KG
11366
v.456

Polar Catalogue
Observations & Reductions
B1 1872-3
From 13^{h} 12^{m} to 16^{h} 22^{m}

Charles W. Sever, University Bookstore, Cambridge.

Poles Stars

Observations & Reductions

A'

Polaris

13 12

June 13 1872

13 8 16.8
59.1
41.6
27.1
9.3
49.6
84.1
17.7
59.1

314.4
74.4
~~554.4~~
~~50.400~~
8.267

July 24 1872

03 21.8
(49.1)
(49.9)
18.7
52.0
(83.2)
(33.7)
16.9
59.3
(39.8)
4 (41.6)
(43.0)
(19.9)
(23.3)
(24.8)
10.2
57.3
(38.6)
(40.7)
(42.6)
(44.3)
(6.4)
8 (8.3)
(12.1)
35.7

03 21.8
(49.1)
(49.9)
18.7
52.0
33.5
16.9
59.3
(39.8)
(41.5)
(43.0)
(19.9)
(23.3)
(24.7)
10.2
51.5
(38.6)
(40.7)
(42.6)
(44.3)
(3.4)
(8.3)
(12.1)
35.7

Approximate number of observations

$A_1 = 551$
$2 = 512$
$3 = 483$
$4 = 477$
$5 = 392$
$6 = 388$
$7 = 386$
$8 = 420$
Sup. List $= A'_1 = 312$
$\overline{3921}$

For converting Circle readings into declinations.

For Stars below the Equator.
Subtract $22' 48''.5$ from the circle readings.

For stars between the equator and the pole
Subtract the circle readings from $22' 48''.5$

For stars below pole.
Subtract the circle readings from $22' 48''.5$ to get $\underline{\underline{180-\delta}}$.

Approximate value of the Equator-point Correction to be used in computing the equations for this book only

For 1872 $R_{eq} = +4''.75$

For 1873 $R_{eq} = -1.12$

Inclination, i. from June 11 1872 to Sept 28 1872 = 4° 58' 24''

$\tan i = 8.93962_n$
$\log 15 = 1.17609$
$\log 15 \tan i = 0.11571_n = \log C.$

Inclination from Sept. 28 1872 to Oct. 29 1872 inclusive

$i = 4° 43' 17''$

Log. Constant = .09302

In the first reduction of the Polar Catalogue for Runs. the error of the 5' space was taken with the wrong sign. Instead of changing the value of the runs already found, the correction (given on the sixth line from the bottom of the page) is applied directly to the observed declination.

a Virginis

h	m	s
13	18	24
13	18	30
—	10	29
—	10	29 51
		52 39

n =
sin z = +.81 1872

tang δ = −.19
x = −.016
cos x = −.008
″ τ1872 = 27.92 δ = 29 31.88
τ1873 = 30.295 δ = 29 50.79

1873 Wash. Places.

May 20	18m	31.52	
25		31.51	1
30		31.49	2
June 4		31.46	3
9		31.43	3
14		31.39	4
19		31.35	4
24			

log sin δ 9.26063n
log cos δ 9.99267
log b 1.1571n
log tan cos δ .10838n

0 ″
25 30.07
06
06
05
03
02
0.0

	1872 June 11 −.20 −.194		1873 May 29 −.34 −.347		May 31 −.19 −.173		June 2 −.33 −.320		June 5 −.32 −.325		1873 June 10 −.27 −.305	
13 18	0 1.6	17 54.6	17 56.5	17 47.2	17 57.2	17 44.0	17 57.6	17 49.3	17 58.6	17 50.7	18 0.6	17 53.6
	3.8	55.5	58.6	48.3	59.2	45.5	59.6	50.4	18 0.8	57.8	2.8	55.0
	4.9	56.7	18 0.8	49.4	18 1.4	46.9	18 1.7	51.9	2.9	53.0	5.0	56.1
	10.0		5.0		5.5		5.7		7.0		9.0	
	12.2		7.0		7.7		8.2		9.1		11.2	
	14.3		9.0		9.6		10.2		11.3		13.4	
	16.4		11.0		11.8		12.3		13.3		15.3	
	18.5		13.3		13.9		14.3		15.5		17.6	
	22.6		17.6		18.0		18.7		19.6		21.6	
	24.7		19.6		21.2		20.4		21.7		23.9	
	26.8		21.8		22.4		22.4		23.7		25.8	
	155.8		100.2		226.9		231.7		183.5		146.2	
					106.9		111.7		123.5			
	14.164		9.109		9.719		10.155		11.227		13.291	
T	18 14.15	17 55.60	18 9.09	17 48.30	18 9.70	17 45.47	18 10.14	17 50.53	18 11.21	17 51.83	18 13.27	17 54.90
RA	18 28.08		18 31.46		18 31.46		18 31.44		18 31.45		18 31.39	
T−RA	−13.93		−22.37		−21.76		−21.30		−20.24		−18.12	
dT+m	+13.90 +.00		+22.34 +.01		+21.81 −.07		+21.35 +.00		+20.23 +.02		+18.02 +.01	
n tang δ	+ .04	+.04	+ .06	+.06	+ .04	+.03	+ .04	+.06	+ .06	+.06	+ .05	+.06
Red. 1471.0	+0.94		−1.17	−1.16	−1.16		−1.15		−1.15		−1.10	
Sum	+13.00		+21.24		+20.61		+20.26		+19.94 16		+16.99	
T	18 14.15		18 9.09		18 9.70		18 10.14		18 11.21		18 13.27	
RA	18 27.15		18 30.32		18 30.39		18 30.40		18 30.35		18 30.24	
Corr. RA.	18 27.12		18 30.29		30.36		30.37		30.32		30.21	
	18 27.12		18 30.30		18 30.28		18 30.37		18 30.34		18 30.23	
R.A.	18 27.15		18 30.33		18 30.31		18 30.40		18 30.37		18 30.26	

55	+1.21	+1.86	+1.85	+1.83	+1.82	+1.79
		50	50	50	50	50
1.	1 26.0	0 52.0	0 51.4	~~50~~ 48.0	0 50.0	0 47.9
	25.3	61.9	57.1	0 55.0	56.2	55.2
	51.3	113.9	108.5	103.0	106.2	103.1
	56 25.65	50 56.95	50 54.25	50 51.50	50 53.10	50 51.55
	+18.55	+20.79	+24.23	+19.61	+19.38	+18.37
	1.26834	1.31785	1.38435	1.29248	1.28735	1.26411
	1.37672n	1.42628n	1.49278n	1.40086	1.39573	1.37242
	−23.81	−26.69	−31.11	−25.17	−24.87	−23.58
	56 25.65	50 56.95	50 54.25	50 51.50	50 53.10	50 51.55
	(56 1.84	50 30.26	50 23.15	50 26.33	50 28.23	50 27.97
δ	−10° 33′ 13.49″	~~37~~ 27 41.91	27 34.80	27 37.98	27 39.88	27 39.62

λ +52° 57′ 17″ μ+ξ7 = 1.89602
1.86450
51 37 ~~1.89559~~
58 37 ~~1.89770~~
~~+.2494~~
1.86450
51 50

−.1696	−.1523	+.0694	−.0185	−.0433	−.1118
~~1.87904~~	~~1.88077~~	~~1.90464~~	~~1.89585~~	~~1.89337~~	~~1.88652~~
1.84754	1.84927	1.87144	1.86265	1.86017	1.85332
±1 ~~15.69~~ 10.40	±1 ~~15.99~~ 10.67	±1 ~~20.29~~ 14.38	±1 ~~18.68~~ 12.89	±1 ~~16.23~~ 12.47	±1 ~~17.07~~ 11.34
+ .03	+ .04	+ .05	+ .04	+ .03	+ .03
+ .03	+ .03	+ .03	+ .03	+ .03	+ .03

	−1 10.48	−1 10.68	−1 14.37	−1 12.89	−1 12.48	−1 11.35
	+1 ~~15.75~~ −1 ~~18.63~~	+1 ~~16.06~~ −1 ~~15.92~~	+1 ~~20.37~~ −1 ~~20.21~~	+1 ~~18.75~~ −1 ~~18.61~~	+1 ~~18.29~~ −1 ~~18.17~~	+1 ~~17.06~~ −1 ~~16.94~~
−10	~~31 57.74~~ ~~31 57.86~~	~~26 25.85~~ ~~26 25.98~~	~~26 14.43~~ ~~26 14.59~~	~~26 19.23~~	~~26 21.59~~	~~26 22.56~~
−10	~~34 29.12~~ ~~34 29.26~~	28 57.81 ~~28 57.91~~	~~28 55.01~~ ~~55.08~~	~~28 56.59~~ ~~56.66~~	~~28 58.05~~ ~~58.12~~	~~28 56.56~~ 56.63
−10	29 38.0 34 23.97	30 0.6 28 52.59	30 0.6 28 49.17	30 0.5 28 50.87	30 0.5 28 52.36	30 0.8 28 50.97
	+ 6.10	+ 9.87	+ 9.8	+ 9.70	+ 9.70	+ 9.5
Correction to the first value of Runs.	+4 45.21 −.14 45.07	−1 7.18 −.08 7.26	−1 6.96 −.07 7.03	−1 5.94 −.07 6.01	−1 6.32 −.07 6.39	−1 6.07 −.07 6.14
	+4 51.31		29 52.17	− 56.24	− 56.62	− 56.57
	29 37.81 + 6.10	29 35.21 + 9.80	29 52.17 + 9.80	29 52.83 + 9.70	29 54.67 + 9.70	29 53.13 + 9.50
	+4 45.02	−1 7.39	−1 6.78	−1 6.52	−1 6.16	−1 6.51
	* .98	* 1.50	* 1.49	* 1.48	* 1.47	* 1.44
1.	+4 40.14	−0 59.09	−0 58.47	−0 58.30	−0 57.93	−0 58.45
	−10 29 49.12	29 57.00	29 53.55	29 54.96	29 56.05	29 55.08

u+Tg₂ₓ=

1873
June 11. _ .33
_ .337

18 1.2
3.4
5.6
9.7
11.7
13.8
15.9
18.0
22.2
24.3
26.4
152.7
13.827

17 55.7
56.8
58.0

18 13.81 17 56.83
18 31.39
− 17.58

+ 17.60 +.00
+ .06 +.06
− 1.09
+ 16.57
18 13.81
18 30.38
30.35
18 30.35
18 30.38

+1.78
50
0 48.9
56.8
105.7
50 52.85
s
+16.98
1.22994
1.33832
− 27.70
50 52.85
50 31.06

27 42.71

−1447
~~1.88323~~
1.85003
1 ~~16.42~~ 10.80
+ .03
+ .00
+ 1 16.45 −1 1084
~~−1 16.39~~
26 2626
~~28 59.10~~ ~~59.17~~
30 0.8 28 53.55
+ 9.40
− 1 5.86 −.07 5.93
− 5646
27 55.56 + 9.40
+ −1 5.99
* 1.44
− 0 58.03
29 57.20

June 12 _ .32
_ .347

18 2.7
5.8
8.9
10.0
12.2
14.3
16.2
18.4
162.5
14.22

17 59.7
18 0.7
1.7

18 14.20 18 0.70
18 31.38
− 17.28

+ 17.13 +.01
+ .06 +.06
− 1.09
+ 16.11
18 14.20
18 30.20
30.27
18 30.28
18 30.31

+1.78
50
0 42.1
49.7
91.8
50 45.90
+13.50
1.13033
1.23871
− 17.33
50 45.90
50 ~~28.57~~

27 40.22

−547
~~1.89223~~
1.85903
1 ~~18.02~~ 12.28
+ .01
+ .00
+ 1 18.03 −1 12.33
~~−1 18.01~~
26 2219
~~28 58.23~~ ~~58.29~~
30 0.2 28 52.55
+ 9.30
− 1 5.52 −.06 5.58
− 5622
27 54.45 + 9.30
−1 5.94
* 1.44
− 58.08
29 56.37

June 15 _ .28
_ .277

18 3.0
5.0
7.1
11.3
13.4
15.5
17.6
19.7
23.9
25.9
28.0
170.4
15.491

17 58.7
59.9
18 0.8

18 15.47 17 59.80
18 31.35
− 15.88

+ 15.85 +.00
+ .05 +.05
− 1.06
+ 14.84
18 15.47
18 30.31
30.28
18 30.28
18 30.31

+1.77
50 47.2
0 54.9
102.1
0 51.05
50 51.05
+15.67
1.19507
1.30345
− 20.11
50 51.05
50 ~~30.94~~

27 42.59

−1658
~~1.88112~~
1.84792
1 ~~16.05~~ 10.46
+ .02
+ .00
+ 1 16.07 −1 10.51
~~−1 16.03~~
~~26 2652~~
~~28 58.62~~ ~~58.69~~
12 0.2 28 53.10
+ 9.30
− 1 5.49 −.07 5.56
− 5619
27 54.81 + 9.30
−1 5.81
* 1.43
− 57.94
29 56.63

June 17. _ .37
_ .350

18 4.0
6.1
8.2
12.3
14.4
16.5
18.7
20.8
25.0
26.9
29.0
181.9
16.536

17 58.6
18 0.6
1.7

18 16.52 18 0.63
18 31.33
− 14.81

+ 14.81 −.02
+ .07 +.07
− 1.03
+ 13.85
18 16.52
18 30.37
30.34
18 30.32
18 30.35

+1.74
50 47.0
0 55.9
102.9
50 51.45
+15.89
1.20112
1.30950
20.39
50 51.45
50 ~~31.06~~

27 42.71

−1527
1.88243
1.84923
1 ~~16.28~~ 10.67
+ .02
+ .00
+ 1 16.30 −1 10.72
~~−1 16.26~~
~~26 2641~~
~~28 58.97~~ ~~59.04~~
12 0.1 28 53.43
+ 9.20
− 1 5.83 −.07 5.90
− 5663
27 55.60 + 9.20
−1 5.82
* 1.40
− 58.02
29 57.06

1873
June 1. _ .25
_ .254

17 57.4
59.5
18 1.5
5.7
7.7
9.9
12.0
14.0
18.3
20.5
22.5
229.0
169.0
9.909

17 46.6
48.0
49.5

18 9.89 17 48.03
18 31.45
− 21.56

+ 21.49 +.01
+ .05 +.05
− 1.16
+ 20.39
18 9.89
18 30.27
30.24
30.28
18 30.28

30.292

+1.84
50
0 54.0
0.9
114.9
50 57.45
+21.86
1.83965
1.44803
− 28.06
50 57.45
50 ~~29.39~~

27 41.04

− 997
1.88773
1.85453
1 ~~17.22~~ 11.54
+ .04
+ .02
+ 1 17.29 −1 11.55
~~−1 17.15~~
~~26 2276~~
~~28 58.19~~ ~~58.27~~
30 0.6 28 52.59
+ * 9.70
− 1 6.81 −.08 6.89
− 5711
27 58.30 + 9.70
−1 7.07
* 1.49
− 58.86
29 57.13

~~B. A. C 852~~ ~~Reject~~

~~13~~ ~~19~~ ~~49~~

+ ~~85~~ ~~40~~

69 (Hev.) Urs. Maj tang δ = +1.78

h	m	s
1	23	40
13	33	47
7	68	37
+	60	36 07
z =	−18	18 11

x = −.032
Con α = −.06 + 1.0
α 1872 = 47.899 δ = 36 25.35 dα = +2.215
α 1873 = 47.313 δ = 36 6.63 dδ = −18.72

Corr.

1872				
May 20.4	23 47.61			
30	47.29	.22		
June 9	47.02	.27	36.9	
19	46.74	.28		
29	46.42	.32	38.9	

1873			
May 20	23 50.14		33.2
25	50.03	.11	
30	49.92	.11	
June 4	49.80	.12	
9	49.67	.13	
14	49.53	.14	
19	49.38	.15	
24	49.12	.16	
29	49.06	.16	

Sin δ = 9.94012
Cos δ = 9.69100
.11571n
9.80671n

° '	"	
60 35	72.5	
	73.6	+1.1
	74.6	1.0
	75.4	.8
35	76.2	.8
	76.8	.6
	77.4	.6
	77.8	.4
35	78.2	.4

Σ vig = −.31

1872 June 18 −.17	1873 May 29 −.34 −.347	May 31 −.19 −.173	June 2 −.33 −.320	June 5 −.32 −.325	1873 June 10 −.27 −.305	June 11
23 8.0 12.2 16.5 24.7 29.0 33.3 37.4 41.6 49.9 54.2 58.4	23 19.7 21.9 24.0 26.0 28.1 30.3 32.3 34.5 36.6	23 21.0 22.4 24.4 26.4 28.5 30.7 32.9 34.9 36.6	23 21.7 22.7 24.8 27.0 29.3 31.3 33.2 35.2 37.3	23 21.8 24.0 26.0 27.8 30.0 32.2 34.4 36.3 38.5	23 23.8 25.9 28.0 30.0 32.0 34.2 36.2 38.3 40.4	23 24.1 26.3 28.3 30.5 32.5 34.5 36.8 38.8 40.9
22 59.6 −.171 23 0.9 2.6 57.0 58.9 24 0.5	22 57.3 59.1 23 1.6	22 48.0 49.5 51.0	23 4.6 7.1 9.2	23 3.7 5.5 7.6	23 8.5 9.9 11.8	23
3652	2534	2568		2710	3888	2927
33.200 23 33.17 46.70 −13.53	28.155 23 28.12 49.88 −21.76 22 59.00 22 59.33	28.533 23 28.50 49.84 −21.34 22 49.50	29.056 23 29.02 49.78 −20.76 23 6.97	30.111 23 30.08 49.72 −19.64 23 5.60	32.089 23 32.06 49.58 −17.52 23 10.07	32.522 23 32.49 49.55 −17.06 23
+13.94 −.07 − .30 −30 −1.60 +0.61 ~~+12.44~~ 11.97 33.17 45.21 45.15 23 45.08 RA 23 45.14 47.35	+22.34 +.01 − .61 −62 −2.57 +19.16 28.12 23 47.28 23 47.22 23 47.22 23 47.28	+21.81 −.07 − .34 −31 −2.53 +18.94 28.50 47.44 47.40 23 47.34 38 23 47.40	+21.35 +.00 − .59 −57 −2.47 +18.29 31 29.02 47.31 47.25 23 47.28 23 ~~47.29~~ 47.33	+20.23 +.02 − .57 −88 −2.41 +17.26 30.08 47.33 47.27 23 47.28 23 47.34	+18.02 +.01 − .48 −54 −2.27 +15.27 2 32.06 47.33 47.27 23 47.22 23 47.28	+17.60 +.00 −1.59 −60 −2.24 +14.76 32.49 47.26 47.20 23 47.19 23 47.25

1873		
June 11	23 47.22	36 7.54
12	47.24	6.68
15	47.26	7.30
17	47.23	7.16

+1.10	+1.86	+1.85	+1.83	+1.82	+1.79	+1.78
50 1 39.1 28.8 6.79 51 33.95	45 0 56.0 9.9 12.59 46 2.95	45 1 4.2 15.2 19.4 46 9.70	45 0 54.3 6.1 12.04 46 0.20	45.0 0 54.2 6.8 12.10 46 0.50	45.0 0 50.7 3.3 11.40 45 57.00	45.0 0 47.7 62.3 11.00 45 55.00
$T_m - T_\delta$	s +28.82 1.45969 1.26640n −18.47 45 2.95 45 44.48	+39.00 1.59106 1.39777n −24.99 46 9.70 45 44.71	+22.05 1.34341 1.15012n −14.13 46 0.20 45 46.07	+24.48 1.38881 1.19552 15.69 46 0.50 45 44.81	+21.99 1.34223 1.14894n −14.09 45 37.00 45 42.91	+17.62 1.24601 1.05272n −11.29 45 55.00 45 43.71
Circle 51 33.95 Reading δ' ° ' " +60 31 14.40	37 3.87	37 3.64	37 2.28	37 3.54	37 5.44	37 4.64
−18 12 11 −13.23 1.26447n	−18 13 09 −15.03 1.26267n	1.27770n 7721 1.28491n	−156 1.27614n	−425 1.27345n	−1108 1.26662n	−1423 1.26347n
m s + 18.39 + .03	+ 18.31 − .19 + .02	+ 19.27 − .36 + .02	+ 18.89 − .11 + .02	+ 18.77 − .14 + .03	+ 18.48 − .11 + .03	+ 18.34 − .07 + .00
+60 +60 +1°	− 18.47 + 18.16 36 45.40 37 22.02 .37 21.93 36 14.2 −1 7.8 −.09 7.89 −1 6.8 6.9	− 19.60 + 18.94 36 44.04 37 22.58 22.44 36 14.8 −1 7.8 −.09 7.89 −1 6.8 6.9	− 18.97 + 18.81 36 43.31 37 21.09 21.01 36 15.1 −1 6.0 −.08 6.08 −1 5.0 5.1	− 18.88 + 18.66 36 44.66 37 22.20 22.12 36 15.3 −1 6.9 −.08 6.98 −1 5.9 6.0	− 18.56 + 18.40 36 46.88 37 23.84 23.76 36 16.4 −1 7.4 −.08 7.48 −1 6.4 6.5	− 18.41 + 18.2 36 46.23 37 22.91 36 16.5 −1 6.4 −1 5.4
	− 7.60 − 7.60 −1 7.18 −.09 ~~7.04~~ 7.39 −1 14.78 + .57 36 7.24 −1 14.42 +60 36 7.51	− 8.20 − 8.20 1 6.96 −.09 ~~7.05~~ 6.75 −1 15.16 + .57 36 7.42 −1 14.41 36 8.08	− 8.50 − 8.50 1 5.94 −.08 ~~6.02~~ 6.52 1 14.44 + .56 36 6.65 −1 14.46 36 6.55	− 8.70 − 8.70 1 6.32 −.08 ~~6.40~~ 6.16 −1 15.02 + .56 36 7.18 −1 14.30 36 7.82	− 9.40 − 9.80 −1 6.07 −.08 ~~6.15~~ 6.51 −1 15.87 + .55 36 7.97 −1 15.76 36 8.00	− 9.90 −1 5.86 −1 15.76 36 7.15

3 Virginis

h m s
13 28 07
13 28 13
+ 0° 0′ 04″
+ 0 03 15
sin? = +.67
2 = +42 19 33

Tang x = +.00
x = –.015
corr = +.05
1872 α = 10.308 δ = 3 33.56
1873 α = 13.361 δ = 3 15.03

corr. =

1873				
May 20	28 m 11.44 s		14.66 s	
25	11.43	.01	64	2
30	11.41	2	62	2
June 4	11.38	3	60	2
9	11.35	3	14.57	3
14	11.32	3	54	3
19	11.28	4	.50	4
24	11.24	4	.46	4
29	11.19	05	14.42	4

Sin δ = 6.94085
Cos δ 10.00000
.11571n
.11571n

dα = +3.052
dδ = –18.54

+0°	3′	7.3″	
		7.6	+.3
		7.9	.3
		8.2	.3
	3	8.5	3
		8.8	3
		9.2	4
		9.6	4
	3	9.9	3

1873 June 11 –.33 –.337	1872 June 18 –.17 –.171	1873 May 31 –.19 –.173	June 2 –.33 –.320	June 5 –.32 –.325	June 10 –.27 –.305	June 12 –.32 –.347
23 13.4	27 45.0 · 27 46.1	27 40.6 · 27 33.0	27 41.0 · 27 23.6	27 42.1 · 27 27.3	27 44.3 · 27 39.0	27 45.1 · 27 37.0
14.9	47.1	42.7 · 34.0	42.9 · 25.0	44.4 · 28.5	46.3 · 39.9	47.2 · 38.2
16.3	49.1	44.6 · 35.4	45.3 · 26.7	46.3 · 29.8	48.4 · 41.1	49.3 · 39.4
	53.3	48.8	49.2	50.3	52.6	53.3
	53.4	50.9	51.3	52.4	54.6	55.4
	57.5	53.0	53.3	54.4	56.6	57.5
	59.5	55.0	55.3	56.5	58.7	59.6
	28 1.5	57.0	57.2	58.7	28 0.7	28 1.6
	5.6	28 1.0	28 1.6	28 2.7	4.8	5.6
	7.7	3.0	3.7	4.9	6.9	7.9
	9.8	5.3	5.7	6.9	9.0	9.9
	392.5	401.9	406.5	419.6	382.9	
	681.5	581.9	586.5	599.6	622.9	
	57.409	52.900	53.319	54.509	56.627	57.491
23 14.87	27 57.39 · 27 46.10	27 52.89 · 27 34.13	27 53.30 · 27 25.10	27 54.49 · 27 28.53	27 56.61 · ~~27 39.67~~ 27 40.00	27 57.48 · 27 38.20
	28 11.34	28 14.67	14.66	14.64	14.61	14.60
	–13.95 –13	–21.78	–21.36	–20.15	–18.00	–17.12
	–13.90	–21.73	–21.31	–20.10	–17.95	–17.07
+.00	+13.94 –.07	+21.81 –.07	+21.35 +.00	+20.23 +.02	+18.02 +.01	+17.13 +.01
–60	.00 · .00	.00 · .00	.00 · .00	.00 · .00	.00 · .00	.00 · .00
	–1.03 +2.02 –1.31	–1.31	–1.30	–1.28	–1.25	–1.24
	+12.84	+20.43	+20.05	+18.97	+16.78	+15.90
	57.39	52.89	53.30	54.49	56.61	57.48
	10.30	13.39	13.35	13.44	13.38	13.37
47.268	10.30	28 13.44	13.40	13.49	13.43	13.42 = 13.436
R.A.	28 10.23 · 13.28	28 13.32	28 13.35	28 13.46	28 13.39	28 13.38

+1.10	+1.85	+1.83	+1.82	+1.79	+1.78
20	15	15	15	15	15
3 27.9	3 1.1	3 14.1	3 11.1	3 57.6	3 1.2
26.0	7.4	21.9	19.1	7.9	9.8
53.9	8.5	36.0	30.2	15.5	11.0
23 26.95	18 4.25	18 18.00	18 15.10	18 2.75	18 5.50
+11.29	+18.76	+28.20	+25.96	+16.61	+19.28
1.05269	1.27323	1.45025	1.41414	1.22037	1.28511
1.16890n	1.38894n	1.56596n	1.52985n	1.33608n	1.40082n
–14.73	–24.49	–36.81	–33.87	–21.68	–25.17
23 26.95	18 4.25	18 18.00	18 15.10	18 2.75	18 5.50
23 12.22	17 39.76	17 41.19	17 41.23	17 41.07	17 40.33
+0° 59 36.13	5 8.59	5 7.16	5 7.15	5 7.28	5 8.02
° ′ ″ +42 18 27	+42 18 47 1.71910				
–1323	+721	–156	–425	–1108	–519
1.70587	1.72631	1.71754	1.71495	1.70812	1.71391
*– 50.80	*– 53.25	*– 52.18	*– 51.86	+– 51.06	+– 51.75
– .00	.00	.00	.00	.00	.00
+ .07	+ .09	+ .10	+ .10	+ .06	+ .00
+ 50.87 – 50.73	+ 53.34 – 53.16	+ 52.28 – 52.08	+ 51.96 – 51.76	+ 51.12 – 51.00	+ 51.75 – 51.75
	6 1.93	5 59.44	5 59.11	5 58.40	5 59.77
58 45.40 · 58 45.06	4 15.43 · 4 15.18	4 15.08 · 14.82	4 15.39 · 15.13	4 16.28 · 16.04	4 16.27 · 16.02
3 29.8	3 8.0	3 8.1	3 8.3	3 8.6	3 8.7
+ 4 44.4 –.34 · 44.74	–1 7.4 –.3 · 7.65	–1 7.0 · 7.3	–1 7.1 · 7.4	–1 7.7 · 7.9	–1 7.6 · 7.8
–14.74					
+3.80	+7.00	+6.90	+6.70	+6.40	+6.30
+4 45.17 –.34 · 44.83	–1 6.96 –.25 · 7.21	–1 5.94 –.26 · 6.20	–1 6.32 –.26 · 6.58	–1 6.07 –.24 · 6.31	–1 5.52 –.25 · 5.77
+4 48.97 +4 · 3.80 · 45.40	–0 59.96 –1 · 7.00 · 6.78	0 59.04 –1 · 6.90 · 6.52	0 59.62 –1 · 6.70 · 6.36	–0 59.67 –1 · 6.40 · 6.51	0 59.22 –1 · 6.30 · 5.94
3 34.37 · .73	3 15.47 · 1.23	3 16.04 · 1.22	3 15.77 · 1.21	3 16.61 · 1.19	3 17.05 · 1.19
+4 48.47	–1 1.00	–1 0.84	–1 0.67	–1 1.30	–1 0.83
+0 3 33.83 · 3 14.99	3 14.17	3 13.98	3 14.46	3 14.74	3 15.19

+18.27
2284.30
0
6.5
5.5
9.90
5.93 1 5.99
+ .55
–1 15.34
36 7.50

ζ Virginis.

