27 54.0 28 2.33
59.7 23.20
22 26.05
28.80
31.85
34.60
37.48
40.35
43.20

28 4.7 28 22.28
8.9 24.90
12.8 27.90
30.80
33.60
36.40
39.50
42.48
45.10

27 47.0 28 29.90
51.1 32.70
56.0 35.75
38.60
41.37
44.35
47.20
50.00
53.03

27 43.00 224.05
28 24.894
28 16.284
+ 8.61
+ 8.56
−4.75
−3.58
−.14
−2.57
−11.04
+28 13.85

28 2.33 256.15
28 28.461
28 15.981
+ 1.248
+ 1.243
−8.83
−3.55
−2.26
−14.64
+13.82

27 58.63 285.99
28 31.777
28 15.648
+ 16.08
+ 16.03
−12.75
−3.45
−1.98
−18.18
+13.60

28 8.80 302.96
28 33.662
28 15.586
+ 18.68
+ 18.03
−14.46
−3.389
−.17
−1.896
−19.88
+13.78

27 51.37 273.07
28 41.452
28 15.122
+ 26.33
+ 26.28
−22.92
−3.45
−1.40
−27.77
+13.68

+41.89
1.622 11
1.298 38
25 1

+26.13
1.411 714
1.069 341
25 1

+33.15
1.520 48
1.196 75
25 1

+24.86
1.395 50
1.071 77
25 1

+50.08
1.699 66
1.375 93
25 0

ε 4.1
η 10.4
ζ 10.6
κ 9.9
35.0
26 8.75

9.1
17.1
17.5
17.1
60.8
26 15.20

8.4
11.9
11.8
10.6
26 ~~35.7~~ 8.93
~~27 6.43~~

10.7
15.5
16.8
16.9
26 14.98

54.9
0.5
2.4
2.5
0.3
26 6.08

+19.88
26 28.63

+12.40
26 27.60

+15.73
~~25 22.46~~ 24.66
26

+11.80
26 26.78

+23.76
26 23.84

+68 56 19.72

56 20.75

56 ~~24.19~~ 23.69

56 21.57

56 24.51

−26 39 9
1.460 80
−12 40
1.448 40
+28.08
−.32
−.11
+.07
+27.72

39 3
1.460 80
−5 60
1.455 20
+28.52
−.12
−.13
+.08
+28.35

39 12
1.460 90
−18 35
1.442 55
+27.70
−.18
−.11
+.07
+27.48

39 3
1.460 80
−17 25
1.443 55
+27.77
−.11
−.12
+.07
+27.61

39 18
1.460 90
−22 02
1.438 88
+27.47
−.46
−.10
+.06
+27.97

+68 56 47.44

56 49.10

56 ~~53.67~~ 51.17

56 49.18

56 51.48

+5 18.74
2 6.34
+5 19.0
19.6

+5 18.16
2 7.3
+5 18.2
18.8

+5 17.79
2 7.8
+5 ~~14.1~~ 16.6
14.7 17.2

+5 18.18
2 8.0
+5 18.8
19.4

+5 16.57
2 8.6
+5 17.1
17.7

+0.5 −3.7
+0.5 −4.6
+0.5 −5.1
+0.5 −5.3
+0.5 −5.9

+5 15.54
+2 2.98

+5 14.06
+2 3.16

+5 13.19
+2 4.36

+5 13.38
+2 2.56

+5 11.47
+2 2.65

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θ Herculis

1877

| | | |

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Gr. 848 L.C.

h m s
4 32 3
° ′ ″
+75 42 33
104 18 27
−61 54 39

1877
−1.32
Aug 6

July 29
Aug. 3
8

Corr α
dα/dt
Δδ
Corr δ
dδ/dt

m s
32 18.95
+ .17
+7.952
42 4.745
17 12.55
+ .1
+7.355

m s
32 20.96
21.47
22.00

51 42 45.6 4
53 45.2 3
41.9

log cos δ 9.39220 n
log sin α 9.51480 n
tang δ + 3.93 4.05
sin z − .88

32 38.87 26.27
33 27.43 32 29.474
32 21.456
+ 7.72
−12.75 + 7.55
+5.19
−3.06
−12.62 −10.62
+32 +6.05 18.85
~~4.57~~

−9.40 −57.96
0.97313n 1.76313n
0.48793 1.27793
10 2 10 2

28.3 12.9
37.6 22.3
33.2 30.75 18.4 15.65
329 17.3
132.0 10.9
12 33.00 12 17.73
+ 3.08 + 18.96
12 36.08 12 36.69
+104 10 12.27 11.66

−61 52 45 53 0
203066 203075
−1822 −1822
201244 201253
+10291 +10293
+ .01 + .44
− .26 − .23
+ .16 + .14
+1 4282 +1 4328
+104 11 55.09 54.94
+104 11 55.02 +5 17.79
17 15.0 +0.9
+5 200 −2.4
199
+5 16.29
104 +17 11.21

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50 H Cephei 2.6.