13 28 07
+ 0 04

40 Cass.

1873 ~~Cass.~~ June 19.8 1 28 22.73 .39 June 19 = 197 Cc

24 23.13 .40

29 23.54 .41

July 4 23.95 .41

9 24.36 .41

72° 23′ 16.1″

16.2 +.1

23 16.3 .1

16.6 3

23 17.0 4

log δ = 7.315

x = = +.050

con = −.08 +07

sin δ = 9.97914

cos δ = 9.48094

11571 n

9.59665 n

h m s

13 28 15

1 28 2.5

° ″ ″

10 7 37

+72 23 28

107 36 32 z = −65° 13′ 44″

sin z = −.91

α 1873 = 24.552 δ = 23′ 28″.40 = 36′ 31″.60

dα = +4.647

dδ = +18.56

1873 June 11 −.33 −.337

13 27 27 2.5 27

49.9 4.9

53.1 6.9

56.5

28 0.2

3.3

6.7

10.5

13.8

17.1

211.1

31.1

3.455

28 3.51

June 15 −.28 −.277

27 2.9

52.0 5.6

55.3 8.6

58.8

28 2.0

5.6

8.9

12.4

15.8

19.4

230.2

35.02

6.5 78

28 5.63

1873 June 17 −.37 −.350

27 28 21.8

53.2

56.6

28 0.0

3.6

6.8

9.9

13.7

17.0

20.4

181.2

61.2

6.800

28 6.85

~~June 17.~~

28 3.51 27 4.77 28 5.63 27 5.70 28 6.85 28 21.80

28 22.06 28 22.37 28 22.53

−18.55 −16.74 −15.68

+17.60 +.00 +15.85 15.80 +.00 +14.81 −.02

+1.04 +1.06 +0.88 +.87 +1.17 +1.10

+2.49 + ~~7.74~~ +2.18 +2.02

+21.135 +18.970 + ~~18.00~~ 17.91

28 3.51 5.63 6.85

28 24.64 24.54 24.85

28 24.61 24.51 24.82 = 24.647

R.A. 28 24.66 28 24.53 28 24.76

+1.78 +1.77 +1.74

45 45 45

1 30.3 1 29.0 1 37.9

46.9 45.0 53.1

77.2 74.0 91.0

1 38.60 1 37.00 1 45.50

46 46 46

+58.74 +59.93 −14.95 45.05

1.76893 1.77764 1.17464 n 1.65369

1.36558 n 1.37429 0.77129 1.25034

+23.20″ +23.67 −5.91 +17.80

46 38.60 46 37.00 46 45.50 45.50

47 1.80 47 0.67 46 39.59 47 3.30

° ′ ″

107 35 46.55 35 47.68 367 8.76 45.05

−65 11 52

2

1.09324

−1423 −1632 −1521

2.07901 n 2.07692 n 2.07803 n

+ .03 + .03 + .03

+1 59.45 +1 59.37 +1 59.68

+ .54 + .56 + .04

+ .00 + .00 + .00

~~−1 59.44~~ +2 0.47 ~~−1 58.84~~ +1 59.96 ~~59.67~~ +1 59.75

107 ~~33 47.11~~ 33 48.84 34 ~~9.09~~

+107 37 47.02 37 46.89 37 47.64 47.51 387 ~~8.5~~ 44.80 44.56

36 4.39 36 4.39 36 ~~4.39~~

−1 3.1 3.2 −1 3.7 3.8 −1 0.9

−1 2.4 3.9 −1 ~~3.0~~ 4.5 −1 1.6

−1 3.8 −1 4.4

− 12.30 − 12.30 − 12.30

−12.30 −1 15.99 −12.30 −1 15.81 −12.30 −1 15.82

−1 5.86 ~~+73 6.89~~ −1 5.49 ~~+79 6.21~~ −1 5.83 ~~+74 15.97~~

−1 18.16 −1 16.68 −1 17.79 −1 16.50 −1 18.13 −1 16.54

36 28.86 36 30.21 36 29.85 36 31.01 37 ~~50.38~~ 36 28.02

26.67

17 W Can. Ven. tang δ = +.77

	h	m	s	Δ
June 9	13	29	9.00	
14			8.94	.06
24			8.87	.07
29			8.80	.07
July 4			8.72	.08

sin δ = 9.78772
cos δ = 9.89752
.11571n
.01323n

°	′	″	
37	49	64.9	
		65.4	+5
		66.0	6
	~~49~~	66.6	6
	49	67.2	6

x = −.020 ~~+.04~~
Corr x = ~~+.02~~ −.04

h	m	s
13	29	06
13	29	07
+37	51	07
+37	50	01

n = + 4 32 47 sin z = +.08

″ 1873.0 α = 7.396 δ = 50 0.″58

dα = +2.683
dδ = −18.56

1873 June 11 −.33 (−.337)	June 15 −.28 (−.277)	June 16 −.37 (−.377)	1873 June 17 −.37 −.350
13 28 28 42.6	28 28 43.4	28 38.2 28 40.0	28 28 58.9
46.4 43.5	48.0 44.4	40.9 43.0	— 29 0.2
47.8 44.5	49.5 45.7	43.5 44.1	— 0.9
49.0	50.8	48.8	(49.6)
50.5	52.1	51.3	51.8
51.7	53.4	53.9	54.5
53.0	54.7	56.6	57.0
54.3	56.0	59.0	59.8
55.6	57.3	29 4.1	—
57.0	58.6	7.0	—
		9.5	—
4653	4807	4131	
~~51.700~~		5931	
28 51.700 28 43.53	28 53.411 28 44.50	28 53.918 28 42.37	28 54.540 ∫ 29 0.00
28 51.68	28 53.39	28 53.90	28 54.52
29 8.95	29 8.90	29 8.88	29 8.87
− 17.27	− 15.51	− 14.98	− 14.35
(−.05) −17.32	− 15.56	− 15.03	− 14.40
+17.60 +.00	+15.85 +.00	+15.34 +.03	+14.81 −.02
− .25 −.26	− .22 −.21	− .28 −.29	− .28 −.27
− 1.55	− 1.50	− 1.48	− 1.47
+15.80 79	+14.13 14	+13.58 60	+13.11 15
28 51.68	53.39	53.90	54.52
29 7.48	7.52	7.48	7.58
29 7.45	7.49	7.45	7.55 = 7.485
R.A. 29 7.47	29 7.53	29 7.50	29 7.57

+1.78	+1.77	+1.75	+1.74
30	30	30	30
1 33.8	1 34.0	1 38.0	1 19.7
45.9	46.5	49.2	31.7
79.7	80.5	87.2	51.4
1 39.85	1 40.25	1 43.60	1 25.70
31	31	31	31
+8.17	+8.91	+11.55	− 5.46
0.91222	0.99607	1.06258	0.73719n
0.92545n	1.00930n	1.07581n	0.75042
− 8.42	− 10.22 30	− 11.91	+ 5.63
31 39.85	31 40.25	31 43.60	31 25.70
31 31.43	31 32.95	31 31.69	31 31.33
+37° 51′ 16.92	51 15.40	51 16.66	51 17.02
+4 32 38	0.66020		
− 1399	− 1606	− 2084	− 1515
0.64651n	0.64444n	0.63966n	0.64535n
x − 4.43	x − 4.41	x − 4.36	x − 4.42
− .03	− .03	− .03	− .03
+ .00	+ .00	+ .00	+ .00
+ 4.40 − 4.46	+ ~~4.38~~ − 4.44	+ ~~4.33~~ − 4.39	+ ~~4.39~~ − 4.45
~~+37 51 21.32~~	~~51 19.78~~	~~51 20.99~~	~~51 21.41~~
+37 51 12.46 51 12.32	51 10.96 10.82	51 ~~11.27~~ 12.27 12.13	51 12.57 12.46
50 51	50 55	50 56	50 57
−1 7.4 7.5	−1 5.5 5.6	−1 ~~5.7~~ 6.7 6.8	−1 6.9 7.0
−1 7.8 7.9	−1 5.9 6.0	−1 7.1 7.2	−1 7.3 7.4
− 4.50 − 4.50	− 4.90 − 4.90	− 5.00 − 5.00	− 5.10 − 5.10
−1 5.86 ~~−.14~~ 5.99 ~~6.00~~	−1 5.19 ~~−.14~~ ~~5.86~~	−1 5.87 ~~−.14~~ 6.09 ~~6.01~~	−1 5.85 ~~−.14~~ 5.82 ~~5.94~~
−1 10.36 .14	−1 10.39 .14	−1 10.87 .14	−1 10.93 .14
+37 50 2.10 −1 10.63	50 0.57 −1 10.90	50 1.40 −1 11.23	50 1.64 −1 11.06
+37 50 1.69	49 59.92	50 0.90	50 1.40

Gr, 2029

h	m	s	
13	34	06	
13	34	08	
+	71	54	
+	71	53	20
	0	29	28
z = − 29		30	32

sin z = −.49

tang δ = +3.06

α = −.048

corr α = +.10 −.03

1873 α = 8.012 δ = 53 20.14

1873	m	s	Δ
May 30	34	12.08	
June 4		11.86	.22
June 9		11.62	.24
" 14		11.37	.25
19		11.10	.27

sin δ = 9.97792
cos δ = 9.49269
11.571n
9.60840n

°	′	″	
71	52	89.0	
		89.9	+.9
		90.7	.8
		91.4	.7
		92.0	.6

dα = +1.431
dδ = −18.38

	1873 May 31	−.173 −.19	June 11	−.337 −.33	June 12	−.347 −.32
	33	33 ~~16.9~~	33	33 20.8	33	33 16.4
	37.8	~~22.9~~	—	23.8	42.2	19.0
	40.8	56.0		26.5	45.8	21.9
	44.3		48.5		48.9	
	47.6		51.7		52.0	
	51.0		55.2		55.4	
	54.2		58.4		58.9	
	57.0		34 2.4		34 2.5	
	34 0.6		—		5.6	
	4.2		—		8.9	
	3375		2162		3195	
	457.5		276.2		499.5	
	50.838	33 19.90	55.240	33 23.70	55.500	33 19.10
	33 50.79		33 55.19		33 55.45	
	34 12.33 12.03		34 11.61		11.56	
	−21.34		−16.42		−16.11	
	+21.80 −.07		+17.60 +.00		+17.13 +.01	
	−.58	−.53	−1.01	−1.03	−.98	−1.06
	−4.02		−3.60		−3.55	
	+17.20 .18		+12.99 .97		+12.60 .53	
	33 50.79		55.19		55.45	
	34 7.99		8.16		8.05	
	34 8.09		8.26		8.15 = 8.150	
R.A.	34 7.97		34 8.16		34 7.98	
	+1.85		+1.78		+1.78	
	25 41.81		25		25	
	3 46.5		3 50.5		3 54.0	
	48.1		1.8		6.1	
	89.6		112.3		120.1	
	28 44.80		28 56.15		28 60.05	
	+ ~~30.93~~ −6.17		+31.54		+36.40	
	1.49038	0.71349	1.49886		1.56110	
	1.09878n	.32182n	1.10726		1.16950n	
	−12.55	−2.13	−12.80		−14.78	
	28 44.80	44.80	28 56.15		28 60.05	
	28 32.25	42.67	28 43.35		28 45.27	
~~+71 54 16.10~~						
+71°	54 16.10	54 4.68	54 5.00		54 3.08	
−29	30 21	1.51290n	30 20	1.51290n		
	+7.76		−13.75		−4.63	
	1.52066n		1.49915n		1.50827n	
	+ 33.16		+ 31.56		+ 32.23	
	− .16		− .16		− .21	
	+ .11		+ .00		+ .00	
	− ~~33.21~~	+33.11	~~31.72~~	+31.40	~~32.44~~	+32.01
+71	~~53 42.89~~		~~53 33.28~~		~~53 30.64~~	
+71	54 ~~44.21~~	37.79 37.49	54 36.40	36.08	54 35.04	34.77
	53 29.2		53 31.1		53 31.3	
	−1 8.6		−1 5.3	5.6	−1 3.8	4.1
−53	−1 8.9		−1 5.6	5.9	−1 4.1	4.4
	−9.10	9.10	−11.00	11.00	−11.20	11.20
	−1 6.96	~~−30 6.78~~	−1 5.86	~~−32 6.98~~	−1 5.52	~~−32 5.94~~
	−1 16.06	+ .90	−1 16.86	+ .87	−1 16.72	+ .87
	53 ~~33.15~~ 21.73	−1 14.98 53 22.61	53 19.54	−1 16.12 53 19.96	53 18.34	−1 16.27 53 18.50

1873
June 15 348.
16 8.
17 8.

30

4 26.3
14.9

Gr. 339

h m s	h	m	s
13 34 08	13	34	08
		85	39
+85° 39′ 21″		94	21

Reduction

		s
1	41.22	54.3
2	30.96	40.7
3	20.64	27.2
4	12.49	13.6
5.	0.00	0.0

Sin δ = 9.99875
Cos δ = 8.87995
11571
8.99566

1873 June 11		June 12		June 15		1878 June 17
34	34 40.6		34 43.8	34	33 39.5	35 53.5
–	48.4	–	48.1	–	44.3	54.6
–	35 7.8	–	51.6	–	51.7	–
–		–		–		–
–		–		–		–
21.9		–		–		–
38.0		–		–		–
54.8		–		34 59.1		35 0.0
35 10.2		35 11.0		35 14.3		14.4
26.9		28.6		30.4		30.5

This star is to be rejected, the wrong one having evidently been observed.

1873			
June 15	348.17	53	18.24
16	8.05		18.41
17	8.08		19.05

40		40		40		40	′
0	47.0	0	50.0	0	51.9	0	52.1
	62.2		40.0		6.5		8.1
	109.2		90.0		118.4		120.2
40′	54.60″	40°	45.00	40	59.20	41′	0.10

η Urs. Maj.

h	m	s
13	42	29
13	42	32
+	49°	57′
+	49	56 52″

z = − 7 34 04

sin. z = −.13

tang δ = +1.19

α = −.024

Corr α = ~~−.07~~

1872 α = 29.707 δ = 57 9.99

1873 α = 32.080 δ = 56 51.89

1873	m	s	a
May 20	42	34.34	
25		34.28	.06
29		34.21	.07
June 4		34.14	.07
June 9		34.06	.08
14		33.97	.09
19		33.88	.09
24		33.78	.10
29		33.67	.11

Sin δ = 9.88394
Cos δ = 9.80852
14871n
9.92423n

dα = +2.373
dδ = −18.10

°	′	″	
49	56	54.4 +	
		55.5	1.1
		56.6	1.1
		57.5	.9
		58.4	.9
		59.1	.7
		59.8	.7
		60.4	.6
		60.9	.5

1872 −.254 June 19 −.25		1873 −.320 June 2, −.33		−.325 June 5 −.32		−.305 June 10 −.27	
42 11.8	41 54.6	41 54.0	41 36.1	41 55.0	41 47.3	41 57.0	41 50.3
13.0	55.9	57.0	39.3	58.4	48.4	42 0.2	51.7
14.7	57.3	42 0.3	41.3	42 1.6	49.4	3.6	53.5
16.2	58.6	6.6		7.9		9.9	
17.8		9.9		11.2		13.2	
19.4		12.9		14.3		16.3	
20.9		16.3		17.4		19.5	
22.5		19.4		20.6		23.7	
24.2		21.8		27.0		29.2	
		29.1		30.3		32.4	
		32.4		33.4		35.6	
160.0		263.7		257.1		230.6	
~~220.0~~		143.7		157.1		149.6	
~~30.000~~ 17.777	41 57.10 41 56.60 √	13.064	41 38.90	14.282	41 48.37	16.327	41 51.83
42 17.75		42 13.04		42 14.26		42 16.30	
42 31.21		42 34.10		42 34.06		42 33.97	
13.36		−21.06		−19.80		−17.67	
.07° − 13.43		−21.13		−19.87		−17.74	
+13.70 +.00		+21.34 +.00		+20.23 +.02		+18.02 +.01	
−.30	−.30	−.39	−.38	−.38	−.39	−.32	−.36
−1.40	+0.97	−2.02		−1.98		−1.89	
+12.00		+18.934		+17.87 78		+~~15.81~~ 78	
17.75		42 13.04		14.26		16.30	
29.75		42 31.97		32.13		32.11	
29.68		31.90		32.06		32.04	
R.A. 42 29.75	32.12	42 31.98		42 32.14		42 32.08	
+1.08		+1.83		+1.82		+1.79	
		25		25.0		25	
0 43.0		0 11.9		0 6.7		0 4.9	
31.8		24.9		19.2		16.9	
74.8		36.8		25.9		21.8	
0 37.40		0 25 18.40		0 25 12.95		0 25 10.90	
+21.18		+34.16		+25.91		+24.50	
1.32593		1.53352		1.41347		1.38917	
1.25116n		1.45775n		1.33740n		1.31340n	
−17.79		−28.69		−21.76		−20.58	
30 37.40		25 18.40		25 12.95		25 16.90	
30 19.61		24 49.71		24 51.19		24 50.32	
+49 52 28.74		57 58.64		57 57.16		57 58.03	
−7 34 27	0.88400n	−7 34 3	0.88370n				
−1277		−2069		−400		−1078	
0.87123n		0.88381n 0		0.87970n		~~0.87308n~~ 0.87292n	
± 7.43		± 7.64		± 7.58		± 7.46	
.12		.31		.18		.16	
+ .01		+ .07 .01		+ .06 .01		+ .06 .01	
− 7.54 +7.32		− 7.94 +7.34		− 7.75 +7.41		− 7.61 +7.31	
+49 ~~52 21.20~~		~~57 50.70~~		~~57 49.41~~		~~57 50.42~~	
+49 52 36.06	52 36.00	58 5.98	58 5.96	58 4.57	4.55	58 5.34	5.32
57 20.0		56 57.2		56 57.7		56 58.6	
+4 43.9	43.8	−1 8.8	8.8	−1 6.9	6.9	−1 6.7	6.7
28.10							
−10.00	− 10.00	− 5.30 −	5.30	− 5.80 −	5.80	− 6.70 −	6.70
+4 44.16 ~~−.06~~ ±.4	~~44.10~~ 44.39	−1 5.94 −.02	~~5.96~~ 6.52	−1 6.32 −.02	~~6.34~~ 6.16	−1 6.07 −.02	~~6.09~~ 6.51
+4 34.16 +	.14	−1 11.24 +	.23	−1 12.12 +	.23	−1 12.77 +	.23
+49 57 10.22 +4	34.53	56 54.74 −1	11.59	56 52.46 −1	11.73	56 52.54 −1	12.98
−.15	57 10.53	−.29	56 54.37	−.29	56 52.82	−.29	56 52.34
+49 57 10.07	56 52.43	56 54.45		56 52.16		56 52.28	

May 20			31.64	6	74.7		
1872 25			31.58	7	75.9	12	
30			31.51	7	76.9	10	
4	h	m	31.244	8	77.8	9	
June 9	13	42	31.36	8 56	78.7	9	
14			31.28		79.4	+ .7	
19			31.18	10	80.0	.6	
23			31.08	10	80.6	.6	
29			30.97	11	81.2	.6	

1872.0

α	δ
29.75	10.07
″	
29.750	10.07 +30
.707	9.99
+.043	~~+.08~~
	1037
	9.99
	+ .38

1873.0

α		δ
31.98		54.45
32.14		52.16
.08		52.28
.13		52.29
.18		51.55
.11		52.87
.16		51.40
.10		52.17
32.110	+58	52.40
.080		51.89
+0.030		~~+0.51~~
		52.98
		51.99
		+ 1.09

1873 .337
June 11 – .33
41 57.5 41 57.4
42 0.7 52.7
4.1 54.2
10.5
13.4
16.9
20.0
23.2
29.7
32.9
36.0
245.2
185.2
16,836 41 52.77

42 16.81
42 33.96
– 17.15
– 17.22

+17.60 +.00
– .39 –.40
– 1.88
+ 15.332
16.81
32.14
32.07

R.A. 42 32.13
+1.78
25
0 3.3
17.7
21.0
δ 0 10.50
25
+ 24.07
1.38148
1.30571n
– 2022
25 10.50
24 50.28

57 58.07

– 1351
0.87019n

+ 7.42
– .15
+ .01 00

– 7.57 + 7.27
57 50.50
58 5.34 5.32
56 58.8
– 1 6.5 6.5

– 6.90 – 6.90
– 1 5.86 – .02 ~~5.88~~ 5.99
– 1 12.76 + .23
56 52.58 – 1 12.66
– .29 56 52.66
56 52.29

June 12 – .347
– .32
41 58.1 41 57.5
42 1.2 53.3
4.5 54.8
10.9
14.2
17.2
20.6
23.7
30.1
33.2
37.0
255.7
190.4
17,336 41 . 53.20

42 17.31
42 33.94
– 16.63
– 16.70

+17.13 +.01
– .38 – .41
– 1.86
+ 14.89
17.31
32.20
32.19

42 32.18
+1.78
25.0
0 4.8
18.3
23.1
0 11.55
25
+ 24.10
1.38202
1.30625n
– 2024
25 11.55
24 51.31

57 57.04

– 435
0.87935n

+ 7.57
– .15
+ .01 00

– 7.72 + 7.42
57 47.32
58 4.46 4.44
56 59.0
– 1 5.5 5.5

– 7.10 – 7.10
– 1 5.52 – .02 ~~5.54~~ 5.94
– 1 12.62 + .23
56 51.84 – 1 12.81
– .29 56 51.63
56 51.55

June 15 – .277
– .28
41 59.3 41 49.6
42 2.4 50.9
5.6 52.5
11.9
15.3
18.4
21.5
24.9
31.1
34.5
37.6
262.5
202.5
18,409 41 . 51.00

42 18.39
42 33.88
– 15.49
– 15.56

+15.85 +.00
– .33 – .33
– 1.80
+ 13.72
18.39
32.11
32.04

42 32.11
+1.77
25
0 6.0
19.0
25.0
0 12.50
25
+ 27.41
1.43791
1.36214n
– 2302
25 12.50
24 49.48

57 58.87

– 1553
0.86817n

+ 7.38
– .20
+ .01 00

– 7.58 + 7.18
57 51.29
58 6.05 6.03
56 59.3
– 1 6.7 6.7

– 7.40 – 7.40
– 1 5.49 – .02 ~~5.51~~ 5.81
– 1 12.89 + .23
56 53.16 – 1 12.98
– .29 56 53.05
56 52.87

June 16 – .377
– .37
41 59.9 41 50.6
42 3.0 51.9
6.4 53.5
12.6
15.8
19.0
22.2
25.5
31.8
35.0
38.3
269.5
209.5
19,045 41 52.00

42 19.02
42 33.86
– 14.84
– 14.91

+15.34 +.03
– .44 – .45
– 1.78
+ 13.124
19.02
32.14
32.07

42 32.16
+1.75
25
0 5.9
20.3
26.2
0 13.10
25
+ 27.04
1.43201
1.35624n
– 2271
25 13.10
24 50.39

57 57.96

– 2043
0.86327n

+ 7.30
– .20
+ .01 00

– 7.50 + 7.10
57 50.46
58 5.06 5.04
56 59.4
– 1 5.7 5.7

– 7.50 – 7.50
– 1 5.87 – .02 ~~5.89~~ 6.09
– 1 13.34 + .22
56 51.69 – 1 13.37
– .29 56 51.67
56 51.40

1873 – .350
June 17 – .37.
42 0.4 41 48.3
3.6 49.8
6.7 51.5
13.0
16.4
19.6
22.7
25.9
32.3
35.4
38.7
214.7
19,518 41 49.83

42 19.49
42 33.84
– 14.35
– 14.42

+14.81 – .02
– .44 – .42
– 1.76
+ 12.61
19.49
32.10
32.04 = 32.045

42 32.10
+1.74
25
0 8.0
20.9
28.9
0 14.45
25
+ 29.69
1.47261
1.39684n
– 2494
25 14.45
24 49.51

57 58.84

– 1503
0.86867n

+ 7.39
– .24
+ .01 00

– 7.63 + 7.15
57 51.21
58 5.99 5.97
56 59.6
– 1 6.4 6.4

– 7.70 – 7.70
– 1 5.83 – .02 ~~5.85~~ 5.82
– 1 13.53 + .22
56 52.46 – 1 13.30
– .29 56 52.67
56 52.17

~~Gr 20 03~~

~~13 43 49~~

~~+ 83 27~~

1872
June 19

~~1872~~
~~June 19~~

13 44 14.6 13
16.7
18.3
15.7
21.8
30.7
34.2
37.5

η Bootis

h	m	s	
13	48	34	
13	48	38	
+	19°	03′	″
+	19	02′	07″

ζ = +23° 20′ 4″

sin. ζ = + ~~.39~~ .40

Tang δ = +.35

x = -.016

cos x = + ~~.03~~ .05

m α = 35.384 δ = 2′ 24.87″

1873 α = 38.241 δ = 2 6.66

1873	m	s	d
May 20	48	39.77	
25		39.75	-.02
29		39.73	.02
June 4		39.71	.03
9		39.68	.03
14		39.64	.04
19		39.60	.04
24		39.56	.04
29		39.51	.05

Sin δ = 9.51338

Cos δ = 9.97588

11571ₙ

.09129ₙ

dα = +2.857

dδ = -1821

°	′	″	
19	1	62.4	
		63.1	+.7
		63.8	.7
		64.5	.7
		65.1	.6
		65.7	.6
		66.2	.5
		66.7	.5
		67.2	.5

1872 -.254
June 19 -.25

13 48 9.8 48 2.6 13
12.1 4.2
14.2 5.4
18.6 6.4
20.8
22.9
25.1
27.3
31.8
33.8
33.9
252.3

22.936 48 ~~4.55~~ ✓
48 4.65 ✓

48 22.92
48 36.56
-1364
-13.61

+13.70 +.00
-.09 -.09
-1.18 +1.68
+12.43
48 22.92
48 35.35
48 35.38

R.A. 48 35.35 38.21
+1.08

25

0 6.9
3.7
10.6
0′ 5.30
25 25

+18.29
1.26221
1.35350ₙ
-2257
25 5.30
24 42.83

+~~17~~ 18° 58′ 5.55″

+23 19 58 μ + Tγ ζ = 1.39510ₙ
-1265
1.38245ₙ

x - 24.12
- .06
+ .00

+ ~~24.06~~ - 24.18
+18. 58 ~~29.58~~
+ 18 57 41.34 57 41.33
19 2 26.6
+4 45.3 45.3
19.91
- 1.70 - 1.70
+4 44.16 -.01 ~~44.15~~
+4 42.46 +4 44.39
+19 2 23.80 - .43
+.45 +4 42.26
+19 2 24.25 2 23.59
5.38

1872 -.247
June 27 -.25

48 14.8 48 5.6
16.9 6.6
18.9 7.3
23.3
25.6
27.8
29.9
32.1
36.6
38.7
40.7
306.2

27.745 48 6.50

48 27.73
48 36.48
-~~8.75~~
-8.72

+8.88 +.00
-.09 -.09
-1.10 +1.76
+7.69
27.73
35.402
35.43

48 35.42 38.28
+0.95

0 8.9
2.9
11.8
0 5.90
25

+21.24
1.32715
1.41844ₙ
-2621
25 5.90
24 39.69

58 8.66

-984
1.38526

x - 24.28
- .08
+ .00

+ ~~24.20~~ - 24.36
58 ~~32.86~~
57 40.30 57 44.29
2 27.4
+4 43.1 43.1
20.71
- 2.50 - 2.50
+4 43.88 -.01 ~~43.87~~
+4 41.38 +4 44.16
2 25.68 - .38
+ .45 +4 41.28
2 26.13 2 25.54
7.36

~~July 24~~ 1872 ?

1873 -.173
May 31 -.19

48 48 1.8
13.8
14.6
15.7
16.8
18.2
19.0
20.3
21.2
22.3
1618

17.978 48.180

48 17.96
48 39.75
-21.79
-21.76

+21.80 -.07
-.07 -.06
-1.51
+20.22 16
48 17.96
48 38.18
48 38.21

48 38.12
+1.85
A.K.

+16.18
1.20898
1.30027ₙ
-19.97

-.320
June 2 -.33

48 5.4 47 54.9
7.7 55.9
9.9 56.7
14.0
16.3
18.4
20.6
22.8
27.3
28.1
31.5
2030

18.455 47 55.83

48 18.44
48 39.75
-21.31
-21.28

+21.34 +.00
-.12 -.11
-1.51
+19.71 2
18.44
38.15
38.18

48 38.16
+1.83

15
4 36.9
44.5
81.4
4 40.70
19

+22.62
1.35449
1.44578ₙ
-27.91
19 40.70
19 12.79

19° 3′ 35.56″

+23 20 20 μ + Tγ ζ = 1.39
-0040
1.38470
8

x - 24.25
- .09
+ .10 14

+ ~~24.30~~ - 24.20
+ 19° 3 59.86
+ 19 3 11.36 3 10.99
2 41
-1 7.3 7.7

+2.60 + 2.60
-1 5.94 -.37 ~~2.31~~
-1 3.34 - 1 6.52
2 8.02 - .74
+ .86 - 1 4.66
2 8.88 2 6.33

1872	h	m	s	'	"	
June 9	13	48	36.61	2	25.5	
14					26.1	+.6
19.					26.6	.5
24					27.1	.5
29			36.43		27.7	.6

1872.4 α	δ	1873.0 α	δ
35.35	24.25	38.12	8.88
.42	26.13	.16	7.44
		.21	7.88
		.24	6.38
		.19	9.07
		.20	6.32
		.16	
35.385	25.190 –.90	38.183	7.66 –1.72
35.384	24.87	.241	6.66
+.001	~~+.32~~	–.058	~~+1.00~~
	24.29		5.94
	.87		6.66
	–.58		–.72

1873

June 11 –.337 –.33

48 9.2 47 59.4
11.3 48 0.6
13.5 1.7
17.9
20.1
22.3
24.3
26.6
30.9
33.1
35.2
29.4 4

22.218 48 0.57

48 22.20
48 39.70
–17.50
–17.47

+17.59 +.00
– .12 –.12
–1.46
+16.01
22.20
38.21
38.24

R.A. 48 38.21
+1.78
15
4 35.9
44.0
79.9
4 39.95
19
+21.65
1.33546
1.42675
–26.71n
19 39.95
19 13.24
3 35.11

1.39520
–1327
1.38193

*– 24.09
– .08
+ .14.00
+ 24.01 – 24.17
3 59.12 –
3 10.94 10.57
2 5.4
–*1 5.5 5.9

+ 1.30 + 1.30
–1 5.86 –37 ~~6.23~~
–1 4.56 –1 5.99
2 6.58 – .71
+.86 –1 4.40
2 7.44 2 6.17

June 12 –.347 –.32

48 9.6 47 59.8
11.7 48 1.0
14.0 2.1
18.0
20.5
22.6
25.0
27.0
31.4
33.8
35.8
24.97

22.700 48 0.97

48 22.68
48 39.69
–17.01
–16.88

+17.12 +.01
– .11 –.12
–1.45
+15.56
22.68
38.24
38.27

48 38.24
+1.78
15
4 35.0
43.3
78.3
4 39.15
19
+ 21.73
1.33726n
1.42855n
–26.83
19 39.15
19 12.32
3 36.03

–1407
1.39113

*– 24.61
– .08
+ .14.00
+ ~~25.53~~ – ~~24.53~~ 24.69
4 1.56
3 ~~11.50~~ 11.34 10.97
2 5.5
–*1 ~~6.0~~ 5.8 6.2

+ 1.20 + 1.20
–1 5.52 –37 ~~5.89~~
–1 4.32 –1 5.94
2 7.02 – .71
+.86 –1 5.45
2 7.88 2 5.52

June 15 –.277 –.28

48 10.9 48 7.8
12.9 8.7
15.1 9.6
19.6
21.7
23.9
26.0
28.3
32.6
34.7
37.0
26.27

23.882 48 8.70

48 23.87
48 39.66
–15.79
–15.76

+15.84 +.00
– .10 –.10
–1.42
+14.32
23.87
38.19
38.22

48 38.19
+1.77
15
4 28.0
37.9
65.9
4 ~~37.95~~
19 32.95
+ 15.18
1.18127
1.27256n
–18.73
19 32.95
19 14.22
3 34.13

–1527
1.37993

*– 23.98
– .04
+ .14.00
+ 23.94 – 24.02
3 58.07
3 10.11 9.75
2 5.8
–*1 4.3 4.7

+ 0.90 + 0.90
–1 5.49 –36 ~~5.85~~
–1 4.59 –1 5.51
2 5.52 – .71
+.86 5.62
2 6.38 2 4.13

June 16 –.377 –.37

48 11.3 48 5.9
13.4 6.7
15.8 7.6
20.0
22.2
24.4
26.7
28.8
33.0
35.3
37.4
26.83

24.391 48 6.73

48 24.38
48 39.65
–15.27
–15.24

+15.33 +.03
– .13 –.13
–1.41
+13.79 82
24.38
38.17
38.20

48 38.20
+1.75
15
4 30.1
41.0
71.1
4 35.55
19
+ 19.66
1.29358
1.38487n
–24.26
19 35.55
19 11.29
3 37.06

–2022
1.37498

*– 23.71
– .07
+ .14.00
+ 23.64 – 23.78
4 ~~0.70~~
3 13.28 12.92
2 5.9
–*1 7.4 7.8

+ 0.80 + 0.80
–1 5.87 –36 ~~6.23~~
–1 5.07 –1 6.09
2 8.21 – .70
+.86 –1 5.99
2 9.07 2 6.93

1873

June 17 –.37 –.350

48 11.9 48 3.2
14.0 4.5
16.3 5.6
20.6
22.7
24.9
27.0
29.3
33.6
35.9
37.9
27.41

24.918 4.43

48 24.90
48 39.64
–14.74
–14.71

+14.80 –.02
– .13 –.12
–1.40
+13.27 6
24.93
38.16
38.20 = 38.217

48 38.16
+1.74
15
4 33.9
43.8
77.7
4 38.85
19
+ 20.48
1.31133
1.40262n
–25.27
19 38.85
19 13.58
3 34.77

–1497
1.38023

*– 24.00
– .08
+ .14.00
+ ~~23.92~~ – 24.08
3 ~~58.69~~
3 10.69 10.32
2 6.1
–*1 4.6 5.0

+ 0.60 + 0.60
–1 5.83 –37 ~~6.20~~
–1 6.23 –1 5.82
2 5.46 – .70
+.86 –1 5.92
2 6.32 2 4.40

Sch, 813 =

Tang δ = +5.466
+5.462
k = -.085

Sin δ 9.99283
Cos δ 9.25583
11571n
9.37154n

12dt/dt = -.03

h m s
13 50 22
13 50 22
+ 79 38
+ 79 37 22″
n = -37° 14′ 34″
Sin n = -.60

1872 June 19 | 1872 June 19 -.254 | 1873 May 31. -.173 | June 11 -.337 | June 15 -.277

13 51 17.1 50 24.5 | 13 49 58.8 49 45.0 | 49 53.8 49 48.2 | 49 49 9.7 | 49 49 51.3
20.2 24.1 | 5.5 56.4 | 53.7 | 57.4 14.1 | 57.9 52.5
23.3 25.6 | 10.5 57.2 | 58.5 57.0 | 50 2.7 19.4 | 50 3.7 53.6
27.3 | 15.9 | 50 4.2 | 8.4 | 9.4
34.9 | 22.0 | 10.4 | 14.6 | 15.4
51 23.8 | 27.8 51 1.1 | 15.7 | 19.7 | 21.0
33.6 7.3 | 21.3 | 25.6 | 26.7
39.4 11.3 | 27.4 | 31.3 | 32.3
45.5 | 32.8 | 37.0 | 38.0
38.5 | 42.9 | 43.9

259.0 | 239.6 | 248.3
199.0 | 179.6 | 188.3
~~22.000~~ 22.111 22.026 | 49 50.87 | 15.733 | 49.05297 | 19.955 | 49 14.07 14.40 | 20.922 | 49 52.47
+13.93 | 50 22.03 | 50 15.65 | 50 19.57 | 50 20.89
+13.70 | +21.73 | +17.59 | +15.84
-.84 - + 1.39 | -.95 | -1.84 | -1.51
-* 4.35 | -* 6.96 | -* 6.00 | -* 5.62
50 29.99 | 50 29.47 | 50 29.62 | 50 29.53

50

+1.08 | +1.85 | +1.78 | +1.77
40 | 45.0 | 40
0 36.1 0 19.0 | 4 57.9 | 0 1.9 | 4 53.1
22.3 5.9 | 7.4 | 15.1 | 6.0
58.4 | 125 3 | 17 0 | 119 1
0 29.20 | 5 2.15 | 0 8.50 | 4 59.05
50 31.24 | 45 2.65 50 22.76 | 45 | 44 59.55
+31.24 | +22.76 | +65.55 | +28.45
1.49471 | 1.35717 | 1.81657 | 1.45408
0.86625n | 0.72871n | 1.18811n | 0.82562n
-7.35 | -5.35 | -15.42 | -6.69
50 29.20 | 45 2.65 | 45 8.50 | 44 59.55
50 21.85 | 44 57.30 | 44 53.08 | 44 52.86

+79° 32′ 26.50″ | 37 51.05 | 37 55.27 | 37 55.49

-37° 14′ 23″ 1.64090n | -37° 13′ 56″ 1.64080n
-1265 | +830 | -1327 | -1527
1.62825n | 1.64920n | 1.62753n | 1.62553n

+ 42.49 | + 44.57 | + 42.92 | + 42.22
- .09 | - .05 | - .43 | - .07
+ .01 | + .01 .00 | + .01 .00 | + .00

- 42.57 + 42.41 | - 44.62 + 44.52 | - 42.85 + 41.99 | - 42.29 + 42.15
+79 32 43.93 | 37 6.43 | 37 12.42 | 37 13.20
+79 33 8.91 33 8.86 | 38 35.57 38 35.17 | 38 37.26 37.25 | 38 37.64 38.24
- 13.93 | - 8.78 | - 10.67 | - 11.21
+4 44.16 -.05 ~~44.4~~ | -1 6.96 -.40 ~~7.36~~ | -1 5.86 -.08 ~~5.87~~ | -1 5.49 -.40 5.89
+4 30.23 | -1 15.74 | -1 16.53 | -1 16.70
+79 37 39.14 | 37 19.83 | 37 20.73 | 37 20.94

- 13.93 | - 8.78 | - 10.67 | - 11.21
+4 44.39 | -1 6.78 | -1 5.99 | -1 5.81
+ .65 | + 1.12 | + 1.06 | + 1.06
+4 31.11 | -1 14.44 | -1 15.60 | -1 15.96
+79 37 39.97 | 37 20.73 | 37 21.65 | 37 22.28

h m s s
13 50 34.6 36.4
79 37 54 27

	m s		' ''	
α 1872	50 29.95	1	37 39.97	
α 1873	29.59	5	~~29.44~~	21.18

1873

June 16 -.377

49 — 49 29.6
58.9 — 34.8
50 4.6 — 39.7
10.9
16.5
21.9
27.8
33.5
39.1
44.8

2580
1980
22.000 — 49 α'' 34.70

50 21.91
+15.36
−2.06
−*5.52

50 29.69

+1.75
44
4 56.2
10.6
126.8
D. 34.0
45

+47.30
1.67486
0.04640n
−11.13
45 3.40
44 52.27

37 56.08

−2022
1.62058m

+ 41.74
− .23
+ .01,00

− 41.97 + 41.51
37 14.11
38 37.59 37.14
− 11.33
−1 5.87 −.40 ~~6.27~~
−1 17.20
37 20.39

− 11.33
−1 6.09
+ 1.05
−1 17.37
37 19.82

June 17 -.350

49 — 49 9.2
59.3 — 15.8
50 5.4 — 21.3
11.0
16.6
21.7
27.8
33.7
39.6
45.2

2603
200.3
22.255 — 49 α'' 15.43

50 22.17
+14.78
−1.91
−*5.42

50 29.62

+1.74
45
0 1.1
14.5
15.6
0 7.80
45

+ 16.82
1.82491
1.19643n
−15.72
45 7.80
44 52.08

37 56.27

−1497
1.62583m

+ 42.25
− .44
+ .01,00

− 42.69 + 41.81
37 13.58
38 38.08 37.67
− 11.45
−1 5.83 −.41 6.24
−1 17.28
37 20.80

− 11.45
−1 5.82
+ 1.04
−1 16.23
37 21.44

T Virginis

h	m	s	
13	55	07	
13	55	11	
+	2	10	″
+	2	09	35
z = + 40		13	13
+ .65			

Tang δ = +.04

x = −.015

corr x = +.08 s

1872 α = 7.951 δ = 9′ 53.02″ dα = +3.049

1873 α = 11.031 δ = 9 35.39 dδ = −17.64

1872

1873	m	s	
May 20	55	12.44	4
25		12.43	.01
30		12.42	.01
June 4		12.41	.01
9		12.39	.02
14		12.36	.03
19		12.33	.03
24		12.30	.03
29		12.26	.04

Sin δ 8.57757
Cos 9.99969
11.571n
.11540n

2° 9′	″	
	27.5	+4
	27.9	.4
	28.3	.4
	28.7	.4
	29.1	.3
	29.4	.4
	29.8	.4
	30.2	.4
	30.6	

1872 June 19 −.25 −.254	1872 June 27 −.25 −.247	1873 May 31 −.19 −.173	1873 June 15 −.28 −.277
13 54 43.0 · 54 54.2	54 47.9 · 54 42.0	54 38.4 · 54 32.8	54 44.3 · 54 38.8
45.2	49.9 · 43.2	40.4 · 34.0	46.2 · 39.6
47.2	52.1 · 44.0	42.4 · 35.0	48.3 · 40.4
51.4	56.2	46.5	52.5
53.4	58.3	48.7	54.6
55.4	0.3	50.7	56.6
56.5	2.5	52.8	58.7
59.5	4.5	54.7	55 0.8
3.7	8.5	59.0	4.9
5.7	10.5	1.0	6.9
7.9	12.6	3.0	8.9
885.9	303.3	437.6	382.7
608.9	3.3	557.6	622.7
56.9~~00~~ 55.355 · 54 54.20	0.308 · 54 43.07	50.691 · 54 33.93	56.609 · 54 39.60
54 55.34	55 0.29	54 50.68	54 56.59
55 9.18	55 9.13	55 12.50	55 12.43
− 13.84	− 8.84	− 21.82	− 15.84
+13.70 +.00	+8.87 +.00	+21.80 −.07	+15.84 +.00
− .01 · −.01	− .01 · −.01	− .01 · −.01	− .01 · −.01
−1.20 · +1.85	−1.15 · +1.90	−1.47	−1.40
+12.49	+7.71	+20.~~32~~ 25	+14.43
54 55.34	6.29	50.68	56.59
55 7.83	8.00	55 11.00	11.62
7.91	8.08	55 11.08	11.10 = 11.090
R.A. 55 7.83 · 10.88	55 8.00 · 11.05	55 10.93	55 11.02
+ 1.08	+0.95	+1.85	+1.77
15	15	10	10
1 56.2 ?	2 16.0	1 39.0	1 42.2
52.9	13.7	46.4	51.8
10.91	29.7	85.4	94.0
1′ 54″.55	2 14.85	1 42.70	1 47.00
16	17	11	11
+ 1.15	+17.23	+16.76	+17.01
0.06070	1.23629	1.22427	1.23070
0.17610n	1.35769n	1.33967n	1.34610n
−1.50	−22.47	−21.86	−22.19
16 54.55	17 14.85	11 42.70	11 47.00
16 53.05	16 52.38	11 20.84 ?	11 24.81 ?
+2° 5′ 55″.30	5 55.97	11 27.51	11 23.54
+40° 12′ 8″ 1.68700 (688)		+40° 12′ 28″ 1.68690	
− 1273	− 975	+ 858	− 1501
1.67427	1.67705	1.695~~38~~ 4	1.67189
m s			
∓ 0 47.24	∗ − 47.54	∗ − 49.60	∗ − 46.98
− 00	− .01	− .01	− .01
+ .04	− 02	+ .03 .05	+ .05 .00
+ ~~47.28~~ − 47.20	+ ~~47.51~~ − 47.57	+ ~~49.64~~ − 49.56	+ ~~46.97~~ − 46.99
+2 ~~6 42.58~~	~~6 43.48~~	~~12 17.15~~	12 10.51
+2 5 8.10 · 5 7.91	5 ~~8.42~~ 40 · 5 8.18	10 37.95 · 10 37.81	10 36.55 · 10 36.41
9 49.7	9 50.2	9 28.4	9 29.5
+4 41.6 · 41.4	+4 41.8 · 41.6	−1 9.5 · 9.6	∓1 7.0 · 7.1
− 14.34	− 14.84		
+ 3.30 · + 3.30	+ 2.80 · + 2.80	+ 7.00 · + 7.00	+ 5.90 · + 5.90
+4 44.16 −.19 · ~~43.97~~	+4 43.88 −.22 · ~~43.66~~	−1 6.96 −.14 · ~~7.10~~	1 5.49 −.14 · ~~5.63~~
+4 47.46 · +4 44.39	+4 46.68 · +4 44.16	− 0 59.96 · −1 6.78	− 0 59.59 · −1 5.81
+2 9 55.56 · − .70	9 55.08 · − .61	9 37.98 · − 1.20	9 36.96 · − 1.15
+4 46.49	+4 49.35	−1 0.98	−1 1.06
+2 9 59.90	9 54.53	9 36.83	9 35.35
9 37.26	36.89		

1872

	h	m	s	'	"	
June 9	13	55	9.16	9	49.0	
14					49.4	+.4
19					49.7	.3
24					50.0	.3
29			9.03		50.4	.4

α Draco

h	m	s
14	0	57
14	00	57
+	65°	00′
+	64	59 00′

z = −22 36
sin. z = −.38

tang δ = +2.14
x = −.036
corr = .000 +04
1872α = 55.480 δ = 59 17.02
1873α = 57.103 δ = 58 59.70

1873	m s	Δ
May 20	1 0.58	
25	0.48	+.10
29	0.36	.12
June 4	0.23	.13
9	0.08	.15
14	59.92	.16
19	59.76	.16
24	59.58	.18
29	59.38	.20

sin δ 9.95722
cos δ 9.62622
11571n
9.74193n
dα = +1.623
dδ = −17.32

°	′	″	
64	58	63.3	
		64.5	+1.2
		65.7	1.2
		66.7	1.0
		67.7	1.0
		68.5	.8
		69.3	.8
		69.9	.6
		70.5	.6

	1872 June 19 −.25 −.254	1872 June 27 −.25 −.247	1873 May 31 −.19 −.173	June 11 −.33 −.337	June 12 −.32 −.347	June 15 −.28 −.277
14	0 15.4 0 5.2	0 20.0 0 57.4	0 —	0 0 17.9	0 0 9.7	0 0 16.0
	20.2 10.7	24.8 0.6	29.2 —	33.4 19.9	33.8 11.8	33.0 18.0
	24.9 13.5	29.6 2.7	31.4 —	35.8 23.1	36.2 14.5	37.5 19.5
	34.9	39.4	33.8	38.2	38.8	39.8
	39.8	44.3	36.4	40.6	41.2	42.3
	44.6 1 1.8	48.9	38.7	43.2	43.7	44.9
	49.3 3.6	54.2	41.3	45.5	45.8	47.0
	54.4 5.9	58.8	43.8	48.1	48.3	49.5
	4.0	8.7	45.7	50.4	50.7	51.8
	8.9	13.6	48.6	53.0	53.3	54.5
	13.9	18.4				
	310.3	360.7	348.9	388.2	391.8	402.8
	490.3	540.7	38.767	43.133	43.533	44.700
	0 44.573 0 9.80	0 49.155 0 0.23	0 38.767	0 43.133 0 20.30	0 43.533 0 12.00	0 44.700 0 17.83
	1 3.77					
	0 44.54	0 49.12	0 38.73	0 43.10	0 43.50	0 44.66
	0 57.68	0 57.38	0 0.30	0 0.01	0 59.98	0 59.88
	− 13.14	− 8.26	−21.57	−16.91	−16.48	−15.22
	+13.70 +.00	+8.87 +.00	+21.80 −.07	+17.59 +.00	+17.12 +.01	+15.84 +.00
	− .54 −.54	− .54 −.53	− .41 −.37	− .71 −.72	− .68 −.74	− .60 −.59
	−2.20 − 0.58	−1.90 − 0.28	−3.20	−2.91	−2.88	−2.78
	+10.9~~7~~6	+6.4184	+18.1~~7~~6	+13.9~~7~~6	+13.5~~6~~1	+12.4~~8~~7
	0 44.54	0 49.12	0 38.73	43.10	43.54	44.66
	1 ~~0.47~~ 55.50	0 55.56	0 56.92	57.07	57.06	57.12
R.A.	0 55.50 57.12	0 55.56 57.18	0 56.89	0 57.06	0 57.01	0 ~~44.67~~ 57.13
	+1.08	+0.95	A.R. +1.85	+1.78	+1.78	+1.77
25				20	20	20
	3 52.9 3 24.1	3 59.5		3 4.0	3 9.2	3 6.0
	41.8 12.8	48.8		16.2	21.5	18.4
	94.7 36.9	107.8		20.2	30.7	24.4
	3 47.35 3 18.45	28 53.90		3 10.10	3 15.35	3 12.20
	+ ~~44.57~~ 34.77 − 19.20	+48.92 ~~−11.08~~		+22.83	+31.53	+26.87
	1.54120 1.28330n	1.68949		1.35851	1.49872	1.42927
	1.28313 1.02523n	1.43142		1.10044n	1.24065n	1.17120n
	−19.19n +10.60	−27.01		−12.60	−17.40	−14.83
	28 47.35 28 18.45	28 53.90		23 10.10	23 15.35	23 12.20
	28 28.16 28 29.05	28 26.89		22 57.50	22 57.95	22 57.37
+64°	54′ 20.19″ 54 19.30	54 21.46		59 50.85	59 50.40	59 50.98
−22°	36′ 17″ 1.37970n		−22° 35′ 56″	1.37960n		
	−12.41	−9.66		−12.78	−3.50	−14.73
	1.36729n	1.37004n		1.36692n 8	1.37610n	1.36487n
	± 23.30	± 23.44		+ 23.27	+ 23.77	+ 23.17
	∓ .26	∓ .50		− .11	− .20	− .15
	+ .08	− .04		+ .10 00	+ .10 00	+ .10 00
	− ~~23.48~~ +23.12	− ~~23.98~~ +22.90		− ~~23.38~~ +23.16	− ~~23.97~~ +23.57	− ~~23.32~~ +23.02
+64	53 ~~56.71~~	53 ~~57.48~~		59 ~~27.47~~	59 ~~26.43~~	59 ~~27.66~~
+64	54 43.31 54 42.93	54 44.36 54 43.97	+65	0 14.01 0 13.76	0 13.97 13.71	0 14.00 13.74
	59 28.8	59 30.0		59 8.1	59 8.3	59 8.7
″	+4 45.5 45.1	+4 45.6 45.2		−1 5.9 6.1	−1 5.7 6.0	−1 5.3 5.6
+0.4	+4 45.9 45.5	+4 46.0 45.6		−1 5.5 5.7	−1 5.3 5.6	−1 4.9 5.2
	− 29.12	30.32				
	− 11.80 − 11.80	− 13.00 − 13.00		− 8.40 − 8.40	− 8.60 − 8.60	− 9.00 − 9.00
	+4 44.16 −.38 ~~43.78~~	+4 43.88 −.39 ~~43.49~~		−1 5.86 −.25 ~~6.11~~	−1 5.52 −.26 ~~5.78~~	−1 5.49 −.26 ~~5.75~~
	+4 32.36 ∓.4 44.39	+4 30.88 ∓ 44.16		−1 14.26 ∓ 5.99	−1 14.12 ∓ 5.44	−1 14.49 ∓ 5.81
	64 59 15.67 +4 .41 33.00	59 15.24 +4 .36 31.52		58 59.75 −1 .67 13.72	58 59.85 −1 .67 13.87	58 59.51 −1 .67 14.14
	−.44 59 15.93	−.44 59 15.49		−.84 59 0.04	−.84 58 59.84	−.84 58 59.60
+64	59 15.23 58.61	59 14.80 58.17		58 58.91	58 59.01	58 58.67

1872

	h	m	s	'	"	
June 9	14	0	58.02	59	27.4	
14					28.1	+.7
19					28.8	.7
24					29.5	.7
29			57.32		30.1	.6

	1872.0			1873.0			
α	δ			α	δ		
55.50	15.23			56.89	58.91		
.56	14.80			57.06	59.01		
				.01	58.67		
				.13	57.33		
				.10	58.41		
				.18			
55.530	15.01	+88	15.89	57.062	58.47	+1.68	60.15
.480	17.02		17.02	.103	59.70		59.70
+.050	~~−2.01~~	−1.13		−.041	~~−1.23~~		+.45

June 16	−.377 −.37			June 17	−.350 −.37		
0		0	28.9	0		0	23.4
	35.5		31.2		36.1		25.8
	38.0		33.7		38.7		29.0
	40.4				41.0		
	42.9				43.5		
	45.4				45.8		
	47.6				48.4		
	50.3				50.8		
	52.8				53.1		
	55.1				55.7		
	408.0				413.1		
	45.333				45.900		
0	45.333	0	31.27	0	45.900	0	26.07
0	45.30			0	45.86		
0	59.85			0	59.81		
	−14.55				−13.95		
	+15.33 +.03				+14.80 −.02		
	−.79		−.81		−.79		−.75
	−2.75				−2.71		
	+11.79 .80				+11.30 2		
	45.30				45.86		
	57.09				57.16	= 57.070	
0	57.10			0	57.18		
	+1.75				+1.74		
20				20			
2	59.4			3	2.1		
	11.8				13.9		
	131.2				16.0		
3	5.60			3	8.00		
	+14.06				+19.83		
	1.14799				1.29732		
	0.88992_n				1.03925_n		
	−7.76				−10.93		
23	5.60			23	8.00		
22	57.84			22	57.05		
59	50.51			59	51.30		
	−19.81				−14.85		
	1.35979_n				1.36475_n		
+	22.90			+	23.16		
−	.15			−	.08		
+	.10 00			+	.10 00		
−	~~23.05~~ + 22.75			−	~~23.24~~ + 23.08		
~~59~~	~~27.46~~			~~59~~	~~28.06~~		
0	13.26		13.01	0	14.38		14.13
59	8.9			59	9.0		
−1	4.4	4.7		−1	5.4	5.6	
−1	4.0	4.3		−1	5.0	5.2	
	−9.20 −		9.20		−9.30 −		9.30
−1	5.89 −25		~~6.14~~	−1	5.83 −25		~~6.08~~
			6.09				5.82
−1	15.09 +		.66	−1	15.13 +		.66
58	58.17 −1		14.63	58	59.25 −1		14.46
	−.84	58	58.48		−.84	58	59.67
58	57.33			58	58.41		

α Bootis.