4 h m s
4 37 2
+ 80 37 7
99 13
− 57 46

log cos δ 9.20145 n
15 cos δ tan i 9.32405 n
tang δ ± 6,21 6.26
sin z − .84

log I 1.11284
I 1296
1/I 6.918

1877

July 24				July 25				Aug. 6				Aug. 8				Aug. 16			
			−1.38				−1.39				−1.32				−1.30 −.06				−1.32
21	37	11.4	m 2	36	54.70	36	48.4	36	55.20	36	57.8	37	6.12	37	18.4	37	—	37	13.2	37	18.60
		19.0			1.41		0.0		1.44		3.7		12.60						27.3		24.62
		32.5			7.86		11.0		8.38		12.0		17.20						36.4		31.34
					14.37				14.87				25.32			34.98	28.50				38.60
					20.75				21.39				32.05			.30	34.30				44.55
	38	02		38	29.2				28.0				38.80								51.10
		13.2			40.1				34.47				45.85								57.47
		23.3			53.4				41.77				52.32								4.45
									48.00				59.35								11.60
	37	20.97	24871	37	50.90				253.54												280.36
		188.77							193.54	37	3.83		291.61	37	18.40			37	25.63		404.36
	38	12.23	37	20.474	38	39.90	37	21.504				37	32.401			37	34.46			37	44.484
		−3.67			− 4.22				−12.75				− 14.47						−22.93		
		+ 6.57			+ 6.63				+ 8.20				+ 8.07						+ 8.20		
													+ .38								
		− 1.50	42		− 1.64	.57			− 3.48	1			− 3.87	72					− 5.72	04	
		+ 3.40			+ 2.71				− 8.04				− 9.83						− 19.85		
	37	21.37	45	37	24.27	34		37	24.36	44		37	24.81	92				37	24.63	71	

4 m s
4 37 24.572

		+ 0.00		− 51.26		− 38.40 + 21.60		− 16.80		+ 28.57			+ 16.24			+ 18.85					
		0.00000		1.70978n		1.33445n		1.89432n		1.45591			1.21059			1.27531					
		9.32405n		1.03383		0.65558		1.21837		0.77996n			0.53464n			0.54936n					
		25 3		25 3		25 3 0.90838		25 3		25 3			25 3			25 3					
E		27.4		17.2		26.9		12.1		31.5			30.7			26.6					
H		35.9		25.5		30.1		21.4		40.3			38.9			33.9					
G		31.8	28.60	20.9	19.05	26.2	23.55	17.4	14.75	35.1	33.30		35.0	32.85		31.5	29.05				
K		31.2		20.4		25.6		16.9		34.6			34.8			30.9					
		126.3		84.0		102.8		67.8		141.5			19.4			122.9					
28		31.58	28	21.00	28	25.70	28	16.95	28	35.38		28	34.85		28	30.73					
		− 0.21		+ 10.81		+ 4.56 8.10		+ 16.53		− 6.02			− 3.42			− 3.98					
28		31.37	28	31.81	28	33.80	28	33.48	28	29.36		28	31.43		28	26.75					
+98	54	16.98		16.54	54	14.55	54	14.87	54	18.99		54	16.92		54	21.60					
−56	36	46	36	57	36	52	37	1	36	43		36	43		36	47					
	1.94025		1.94027		1.94027		1.94030		1.94022			1.94022			1.94025					
	− 16	57 58	− 16	58	− 15	46	− 15	46	− 18	03		− 17	05		− 21	58					
	1.92367		1.92369		1.92481		1.92484		1.92219			1.92317			1.91867					
	+83.88		+83.89		+84.10		+84.11		+83.60			+83.79			+82.92					
	+ .00		+ .22		+ .12		+ .52		+ .06			+ .02			+ .02					
	− .35		− .33		− .34		− .32		− .36			− .36			− .35					
	+ .21		+ .20		+ .20		+ .20		+ .22			+ .22			+ .21					
	+1 23.74		+1 23.98		+1 24.30 .08		+1 24.51		+1 23.52			+1 23.67			+1 22.80					
+98	55	40.72	55	40.54	55	38.88 .52	55	39.38	55	42.51		55	40.59		55	44.40					
	55	40.63	+5	18.36	55	39.40	+5	18.82			+5	17.79		+5	18.18			+5	16.57		
				+ 1.0				+ 1.0				+ 0.9			+ 0.9				+ 0.9		
				− 1.9				− 2.0				− 3.2			− 3.4	3			− 3.7		
			+5	17.46			+5	17.82			+5	15.49		+5	15.78			+5	13.77		
+99			0	58.09			0	56.82			0	58.00		0	56.37			0	58.17		