14h	04m	33s	
14	04	36	
+	25°	43′	
+	25	41′	39″
g =	+16°	41′	09″
	+.29		

tan υ = +48

x = −.017s

cos x = −.03s

−.09 −.00

1872 α = 33.723 δ = 41′ 56.17″

1873 α = 36.462 δ = 41 38.96

1872	m	s	
June 9	4	35.08	4
14		35.04	4
19		34.99	5
24		34.94	5
29		34.89	5

1873	m	s	
May 20	4	38.13	.1
25		38.11	−.02
29		38.09	.02
June 4		38.07	.02
9		38.04	.03
14		38.00	.04
19		27.96	.03
24		37.91	.05
29		37.86	.05

sin δ 9.63715

cos δ 9.98476

11571n

.07047n

dα = +2.739

dδ = −17.22

25	41′	35.4″	
		36.3	+.9
		37.2	.9
		38.0	.8
		38.8	.8
		39.5	.7
		40.2	.7
		40.8	.6
		41.3	.5

	June 18 1872 −.155 −.17		1872 June 19 −.254 −.25		1872 June 27 −.247 −.25		1873 May 31 −.173 −.19		June 12 −.347 −.32	
14	04 15.9		04 7.8	04 1.7	04 12.4	04 8.5	4 2.7	3 55.6	4 7.4	3 57.6
	18.1		10.0	2.9	14.9	9.9	4.9	56.7	9.6	58.8
	20.5		12.2	4.0	17.0	10.8	7.2	57.9	11.9	59.8
	22.8		16.8		21.6		11.8		16.4	
	25.2		19.2		23.9		14.2		18.8	
			21.5		26.2		16.5		21.0	
		04 37.1	23.8		28.5		18.8		23.2	
		37.8	25.9		30.8		20.9		25.6	
		38.9	30.6		33.3		25.6		30.0	
			32.9		37.6		27.9		32.4	
			35.0		39.9		30.1		34.7	
	102.5		235.7		288.1		180.6		231.0	
	20.500	4 37.93	21.427	4 2.87	26.191	4 9.73	16.419	3 56.73	21.000	3 58.73
	4 20.48		4 21.41		4 26.17		4 16.40		4 20.98	
	4 35.02		4 34.97		4 34.88		4 38.05		4 37.99	
	s − 14.54		−13.56		−8.71		−21.65		−17.01	
	+.06 −14.48		−13.50		−8.65		−21.59		−16.95	
	+14.58 −.06		+13.70 +.00		+8.87 +.00		+21.80 −.07		+17.12 +.01	
	−.08	−.07	−.12	−.12	−.12	−.12	−.09	−.08	−15	−.17
	−1.30	+1.44	−1.25	+1.49	−1.16	+ 1.58	−1.59		−1.53	
	+13.20 .15		+12.33		+7.59		+20.12 .06		+15.43	
	4 20.48		21.41		26.17		16.40		20.98	
	4 33.68		33.74		33.76		36.52		36.39 .42	
	4 33.65		33.71		33.73 = 33.697		36.49		36.36	
+.06 R.A.	4 33.63	36.37	4 33.74	36.48	4 33.76	36.50	4 36.46		4 36.41	
	+1.10		+1.08		+0.95		+1.85		+1.78	
	δ.R						40		40	
45			0 41.1	4 39.1	0 36.8		0 4.3		0 6.1	
			34.3	31.9	31.5		13.5		16.9	
			75.4	71.0	68.3		17.8		23.0	
			0 37.70	4 35.50	0 34.15		0 8.90		0 11.50	
	−17.43		+18.56		+16.46		+19.69		+22.27	
	1.24130		1.26858		1.21643		1.29425		1.34772	
	1.31177n		1.33905		1.28690n		1.36472		1.41819	
	−20.50		−21.83		−19.36		−23.16		−26.19	
			45 37.70		45 34.15		40 8.90		40 11.50	
			45 15.87		45 14.71		39 45.74		39 45.31	
		+25°	37′ 32.48″		37 33.56		43 2.61		43 3.64	
		+16°	41′ 31″	1.23720		+16°	40′ 53″	1.23700		
			−1229		−957		+912		−322	
			1.22491		1.22763		1.24632		1.23378	
			*− 16.78		*− 16.89		*− 17.62		*− 17.13	
			− .08		− .06		− .08		− .11	
			+ .01		− .01		+ .00		+ .01 .00	
			~~+ 16.71~~	−16.85	~~+ 16.82~~	−16.96	~~+ 17.54~~	−17.70	~~+ 17.02~~	−17.24
		~~+25~~	~~37 49.19~~		~~37 50.38~~		~~43 20.15~~		~~43 20.06~~	
		+25	37 15.63	37 15.57	37 16.60	37 16.54	42 44.91	42 44.90	42 45.80	42 45.78
			41 59.6		41 60.7		41 37.6		41 39.3	
			+4 44.0	43.9	+4 44.1	44.0	−1 7.3	7.3	−1 6.5	6.5
	−.00		− 20.62		− 21.72					
			− 3.40	− 3.40	− 4.50	− 4.50	+1.40	+ 1.40	−0.30	− 0.30
		+4	44.16 −.06	~~44.10~~	+4 43.88 −.06	~~43.82~~	−1 6.96 −.01	~~6.97~~	−1 5.52 −.02	~~5.54~~
		+4	39.75 +4	44.39	+4 39.38 +	44.16	−1 5.56 −1	6.78	−1 5.82 −	5.94
		+25	41 55.39 −	.31	41 55.98 −	.27	41 39.35 −	.53	41 39.98 −	.51
				+4 40.68		+4 39.39		−1 5.91		−1 6.75
			+25 41	56.25		41 55.73		41 38.99		41 39.03
			41	39.03		38.71				

1872	h	m	s	°	''	
June 9	14	4	35.08	41	58.3	
14					59.0	+.7
19					59.6	.6
24			34.89		60.3	.7
29			34.89		60.9	.6

Sch 109

h m s
14 05 00
2 05 15
100° 17
+ 79 37 54''
1873
June 12

1873 .277
June 15. – .28

4 8.6 3 57.8
10.9 58.9
13.0 59.6
17.6
20.0
22.3
24.6
26.9
31.5
33.6
35.9
244.9

22.264 3 58.77

5 25.9
26.9

5
46.3
59.0
6 11.4

4 22.25
4 37.96
–15.71
–15.65

+15.84 +.00
– .13 –.13
–1.50
+14.21
22.25
36.46 = 36.4
36.43 = 36.460

4 36.46
+1.77

40
.0 8.1
20.0
38.1
0' 14.05''

30
1 11.9
26.0
37.9
1 18.95

+23.49
1.37088
1.44133$_n$
–27.63
40 14.05
39 46.42

43 1.93

– 14.57
1.22243

+ 16.69
– .12
+ .01 .00

+ 16.57 – 16.81
43 18.50
42 48.12 42 45.10
59.7
–1 5.4 5.4

– 0.70 – 0.70
–1 5.49 –.02 ~~5.51~~
–1 6.19 – 5.81
41 38.93 – .51
–1 7.02
41 38.08

4 Urs Min

h	m	s
14	9	23
14	09	23
+	78°	9'
+	78	08. 39"

δ = -35° 45 57"
-.58

tang δ = +4.76
5
x = -.075
Corr x = -.21 +.5"
1872α = 23.630 δ = 8' 55.70
1873α = 22.950 δ = 8 38.77

1873	m	s	
June 9	9	28.72	
14		28.33	-.39
19		27.93	.40
24		27.51	.42
29		27.06	.45
July 4		26.60	.46
9		26.12	.48

sin δ 9.99064
cos δ 9.31250
11571n
9.42821n

dα = -0.340
dδ = -16.92

'	"	
8	47.7	
	48.5	+8
	49.2	.7
	49.8	.6
	50.3	.5
	50.7	.4
	50.9	.2

June 13 1872
-.17 -.155

14 8 14.1
23.7
34.3
54.1
4.4
14.0
23.9
33.9
54.0
4.4
14.3
275.1
155.1
14.100

9 14.03
9 27.82
-13.79

+14.58 -.06
- .81 -.74
-4.19 -4.53
+9.589
9 14.03
9 23.61
23.40

R.A. 9 23.62 23.28
+1.20
15- A. R

1872 -.254
June 19 -.25

8 55.37 7 42.7
59.6 45.5
4.8 49.0
9.9 54.1
15.0
19.9
24.8
29.8
34.9
254.0
134.0
14.889 7 47.82

9 14.81
9 27.32
-12.51

+13.70 +.00
-1.19 -1.21
-3.69 -4.03
+8.820
14.81
23.63
23.42

9 23.61 23.27
13- +1.08
4 34.1
21.9
56.0
4' 28.00"
8
+27.07
1.43249 1.93987
0.86070n 1.36868n
-7.26n -23.34
19 28.00 19 28.00
19 20.74 19 4.66
+78° 3' 27.61" 43.69
-35° 45' 24" 1.61740n
-1229
1.60511n

+ 40.28
− .09
+ .09

− 40.28 +40.28
+78 3 47.33
+78 4 ~~7.89~~ 23.974 23.52
9 8.6
+~~6~~ ~~0.7~~ 4.46 4.42
+~~5~~ ~~1.2~~ 4.51 44.7
- 29.82
- 12.90 12.90
+4 44.16 -.45 ~~43.44~~
+4 31.26 +4 44.39
+78 8 55.23 +4 32.11
+78 8 55.63
38.71

1873 -.337
June 11 -.33

8 8 0.4
52.0 3.8
57.5 9.7
9 2.5
7.4
12.4
17.4
22.6
27.6
32.6
232.0
112.0
12.444 8 4.63

9 12.37
9 28.34
-15.97

+17.59 +.00
-1.57 -1.60
-5.39
+10.630
9 12.37
9 23.00
9 22.79

9 22.97
+1.78
10
3 46.1
59.1
105.2
3 52.60
-52.14 +67.81
1.83129
1.25950n
-1818
13 52.60
13 34.42
9 13.93
-35° 45' 19"
-1254
1.60486n

+ 40.26
− .50
+ .12 .50

− 40.76 +39.76
8 33.17
9 53.69 9 53.38
8 48.2
-1 5.5 5.8
-1 5.0 5.3
- 9.40 9.40
-1 5.86 -.31 ~~6.14~~
-1 15.26 -4 5.99
8 38.43 + -1 1.03
14.36
8 39.02

June 12 -.347
-.32

8 8 13.0
52.8 16.8
57.6 21.9
9 2.8
7.9
12.8
17.8
22.8
28.0
33.2
235.6
115.6
12.844 8 17.23

9 12.77
9 28.26
-15.49

+17.12 +.01
-1.52 -1.65
-5.31
+10.317
12.77
23.06
22.85

9 22.94
+1.98
10
3 44.1
55.9
100.0
3 50.00
+55.61
1.74515
1.17336n
-14.91
13 50.00
13 35.09
9 13.26
1.61740n
-322
1.61418n

+ 41.13
− .34
+ .11 .60

− 41.47 +40.79
8 31.79
9 54.05 53.75
8 48.4
-1 5.6 5.9
-1 5.1 5.4
- 9.60 9.60
-1 5.52 -.30 ~~5.82~~
-1 15.12 + 5.94
8 39.93 -1 1.03
14.51
8 39.24

June 15 -.277
-.28

8 8 15.5
53.7 18.8
58.6 24.7
9 3.8
8.6
13.5
18.5
23.6
28.8
33.7
242.8
122.8
13.644 8 19.67

9 13.57
9 28.02
-14.45

+15.84 +.00
-1.33 -1.32
-5.07
+9.445
13.57
23.01
22.80

9 23.02
+1.77
10.8
3 42.6
55.0
97.6
3 48.80
+53.97
1.73215
1.16036n
-1446
13 48.80
13 34.34
9 14.01
-1457
1.60283n

+ 40.07
− .32
+ .11.00

− 40.39 +39.75
8 33.62
9 53.76 53.46
8 48.7
-1 5.1 5.4
-1 4.6 4.9
- 9.90 9.90
-1 5.49 -.30 ~~5.79~~
-1 15.39 + 5.81
8 38.37 -1 1.02
14.69
8 38.77

June 16 -.377
-.37

8 7 57.6
54.9 56.9
59.7 8 2.2
9 4.5
9.7
14.6
19.5
24.4
29.6
34.7
257.6
137.6
14.622 7 56.90

9 14.55
9 27.947
-13.39

+15.33 +.08
-1.76 -1.79
-4.99
+8.58
14.55
23.13
22.92

9 23.13
+1.75
10
3 47.2
1.1
108.3
3 54.15
+77.72
1.89053
1.31874n
-2083
13 54.15
13 33.32
9 15.03
-1960
1.59780n

+ 39.61
− .66
+ .12.00

− 40.27 +38.95
8 34.76
9 53.98 53.67
8 48.8
-1 5.2 5.5
-1 4.7 5.0
- 10.00 10.00
-1 5.87 -.31 6.18
-1 15.87 + 6.09
8 38.11 -1 1.02
15.08
8 38.59

1872	h	m	s	'	"
June 9	14	9	28.34	8	67.0
14					67.9 +.9
19			27.55		68.6 .7
24					69.2 .6
29			26.68		69.6 .4

	June 17 −.350 −.37		June 25 −.324 −.32		June 26 −.406 −.40		1873 July 6 −.518 −.51
57.6	8	8 3.0	8	8 25.1	9	8 43.1	Ch J.
56.9	55.0	5.0	58.6	29.4	(59.0)	46.5	
2.2	9 0.1	10.1	9 3.5	35.7	(4.0)	49.4	
	4.9		8.5		9.0		
	9.9		13.4		14.2		
	14.6		18.7		19.1		
	19.8		23.6		23.9		
	24.8		28.6		29.1		
	29.6		33.4		34.4		
	34.9		38.4		39.0		
	1936		2267		2317		
	1336		1664		1717		
690	14.844	8 6.03	18.522	8 30.07	19.078	8 46.33	
	9 14.77		9 18.45		9 19.00		
	9 27.86		9 27.20		9 27.11		
	−13.09		− 8.75		− 8.11		
	+14.80 −.02		+10.46 +.01		+10.06 +.00		
−1.79	− 1.76	−1.66	−1.52	−1.54	−1.90	−1.93	
	−4.91		−4.25		−4.16		
	+ 8.7321		+4.678		+ ~~4.00~~ 3.97		
	14.77		18.45		19.00		
	22.40		23.14		23.00		
	22.69		22.93		22.79 = 22.824		
	9 22.98		9 23.13		9 22.97		
	+1.74		+1.68		+1.66		
	10		10		10		10
	3 45.8		3 41.0		3 20.8		3 20.7
	58.7		54.3		35.1		36.2
	104.5		95.3		55.9		56.9
	3 52.25		3 47.65		3 27.95		3 28.45
					+ ~~32.75~~	+32.75	
	+68.85		+48.45		− ~~27.25~~		
	1.83790		1.68529		~~1.43537~~n 1.51521		
	1.26611n		1.11350n		~~0.86358~~ 90342		
	−18.45		−12.99		+ ~~8.78~~		
	13 52.25		13 47.65		13 27.95		
	13 33.80		13 34.66		13 ~~36.73~~ 35.33		
	9 14.55		9 13.69		9 13.02		
	−14.79		−6.42		−13.47		
	1.60261n		1.61098n		1.60393n		
	+ 40.95		+ 40.83		+ 40.17		
	− .53		− .26		− .11		
	+ .12 .00		+ .00		+ .00		
				+4.057			
	− 40.58 +39.52		− 41.09 ~~+39.57~~		− 40.28 +40.06		
	8 33.97		8 32.66		8 31.34		
53.67	9 54.07	53.76	9 ~~53.26~~ 54.26	53.96	9 53.08	52.80	
	8 49.0		8 49.9		8 50.0		
	−1 5.1	5.4	−1 ~~3.4~~ 4.4	4.7	−1 3.1	3.4	
	−1 4.6	4.9	−1 3.9	4.2	−1 2.6	2.9	
10.00	−10.20	10.20	−11.10	11.10	−11.20	11.20	
~~6.18~~ 6.09	−1 5.83 −.31	~~6.14~~ 5.82	−1 3.87 −.30	~~4.17~~ 4.63	−1 3.52 −.28	~~3.80~~ 4.09	
1.01	−1 16.03 +	1.00	−1 14.97 +	.97	−1 14.72 +	.96	
15.08	8 38.04 −1	15.02	8 39.29 −1	14.76	8 38.36 −1	14.33	
38.59		8 38.74		8 39.20		8 38.47	

i Bootis

h	m	s
14	11	37
14	11	40
+	51°	57′
+	51	57 13
z = −9°	34′	25″
−.17		

Ang = +1.28 s
x = −025
Corr α =
α 1872 37.950 δ = 57′ 29.70″
α 1873 40.078 δ = 57 12.94

1873		m s	
June 9	11	42.29	−08
14		42.21	
19		42.12	−09
24		42.01	−11
29		41.90	−11

Sin δ 9.89624
cos δ 9.78983
11571n
9.90554n

dα = +2.128
dδ = −16.77

1873				
June 17	11	40.04	57	12.65
25		40.11		13.55
26		40.04		12.96

1872	1873		1872	m s	1872	
56	782		June 9	11 39.85	374	
	790	+8	14		382	+8
	798	8	19		390	8
	806	8	24		398	8
	813	7	29	39.46	405	7

	June 18 1872 −.17 −.155	June 19 1872 −.25 −.254	June 11 1873 −.33 −.337	June 12 −.32 −.347	June 15 −.28 −.277	June 16 1873 −.37 −.377
14	11 5.4 8.9 12.0 18.8 22.0 25.4 28.6 32.1 38.7 42.0 45.5	11 6.4 10 49.7 9.6 51.1 12.9 52.5 19.9 23.1 26.3 11 52.0 29.7 53.1 33.2 54.4 39.6 55.1 43.1 46.4	11 5.0 10 58.2 8.4 11 0.1 11.7 1.5 18.4 21.7 25.0 28.4 31.7 38.4 41.9 45.1	11 11 1.3 18.9 2.9 20.5 4.9 22.3 23.9 25.6 27.1 28.9 30.6 32.2	11 6.6 11 2.3 9.9 4.1 13.4 5.4 20.0 23.4 26.7 30.0 33.4 40.0 43.4 46.9	11 7.3 10 54.4 10.8 55.8 13.9 57.9 20.6 23.9 27.4 30.7 34.0 40.6 43.9 47.3
	279.4 25.400 11 25.38 11 39.78 −14.40	290.2 26.382 10 51.10 11 53.65 11 26.36 39.67 −13.31	275.7 25.064 10 59.93 11 25.04 42.26 −17.22	230.0 25.555 11 3.03 11 25.53 42.24 −16.71	293.7 26.700 11 3.93 11 26.68 42.19 −15.51	300.4 27.309 10 56.03 11 27.28 42.17 −14.89
R.A.	+14.58 −.06 − .22 −.20 −1.83 + 0.54 +12.53 49 11 25.38 11 37.91 11 37.87 40.03 +1.20 A.R.	+13.70 +.00 − .32 −.32 −1.72 + 0.65 +11.66 26.36 38.02 11 38.02 40.39 +1.08	+17.59 +.00 − .42 −.43 −2.18 +14.97 8 25.04 40.03 11 40.02 +1.78	+17.12 +.01 − .41 −.44 −2.16 +14.55 3 25.53 40.08 11 40.06 +1.78	+15.84 +.00 − .36 −.35 −2.11 +13.37 8 26.68 40.05 11 40.06 +1.77	+15.33 +.03 − .47 −.48 −2.09 +12.76 79 27.28 40.05 = 40.050 11 40.07 +1.75
30		25 0 36.8 4 45.1 25.9 36.0 62.7 81.1 0′ 31.35 4 40.55 +35.28 −27.27 1.54753 1.43569n 2.45307 1.34123 −28.38 +21.94 31.35 29 40.55 30 2.97 30 2.49 +51° 52 45.38 52 45.86 −9° 34′ 42″ 0.98764n −12.17 0.97543n + 9.45 − .33 + .01 − 9.77 + 9.13 +51 ~~52 35.61~~ + 51 52 34.51 52 54.46 57 34.0 + 4 44.5 44.5 − 26.07 − 9.30 ~~9.30~~ + 4 44.16 −.05 ~~44.11~~ + 4 34.86 − 9.30 + 51 57 29.37 + 4 44.39 + .18 + 4 35.27 + 51 57 29.73 12.96	20 4 45.9 58.8 104.7 4 52.35 +25.13 1.40019 1.30573n −20.22 24 52.35 24 32.13 58 16.22 −9° 34′ 21″ 0.98730n −12.30 0.97530n + 9.44 − .17 + .13 .00 − 9.61 + 9.27 ~~58 6.61~~ 58 25.99 58 25.10 57 18.6 −1 6.9 7.3 −5.70 ~~5.70~~ −1 5.86 −.39 ~~6.25~~ −1 11.56 − 5.70 57 13.93 −1 5.99 + .30 −1 11.39 57 13.71	20 4 44.1 57.4 101.5 4 50.75 +22.52 1.35257 1.25811n −18.12 24 50.75 24 32.63 58 15.72 −2.94 0.98436n + 9.65 − .13 + .14 .00 − 9.78 + 9.52 ~~58 5.94~~ 58 24.24 25.24 24.85 57 18.8 −1 5.4 6.4 6.8 − 5.90 ~~5.90~~ −1 5.52 −.39 ~~5.91~~ −1 11.42 − 5.90 57 13.82 − 5.94 + .30 −1 11.54 57 13.31	20 4 43.8 57.0 100.8 4 50.40 +22.77 1.35736 1.26290n −18.32 24 50.40 24 32.08 58 16.27 −14.40 0.97290n + 9.39 − .14 + .14 .00 − 9.53 + 9.25 58 6.74 58 25.52 25.13 57 19.2 −1 6.3 6.7 − 6.30 ~~6.30~~ −1 5.49 −.39 ~~5.88~~ −1 11.79 − 6.30 57 13.73 − 5.81 + .30 −1 11.81 57 13.32	20 4 50.4 4.7 115.1 4 57.55 +31.28 1.49527 1.20081n −25.71 24 57.55 24 32.38 58 15.97 −19.40 0.96790n + 9.29 − .26 + .15 .00 − 9.55 + 9.03 58 6.42 58 25.00 24.60 57 19.3 −1 5.7 6.1 − 6.40 − ~~6.40~~ 1 5.87 −.40 ~~6.24~~ 1 12.27 − 6.10 57 12.73 − 6.09 + .29 −1 12.20 57 12.40

14

10

1872
85 374
38.8
39.0 8
39.3 8
46 405 7

Gort
14h 18m 28s
18 .38
113° 11' "
+ 66 49 46
113 11 34
z = −70° 48' 48".6
− .94

tang δ = −2.34
x = +.038
cos α = +.18
α 1872 32.863
α 1873 37.700

sin δ 9.96349
cos δ 9.59484
.11571n
9.71055n

δ 49' ~~12.07~~ 29.65" ~~47.43~~ 30.95
49 45.2 14.48

dα +4.836
dδ +16.47

1873
June 17 18 38.01 10 10.33
25 37.86 14.24
26 37.96 12.17

~~1872~~
~~June~~

Wrong #?
June 18 1872 −.17 −.155

14 18 5.4
8.2
10.8
13.5
15.9
18.4
20.9
23.2
26.5
Rej.
142.8
16.867
18 15.90
− .36
10
I.R.
~~4 12.1~~
~~56.4~~
Obs.
Rm.

June 19 1872 −.25 .254

18 45.5 17 35.8
50.9 39.5
55.2 41.6
19 6.6
12.1
17.1
22.5
27.6
38.1
43.3
48.5
368.4
188.4
17.127 17 38.97
18 17.16
18 ~~17.20~~ 16
+13.69
+ .59
+1.63
18 31.93 89
~~36.75~~ 33.07
37.91
+1.08
4 12.1
56.9
12.80
4 54.50
14 4.50
98.16
1.99793
1.70248n
+50.40
14 4.50
~~13 14.10~~
13 54.90
113° 9' 53.45"
−70° 51' 50" [2.21558]
12.05
2.20383n
.08
+2 39.89
+ .08
+ 1.51
−2 ~~38.38~~ +2 41.56
+113 6 15.07
113 11 35.01
7.56
+4 44.16
+4 32.60
113 16 7.61 − 11.56
+4 44.89
+ 1.01
+4 33.84

June 5 1873 −.32 .325

18 ~~[illegible]~~ 17 35.5
4.2 37.2
6.7 38.5
9.0
11.9
14.2
16.8
19.6
22.2
24.5
129.2
14.356 17 37.07
18 14.39
18 ~~14.43~~ 39
+20.23
+ .76
+2.50
18 ~~36.40~~ 36
37.88
+1.82
10
3 37.9
54.8
92.7
3 46.35
+37.29
1.57159
1.28214n
+19.15
13 46.35
~~13 27.20~~
14 3.50
8 42.85
−70° 44' 48" 2.21309
−.332
~~2.21256n~~
2.20977n +.02
+2 42.09
+ .08
+ .27
−2 ~~41.73~~ +2 42.48
6 1.12
11 25.32 11 25.02
− 7.95
−1 6.32 −.30 ~~6.62~~
−1 14.27
10 11.05 − 7.95
−1 6.16
1.71
+ −1 12.40
113 10 12.62

June 11 −.33 −.337

18 17 59.4
6.4 18 1.6
9.3 4.4
11.9
14.5
17.0
19.9
22.5
25.1
27.9
164.8
17.200 18 1.80
18 17.24
18 ~~17.28~~ 24
+17.58
+ .79
+2.18
18 ~~36.25~~ 21
37.79
+1.78
10
3 45.1
02.2
107.3
13 53.65
+15.40
1.18752
0.89807n
+7.91
13 53.65
13 ~~45.74~~
14 1.56
8 46.69
−.1206
2.20103n
.07
+2 38.86
+ .00
+ .03
−2 ~~38.88~~ +2 38.98
6 7.91
11 25.77 25.46
− 8.55
−1 5.86 −.31 ~~6.17~~
−1 14.41
10 11.36 − 8.55
− 5.49
1.67
−1 12.87
10 12.59

June 15 −.28 −.277

18 18 0.1
9.2 1.4
11.7 3.5
14.2
16.8
19.4
22.0
24.5
27.3
29.7
174.8
19.422 18 1.67
18 19.46
18 ~~19.50~~ 46
+15.83
+ .65
+1.95
18 ~~36.63~~ 59
37.89
+1.77
10
3 48.8
0.2
104.0
13 52.00
~~18~~ 17.75
1.24920
0.95975n
+9.11
13 52.00
~~13 42.89~~
14 1.71
8 47.24
−.1424
2.19885n
.07
+2 38.07
+ .00
+ .06
−2 ~~38.08~~ +2 38.20
6 9.16
11 25.44 25.13
− 8.86
−1 5.49 −.31 ~~5.80~~
−1 14.35
10 11.09 − 8.86
5.81
1.66
+ −1 13.01
10 12.12

June 16 1873 −.37 .377

18 18 5.7
9.8
12.9
(15.0)
17.7
20.2
22.8
25.0
27.6
30.4
191.4
20.156 18 5.70
18 20.19
18 ~~20.23~~ 19
+15.35
+ .88
+1.89
18 ~~36.59~~ 55
38.31
+1.75
10
3 41.3
1.1
102.4
3 51.20
+14.46
1.16017
0.87072n
+7.42
13 51.20
~~13 43.78~~
13 58.62
8 59.73
−.1919
2.19390n
.08
+2 36.28
+ .00
+ .04
−2 ~~36.32~~ +2 36.40
6 23.41
11 26.13 25.82
− 8.92
−1 5.87 −.31 ~~6.18~~
−1 14.79
11 11.34 − 8.92
6.09
+ 1.64
−1 13.37
10 12.45

2460
~~6.40~~
6.24
6.40
6.09
.29
12.20
12.40

θ Bootis

14 20 47

14 20 52

+ 52° 27′

+ 52 26′ 18

g = -10° 3′ 30″

sin. g = -.17

tan δ = +1.30

x = -.025

cos x = − ~~02~~

α 1872 50.344 δ = 26 34.729

α 1873 52.388 δ = 26 17.91

1873	m	s	
June 9	20	54.66	
14		54.59	.07
19		54.50	.09
24		54.39	.11
29		54.28	.11
34		54.16	.12
		54.04	.12

sin δ 9.89908

cos δ 9.78510

11571n

9.90081n

dα = +2.043

dδ = -1681

1873		
25	82.5	
	83.4	+.9
	84.2	.8
	85.0	.8
	85.8	.8
	86.6	

	June 13 1872 -.17 -.155	1872 June 19 -.254 -.25	1873 June 5 -.325 -.32	June 10 -.305 -.27	June 12 -.347 -.32	June 15 -.277 -.28
14	20 17.6	20 18.6 20 5.4	20 – 20 7.2	20 16.6 20 9.0	20 20 11.9	20 18.9 20 13.3
	21.2	21.9 7.1	– 8.6	20.1 10.3	31.0 13.6	22.3 14.7
	24.4	25.3 9.0	– 11.4	23.4 11.8	32.9 15.2	25.5 16.5
	31.1	32.0	28.1	30.2	34.5	32.4
	34.6	35.3	31.5	33.7	36.2	35.7
	37.9	38.8 21 9.3	34.8	36.9	37.9	39.0
	41.5	42.1 10.8	38.0	40.2	39.5	42.5
	44.7	45.6 12.3	41.6	43.7	41.3	45.9
	51.5	52.4	~~48.8~~	50.5	42.8	52.6
	54.9	55.7	~~51.6~~	53.9	44.1	56.0
	58.2	59.1	~~54.9~~	57.1		59.4
	417.6	426.8		406.3	340.8	430.2
	37.964	38.800 20 7.17 21 10.80	34.800 20 8.73	36.936 20 10.37	37.867 20 13.57	39.109 20 14.83
	20 37.94	20 38.78	20 34.78	20 36.91	20 37.84	20 39.08
	20 52.23	20 52.12	20 54.68	54.63	54.60	54.56
	-14.29	-13.34	-19.90	-17.72	-16.76	-15.48
	(-.02) -14.31	-13.36	-19.92	-17.74	-16.78	-15.50
	+14.58 -.06	+13.69 +.00	+20.21 +.02	+18.00 +.01	+17.11 +.01	+15.83 +.00
	- .22 -.20	- .33 -.33	- .42 -.42	- .35 -.39	- .42 -.45	- .36 -.36
	-1.89 +0.15	-1.78 +0.26	-2.29	-2.24	-2.21	-2.17
	+12.47 3	+11.58	+17.50 2	+15.41 38	+14.48	+13.30
	20 37.94	38.78	34.78	36.41	37.84 6	39.08
	20 50.41	50.36	52.28	52.32	52.32	52.38
	20 50.39	50.34	52.26	52.30	52.30	52.36
R.A.	20 50.37 52.41	20 50.36 52.40	20 52.30	20 52.29	20 52.30	20 52.38
	+1.20	+1.08	+1.82	+1.78	+1.78	+1.77
0			55	55.8	55	55
	~~27.0 0 37.21~~ ~~18.8 27.9~~	27.0 0 37.2	0 43.5	0 43.0	0 41.5	0 40.2
		18.8 27.9	56.6	56.1	54.4	53.9
		45.8 65.1	100.1	99.1	95.9	94.1
		1 22.90 0 32.55	0 50.05	0 49.55	0 47.95	0 47.05
		+31.63 -32.00	+26.07	+26.57	+24.30	+24.28
		1.50010 1.50515n	1.41614	1.42439	1.38561	1.38525
		1.40091n 1.40596n	1.31695n	1.32520n	1.28642n	1.28606n
		-25.17 +28.46	-20.73	-21.15	-19.34	-19.32
		1 22.90 55 32.55	55 50.05	55 49.55	55 47.95	55 47.05
		0 57.73 55 58.01	55 29.30	55 28.40	55 28.61	55 27.73
	+52°	26′ 50.62″ 26 50.34	27 19.05	27 19.95	27 19.74	27 20.62
	-10°	8′ 47″ 1.01310n	-10° 8′ 24″ 1.00910n			
		-12.05	-3.32	-10.37	-2.66	-14.24
		1.00105n	~~1.00978n~~ 1.00578n	0.99813n	1.00644n	0.99486n
		+ 10.03	+ 10.13	+ 9.97	+ 10.15	+ 9.88
		- .26	- .18	- .18	- .16	- .16
		+ .03	+ .02	+ .02	+ .02	+ .02
		~~- 10.26~~ +9.80	~~- 10.29~~ +9.97	~~- 10.13~~ +9.81	~~- 10.31~~ +9.99	~~- 10.04~~ +9.72
	+52	~~26 40.36~~	~~27 8.76~~	~~27 9.82~~	~~27 9.43~~	~~27 10.58~~
	+52	27 0.42 22 0.28	27 29.02 27 28.96	27 29.76 29.70	27 29.73 29.67	27 30.34 30.28
		26 43.5	26 21.8	26 22.7	26 23.5	26 23.6
		+ 4 43.1 43.0	-1 7.2 7.3	-1 7.1 7.2	-1 6.6 6.7	-1 6.7 6.8
		- 25.61				
		- 8.80 - 8.80	-3.90 - 3.90	-4.80 - 4.80	-5.20 - 5.20	-5.70 - 5.70
		+4 44.16 -.14 ~~44.02~~	-1 6.32 -.06 ~~6.38~~	-1 6.07 -.06 ~~6.13~~	-1 5.52 -.06 ~~5.58~~	-1 5.49 -.06 ~~5.55~~
		+3 35.36 +4 44.39	-1 10.22 - 6.16	-1 10.87 - 6.51	-1 10.72 - 5.94	-1 11.19 - 5.81
	+52	25 35.78 + .18	26 17.80 + .30	26 18.89 + .30	26 19.01 + .30	26 19.15 + .30
		- .20 +4 35.77	- .20 37 -1 9.76	- .37 -1 11.01	- .37 -1 10.84	- .37 -1 11.21
	+52	25 35.58 26 36.05	26 17.60 26 19.20	26 18.52 26 18.69	26 18.64 26 18.83	26 18.78 26 19.01
		19.24	43			

1872

	h	m	s	'	"	
June 9	14	20	52.31	26	41.8	
14					42.7	+.9
19					43.5	.8
24					44.3	.8
29			51.92		45.1	.8

1872.0 α	1872.0 δ	1873.0 α	1873.0 δ
50.37	35.58	52.30	17.60 43
.36		29	18.52
		30	18.64
		.38	18.78
		.37	17.36
		.40	19.02
		.37	19.48
		41	19.71
		.36	18.21
50.365	35.58 +.40 35.98	52.353	18.57 +.74 19.31
.344	34.72 34.72	.388	17.91 17.91
+.021	~~+0.86~~ +1.26	−.035	~~+.68~~ +1.40

−277 −.28	June 16 −.377 −.37	June 25 −.324 −.32	June 26 −.406 −.40	June 29 −.472 −.47	July 6 −.518 −.51
13.3	20 19.4 20 9.5	20 24.1 20 14.0	20 24.6 20 18.0	20 26.3 20 13.1	20 32.9 20 25.0
14.7	22.8 10.8	27.5 15.4	27.8 19.6	29.5 14.6	36.3 26.0
16.5	26.2 11.8	30.9 17.3	31.3 21.3	33.0 16.0	39.6 27.5
	32.9	37.6	38.0	39.8	46.4
	36.3	41.0	41.4	43.1	49.8
	39.5	44.3	44.9	46.4	53.0
	43.0	47.8	48.2	49.8	56.4
	46.5	51.0	51.6	53.2	59.9
	53.3	57.9	58.3	59.9	21 6.6
	56.6	21 1.1	21 1.6	21 3.4	10.0
	21 0.0	4.6	5.0	6.8	13.5
	37.65	36.78	37.27	39.12	40.44
	43.65	48.78	49.27	51.12	58.44
14.83	39.682 20 10.70	44.345 20 15.57	44.791 20 19.63	46.473 20 14.57	53.127 20 26.17
	20 39.66	20 44.32	20 44.77	20 46.45	20 53.10
	34.54	54.35	54.33	54.26	54.09
	−14.88	−10.03	−9.56	−7.81	−0.99
	−14.90	−10.05	−9.58	−7.83	−1.01
	+15.32 +.03	+10.45 +.01	+10.06 +.00	+8.44 +.00	+1.61 +.02
−.36	−.48 −.49	−.42 −.42	−.52 −.52	−.61 −.61	−.66 −.67
	−2.15	−1.96	−1.94	−1.87	−1.70
	+12.69 71	+8.07 8	+7.60	+5.96	−0.75 4
	39.66	44.32	44.77	46.45	53.10
	52.35	52.39	52.37	52.41	52.35
	52.33	52.37	52.35	52.39	52.33 = 52.322
	20 52.37	20 52.40	20 52.37	20 52.41	20 52.36
	+1.75	+1.68	+1.66	+1.62	+1.57
	55	55	55	55	55
	0 44.1	0 43.9	0 40.5	0 44.1	0 39.7
	58.8	57.2	54.0	0.2	56.7
	102.9	101.1	94.5	104.3	96.4
	0 51.45	0 50.55	0 47.25	0 52.15	55 48.20
	+28.98	+28.78	+25.16	+31.90	+26.96
	1.46210	1.45909	1.40071	1.50379	1.43072
	1.36291n	1.35990n	1.30152n	1.40460n	1.33153n
	−23.06	−22.90	−20.03	−25.39	−21.46
	55 51.45	55 50.55	55 47.25	55 52.15	55 48.20
	55 28.39	55 27.65	55 27.22	55 26.76	55 26.74
	27 19.66	27 20.70	27 21.13	27 21.59	27 22.21
	−1919	−592	−1298	−2167	−1216
	0.98991n	1.00318n	0.99612n	0.98743n	0.99694n
	+ 9.77	+ 10.07	+ 9.91	+ 9.71	+ 9.93
	− .23	− .21	− .17	− .26	− .19
	+ .00	+ .00	+ .00	+ .00	+ .06 .01
72	− ~~10.00~~ +9.54	− ~~10.28~~ +9.86	− ~~10.08~~ +9.74	− ~~9.97~~ +9.45	− ~~10.11~~ +9.75
	27 9.96	27 10.42	27 11.05	27 11.62	27 12.10
30.28	27 29.50 29.43	27 30.56 30.49	27 30.87 30.81	27 31.04 30.97	27 31.96 31.90
	26 23.8	26 25.2	26 25.4	26 25.8	26 27.0
8	−1 5.7 5.8	−+1 5.4 5.5	−+1 5.5 5.6	−+1 5.2 5.3	−+1 5.0 5.1
5.70	− 5.90 − 5.90	− 7.30 − 7.30	− 7.50 − 7.50	− 7.90 − 7.90	− 9.10 − 9.10
~~5.55~~	−1 5.87 −.07 ~~5.94~~	−1 3.87 −.07 ~~3.94~~	−1 3.52 −.06 ~~3.58~~	−1 3.06 −.07 ~~3.13~~	−1 4.28 −.06 ~~4.34~~
5.81	−1 11.77 − 6.09	−1 11.17 − 4.63	−1 11.02 − 4.09	−1 10.96 − 3.64	−1 13.38 − 4.41
.30	26 17.73 + .29	26 19.39 + .28	26 19.85 + .28	26 20.08 + .27	26 18.58 + .26
11.21	−.37 −1 11.70	−.37 −1 11.75	−.37 −1 11.31	−.37 −1 11.37	−.37 −1 13.25
19.07	26 17.36 26 17.73	26 19.02 26 18.74	26 19.48 26 19.50	26 19.71 26 19.60	26 18.21 26 18.65

36 H. Cass

h	m	s
14	25	49
2	26	00
107	43'	''
+ 72	15	37
δ = -107	44'	23"
δ = -65°	21'	35"

sin z = -.91

tang δ = -3.12

x = +0.49

cos x =

α 1872 54.647 δ = 15 20.7 - 29 44 38.83

α 1873 0.190 δ = 15 37.29 = 44 22.71

1873	m	s					
May 30	25	56.41		sin δ	9.97886	15' 30.5"	
June 4		56.71	.30			29.8	-.7
June 9		57.03	.32	cos δ	9.48371	29.1	.7
14		57.37	.34		.11571n	28.3	.6
19		57.73	.36		9.59942n	28.1	.4
24		58.11	.38			27.8	.3
		58.50	.39	dα = +5.542		27.6	.2
				dδ = +16.12			

	1872 June 19 -.254 -.25	1873 June 5 -.325 -.32	June 9 -.287 -.29	June 15 -.277 -.28	June 25 -.324 -.32	June 26 -.406 -.40
14	25 24.3 — 24 48.6	25 — 25 3.7	25 — 24 39.2	25 — 24 55.9	25	25 — 25 5.6
	27.8 — 50.9	21.6 — 7.2	24.3 — 43.3	27.4 — 59.1	33.1	33.6 — 8.2
	31.2 — 53.9	25.1 — 9.5	27.7 — 48.0	30.9 — 25 1.2	36.4	37.0 — 11.9
	34.6	28.5	31.2	34.0	39.7	40.2
	37.9	31.7	34.4	37.4	43.1	43.5
	41.0	35.8	38.0	40.8	46.6	46.8
	44.7	39.4	41.2	44.2	50.2	50.1
	47.6	42.1	44.7	47.6	53.6	53.4
	51.5	45.4	47.4	51.0	57.0	57.2
		49.6	51.4	54.4	26 0.5	26 0.5
	340.6	319.2	340.6	367.7	420.3	422.3
	37.844 — 24 51.13	35.467 — 25 6.80	37.844 — 24 43.50	40.855 — 24 58.73	46.689	46.922 — 25 8.57
	25 ~~37.80~~	25 ~~35.42~~	25 ~~37.80~~	25 ~~40.81~~	25 ~~46.64~~	25 ~~46.87~~
	37.89	35.52	37.89	40.90	46.74	46.97
	25 52.34	25 51.46	57.02	57.42	58.17	58.24
	-14.45	-21.24	-19.13	-16.52	-11.43	-11.27
	+13.69 +.00	+20.21 +.02	+18.48 -.03	+15.83 +.00	+10.45 +.01	+10.06 +.00
	+ .78 — +.79	+ 1.00 — +1.01	+ .90 — +.89	+ .87 — +.86	+ 1.00 — +1.01	+ 1.25 — +1.27
	+ 2.31 — 7.85	+3.43	+3.17	+2.77	+2.02	+1.95
	+16.789	+24.647	+22.551	+19.476	+13.479	+13.268
	25 37.89	25 35.52	37.89	40.90	46.79	46.97
	25 54.67	26 0.17	0.44	0.37	0.21	0.23
R.A.	25 54.68 — 26 0.22	26 ~~0.20~~ 0.19	26 0.40	26 0.36	26 0.23	26 0.25
	+1.08	+1.82	+1.80	+1.77	+1.68	+1.66
40		35	35	35	35	35
	4 36.3	3 0.0	3 49.2	3 50.3	3 42.0	3 52.8
	21.9	14.2	3.3	5.9	57.6	9.1
	58.2	1.42	11.25	11.62	9.96	12.19
	4 29.10	3 7.10	3 56.25	3 58.10	3 49.80	4 0.95
				42.12		
	+46.71	+28.67	+54.34	+ ~~41.72~~	1	+38.35
	1.66941	1.45743	1.73512	1.62449		1.58377
	1.26883n	1.05685n	1.33454n	1.22391n		1.18319n
	+18.57	+11.40	+21.61	+14.74		+15.26
	44 29.10	38 7.10	38 56.25	38 58.10		39 0.95
	~~44 10.53~~	~~38 55.70~~	~~38 34.64~~	~~38 0.05~~		~~38 45.70~~
	44 47.67	38/9 18.50	38/9 17.86	38/9 14.84		39 16.20
107°	38' 0.68"	44/3 29.85	44/3 30.49	44/3 33.51		43 32.15

-65 19 57 2.09588n -65 20 35 2.09611n

1872 June 19	1873 June 5	June 9	June 15	June 25	June 26
-1193	-318	-319	-1407		-1273
2.08395n	~~2.09270n~~ 2.09293	2.09292n	2.08204n		2.08338n
+ .03	+ .01	+ .02	+ .03		+ .03
+ 2 1.32	+ 2 3.86	+ 2 3.86	+ 2 0.79		+ 2 1.16
+ .34	+ .13	+ .47	+ .28		+ .23
+ .09	+ .06 .09	+ .12	+ .00		+ .00
- 2 0.92 +2 1.78	-2 3.65 +2 4.09	-2 3.29 +2 4.47	-2 0.54 +2 1.10		-2 0.96 +2 1.42
+107 35 59.76	42 26.20	42 27.20	42 32.97		41 31.19
+107 40 2.46 — 40 2.01	45 33.94 — 45 33.61	45 34.96 — 34.64	45 34.61 — 34.29		45 33.57 — 33.25
44 50.6	44 30.3	44 30.9	44 31.6	44 32.2	44 32.3
+4 48.1 — 48.5	-1 3.6 — 3.9	-1 4.2 — 4.5	-1 3.0 — 3.3		-1 1.3 — 1.6
+ 27.92					
- 11.80 — 11.80	-7.60 — 7.60	-7.60 ~~-.37~~ — 7.60	-8.90 — 8.90		-9.60 — 9.60
+4 44.16 -.45 + 44.39	-1 6.32 -.33 — 6.16	-1 6.56 -.32 — 6.93	-1 5.49 ~~-.32~~ — ~~5.81~~		-1 3.52 -.32 — ~~3.84~~ 4.09
+4 32.36 + .98	-1 13.92 + — 1.65	-1 14.16 + — 1.68	-1 14.39 + — 1.61		-1 13.12 + — 3.51
107 44 34.82 +4 31.61	44 20.02 -1 12.11	44 20.80 -1 12.70	44 20.22 -1 13.10		44 20.43 -1 12.18
-1.06 44 33.62	-2.00 44 21.50	-2.00 44 21.94	-2.00 44 21.19		-2.00 44 21.07
44 33.76 — 17.50	18.02	18.80	18.22		18.45

1872	h	m	s	'	"	
June 9	2	25	51.66	15	10.4	
14					9.8	-.6
19			52.35		9.4	.4
24					9.1	.3
29			53.11		8.9	.2

1872.0

α	δ
s	"
54.68	33.76
54.647	38.83 +2.12
+.033	- 5.07
	+ 2.12
	- 2.95

1873.0

α	δ
0.19	18.02
.40	.80
36	.22
.23	.45
.25	.77
.22	
0.275	18.45 + 4.00
.190	22.71
+.085	- 4.26
	+ 4.00
	- .26

-.406
-.40
56
8.2
11.9

June 29 -.47 -.472

25 25 2.3
35.0 6.2
384 9.6
419
450
486
519
553
588
26 2,1

4370

8.57 48.555 25 6.03

25 ~~48.51~~
48.60
8.848
- 9.88

+ 8.44 +.00
+1.27 + 1.47 +1.47
+1.71
+11.62
48.60
0.22 = 0.273

26 022

+1.62

35
3 48.5
6.5
1140
3 57.00

+4252
1.62859
1.22801n
+16.91
38 57.00
~~38 40.09~~
39 13.91

43 34.44

-2141
2.07470n
+ .04
+1 5876
+ .29
+ .00

- ~~6 58.51~~ +1 59.09
1.42 ~~41 35.93~~
45 ~~34.53~~ 33.53 33.21
33.25 ~~44~~ 32.4
- 1 2.1 1.1 1.4
6

960 - 3.70 - 9.70
~~384~~ - 1 3.06 - 32 3.38
404
359 - 1 12.76 + 1.44
12.18 44 20.77 - 1 18.87
21.07 - 2.00 44 21.34
18.77

5 Urs. Min =

h	m	s	″
14	27	50	
14	27	49	
+ 76	76°	16′	
+ 76	76	15	36
z = −33		52	58
			4

Rνh = −.56

Tang δ = +4.091   Sin δ   9.98740
+4.089
x = −.064   cos δ   9.37549
11571n
Corr x = − .04   9.49120n

α 1872 27m 49.405s   δ 15′ 5″.254

δ 1873   49.194   δ 15 36.49

1873	α	δ ″	
May 30		15′.41.8	
4		43.0	1.2
June 9		44.0	1.0
14		45.0	1.0
19		45.8	.8
24		46.5	.7
29		47.1	.6

	1872 .155 June 13 −.17 −.15		1872 −.254 June 19 −.25		1873 −.173 May 31 −.19		June 5 −.325 −.32		June 9 −.287 −.29		June 10 −.305 −.27	
14	27 23.9		27 23.3	26 26.8	27	26 36.4	27	26 23.8	27	26 40.5	27	26 59.7
	28.2		32.4	29.8	16.4	39.2	18.0	31.2	20.1	44.2	20.5	27 2.2
	32.2		41.4	31.3	20.5	44.3	22.8	34.9	24.2	49.2	24.8	5.6
	36.4		49.6	34.4	24.9		27.4		28.7		29.2	
	41.2		58.2		29.0		31.4		32.8		33.3	
	45.4				33.6		35.7		36.8		37.8	
	49.8			28 15.5	38.1		40.0		41.7		41.7	
	53.9			24.2	42.0		44.5		45.8		46.2	
	58.7			33.4	46.6		49.0		49.9		50.6	
					58.9		53.0		54.4		54.9	
	369.7		204.9		302.0		321.8		334.4		339.0	
	41.077		40.980	26 30.57 28 24.37	33.555	26 40.97	35.755	~~26 29.87~~ 26 29.97	37.155	26 44.63	37.667	27 2.50
	27 40.01		27 40.92		27 33.49		27 35.69		27 37.09		27 37.60	
	27 40.01		27 40.92		27 33.49		27 35.69		27 37.09		27 37.60	
n tang δ	−.63		−1.04		−.71		−1.33		−1.17		−1.25	
ΔT+m =	+14.52		+13.69		+21.72		+20.23		+18.95		+18.01	
	+4.42		+4.09		+5.70		+5.41		+5.22		+5.19	
	27 49.48		27 49.48		27 48.75		27 49.12		27 49.15		27 49.17	

10	+1.20 R.R.	+1.08		+1.85	+1.82	+1.80	+1.79	
		10		5	5	5	5	
		2 32.8	1 48.1	1 48.8	1 52.0	1 47.8	1 41.1	
		19.9	35.0	55.9	2.3	57.0	50.8	
		52.7	83.1	104.7	114.3	104.8	91.9	
		2 26.35	1 41.55	1 52.35	1 57.15	1 52.40	1 45.95	
		+70.41		+52.58	+65.78	+52.52	+35.17	
		1.84763		1.72082	1.81809	1.72032	1.54617	
		1.33883n		1.21202n	1.30929n	1.21152n	1.03737n	
		−21.82		−16.30	−20.38	−16.28	−10.90	
		12 26.35		6 52.35	6 57.15	6 52.40	6 45.90	
		12 4.53		6 36.05	6 36.77	6 36.12	6 35.00	
	+76°	16 43.82″		16 12.30	16 11.58	16 12.23	16 13.35	
	−33° 52′ 41″	1.58710n	−33° 52′ 17″		1.58700n			
		−1193		+994	−318	−319	−1033	
		1.57517n		1.59704n 694n	1.58382n	1.58381n	1.57667n	
		+ 37.60		+ 39.53	+ 38.36	+ 38.35	+ 37.73	
		− .64		− .35	− 55	− .35	− .16	
		+ .05		+ ~~.04~~ .06	+ ~~.04~~ .06	+ .06	+ .05	
		− ~~38.19~~ + 37.01		− ~~39.82~~ + 39.24	− ~~38.85~~ + 37.87	− ~~38.64~~ + 38.06	− ~~37.84~~ + 37.62	
	+76	~~10 56.3~~		~~15 32.48~~	~~15 32.73~~	~~15 33.59~~	~~15 35.51~~	
	+76	11 20.83	11 20.59	16 51.54 · 16 51.40	16 49.45 · 16 49.30	16 50.29 · 16 50.15	16 50.97 · 16 50.83	
		16 4.4 −	11.90	15 42.0 − · 5.50	15 43.2 − · 6.70	15 44.0 − · 7.50	15 44.2 − · 7.70	
	+4	44.16 −24	~~43.98~~ 44.39 −1	6.96 −14 · ~~7.10~~ 6.78 −1	6.32 −15 · ~~6.14~~ 6.16 −1	6.56 −14 · ~~6.70~~ 6.73 −1	6.07 −14 · ~~6.24~~ 6.51	
		−11.90 +4		−5.50 −1	−6.70	−7.65	−7.70	
	+4	32.26 +	.60 −1	12.46 + · 1.03 −1	13.02 + · 1.01 −1	19.06 + · 1.00 −1	13.77 + · 1.00	
		16 63.09 +4	33.09	15 39.08 −1 · 11.25	15 36.43 −1 · 11.85	15 36.23 −1 · 13.23	15 37.20 −1 · 13.21	
			15 53.68	15 40.15	15 37.45	15 36.92	15 37.62	

21872 27 49.48 15 53.68
21873 49.84 15 37.53

1873 June 15 −.277 −.28		June 16 −.377 −.37		June 25 −.324 −.32		June 26 −.406 −.40		June 29 −.472 −.47		1873 July 6 −.518 −.51	
27	26 55.9	27	26 48.5	27	27 9.3	27	26 54.8	27	26 29.8	27	26 52.6
22.0	58.8	22.7	57.9	27.3	11.4	27.8	27 1.6	29.3	34.4	35.7	59.0
26.6	27 1.9	27.4	53.9	31.5	16.6	31.8	6.3	33.7	38.7	40.0	27 4.2
30.7		31.6	54.8	35.9		36.4		37.9		44.3	
35.3		35.9		40.0		40.8		42.3		48.4	
39.3		40.2		44.3		43.2		46.7		52.9	
43.8		44.8		48.9		49.4		51.8		57.4	
48.1		49.0		53.1		53.7		55.3		28 1.4	
52.6		53.4		57.5		58.1		59.7		6.1	
56.9		57.8		28 2.3		28 2.4		28 4.0		10.4	
3553		3628		3408		3436		3597		2969	
				400.8		403.6		419.7		476.9	
39.478	26 58.87	40.311	26 52.27	44.558	27 12.43	44.844	27 2.57	46.635	26 34.30	52.989	26 58.60
27 39.41		27 40.28		27 44.47		27 44.78		27 46.57		27 52.92	
27 39.41		27 40.25		27 44.47		27 44.78		27 46.57		27 52.92	
− 1.13		− 1.54		− 1.33		− 1.66		− 1.93		− 2.12	
+ 15.83		+ 15.35		+ 10.46		+ 10.06		+ 8.43		+ 1.62	
+ 4.88		+ 4.82		+ 4.19		+ 4.12		+ 3.80		+ 3.34	
27 49.23		27 49.24		27 49.41		27 49.06		27 49.17		27 49.08	