+99° 0′ 57.49

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η Herculis

α 16 38 37

δ +39 9 40

+3 13 8

Corr α +.61

dα/dt +2.0561

δ 9 25.66

Corr δ +.2

dδ/dt −7.049

1877

July 19 24 29 Aug. 3 8 13 18 23 28

38 40.79 38 43.63 43.55 43.47 43.38 43.29 43.19 43.08 42.97 42.85

9 25.1 26.0 26.9 27.6 28.2 28.7 29.1 29.4 29.6

log cos δ 9.88958

1 sin² δ sin² α 0.01218

tang δ +0.81

sin z +.06

I 2.48

1.29

Aug 1 −1.36

Aug 6 −1.32

Aug 8 −1.30 −.06

Aug 12 −1.23

Aug 16 −1.32

V. 38 2.18 2.96 2.63 3.44 0.20 2.46 2.88 5.06 39 1.37 1.71 1.90 5.35 6.00 5.70 4.00 6.70 9.30 38 24.23 39 16.60

38 37.44 40.20 42.46 48.28 53.35 56.00 58.70 4.00 6.79 586.79 38 53.345 38 18.412 +.993 +9.92

38 2.18 2.51 2.71 39 1.9 2.20 2.41 38 24.67 39 22.00

38 41.20 43.95 46.42 51.85 54.38 57.05 59.77 2.95 5.78 10.40 13.05 388.11 628.11 38 57.101 38 43.322 +1.378 +13.77

Ch. f.

38 30.5 32.8 34.7 39 24.4 24.7 28.8 38 32.67 39 22.63

38 46.78 49.45 52.00 57.38 0.00 2.70 5.30 7.98 13.36 16.00 18.70 262.65 29.65 39 2.695 38 48.205 +1.949 +19.48

38 42.6 45.0 47.3 39 15.1 17.0 19.5 38 44.97 39 17.20

38 51.20 53.80 56.47 1.85 4.40 7.12 9.85 12.50 17.80 24.70 22.68 2.56 1.67 38 7.061 38 43.118 +2.394 +23.93

−1.05 −.08

−2.61 −12.55 +38 40.79

−2.52 −16.34 +40.76

−2.40 −21.88 +40.82

−2.32 −25.32 +40.74

+29.11 1.46404 1.47622 15 2

−23.26 1.36611n 1.37879n 15 3

+32.43 1.51095 1.52343 15 2

−21.90 1.39620n 1.40838n 15 3

15 3 15 4

+30.03 1.47756 1.48974 15 2

−23.93 1.37894n 1.39112n 15 3

+22.09 1.34420 1.35638 15 3

−10.14 1.00604n 1.01822n 15 3

E 58.1 52.5 54.9 54.9 11.9 2.1 56.9 52.6 3.1 37.1

η 7.9 3.1 4.2 4.1 21.6 11.3 5.4 1.2 11.3 45.5

ζ 8.1 3.10 2.1 5.30 3.9 5.40 3.2 5.05 21.1 16.50 10.8 6.45 6.1 1.50 1.9 5.25 13.0 8.05 48.2 42.65

θ1 6.2 2.1 2.1 2.3 20.8 10.2 4.5 59.4 10.8 45.1

20.3 23.8 5.1 45 75.4 34.4 12.9 23.1 38.2 175.9

18 5.08 18 5.95 18 1.28 19 1.13 18 18.85 19 8.60 18 3.23 18 58.78 18 9.55 18 43.98

+29.94 18 35.02

−23.92 18 36.03

+33.35 18 34.63

−25.61 18 35.52

+30.88 18 34.11

−24.61 18 34.17

+22.72 18 32.27

−10.43 18 33.55

+39 4 13.33 12.32 4 13.72 12.83 4 14.24 14.18 4 16.08 14.80

+3 12 47 0.50960 −.533 0.50427 −3.19 −.22 −.31 +.19 −3.53

13 42 0.51160 −.533 0.50627 −3.21 −.14 −.40 +.24 −3.51

12 43 0.50940 −.1798 0.49142 −3.10 −.28 −.30 +.18 −3.50

13 43 0.51160 −.1798 0.49362 −3.12 −.17 −.40 +.24 −3.45

12 45 0.50940 −.1898 0.49042 −3.09 −.24 −.30 +.18 −3.45

13 41 0.51160 −.1898 0.49262 −3.11 −.15 −.40 +.24 −3.42

12 52 0.50990 −.2153 0.48837 −3.08 −.13 −.31 +.19 −3.33

13 26 0.51100 −.2153 0.48947 −3.09 −.03 −.37 +.22 −3.27

+39 4 9.80 +39 4 9.30 9 27.4 +5 18.1 18.3

8.81 +5 18.16 −0.1 −1.7 +5 16.36

4 10.22 4 9.80 9 28.0 +5 18.2 18.4

9.38 +5 17.79 −0.1 −2.3 +5 15.39

+5 18.18 −0.1

4 10.79 4 10.78 9 28.6 +5 17.8 18.0

10.76 +5 17.21 −0.0 −3.0 +5 14.21

4 12.75 4 12.14 9 29.0 +5 16.9 17.1

11.53 +5 16.57 −0.0 −3.3 +5 13.27

39 +9 25.66 +9 25.19 +9 24.99 +9 25.41

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