+1.77	+1.75	+1.68	+1.66	+1.62	+1.57
5	5	5	5	5	5
1 42.1	1 43.4	1 39.7	1 41.9	1 49.5	1 43.1
53.1	54.9	50.7	52.9	2.1	58.0
95.2	98.3	90.4	94.8	111.6	101.1
1 47.60	1 49.15	1 45.20	1 47.40	1 55.80	1 50.55
+ 40.61	+ 48.04	+ 32.10	+ 42.27	+ 72.33	+ 54.39
1.60863	1.68160	1.50651	1.62603	1.89096	1.73552
1.09983n	1.17280n	0.99771n	1.11723n	1.58216n	1.22672n
−12.58	−14.89	−9.95	−13.10	~~−38.21~~ 33.41	−16.85
6 47.60	6 49.15	6 45.20	6 47.40	6 55.80	6 50.55
6 35.02	6 34.26	6 35.25	6 34.30	6 33.39	6 33.70
16 13.33	16 14.09	16 13.10	16 14.05	16 14.96	16 14.65
−14.07	−18.99	−5.67	−12.73	−21.41	−11.97
1.57293n	1.56801n	1.58133n	1.57427n	1.56559n	1.57503n
+ 37.40	+ 36.99	+ 38.14	+ 37.52	+ 36.78	+ 37.59
− .21	− .30	− .14	− .23	− .67	− .37
+ .05	+ .00	+ .00	+ .00	+ .00	+ .02
− 37.61 + 37.19	− 37.29 + 36.69	− 38.28 + 38.00	− 37.75 + 37.29	− 37.45 + 36.11	− 37.94 + 37.24
15 35.72	15 36.80	15 34.82	15 36.30	15 37.51	15 36.71
16 50.52 16 50.38	16 50.78 16 50.64	16 51.10 16 50.96	16 51.34 16 51.20	16 51.07 16 50.92	16 51.89 16 51.75
15 45.2 − 8.70	15 40.4 − 8.90	15 46.6 − 10.10	15 46.8 − 10.30	15 47.2 − 10.70	15 47.4 − 10.90
−1 5.49 − .14 ~~5.13~~ 5.81	−1 5.87 − .14 ~~6.01~~ 6.09	−1 3.87 − .14 ~~4.01~~ 4.63	−1 3.52 − .14 ~~3.66~~ 4.09	−1 3.06 − .15 ~~3.21~~ 3.64	−1 4.28 − .14 ~~4.41~~ 4.91
− 8.70	− 8.90	− 10.10	− 10.30	− 10.70	− 10.90
−1 14.19 + .99	−1 14.77 + .98	−1 13.97 + .94	−1 13.82 + .92	−1 13.76 + .90	−1 15.18 + .87
15 36.33 − 1 13.52	15 36.01 − 1 14.01	15 37.13 − 1 13.79	15 37.52 − 1 13.47	15 37.31 − 1 13.44	15 36.71 − 1 14.44
15 36.86	15 34.63	15 37.17	15 37.73	15 37.48	15 37.31

33 Bootis.

tang δ = +1.00 1873 June 9 34 8.68 Sin δ 9.84911
x = −.022 14 8.62 6 cos δ 9.84986
Corr = −.02 −.09 19 8.55 7 1.1571n
24 8.48 7 9.96557n
29 8.40 8
α 1872 4.376 δ = 57′ 28.88″ dα = +2.233
α 1873 6.609 δ = 57′ 13.18″ dδ = −15.71

h m s
14 34 04
14 34 07
+ 44° 58″
+ 44 57 13
z = − 2 34 25
− .04

1873″ 1872 m s
56′ 75.9 June 9 34 6.18 | 34
76.8 +.9 14 | 35 +10
77.7 .9 19 | 36 .9
78.6 .9 24 | 36 .8
79.4 .8 29 5.90 | 37 .8
4 | 38 .6
9 | 38 .6
14 | 29 .4
July 19 5.52 | 39.6 .4

1872 ~~June 13~~ −.397 1873 June 9 −.287 −.29 June 29 −.472 −.47 July 6 −.518 −.51
July 1 −.40

14 33 46.5 33 42.2 33 34 2.1 33 — 33 41.5 33 49.8 33 43.0
49.4 43.3 (44.6) 3.2 — 43.4 52.5 44.8
52.4 44.4 46.0 4.4 — 55.6 46.3
58.2 47.6 54.7 34 1.4
1.1 49.0 57.5 34 4.3
4.1 ~~4.0~~ 50.4 34 0.5 7.2
Transit 6.9 51.9 3.4 10.0
Ref. 9.9 53.4 6.2 13.0
15.6 54.9 ~~12.0~~ 19.0
18.6 56.7 ~~15.0~~ 21.7
21.5 ~~17.8~~ 24.1
284.2 454.4 259.2
44.2 79.2
4.01 33 43.30 50.489 34 3.23 0.46 33 42.45 7.20 33 44.70

34 4.00 33 50.47 34 0.24 34 7.18
34 8.66 8.38 8.24
− 18.19 − 7.94 − 1.06

+2.21 −.02 +18.48 −.03 +8.43 +.00 +1.60 +.02
− .40 −.40 − .29 .29 − .47 −.47 − .51 −.52
− 2.05 − 2.05 − 1.77 − 1.63
+16.14 +6.19 − 0.54
33 50.47 0.44 7.18
34 6.61 6.63 6.64 = 6.627
34 6.59 6.61 6.62 = 6.607

R.A. 34 6.58 8.81 34 6.63 34 6.65
+0.89 +1.80 +1.62 +1.57
30 20 20 20
0 20.1 4 12.8 4 38.1 4 40.9
14.0 22.4 52.1 55.1
34.1 35.2 90.2 96.0
0′ 17.05 4 17.60 4 45.10 4 48.00

+20.72 −12.74 +18.01 +22.50
1.31639 1.10517n 1.25551 1.35218
1.28196n 1.07074n 1.22108n 1.31775n
−19.14 +11.77 −16.64 −20.78
30 17.05 24 17.60 24 45.10 24 48.00
29 57.91 24 29.37 24 28.46 24 27.22
+44 52 50.44
+44 52 50.44 58 18.98 58 19.89 58 21.13

−2° 34′ 47″ 0.41410n −2° 34′ 24″ 0.41300
−2851 −299 −2089 −1159
0.38559n 0.41111n 1.39211n 0.40141n
001
+ 2.43 + 2.57 + 2.46 + 2.52
− .12 − .05 − .09 − .13
− .00 + .13 + .00 + .05

− 2.55 +2.31 − 2.49 +2.65 − 2.55 +2.37 − 2.60 +2.44
+44 52 47.89 58 16.49 58 17.34 58 18.53
+44 52 52.75 52 52.72 58 21.63 58 21.29 58 22.26 21.88 58 23.57 23.19
56 38.0 57 15.9 57 19.4 57 20.5
+34 46.3 45.3 −1 5.7 6.0 −1 2.9 3.3 −1 3.1 3.5
+13 44.4 44.4 −1 6.6 6.9 −1 3.8 4.2 −1 4.0 4.4
−0.9 25.81
+ ~~50.90~~ −10.10 10.10 − 2.70 − 2.70 − 6.20 − 6.20 − 7.30 − 7.30
+4 45.90 +4 .03 ~~45.8~~ 45.21 −1 6.56 −.34 ~~6.90~~ 6.73 −1 3.06 −.38 ~~3.44~~ 3.64 −1 4.28 −.38 ~~4.66~~ 4.41
+4 35.80 + .03 −1 9.26 + .07 −1 9.26 + .06 −1 11.58 + .06
+44 57 28.55 +4 35.14 57 12.37 −1 9.36 57 13.50 −1 9.78 57 11.99 −1 11.65
44 57 27.86 57 11.93 57 12.10 57 11.54
12.15

Gr. 537 – 3 = F1   Tang δ = – 2.388   Sin δ 9.96498

k = +.038   cos δ 9.58678

11 57' n

9.70249n

α1873 33 ~~58~~ 58.83

dα = +5054   42 60.12 59.88

dδ = +15.66

h m s

14 33 50

2 33 56

112° 43'

+ 67 16 58"

112° 43' 2"

δ = –70° 20' 14"

–7.94

	1873 June 5 –.325 –.32		June 15 –.277 –.28		June 25 –.324 –.32		1873 June 26 –.406 –.40	
14	33	32 38.5	33	33 5.1	33	33 9.7	33	33 10.6
	21.5	40.1	26.9	8.8	32.5	11.8	32.8	12.0
	24.3	42.3	25.3	11.3	34.8	14.5	35.2	13.0
	26.7		31.9		37.9		38.0	
	29.4		34.6		40.0		40.5	
	32.1		37.2		43.0		43.4	
	34.7		39.8		45.6		46.0	
	37.5		42.4		48.3		48.6	
	40.1		45.2		50.8		51.3	
	43.5		47.9		53.6		53.8	
	2898	1	3352		3865		3896	
	33 32.200	32 40.30	33 37.244	33 8.40	42.944	33 12.00	43.289	33 11.87
	33 32.24		33 37.28		33 42.98		33 43.33	
	+20.23		+15.83	+.77	+10.46		+10.06	
	+.78		+.66		+.77		+.97	
	+2.65		+2.12		+1.52		+1.46	
	33 55.90		33 55.89		33 55.73		33 55.81	

	+1.82	+1.77	+1.68	+1.66
	40 0 43.0	40 0 46.4	40 0 49.3	40 0 46.0
	59.7	4.0	7.2	64.2
	102.7	110.4	116.5	110.2
	0 51.35	0 55.20	0 58.25	0 55.10
	+51.90	+28.84	+30.94	+31.42
	1.71517	1.46000	1.49052	1.49721
	1.41766n	1.16249n	1.19301n	1.19970n
	+26.16	+14.54	+15.60	+15.84
	40 51.35	40 55.20	40 58.25	40 55.10
	40 25.19	40 40.66	40 42.65	40 39.26
	41 17.51	41 9.74	41 13.85	41 10.94
+112°	41 30.84	41 38.61	41 34.50	41 37.41
–70° 17' 35"	2.20286n			
	–304	–1391	–542	–1248
	2.19931n	2.18844n	2.19693n	2.18987n
	+ .01	+ .06	+ .05	+ .07
	+2 38.23	+2 34.33	+2 37.37	+2 34.84
	+ .13	+ .16	+ .19	+ .19
	+ .03	+ .00	+ 00	+ .00
	~~–2 38.08~~ +2 38.40	~~–2 34.23~~ +2 34.55	~~–2 37.23~~ +2 37.61	~~–2 34.72~~ +2 35.10
+112	~~38 52.76~~	~~39 4.38~~	~~38 57.27~~	~~39 2.69~~
+112	44 9.24 44 9.18	44 13.16 13.09	44 12.11 12.03	44 12.54 51 12.44
	+ 6.86	+ 7.95	+ 8.61	+ 8.66
	–1 6.32 –.06 ~~6.38~~	–1 5.49 –.07 ~~5.56~~	–1 3.87 –.08 ~~3.95~~	–1 3.52 –.07 ~~3.59~~
	–0 59.46	–0 57.54	–0 55.26	–0 54.66
+112	43 9.78	43 15.62	43 16.85	43 17.85
	+ – 6.86	+ 7.95	± 8.61	+ 8.66
	– 1 6.16	– 5.81	– 4.63	– 4.09
	+ 1.71	+ 1.66	+ 1.57	+ 1.56
	–1 ~~57.59~~ 11.31	–01 ~~56.20~~ 12.10	–1 ~~54.45~~ 11.67	1 ~~53.97~~ 11.19
	42 ~~17.57~~ 57.57	42 16.89 60.49	42 17.58 60.36	42 18.47 61.25

h m s

2 33 57

° ' "

67 16 86

ω
Q Virginis

h	m	s	
14	36	18	
14	36	22	
–	5	06	11
–	5	06	17

δ = + 47° 29′ 5″
+ 74
1872.94
June 11 – .20

tan δ = –.09
x = –.016
Corr =
α 1872 18.975 δ = 6 0.801
α 1873 22.130 δ = 6 16.70

1873	m	s	
Jan 9	36	23.65	
14		23.64	.01
19		23.62	.02
24		23.60	.02
29		23.57	.03
July 4		23.52	.05
9		23.46	.06
14			

sin δ 8.94887n
cos δ 9.99828
.11571n
.11399n

dα = +3.156
dδ = –15.90

1873 δ	
6 25.3	
25.1	– .2
24.8	.3
24.6	.2
24.3+	.3
24.0	.3
23.8	.2
23.5	.3
–.305 23.2	.3

1872 –.155
June 13

1873
June 5, – .32 –.325
15

June 9 – .29 –.287

June 10 –.305

June 11 – .33 –.337

14 36.2 54.2 36 40.2
56.2 44.4
58.2
2.4
4.5
6.4
8.5
10.7
14.7
16.8
18.8
25 1.4
71.4
37? 6.491 36 42.30

37 6.48
37 20.33
–13.85

June 5:
35 67.0 35 39.9
53.0 41.4
55.1 42.8
59.1
36 1.3
3.4
5.4
7.4
11.8
13.8
15.8
27.1
37.1
3.373
36 3.373 35 41.37

36 3.36
36 23.65
–20.29

June 9:
35 52.8 35 44.1
54.8 45.2
57.0 46.4
36 1.0
3.1
5.2
7.2
9.4
13.5
15.4
17.6
23.0
54.0
6.182
36 5.182 35 45.23

36 5.17
36 23.65
–18.48

June 10:
~~35 53.8~~ ~~35 43.4~~
~~55.7~~ ~~44.6~~
~~57.9~~ ~~45.6~~
~~36 1.9~~
~~4.1~~
~~6.1~~
~~8.2~~
~~10.2~~

June 11:
35 53.8 35 43.4
55.7 44.6
57.9 45.6
36 1.9
4.1
6.1
8.2
10.3
14.4
16.6
18.6
24.6
64.6
6.145
36 6.145 35 44.53

36 6.13
36 23.65
–17.52

+ 13.93 +.02 2
+ .02 +.01
– 1.36 + 1.80
+ 12.59
37 6.48
37 19.07

R.A. 36 19.07 22.23

+1.21

30

3 10.3
6.3
16.6
3 8.30

+ 24.19
1.38364
1.49763n
–31.45
33 8.30
32 36.85

–5° 9′ 48.50″

+47° 28′ 52″ 1.79740
–1494
1.78246

– 1 0.60
+ .03
+ .06

~~+ 1 0.69~~ – 1 0.51
~~–5 8 47.81~~
– 5 10 49.01 10 49.32
6 5.7
+ 4 43.3 43.0
– 11.00
+ 4.90 + 4.90
+ 4 45.21 – .31 ~~44.90~~
+ 4 50.11 + 4 45.02
– 5 5 58.90 – .89
+ 4 49.03
– 5 6 0.29
16.19

+ .03 +.03
+ 20.21 +.02
– 1.52
+18.724
36 3.36
36 22.08

36 22.10

+1.82

A.R.

25
2 25.5
40.1
66.6
2 33.30

+ 22.00
1.34242
1.45641n
–28.60
27 33.30
27 4.70

4 1.635

+47° 28′ 9″ 1.79710
–291
1.79449

– 1 2.26
+ .02
+ .07

~~+ 1 2.35~~ – 1 2.17
~~3 11.50~~
5 18.52 5 18.72
6 25.5
– 1 7.0 7.2

+ 8.80 + 8.80
– 1 6.32 – .20 ~~6.52~~
– 0 57.52 – 1 6.16
6 16.04 – 1.34
– 0 58.70
6 17.42

+ .03 +.03
+ 18.48 –.03
–1.52
+16.986
5.17
22.16

36 22.13

+1.80

25
2 27.0
32.9
59.9
27 29.95

+ 19.95
1.29994
1.41393n
–25.94
27 29.95
27 4.01

4 15.66

–278
1.79432

– 1 2.28
+ .02
+ .07

~~+ 1 2.37~~ – 1 2.19
~~3 13.29~~
5 17.85 18.05
6 25.3
– 1 7.5 7.7

+ 8.60 + 8.60
1 6.56 – .20 ~~6.76~~
– 0 57.96 – 6.73
6 15.81 – 1.53
– 0 59.46
6 17.51

+.03

+1.79

25
2 25.6
36.9
62.5
2 31.25

+ 0.3 +.03
+ 17.58 +.00
–1.52
16.09
6.13
22.22

36 22.22

+1.78

25
2 31.1
39.1
70.2
2 35.10

+ 21.61
1.33465
1.44864n
–28.10
27 35.10
27 7.00

4 18.65

–1134
1.78576

– 1 1.06
+ .02
+ .08

~~+ 1 1.08~~ – 1 1.04
~~3 17.57~~
5 19.69 19.90
6 25.2
– 1 5.5 5.7

+ 8.50 + 8.50
– 1 5.86 – .21 6.07
– 0 57.36 – 5.99
6 17.05 – 1.31
– 58.80
6 18.70

	h	m	s	°	′	″	
June 9	14	36	20.34	− 5	6	58	
17						55	+ .3
19						53	.2
24						50	.3
29			20.25			48	.2

	June 17 −.350 −.37		June 25 −.324 −.32		June 26 −.406 −.40		June 29 −.472 −.47		July 6 −.518 −.51		July 7 1873
	35 56.6	35 —	36 0.6	35 50.5	36 1.2	35 54.0	36 2.6	35 56.5	36 9.5	36 0.3	Lost
	58.6	—	2.8	51.8	3.3	55.4	4.9	57.5	11.5	1.4	
	36 0.6	36 —	4.9	53.0	5.3	56.7	6.9	58.3	13.5	2.7	
	4.7		8.9		9.4		11.0		17.7		
	6.8		11.0		11.4		13.0		20.0		
	8.9		13.0		13.5		15.0		22.0		
	10.9		15.3		15.6		17.1		24.0		
	13.0		17.3		17.6		19.2		26.0		
	17.0		21.5		21.8		23.3		30.2		
	19.3		23.3		23.9		25.4		32.1		
	21.3		25.4		25.9		27.5		34.3		
	217.7		144.0		148.9		165.9		240.8		
	9.7		~~13.091~~								
	8.882		13.091		13.536		15.082		21.891		
			36 13.091	35 51.77	36 13.536	35 55.37	36 15.082	35 57.43	36 21.891	36 1.47	
	36 8.87		36 13.08		36 13.52		36 15.07		36 21.88		
	36 23.63		36 23.59		23.59		23.57		23.50		
	− 14.76		− 10.51		− 10.07		− 8.50		− 1.62		
	+ .03	+.03	+ .03	+.03	+ .04	+.04	+ .04	+.04	+ .05	+.05	
	+ 14.79 −.02		+ 10.45 +.01		+ 10.07 +.00		+ 8.43 +.02		+ 1.60 +.02		
	− 1.50		− 1.46		− 1.46		− 1.44		− 1.37		
	+ 13.320		+ 9.023		+ 8.65		+ 7.03		+ 0.28 30		
	8.87		13.08		13.52		15.07		21.88		
	22.19		22.10		22.17		22.10		22.16		
R.A.	36 22.17		36 22.11		36 22.17		36 22.10		36 22.18		
	+ 1.74		+ 1.68		+ 1.66		+ 1.62		+ 1.57		
A.R.			25		25		25		25		25
			2 29.0		2 25.1		2 26.1		2 25.2		1 54.1
			38.1		35.5		36.9		35.9		3.9
			67.1		60.6		63.0		61.1		11.0
			2 33.55		2 30.30		2 31.50		2 30.55		1 59.00
			+ 21.32		+ 18.17		+ 17.65		+ 20.42		
			1.32879		1.25935		1.24674		1.31006		
			1.44278n		1.37334n		1.36073n		1.42405n		
			− 27.72		− 23.63		− 22.95		− 26.55		
			27 33.53		27 30.30		27 31.50		27 30.55		
			27 5.83		27 6.67		27 8.55		27 4.00		
			4 17.48		4 18.32		4 20.20		4 16.65		
			− 517		− 1223		− 2089		− 1159		
			1.79193		1.78487		1.77621		1.78551		
			⊼ 1 1.93		⊼ 1 0.94		⊼ 0 59.73		⊼ 1 1.04		
			+ .02		+ .01		+ .01		+ .02		
			+ .00		+ .00		+ .00		+ .02		
			~~+ 1 1.95~~ − 1	1.91	~~+ 1 0.95~~ − 1	0.93	~~+ 0 59.74~~ − 0	59.72	~~+ 1 1.08~~ − 1	1.00	
			~~3 16.43~~		~~3 17.37~~		~~3 20.46~~		~~3 15.57~~		
			5 19.39	19.60	5 19.25	19.45	5 19.92	20.12	5 17.65	17.85	
			6 24.5		6 24.5		6 24.3		6 23.9		
			− 1 5.1	5.3	− 1 6.3	5.5	− 1 4.4	4.6	− 1 6.3	6.5	
			+ 7.80 +	7.80	+ 7.80 +	7.80	+ 7.60 +	7.60	+ 7.20 +	7.20	
			− 1 3.87 − .21	~~4.08~~	− 1 3.52 − .20	~~3.72~~	− 1 3.076 − .20	~~3.26~~	− 1 4.28 − .20	~~4.48~~	
			− 0 56.07 −	4.63	− 0 55.72 −	4.09	− 0 55.46 −	3.64	− 0 57.08 −	4.41	
			6 15.46 −	1.24	6 14.97 −	1.22	6 15.38 −	1.19	6 14.73 −	1.16	
			−	58.01	−	57.51		57.23		58.37	
			6	17.67	6	16.96	6	17.35	6	16.22	

Sch. 853 = 17

h	m	s		
14	38	30		
14	38	30		
+	80°	11'	"	
+	80	12	26	
	−37°	50'	38"	
		49		

sin z = −.61

z = 1872

Reduction s
1 24.19
2 18.14
3 12.09
4 6.05
5 0.0

Tang δ = +5.890
+5.793

K = −.090

Sin δ 9.99362
cos δ 9.23098
11571n
9.34669n

June 11 −.20 −.144

sin η = −.61

June 13 1872 −.155

1872 July 1 −.397 −.40

1873 June 5 −.325

June 9 −.287

June 10 −.305
No Observation

14 38
44.1 45.0
49.7 50.7
55.9 56.9
2.0 2.0
7.9 8.9
14.3 15.8
20.1 21.0
26.3 27.3
32.7 33.7

253.0
73.0
37 8.111

37 8.02
+ 13.93
− 1.12
−* 6.40

37 14.43

36 48.7 37 0.8
7.3

36 48.70

36 54.7 37 41.0
0.5 44.2
7.0 5 2
13.3
19.1
24.8
30.9
37.0
43.6

230.9
170.9
18.989 37 42.60

37 18.90
+ 2.19
− 2.30
−* 4.42

37 19.37

36 — — — 55.2 37 7.7 14.1 20.5 26.6 —
13 18 20 24 24

36 56.5
58.3
0.5

37 1.98 36 58.43

37 1.89
+20.23
−1.88
−* 7.61

37 12.63

37 — — 51.1 57.6 38 3.6 9.2 15.1 — —

38 41.9

3.22 38 4.90

37 3.13
+18.45
−1.66
−* 9.29

37 12.63

15

+1.21

0 34.1 0 18.4
17.2 2.9
51.3 61.3
0' 25.65 0 10.65

+ 19.41
1.28803
0.63472n
−43.13
15 25.65 ~~35.0~~
15 21.37
+80° 8 7 27.01" ~~44.10~~
−37° 50' 24" 1.65030n
−1494
1.63536n

+ 43.19
− .03
+ .01

− ~~43.21~~ + 43.17
+80 7 ~~43.80~~
+80 ~~8~~ 8 ~~10.18~~ ~~27.8~~ 10.14
− 10.04
+ 4 45.21 −.04 ~~45.17~~
+4 35.17
+80 13 45.35
12

− 10.04
+4 45.02
.73
+4 35.71
12 45.85

h	m	s	h	m	s
14	37	23	37	20	
°	'	"	'	"	
+80	13	12	12	23	

D. R.

+0.89

0 17.5
4.2
21.7
0 10.85

+ 36.39 −23.61
1.56098
0.90767n
−80.8 +8.25
10.85 10.85
15 21.77 16.10
45.5
7 45.58 32.25

−2851
1.62179n

+ 41.86
− .18 8
+ .00

− ~~42.04~~ + 41.68
7 3.54
8 ~~27.28~~ ~~27.26~~ 4.01
34.10
− 13.21
+ 4 45.70 −.02 ~~41.88~~
+ 4 32.69
12 ~~59.95~~
26.72

13.21
+ 45.21
+ .54
+4 32.54
12 36.55

+1.82

5
4 46.3
58.2
104.5
9 52.25

+ 3.55
0.55023
9.89692n
−0.79
9 52.25
9 51.46
12 56.89

−37° 50' 2" 1.65020n
−291
1.64739n
2

+ 44.39
− .01
+ ~~.10~~ .15

− ~~44.25~~ + 44.53
12 12.64
13 41.42 13 41.03
− 6.14
−1 6.32 −.39 ~~6.44~~
−1 12.46
12 28.96

− 6.14
−1 6.16
+ 1.11
−1 11.19
12 29.84

+1.80

5
4 44.1
56.1
100.2
9 50.10

− 1.68
0.22531n
9.57200
+ 037
9 50.10
9 50.47
12 57.88

−278
1.64742n

+ 44.40
− .00
+ .14

− ~~44.26~~ + 44.54
12 ~~13.62~~
13 42.42 42.04
− 7.01
−1 6.56 −.38 ~~6.94~~
−1 13.54
12 28.85

− 7.01
− 6.73
+ 1.10
−1 12.64
12 27.40

5
4 37.3
48.9
86.2
9 43.10

     m   s
α 1872 37 14.200   12 45.85
  1873   12.681   12 29.38

June 11 – .337

36 — 36 46.07

46.0 4.1
52.1 4.2
58.3 4.4
37 4.0 4.1
9.8 3.7
16.3 4.2
21.7 3.6
28.6 4.5

4.09   36 46.70

37 4.00
+17.58
− 1.95
−* 7.12

37 12.51

+1.78

5
4 47.8
0.2
108.0
9 54.00

+17.39
1.24030
0.58699n
−386
9 54.00
9 50.14

12 58.21

−1134
1.63886n

+ 43.54
− .03
+ 10.00

− 43.57 + 43.51
12 14.64
13 41.72   13 41.33
− 7.42
−1 5.86 −.39   ~~6.25~~
−1 13.28
12 28.44

− 7.42
−1 5.99
+ 1.08
−1 12.33
12 29.00

June 17 – .350

36 — 36 46.6

48.3 6.4
54.9 7.0
37 0.8 6.9
6.4 6.4
12.7 6.6
18.7 6.6
24.9 6.8
30.9 6.8

6.69   36 46.60

37 6.60
+14.77
− 2.03
−* 6.58

37 12.76

+1.74

5
4 46.7
59.8
106.5
9 53.25

+20.09
1.30298
0.64967n
−446
9 53.25
9 48.79

12 59.56

−1449
1.63571n

+ 43.22
− .04
+ .15.00

− 43.26 + 43.18
12 16.30
13 42.74   42.35
− 8.53
−1 5.83 −.39   ~~6.22~~
−1 14.36
12 28.38

− 8.53
− 5.82
+ 1.06
−1 13.29
12 29.06

June 25 – .324

37 19.6
24.4
29.3

37 10.3 11.3
16.2 10.1
22.0 9.9
28.3 10.2
34.6 10.5

10.20   37 24.43

37 10.11
+10.46
− 1.87
−* 5.77

37 12.93

+1.68

5
4 39.9
52.8
92.7
9 46.35

−14.23
1.15320n
0.49989
+316
9 46.35
9 49.51

12 58.84

−517
1.64503n

+ 44.16
− .02
+ .00

− 44.18 + 44.14
12 14.66
13 42.98   13 42.60
− 9.76
−1 3.87 −.38   ~~4.25~~
−1 13.63
12 29.35

− 9.76
− 4.63
+ 1.02
−1 13.37
12 29.23

June 26 – .406

36 — 37 41.6
46.7
53.5

52.6 10.7
58.7 10.8
37 4.8 10.9
11.0 11.0
16.8 10.9
23.1 11.0
29.0 10.9
35.0 10.9

10.86   37 47.27

37 10.77
+10.06
− 2.35
−* 5.67

37 12.81

+1.66

5
4 35.0
47.9
82.9
9 41.45

−36.41
1.56122n
0.90791
+809
9 41.45
9 49.54

12 58.81

−1223
1.63797n

+ 43.45
− 12
+ .00

− 43.57 + 43.33
12 15.24
13 42.14   41.77
− 9.90
−1 3.52 −.37   ~~3.89~~
−1 13.42
12 28.72

− 9.90
− 4.09
+ 1.07
−1 12.98
12 28.79

June 29 – .472

37 — 36 58.9

0.4 12.5
6.2 12.3
12.6 12.6
18.3 12.1
24.4 12.3
30.5 12.4
36.7 12.6

12.40   36 58.90

37 12.31
+ 8.43
− 2.73
−* 5.35

37 12.66

+1.62

5
4 28.7
44.2
72.9
9 36.45
−46.50
~~+13.50~~
~~1.13033~~
~~0.47702n~~
~~−100~~
36.45
9 ~~33.45~~
46.45

13 1.60

−2089
1.62931n

+ 42.59
− 20
+ .00

− 42.79 + 42.39
12 18.81
13 43.99   43.62
− 10.27
−1 3.06 −.37   ~~3.43~~
−1 13.33
12 30.66

− 10.27
− 3.64
+ .98
− 1 12.93
12 30.69

July 6 – .518
1873

37 — 37 59.8
38 3.5
7.3

18.2 18.2
24.5 18.4
30.8 18.7
37.0 18.5
42.7 18.6

18.56   38 3.53

37 18.47
+1.62
− 3.00
−* 4.57

37 12.52

+1.57

5
4 29.9
45.9
75.8
9 37.90

−44.97
1.65292n
0.99961
+499
9 37.90
9 47.89

13 0.46

−1159
1.63861n

+ 43.51
− .19
+ .05

− 43.65 + 43.37
12 16.81
13 43.83   43.46
− 10.95
−1 4.28 −.37   ~~4.65~~
−1 15.23
12 28.60

− 10.95
− 4.41
+ .95
−1 14.41
12 29.05

α_2 Librae

N.A.

h	m		s	
14	4	3	47	
14	43		51	
	15 0		30′	″
—	15		30	144

δ = +57° 53′ 32″
+ ,85

tang δ = −.98
x = −.016
Corr =
α 1872 = 48.013 $\overset{s}{}$ 5′ 30 ~~4470~~ 2850
α 1873 = 51.320 30 ~~2840~~ 4410

43m
May 30 52.89 6
June 4 52.87
9 52.88 +1
14 52.87 −1
19 52.85 2
24 52.82 3
29 52.80 2
July 4 52.77 3
9 52.73 4

Sin δ 9.42735n
cos δ 9.98388
11571n
0.09959n

′ ″
30 54.8
54.8
54.8
54.7
54.7
54.6
54.6
54.5
54.3

1873
June 25 43 51.35 30 45.34
26 51.35 45.23
29 51.30 45.63
30 51.33 46.07
July 6 51.37 44.91
(a¹ Librae) 7 51.41 42.53
10 51.38 43.82
α₁

(α₁)

June 11 Sup. List ↑

1872 June 30 −.330 −.33

1872 July 1 −.397 −.40

1873 May 31 −.173 −.19

June 5 −.325 −.32

June 9 −.287 −.29

June 10

14 43 31.5 48 24.3 43 22.7
33.7 25.4 24.9
35.8 26.4 27.0
41.1 31.3
42.2 33.5
44.3 35.6
46.5 37.7
48.6 39.9
52.9 44.1
55.0 46.2
57.1 48.3
487.7 391.2

44.385 43 25.37 35.564

43 44.32 43 35.55
49.33 43 49.32
− 5.01 − 13.77

43 18.6 43 11.4 43 19.4 43 14.0 43 10.2 43 5.3
20.1 12.9 21.7 15.5 12.3 6.4
22.6 16.0 24.0 16.8 14.6 7.4
26.8 28.3 18.9
29.0 30.5 21.0
31.2 32.7 23.1
33.3 34.8 25.3
35.7 37.0 27.4
40.0 41.2 31.7
41.9 43.2 33.8
43.9 45.4 35.9
342.5 358.2 254.2

31.136 43 13.43 32.564 43 15.43 23.109 43 ~~14.4~~ 6.37

43 31.12 43 32.55 43 23.09
43 52.87 43 52.88 43 52.88
− 21.75 − 20.33 − 29.79

Gp. thread.

+ 4.84 −.02 +.09 + 21.9 −.02 +.11 + 21.79 −.07 +.05 + 20.21 +.02 +.09 + 18.48 −.03 +.08
+ .09 + .11 + .05 + .09 + .08
− 1.32 − 1.31 − 1.55 − 1.56 − 1.56
+ 3.61 59 + 0.99 97 + 20.29 2 + 18.74 6 + 17.00
43 44.32 35.55 31.12 32.55 23.09
43 47.93 36.54 43 51.41 51.29 39.43

R.A. 43 47.91 43 36.52 43 51.34 43 51.31 43 ~~39.90~~ 40.06

+ 0.92 + 0.89 + 1.85 + 1.82 + 1.80

A.K.

55

2 18.5 50 50 45 50
10.5 1 18.8 1 22.1 3 41.3 1 25.0
57 18.6 26.9 30.1 48.8 32.1
9.30 35.7 52.2 90.1 57.1
1 27.85 1 26.10 3 45.05 1 28.55

+ 18.96 + 17.71 + 17.13 + 16.74
1.27784 1.24822 1.23376 1.22376
1.37743n 1.34781n 1.33335n 1.32335n
− 2385 − 2227 − 21.55 − 21.05
57 9.30 ? 51 27.85 51 26.10 48 45.05
56 45.45 ? 50 58.58 ? 51 4.55 ? 48 24.00 ?

−15° 33′ 57.10″ 28 12.23 28 16.20 25 55.65

+57° 52′ 00″ 1.96100 +57° 52′ 8″ 1.96178
− 2756 + 1017 − 277 − 258
1.93344 1.97117 35 1.95841 1.95860

′ ″
∓1 25.79 ∓1 33.62 ∓1 30.87 ∓1 30.91
+ .05 + .04 + .04 + .04
− .02 + .03 .04 + .03 .04 + .11

~~+1 25.82~~ −1 25.76 ~~+1 33.70~~ −1 33.54 ~~+1 30.95~~ −1 30.79 ~~+1 31.06~~ −1 30.76
−15 ~~32 31.28~~ ~~26 38.53~~ ~~26 45.25~~ ~~24 24.59~~
−15 ~~35~~ 22.86 35 23.07 29 45.77 29 45.88 29 46.99 47.10 27 ~~24.41~~ 26.41 27 26.71
+4 45.20 −.21 ~~44.99~~ −1 6.96 −.11 ~~7.07~~ −1 6.32 −.11 ~~6.43~~ −1 6.56 −.30 ~~6.86~~
+ 7.90 + 10.70 + 10.70 + 10.70
+4 53.10 − 56.26 − 55.62 − 55.86
−15 30 29.76 30 42.08 30 42.61 28 22.27

+ 7.90 + 10.70 + 10.70 + 10.70
+4 45.04 −1 6.78 − 6.16 − 6.73
− .78 − 1.57 − 1.54 − 1.53
+4 52.16 − 57.65 − 57.00 − 56.56
−15 30 30.91 30 43.53 30 44.10 (28 23.27)

Special Note.

From this place and on the corrections for α will not be applied till after the values T−R.A. are found. That is the R.A. will be taken out directly and the corr. for α will be applied to T−R.A. The object of this order is to enable me to take out the reduction to the beginning of the year directly by subtracting the app. R.A. from the value of R.A. for the beginning of the year.

20

t π – R.A.1. The object of this order is to enable me to take out the reduction to the beginning of the year directly by subtracting the ~~app~~ R.A. from the value of R.A. for the beginning of the year.

47 Ceph. H. tan δ = ~~+~~.510 Reduction

x = +.079

corr α = +.20 +.14

ʰ	ᵐ	ˢ
14	49	18
2	49	18
7	~~49~~	6
	78	55
	101°	05′
+	78	54

101° 5′ 13″

ζ = –58° 42′ 25″

–.85

α 1872 10.532 δ = 54′ 31.69

α 1873 18.176 δ = 54 46.52

	′
1	21.45
2	16.1
3	10.7
4	5.4
5	0.0

1872

		′	″	
June	9	54	22.3	
	14		21.5	– .8
	19		20.8	.7
	24		20.3	.5
	29		19.8	.5
July	4		19.5	.3
	9		19.3	.2

1872

	m	s	
June 29	49	7.32	
July 4		7.80	.58
July 9		8.50	.60

1873

	m	s	
June 29	49	14.69	
July 4		15.27	.58
9		15.88	.61

June 9	49	12.59	
14		13.07	.48
19		13.58	.51
24		14.12	.54
29		14.69	.57
July 4		15.2~~8~~	.59
9		15.88	60

sin δ 9.99182

cos δ 9.28384

11.571ₙ

9.39955ₙ

dα = +7641

dδ = +14.83

1872 δ = 54′ 31.69″ = 5′ ~~28.9~~ 28.31

1873 δ = 54 46.52 = 5 ~~14.48~~ 13.48

1873

′	″	
54	37.3	
	37.0	– 3
	36.8	– 2
54	39.8	– 8
	39.0	.7
	38.3	.5
	37.8	.5
	37.3	.5
	37.0	.3
	36.8	.2

1872 –.155 June 13 –.17

1872 –.330 June 30 –.33

1872 –.397 July 1 –.40

1873 –.287 June 9 –.29

–.337 June 11 –.33

14 48 10.2 48 27.0 48 – 49 17.8 48 (42.3)

17.6
24.5
41.2
28.6 46.2
34.3 48.9
39.3 52.8
45.0 56.6
50.5 ~~4.6~~
55.6 4.4
1.4 8.8
6.4 12.4
11.4
2 72.5
4 52.5
48 50.278

40.9 0.6
55.4 0.8
0.9 0.9
6.2 0.8
11.5 0.8
16.9 0.8
22.4 1.0
49 0.814

47.6 37
52.6 33
58.0 34
3.5 35
9.2 35
14.1 34
19.3 32
24.9 35
49 3.475

48 48 50.0
50.9
55.1

~~418~~
418 525
47.7 531
53.0 530
58.0 526
49 3.5 528
8.5 524
14.2 528
48 52.743

48 (34.3)
37.6 537
43.0 537
48.6 540
53.4 534
59.3 539
49 4.1 534
9.6 535
15.1 537
53.662

49 7.3
8.6
10.2

48 50.278 48 27.00 49 0.814 49 17.80

48 52.743 48 52.00 48 53.662 49 8.70

48 ~~50.20~~
48 50.36
48 6.87
–15.21
–15.41

49 ~~0.74~~
0.89
49 7.40
–6.51
–6.71

49 ~~3.40~~
3.55
49 7.63
–3.98
–4.18

48 ~~52.66~~
52.82
49 12.57
–19.75
–19.95

48 ~~53.56~~
53.74
49 12.75
–19.01
–19.21

1873
June 17 49 17.95 5 9.88
July 5 18.33 10.65
7 18.47 10.04

+14.58 –.06
+ .87
+4.96
49 + 10.77
+1.20
A.R. 49 10.63

+.79
12.60 3.17
18.27

+ 48.93 –.02
+ 1.68
+3.13
~~A 10.50~~
.53
+1.21
49 10.81
3 34.3
24.0
58.3
3 29.15

8
+1.67
10.77
18.15

+2.18 .02
+2.04
+3.00
10.77
+1.89
49 10.72
18.37

+2.02

+18.487 –.03
+ 1.48
+5.61
49 18.38
+1.80
18.37 15 49 18.33
2 52.9
6.2
119.1
17 59.55

+1.46

+17.587 +.00
+ 1.68
+5.43
18.49
+1.78
15 49 18.45
2 52.3
8.6
120.9
3 0.45

+1.71

+23.28
1.36698
1.46657ₙ
–29.28

–16.99
1.23019ₙ
1.32978
–21.37
23 29.15
~~23 50.52~~
23 7.78

100
+ ~~78~~° 59′ 40.57″
–58 41 40

1.97496ₙ

–27.37
1.94758ₙ
.03
+
+ 1 28.63
+ .03
– .01 .03

~~–1 28.66~~ +1 28.66

~~+100 58 11.91~~
+101 0 9.23
″ 5 40.8
– + 1.4

Reject this out-make out.

+ 0.74
9.86923
9.96882ₙ
+0.93
17 59.55
~~17 58.62~~
18 0.48

– 15.04
1.17728ₙ
0.57680
8.77
18 0.45
~~18 19.37~~
17 58.68

4 47.87

4 51.67

–237
1.97258ₙ
.01
+ 1 33.88
+ .00
+ .09

–1086
1.96409ₙ
.01
+ 1 32.06
+ .02
+ .00

~~–1 33.80~~ +1 33.98
~~+101 3 14.07~~
6 21.85 6 21.61
5 23.2
~~–1 1.4~~ – ~~0 58.6~~
– ~~0 57.2~~ ~~58.8~~
– 1 0.0 0.2
9.70
– 9.70 – 6.73
– 1 6.56 –24 ~~6.80~~
– 1 16.26 +1 14.90 / 1.53
5 5.59 10 5 6.71

~~–1 32.05~~ +1 32.09
3 19.62
6 23.76 23.52
5 23.2
~~–0 59.4~~ –1 ~~0.6~~
~~–0 57.2~~ ~~0.8~~
– 1 2.0 2.2
– 9.70 – 9.70
– 1 5.86 –24 ~~6.10~~ / 5.99
– 1 15.56 +1 14.18 / 1.51
5 8.20 5 9.34

26.63 –
– 11.80 +4
+ 4 45.20 +
+ 4 33.40 +4
+ 101 4 42.63

11.80
45.04
.78
34.02
19.19

Gr, 2164

h	m	s
14	48	11
14	48	13

+ 59° 49′
+ 59 48 39

δ = −17° 25′ 51″
− 30

tang δ = +1.71
x = −.030
Corr α = +.70
− .03 −1.2″

α 1872 11.527 δ = 48 54.12
α 1873 13.044 δ = 48 39.40

1872	m	s		1873	m	s		1872	m	s	
June 9	48	12.22		June 9	48	15.85		June 9	48	14.02	
14		12.12	10	14		15.75	.10	14		13.91	.11
19		12.00	12	19		15.64	11	19		13.80	.11
24		11.87	13	24		15.52	12	24		13.67	.13
29		11.74	13	29		15.39	13	29		13.54	.13
July 4		11.60	14	July 4		15.25	14	July 4		40	.14
9		11.45	15	9		15.11	14	9		26	.14
14		11.29	16	14		14.95	16	14		09	.16
19		11.13	16	19		14.77	18	19		12.92	.18

dα = +1.516
dδ = −14.72

Ink. L. June 11

June 13, 1872 −.17 −.155

14 47 28.6
51.5 34.3
53.7 39.3
55.5 33.0
57.8 30.6
59.7 35.5
1.8 1.3
3.8 6.4
5.9 11.3
~~57.4~~
8.1
297.8
537.8
59.756

47 59.73
48 13.73
− 14.20
~~−14.30~~
− 14.17
+.03
+14.58 −.06
− .29
−2.40
+11.89 6
47 59.73
48 11.62

R.A. 48 11.59
+1.20
R.A.
35

June 30, 1872 −.330 −.33

48 1.1 48 14.3
3.2
5.2
7.2
9.3
11.3
13.3
15.4
17.4
83.4
9.267 48 14.30

48 9.24
48 13.51
− 4.27
~~− 4.37~~
− 4.24
+ 4.83 −.02
− .56
−1.98
+2.29 7
9.24
11.53
−.26
−0.88
−.56
− 0.46

13.11 48 11.51
+0.92

3 48.0
40.4
88.4
3′ 44.20″
− 5.03
0.70157n
0.51863
+ 330
38 44.20
38 47.50
+59° 44′ 0.85″
−17° 25′ 58″ 1.25710n
− 2737
1.22973n
+ 16.97
− .01
− .02 .04
− 27.02 +16.92
+59 43 33.83
+59 44 17.77 44 17.90
49 5.1
+4 47.3 46.9
+4 46.1 45.7
−12
− 25.72
− 11.00 — 11.00
+4 45.20 −.37 ~~44.83~~ 45.04
+4 34.20 +.4 .28
+59 48 51.97 +4 34.32
59 48 51.72
37.00

July 1, 1872 −.397 −.40

48 3.9 48 53.6
5.8 57.5
7.8 59.4
9.8
11.9
14.0
16.0
18.1
20.2
107.5
11.944 48 57.47

48 11.91
48 13.49
− 1.58
~~− 1.68~~
− 1.55
+2.18 −.02
− .68
−1.96
+0.48 8
11.91
11.45
−.68
− 0.44

13.03 48 11.43
+0.89

4 0.3
52.2
11 25
4 36.25
38 56.25
− 45.53 +14.47
1.65830n
1.47538
+ 2958 −9.50
38 56.25
38 ~~36.13~~ 46.75
44 1.60
− 2805
1.22905n
+ 16.95
− .05
− .04
− 17.04 +16.86
43 44.56
44 18.46 44 18.07
49 5.3
+4 46.8 46.4
+4 45.6 45.2
− 25.92
− 11.20 — 11.20
+4 45.90 −.39 45.21
+4 34.70 +.4 .27
48 53.16 +4 34.28
48 52.35
37.63

July 11, 1872 −.349 −.35

48 13.3 47 40.1
15.2 41.5
17.3 43.6
19.3
21.3
23.6
25.5
27.6
29.6
192.7
21.411 47 41.73

48 21.38
48 13.20
+ 8.18
~~+ 8.08~~
+ 8.21
+ 8.56 −.01
− .60
−1.67
−10.83 4
21.38
10.55
−.60
− 0.15

12.95 48 10.54
+0.77

4 13.8
8.2
22.0
4 11.00
+ 39.68
1.59867
1.41565n
− 2604
39 11.00
39 44.96
44 3.49
− 2380
1.23330n
+ 17.11
− .39
+ .34
− 17.16 +17.06
43 46.33
44 20.56 44 20.13
49 6.5
+4 46.0 45.6
+4 44.8 44.4
− 27.12
− 12.40 — 12.40
+4 44.89 −.42 ~~44.47~~ 44.51
+4 32.49 +.4 .23
48 53.04 +4 32.34
48 52.44
37.75

June 29, 1873 −.287 −.29

47 33.5 47 35.3
37.4 38.1
41.4 40.8
49.8
53.9
58.0
48 2.2
6.2
14.4
18.5
22.6
357.9
637.9
57.991 47 38.07

47 57.96
48 15.85
− 17.89
~~− 17.99~~
− 17.86
+18.47 −.03
− .50
−2.81
+15.16 4
57.96
49 13.12
−.49

12.06 (49) 13.10
+1.80

30
3 25.0
36.6
61.6
3 30.80
+ 19.92
1.29929
1.11637n
− 1307
33 30.50
33 17.73
49 30.62
−17° 25′ 35″ 1.25700n
− 237
1.25473 6n
+ 17.97
− .09
+ .10
− 17.96 +17.98
49 12.66
49 48.60 49 48.32
48 43.8
−1 4.8 5.1
−1 6.0 6.3
− 4.40 — 4.40
−1 6.56 −.28 ~~6.84~~ 6.73
−1 10.96 +.1 .54
48 37.64 −1 10.59
48 37.73

1873
° ′ ″
59 48 61.1
62.2 +1.1
63.2 1.0
64.1 .9
64.9 .8
65.6 .7
66.2 .6
66.7 .5
67.0 .3

Sin δ 9.93673
Cos δ 9.70137
11571n
9.81708n

June 9
14
19
24
29
July 4
9
14
19

1873 ″
48 43.7
44.8 +1.1
45.8 1.0
46.7 .9
47.5 .8
48.2 .7
48.8 .6
49.3 .5
49.7 .4

1873
June 11 −.337 −.33
47 —
—
—
50.5
54.7
58.0
48 3.0
7.0
~~15.0~~
~~19.2~~
~~23.4~~
47 42.5
43.6
45.5
47 58.820 47 43.87
47 58.79
48 15.81
−17.02
−~~17.12~~
17.09
+17.57 +.00
−.56 −.58
−2.77
+14.242
58.79
13.03
48 13.05
+1.78
30
3 20.0
33.4
53.4
3 26.70
+14.95
1.17464
0.99172n
−9.81
33 26.70
33 16.89
49 31.46
−1086
1.24614n
+ 17.62
− .05
+ .00
− 17.67 +17.57
49 13.79
49 49.03 49 48.76
48 44.2
−1 4.8 5.1
−1 6.0 6.3
−4.80 — 4.80
−1 5.86 −.27 6.13
−1 10.66 + 5.99
48 38.37 −1 .53
9.26
48 37.50

June 17 −.350 −.37
47
53.5
55.4
57.4
59.4
48 1.6
3.5
5.8
7.6
9.7
253.9
553.9
1.544
47 32.3
34.3
35.7
47 34.10
48 1.51
48 15.68
−14.17
−~~14.27~~
−14.24
+14.78 −.02
−.63 .60
−2.64
+11.512
1.51
13.02
48 13.03
+1.74
30
3 28.0
41.0
69.0
3 34.50
+27.44
1.43838
1.25546n
−1801
33 34.50
33 16.49
49 31.86
−1437
1.24263n
+ 17.48
− .17
+ .00
− 17.65 +17.31
49 14.21
49 49.17 48.88
48 45.4
−1 3.8 4.1
−1 5.0 5.3
−6.00 — 6.00
−1 5.83 −.29 6.12
−1 11.83 + 5.82
48 37.34 −1 .52
10.30
48 28.58

June 27 −.374 −.38
47
58.0
48 0.0
~~2.0~~
4.0
6.2
8.3
10.4
12.3
14.4
6.177
47 37.0
38.6
40.6
47 38.73
48 6.15
48 15.44
−9.29
−~~9.39~~
−9.36
+10.04 −.02
−.65 −.64
−2.40
+6.998
6.15
13.14
48 13.13
+1.65
30
3 27.1
41.4
68.5
3 34.25
+27.45
1.43854
1.25562n
−1801
33 34.25
33 16.24
49 32.11
+17.39
− .20
+ .00
+17.19
49 49.30 49.01
48 47.2
−1 2.1 2.4
−1 3.3 3.6
−7.80 — 7.80
−1 3.96 −.29 ~~4.25~~
1 11.76 + 4.19
48 37.54 −1 .49
11.41
48 37.60

June 30 −.537 −.55
47 44.0
48.0
52.3
48 0.3
4.5
8.6
12.7
16.8
24.9
29.1
33.1
274.3
94.3
8.573
47 31.9
33.5
35.0
38.5
47 33.97
48 8.54
48 15.38
−6.79
+7.75 −.01
−.94 −.92
−2.32
+4.4950
48.54
13.03
48 13.04
+1.61
30
3 30.1
45.1
75.2
3 37.60
+34.60
1.53908
1.35616n
−2270
33 37.60
33 14.90
49 33.45
−1770
1.23930n
+ 17.35
− .30
+ .00 .04
− 17.61 +17.09
49 15.84
49 50.54 50.25
48 47.7
−1 2.8 3.1
−1 4.0 4.3
−8.30 — 8.30
−1 3.985 −.29 4.24
1 12.25 + 4.15
48 38.29 −1 .48
12.07
48 38.18

July 5 +.530 −.55
48
5.3
7.2
9.3
11.4
13.2
15.1
17.4
19.7
21.6
120.2
13.355
47 43.7
45.2
47.0
47 45.30
48 13.33
48 15.22
−1.89
−~~1.99~~
−1.86
+3.08 −.32
−.94 −.98
−2.18
−0.4433
13.33
13.29
48 13.00
+1.57
30
3 25.9
41.3
67.2
3 33.60
+28.05
1.44793
1.26501n
−1841
33 33.60
33 15.19
49 33.16
−1973
1.23727n
+ 17.27
− .18
+ .04
− 17.41 +17.13
49 15.75
49 50.29 50.01
48 48.4
−1 1.9 2.2
−1 3.1 3.4
−9.00 — 9.00
−1 4.22 −.28 ~~4.50~~
−1 13.22 + 4.13
48 37.07 −1 .47
12.68
48 37.33

July 6 −.518 −.51
48
6.2
8.4
10.4
12.4
14.3
16.6
18.7
20.6
22.0
129.6
14.400
47 37.6
39.2
40.2
47 39.00
48 14.37
48 15.19
−0.82
−~~0.92~~
−0.89
+1.59 +.02
−.89 −.88
−2.15
−1.432
14.37
12.94
48 12.945
+1.57
30
3 30.9
46.9
77.8
3 38.90
+35.00
1.54407
1.36115n
−2297
33 38.90
33 15.93
49 32.42
−1121
1.24579n
+ 17.61
− .30
+ .04
− 17.87 +17.35
49 14.55
49 49.77 49.48
48 48.5
−1 1.8 1.6
−1 2.5 2.8
−9.10 — 9.10
−1 4.28 −.29 ~~4.57~~
−1 13.38 + 4.41
48 36.39 −1 .47
13.64
48 36.44

1873 α δ
July 7 48 12.91 48 37.45
13 13.03 37.26

74°

B Urs. Min.

h	m	s	
14	51	06	
14	51	06	
+	74°	41′	″
+	74	40	27

β = − 32° 17′ 39″

sin. z = −.53

Tang δ = +3.65

x = −.057

cona = +.08

α 1872 6.061 δ = 40 42.14

α 1873 5.813 δ = 40 27.38

dα = −0.248

dδ = −14.76

1872 m s 1873
June 29 9
July 4
July 9
14
19
24
29

1873	m	s	
May 30	51	11.19	
June 4		11.00	.19
9		10.78	.22
14		10.53	.25
19		10.26	.27
24		9.96	.30
29		9.65	.31
July 4		9.32	.33
9		8.98	.34

1872	m	s	
June 29	51	9.42	
July 4		9.09	.33
9		8.75	.34
14		8.39	.36
19		8.03	.36
24		7.65	.38
29		7.27	.38

Sub. L.
June 11 & 13 1872 −.330
June 30 −.33

14 50 50.4
54.2
58.1
2.9
5.9
9.9
13.9
17.6
21.5

234.4
54.4
6.044 50 39.95

50 35.9
38.2
41.5
44.2

51 5.99
51 9.34
− 3.35
− 3.40

+ 4.83 −.02
− 1.20 − 1.20
− 3.28 3.53
+ 0.353
51 5.99
51 6.34

R.A. 51 6.32 6.07

+0.42

45

2 25.8
17.5
43.3
2 21.65

+26.09
1.41647
0.95450n
−9.01
47 21.65
47. 12.64

+74° 35′ 35.71″

−32° 17′ 32″ 1.56080n

− 27.37
1.53343n

″
+ 34.15
− .09
− .02

− 34.26 +34.04
+74 35 1.45
+74 36 9.76 36 9.52
40 54.4
+4 44.6 44.4
− 27.06
− 12.30 − 12.30
+4 45.20 −.23 ~~44.77~~
+4 32.90 +4 45.04
+74 40 42.65 + .48
−.61 +4 33.22
+74 40 42.04 40 42.74
27.98

1872
July 1 −.397

50 53.2
57.0
0.8
4.6

50 6.4
11.8
14.2
16.3

2 36.0
26.7
62.7
2 31.35

1872
July 7 −.31 −.319

51 2.9
6.8
10.7
14.8
18.5
22.4
26.3
30.3
34.2

50 45.5
49.1
52.4

166.9
18.544 50 49.00

51 18.49
57 8.87
+9.62
+9.54

− 8.42 +.01
− 1.13 −1.16
− 2.81 3.06
− 12.388
18.49
6.13

51 6.11 5.85

+0.82

2 27.2
17.2
44.4
2 22.20

+29.54
1.47041
1.00844n
−10.20
47 22.20
47 12.00
365
35 36.35

− 17.22
1.54358n

+ 34.96
− .12
+ .19

− 34.89 +35.03
35 1.46
36 11.38 36 11.14
40 65.2
+4 43.8 43.6
27.86
− 13.10 − 13.10
+4 44.75 −.24 ~~44.51~~ +
+4. 31.65 + 44.40 +
40 43.03 + 43
−.61 +4 31.73
40 42.42 40 42.87
28.11

1872 −.349
July 11 −.35

51 2.1
5.9
9.7
13.7
17.7
21.4
25.4
29.3
33.2

50 8.2
12.3
15.5

158.4
17.600 50 12.00

51. 17.51
57 8.59
+8.95
+8.87

− 7.86 −.01
+ 1.28 −1.27
− 2.53 2.78
− 11.37
17.54
6.17

5.92 51 6.17

+0.77

2 37.5
29.0
66.5
2 33.25

+65.60
1.81690
1.35493n
−22.65
47 33.25
47 10.60
35 37.75

− 23.80
1.53700n

+ 34.44
− .60
+ .21

− 34.83 +34.05
35 2.92
36 11.80 36 11.55
40 55.9
+4 43.9 43.7
28.36
− 13.60 − 13.60
+4 44.89 −.25 ~~44.64~~ +
+4 31.29 + 44.51
40 43.09 + 40
−.61 +4 31.31
40 42.48 40 42.86
28.10

1872 −.260
July 24 −.27

50 56.6
0.7
4.4
8.4
12.3
16.3
20.0
23.5
28.0

50 28.5
34.0
38.3

170.2
110.2
12.244 50 33.60

51 12.19
51 7.63
+ 4.56
+ 4.48

− 3.49 −.02
− 11.99 −.95
− 1.57 1.82
− 6.053
12.19
6.14

51 6.16 5.91

+0.66

2 28.5
19.4
47.9
2 23.80

+38.64
1.58704
1.12507n
−13.34
47 23.85
47 10.51
35 37.84

− 18.33
1.54247n

+ 34.87
− .20
+ .24

− 34.63 +34.91
35 3.01
36 12.75 36 12.57
40 56.2
+4 43.6 43.3
28.86
− 14.10 − 14.10
+4 43.88 −.24 ~~43.64~~
+4 29.78 + 43.81
40 42.53 + .34
−.61 +4 30.05
40 41.92 40 42.56
27.80

1872
~~July 24~~

50 51
56.6
0.4
4.5
8.4
12.3
16.3
20.0
23.4
28.0

~~50~~ 28.5
34.0
38.3

+7

1872

°	′	″		
74	40	54.2		
		54.8	+.6	
		55.4	.6	
		55.8	.4	
		56.1	.3	
		56.2	.1	
		56.2	.0	
		56.0		
		55.6		

Sin δ 9.98426

Cos δ 9.42232

11571 n

9.53803 n

1873		α		δ
July 6	51	6.27	40	26.63
7		6.33		28.29
10		6.14		27.48
13		6.10		27.57

1873		1872.0 α	δ	1873.0 α	δ	′	1873 ″	
May	30					39	90.5	
June	4	6.32	42.04	5.77	23.87		91.7	+1.2
	9	.11	42.42	6.07	25.16		92.9	1.2
	14	.17	42.48	5.91	25.64		94.0	1.1
	19	.16	41.92	5.97	25.06		95.0	1.0
	24			5.94	25.15		95.8	.8
	29			6.00	25.53		96.6	.8
July	4			.27	24.92		97.2	.6
	9			.33	26.60		97.8	.6
				14	25.48			
				10	25.90			
		6.190	+.122 42.21 43.43	6.050	25.33 +2.34		27.67	
		.061	42.14 42.14	5.813	27.38		.38	
		+.129	+.07 1.29	+.237	−2.05		+.29	

see S. L.

1873 May 31 −.19 −.173	June 9 −.29 −.287	June 11 −.33 −.337	June 17 −.37 −.350	June 30 −.55 −.537	1873 July 5 −.55 −.530
50 34.5 38.4 42.4 46.0 51.3 53.8 57.5 57 2.0 5.8	50 38.0 42.1 45.9 50.2 53.5 57.6 51 1.5 5.3 9.2	50 39.0 (42.9) 46.9 50.6 54.4 58.5 51 2.2 6.0 10.0	50 41.7 45.7 49.6 53.2 57.0 51 0.0 4.9 8.9 12.8	50 48.5 52.2 56.3 51 0.1 4.0 7.9 11.8 15.6 19.4	50 53.0 56.9 0.8 4.7 8.6 12.7 16.5 20.3 24.4
49 57.0 50 4.9 13.6	50 21.0 23.4 27.0	50 17.6 22.1 25.3	50 12.3 16.0 20.1	49 37.5 40.3 44.2 51 24.5 28.0 31.1	50 34.1 36.7 40.8
330.7 450.7 50.078	303.3 483.3 53.100	310.5 490.5 54.50	273.8 513.8 57.089	215.8 35.8 3.978	197.9 77.9 8.656
50 5.17	50 23.80	50 21.67	50 16.13	49 40.67 51 27.87	50 37.20
50 50.02 51 11.15 −21.13 −21.21	50 53.64 51 10.77 −17.13 −17.21	50 54.45 51 10.68 −16.24 −16.32	50 57.03 51 10.36 −13.33 −13.41	51 3.92 51 9.57 −5.65 −5.73	51 8.60 51 9.24 −0.64 −0.72
+21.79 −.07 − .69 −.63 − 5.34 +15.76 5 50 50.02 51 5.78	+18.47 −.03 −1.06 −1.05 −4.96 +12.45 3 53.64 6.09	+17.57 +.00 −1.20 −1.23 −4.87 11.50 47 54.44 5.94	+14.78 −.02 −1.35 −1.27 −4.55 +8.88 94 57.03 5.91	+7.75 −.01 −2.01 −1.96 −3.76 +~~1.98~~ 2.02 3.92 5.90	+3.08 −.32 −2.01 −1.93 3.43 −2.36 60 8.60 6.24
51 5.77 +1.85	51 6.07 +1.80	51 5.91 +1.78	51 5.97 +1.74	51 5.94 +1.61	51 6.00 +1.57
40 1 57.7 13.3 131.0 3 ~~7.00~~ 42 5.50	40 1 51.8 0.8 112.6 1 56.30	40 1 50.1 3.0 113.1 1 56.55	40 1 52.3 4.1 116.4 1 58.20	40 2 4.0 19.0 23.0 2 11.50	40 1 45.9 0.1 106.0 1 53.00
+44.91 1.65234 1.19037n −15.50 42 5.50 41 50.00	+29.90 1.47567 1.01370n −10.32 41 56.30 41 45.98	+32.83 1.51627 1.05430n −11.33 41 56.55 41 45.22	+40.96 1.61236 1.15039n −14.14 41 58.20 41 44.06	+83.31 1.92070 1.45873n −28.76 42 11.50 41 42.74	+31.46 1.49776 1.03579n −10.86 41 53.00 41 42.14
40 58.35	41 2.37	41 3.13	41 4.29	41 5.61	41 6.21
−32° 17′ 8″ 1.56090n +1044 1.57134n	−237 1.55853n	−1086 1.55004n	−1437 1.54653n	−1770 1.54320n	−1913 1.54177n
+ 37.27 − .28 + .06	+ 36.18 − .12 + .06	+ 35.48 − .14 + .06	+ 35.20 − .23 + .06	+ 34.93 − .89 + ~~.00~~ .02	+ 34.82 − 13 + .02
+74 − 37.49 +37.05 40 25.86 41 ~~40.40~~ 35.40) 41 35.23 40 30.8 −1 4.6 4.8	− 36.24 +36.12 40 26.13 41 38.49 41 38.34 40 33.0 −1 5.5 5.7	− 35.62 +35.34 41 27.51 41 38.47 41 38.32 40 33.2 −1 5.3 5.4	− 35.43 +34.97 40 28.86 41 39.26 39.10 40 34.6 −1 4.7 4.9	− 35.80 +34.06 40 29.81 41 39.67 39.50 40 36.8 −1 2.9 3.1	− 34.93 +34.71 40 31.28 41 40.92 40.77 40 37.4 −1 3.5 3.6
− 3.40 − 3.40 −1 6.96 −.17 ~~7.13~~ −1 10.36 − 6.78 40 25.04 + .98 −1.17 −1 9.20 40 23.87 40 26.03	− 5.60 − 5.60 −1 6.56 −.15 ~~6.71~~ −1 12.16 − 6.73 40 26.33 + .95 −1.17 −1 11.38 40 25.16 40 26.96	− 5.80 − 5.80 −1 5.86 −.15 ~~6.01~~ −1 11.66 − 5.99 40 26.81 + .94 −1.17 −1 10.85 40 25.64 40 27.47	− 7.20 − 7.20 −1 5.83 −.16 ~~5.99~~ −1 13.03 − 5.82 40 26.23 + .92 −1.17 −1 12.10 40 25.06 40 27.00	− 9.40 − 9.40 −1 3.95 −.17 ~~4.12~~ 1 13.35 − 4.15 40 26.32 + .85 −1.17 −1 12.70 40 25.15 40 26.80	− 10.00 − 10.00 −1 4.22 −.15 ~~4.37~~ 1 14.22 − 4.15 40 26.70 + .83 −1.17 −1 13.32 40 25.53 40 27.45

28.5
34.0
38.2

2 Hev. Urs. Min.

h	m	s	
14	55	35	
14	55	34	
+	66°	26′	″
+	66	26	20

δ = −24° 3′ 32″
− ,41

tang δ = +2.29
x = −.038
Corr α = −.21 − 0.″4
α 1872 33.481 δ = 26 34.″26
α 1873 34.420 δ = 26 19.85
dα = +0.939
dδ = −14.39

1872	m	s	
June 29	55	35.94	
July 4		35.75	.19
9		35.55	.20
14		35.33	.22
19		35.10	.23

1873	m	s	
June 9	55	37.88	
14		37.73	.15
19		37.58	.15
24		37.41	.17
29		37.24	.17
July 4		37.04	.20
9		36.84	.20
14		36.62	.22
19		36.40	.22

June 11 ^

June 11 1872

	June 30 1872 −.330 −.33		July 6 1872 −.357 −.35		July 7 1872 −.319 −.31		July 9 1872 −.284 −.29		July 11 1872 −.349 −.35	
14	55 21.3	55 46.9	55 32.8	55 5.3	55 34.1	55 5.5	55 42.1 5	56 1.6	55 33.2	55 0.0
	23.7	48.9	35.4	9.8	36.6	8.2	~~44.6~~ 47.6 6	4.6	36.0	1.8
	26.3	50.7	38.0	11.5	39.2	9.7	50.3 7	6.5	38.6	4.4
	28.9		40.7		41.9		52.9 8		41.1	
	31.6		43.2		44.6		55.4 9		43.8	
	33.9		46.0 55		47.2		m.w.α foll		46.3	
	36.7		48.6		49.8		45.10		48.8	
	39.3		51.1		52.2		02		51.3	
	41.9		53.9		54.9		15		~~53.9~~	
							17		54.0	
							08			
							45.11	45.07		
	283.6		389.7		400.5		251.3		393.1	
	31.511	55 48.83	43.300	55 8.87	44.500	55 7.80	~~50.260~~ 45.11	56 111 4.23	43.678	55 2.07
	55 31.47		55 43.26		55 44.46		45.09 55 50.22		55 43.64	
	55 35.89		55 35.66		55 35.62		55 35.54		55 35.45	
	− 4.42		+7.60		+8.84		+14.68 9.56		+8.19	
	−4.21 − ~~4.63~~		+7.81 + ~~7.99~~		+9.05 + ~~8.63~~		~~+14.89~~ + ~~14.47~~ 9.76		+8.40 + ~~7.98~~	
	+4.82 −.02		−7.11 +.01		−8.43 +.01		−9.15 +.00		−~~7~~8.56 −.01	
	− .76	−.75	− .80	−.82	− .71	−.73	− .66	−.65	− .80	−.80
	− 2.41	− 1.47	−2.18	− 1.24	−2.14	− 1.20	− 2.06	− 1.12	− 1.97	− 1.03
	+1.65 4		−10.09 10		−11.28 9		−11.87 6		−10.33 4	
	31.47		43.26		44.46		45.07		43.64	
	55 33.12		33.19		33.18		33.20		33.31	
R.A.	55 33.11	34.05	55 33.16	34.10	55 33.17	34.11	55 33.21	34.15	55 33.30	34.24
	+0.92		+0.83		+0.82		+0.79		+0.77	
0										
	1 8.7		1 36.7		1 36.8		1 7.9		1 37.1	
	−0.3		26.1		26.2		57.2		28.1	
	9.0		62.8		63.0		12 51		65.2	
	1 4.50		1 31.40		1 31.50		1 ~~32.55~~ 1 2.55		1 32.60	
	− 17.32		+ 34.43		+ 36.70		− 13.97 19.12		+41.61	
	1.23855n		1.53694		1.56467		~~1.14520n~~ 1.28149		1.61920	
	0.95612		1.25451n		1.28224n		0.86177		1.33677n	
	+9.04		−17.97		−19.15		+~~6.69~~ 7.78		−21.72	
	1 4.50		1 31.40		1 31.50		1 2.55		1 32.60	
	1 13.54		1 13.43		1 12.35		1 12.58		1 10.88	
+66°	21′ 34.81″		21′ 34.92″		21′ 36.00″		21′ 35.82″		21′ 37.47″	
−24°	3′ 32″	1.41000n								
	−27.18		−17.14		−17.05		−16.40		−23.65	
	1.38282n		1.39286n		1.39295n		1.39360n		1.38635n	
	+ 24.14		+ 24.71		+ 24.71		+ 24.75		+ 24.34	
	− .06		− .23		− .26		− .07		− .35	
	− .01		+ .02 12		+ .10 .12		+ .08		+ .12	
	− 24.21 + 24.07		− 24.82 + 24.60		− 24.85 + 24.57		− 24.74 + 24.76		− 24.57 + 24.11	
+66	21 10.60		21 10.10		21 11.15		21 11.08		21 12.90	
+66	21 58.88	21 58.77	21 59.52	21 59.37	22 0.57	22 0.42	22 0.58	22 0.44	22 1.58	22 1.43
	26 45.6		26 46.4		26 46.6		26 46.7		26 47.0	
	+4 46.7	46.6	+4 46.9	46.8	+4 46.0	45.8	+4 46.1	46.0	+4 45.4	45.2
−04	+4 46.3	46.2	+4 46.5	46.4	+4 45.6	45.4	+4 45.7	45.6	+4 45.0	44.8
	25.69		26.49		26.69	~~29~~	26.79		27.09	
	− 11.30 −	11.30	− 12.10 −	12.10	− 12.30 −	12.30	− 12.40 −	12.40	− 12.70 −	12.70
	+4 45.20 −14	45.06	+4 44.71 −15	44.56	+4 44.75 −15	44.60	+4 44.68 −14	44.50	+4 44.89 −15	~~44.74~~ 44.51
	+4 33.90 +	37	+4 32.61 +	34	+4 32.45 +	33	+4 32.28 +	32	+4 32.19 +	31
+66	26 32.78 +4	34.11	26 32.13 +4	32.90	26 33.02 +4	32.43	26 32.86 +4	32.42	26 33.77 +4	32.12
	+66 26	32.88	26	32.27	26	32.85	26	32.86	26	33.55
		18.49		17.88		18.46		18.47		19.16

1872
' "
26 41.5 Sun D 9.96218
42.6 +11
43.7 11
44.6 Hor D 9.60186
45.4 8 11571 n
46.1 7 9.71757 n
46.7 .6
47.2 .5
47.6 .4

1873
June 9
14
19
24
29
July 4
9
14
19

1873
' "
25 84.3
85.4 +1.2
86.5 1.2
87.4 .9
88.3 .9
89.0 .7
89.6 .6
90.1 .5
90.5 .4

1873 June 9 −.287 −.29

54 49.2 54 47.9
54.3 55.0
59.2 53.8
55 19.5
14.4
19.8
24.9
30.2
40.5
45.5
50.8
398.6
218.6
19.873 54 50.57

55 19.84
55 37.87
−18.03
−17.82 ~~−18.24~~

+ 18.47 −.03
− .66 −.66
− 3.45
+14.363
19.84
34.20

55 34.17

+1.80

55
0 54.9
4.6
119.5
0 59.75

+ 29.30
1.46687
1.18444n
−15.29
5 59.75
5 44.46

' "
27 3.89
−24° 53' 9" 1.42660n
− 217
1.42443n

+ 26.57
− .16
+ .03

− ~~26.70~~ + 26.44
16 ~~37.19~~
27 30.33 27 30.25
26 24.4
−1 5.9 6.0
−1 6.3 6.4

− 4.60 − 4.60
−1 6.56 −.08 ~~6.64~~
−1 11.16 + 6.73
.73
26 19.17 −1 10.60
26 19.65

1873 June 11? 17?

55
0 53.9
6.8
120.7
1 0.35

July 6 −.518 −.51

55 54 47.3
25.9 55.0
28.4 52.2
31.0
33.8
36.3
39.0
41.3
44.0
46.8
326.5
36.278 54 49.83

55 36.24
55 36.95
− 0.71
−0.50 ~~−0.92~~

+ 1.59 +.02
−1.17 −1.19
− 2.53
− 2.11
36.24
34.13

55 34.13

+1.57

56
0 57.5
12.9
130.4
1 5.20

+ 46.45
1.66699
1.38456n
− 24.24
56 5.20
50 40.96

' "
27 7.39
−1102
1.41558n

+ 26.04
− .42
+ .01

− ~~26.45~~ + 25.63
31 ~~40.94~~
27 33.02 27 32.93
26 29.3
−1 3.7 3.8
−1 4.1 4.2

− 9.40 − 9.40
−1 4.28 −.09 ~~4.37~~
−1 13.68 + 4.41
.64
26 19.34 −1 13.27
26 19.66

July 10 −.428 −.42

55
28.5 55 5.7
31.0 8.8
33.6 10.1
36.0
38.9
41.4
43.9
46.6
49.0
348.9
38.767 55 8.20

55 38.73
55 36.79
+1.94
+2.15 + ~~1.73~~

−1.27 +.00
− .96 −.98
− 2.37
− 4.602
38.73
34.13

55 34.11

+1.56

55
0 49.0
3.0
55 56.0

+ 30.57
1.48530
1.20287n
−15.95
55 56.00
55 40.05

' "
27 8.30
− 1406
1.41184n

+ 25.81
− .18
+ ~~.02~~ .01

− ~~25.98~~ + 25.64
26 ~~42.32~~
27 33.94 33.87
26 29.7
−1 4.2 4.3
−1 4.6 4.7

− 9.90 − 9.90
−1 4.86 −07 ~~4.43~~
−1 14.76 + 4.41
.63
26 19.18 −1 13.98
26 19.89

July 13 −.439 −.44

55
29.7 54 59.6
32.4 1.5
35.0 3.6
37.6
40.2
42.8
45.3
47.9
50.7
361.6
40.178 55 1.57

55 40.14
55 36.65
+ 3.49
+3.70 + ~~3.28~~

− 2.79 +.00
−1.01 −1.00
− 2.23
− 6.032
40.14
34.11

55 34.12

+1.56

55
0 52.9
5.3
118.2
0 59.10

+ 38.61
1.58670
1.30427n
−20.15
55 59.10
55 38.95

' "
27 9.40
−1155
1.41505n

+ 26.00
− .30
+ ~~.01~~ .05

− ~~26.25~~ + 25.75
26 ~~43.15~~
27 36.15 35.07
26 30.0
−1 5.2 5.3
−1 5.6 5.7

− 10.10 − 10.10
−1 4.68 −08 ~~4.76~~
−1 14.78 + 4.85
.63
26 20.37 −1 14.32
26 20.75

1873 June 17? 30?

55
0 50.8
6.0
116.8
0 58.40

B Bootis

h	m	s
14	57	07
14	57	10

°	'	"
+	40	53
+	40	53 33

z = + 1° 29' 13"
+.03

tang δ +.87
x = ~~+~~.020
con α = ~~+.01~~

α 1872 7.460 δ = 53 46.94
α 1873 9.721 δ = 53 32.53

dα = +2.261
dδ = −14.42

1872	m	s	
June 29	57	9.05	
July 4		8.98	.07
9		8.90	.08
14		8.81	.09
19		8.72	.09

1873	m	s	
June 29	57	11.55	
July 4		11.48	.07
9		11.40	.08
14		11.32	.08
19		11.23	.09

June 9	57	11.76	
14		.72	4
19		.67	5
24		.61	6
29		11.55	6
July 4		48	7
9		40	8
14		32	8
19		11.23	9

	1872 June 30 −.330 −.33	1872 July 6 −.357 −.35	1872 July 7 −.319 −.31	1872 July 9 −.284 −.29	1872 July 11 −.349 −.351	1872 July 14 −.301 −.31
14	56 48.2 56 40.4	57 0.0 56 49.3	57 1.3 56 50.2	57 12.9 57 27.7	57 0.5 56 53.6	56 58.6 56 45.4
	50.9 41.7	2.8 50.6	4.0 51.3	14.3 28.3	3.3 54.7	1.2 46.2
	53.6 42.7	5.4 51.7	6.7 52.5	15.6 29.5	5.9 55.9	4.1 47.2
	58.9	10.9	12.2 53.7	17.1 30.5	11.4	9.4
	1.9	13.7	15.0	18.4	14.2	12.1
	−4.6	16.4	17.7	19.8	16.8	14.9
	7.2	19.2	20.4	21.1	19.5	17.7
	9.9	21.8	23.1	22.5	22.2	20.3
	15.4	27.2	28.5	23.5	27.7	25.8
	12.9	29.9	31.2		30.5	28.6
	20.8	32.7	33.9		33.2	31.2
	289.3	180.0	194.1	165.2	185.2	223.9
	49.3					143.9
	4.482 56 41.67	16.364 56 50.53	17.645 56 51.92	18.356 57 29.00	16.836 56 54.70	14.9 56 46.27
	57 4.46	57 16.34	57 17.63	57 18.34	57 16.82	57 14.88
	57 9.23	57 8.95	57 8.93	57 8.90	57 8.87	57 8.81
	−4.57	+7.39	+8.70	+9.44	+7.95	+6.07
	−4.58	+7.38	+8.69	+9.43	+7.94	+6.06
	−4.57	+7.39	+8.70	+9.44	+7.95	+6.07
	+4.81 −.02	+7.11 +.01	−8.43 +.01	−9.15 +.00	−8.56 −.01	−5.77 +.00
	− .29 −.29	− .30 −.31	− .27 −.28	− .26 −.25	− .30 −.30	− .27 −.26
	−1.57 +0.69	−1.49 +0.77	−1.47 +0.79	−1.44 +0.82	−1.41 +0.85	−1.35 +0.91
	+2.953	−8.90	−10.17	−10.84	−10.278	−7.378
	4.46	16.34	17.63	18.34	16.82	14.88
	7.41	7.44	7.46	7.50	7.55	7.45
R.A.	57 7.39 9.65	57 7.44 9.70	57 7.46 9.72	57 7.50 9.76	57 7.54 9.80	57 7.50 9.76
	+0.92	+0.83	+0.82	+0.79	+0.77	+0.73
30						
	3 62.7	4 5.2	4 3.7	3 27.2	3 60.8	4 5.4
	58.0	59.4	−1.8	22.8	56.0	0.3
	12.07	12.46	1.9	5.00	11.68	5.7
	~~33 30.35~~	~~34 32.30~~	34 0.95	33 25.00	~~33 28.40~~	34 2.85
	33 60.35	34 2.30			33 58.40	
	+22.81	+25.83	+25.72	−10.64	+22.14	+28.63
	1.35813	1.41212	1.41027	1.02694n	1.34518	1.45682
	1.35228n	1.40627n	1.40442n	1.02109n	1.33933n	1.45097n
	−22.51	−25.48	−25.38	+10.50	−21.84	−28.25
	33 60.35	34 2.30	34 0.95	33 25.00	33 58.40	34 2.85
	33 37.84	33 36.82	33 35.57	33 35.50	33 36.56	33 34.60
	+40° 49' 10.51"	49 11.53	49 12.78	49 12.85	49 11.79	49 13.75
	+1° 28' 53" 0.17260					
	−2718	−1714	−1705	−1640	−2365	−2051
	0.14542	0.15546	0.15555	0.15620	0.14895	0.15209
	*− 1.40	*− 1.43	*− 1.43	*− 1.43	*− 1.41	*− 1.42
	− .14	− .18	− .18	− .03	− .13	− .23
	− .04	+ .32	+ .32	+ .27	+ .32	+ .40
	+ 1.22 −1.58	+ 1.57 −1.29	+ 1.57 1.29	+ 1.67 −1.19	+ 1.60 −1.22	+ 1.69 −1.25
	~~+40 49 11.73~~	49 13.10	49 14.35	49 14.52	49 13.49	49 15.34
	+40 49 8.93 49 8.53	49 10.24 9.84	49 11.49 11.09	49 11.66 11.32	49 10.57 10.17	49 12.50 12.10
	53 54.7	53 55.0	53 55.1	53 55.3	53 55.6	53 55.9
	+4 45.3 44.9	+4 44.8 44.4	+4 43.6 43.2	+4 43.6 43.3	+4 45.0 44.6	+4 43.4 43.0
	21.72	22.52	22.62	22.82	23.12	23.42
	− 7.30 − 7.30	− 8.10 − 8.10	− 8.20 − 8.20	− 8.40 − 8.40	− 8.70 − 8.70	− 9.00 − 9.00
	+4 45.20 −.40 ~~44.80~~	+4 44.71 −.40 ~~44.31~~	+4 44.75 −.40 ~~44.35~~	+4 44.68 −.34 ~~44.34~~	+4 44.89 −.40 ~~44.49~~	+4 44.14 −.40 43.74
	+4 37.90 +4 45.04	+4 36.61 + 44.66	+4 36.55 + 44.40	+4 36.28 + 44.50	+4 36.19 + 44.51	+4 35.14 + 43.81
	+40 53 46.83 − .03	53 46.85 − .02	53 48.04 − .02	53 47.94 − .02	53 46.76 − .02	53 47.64 − .02
	+4 37.71	+4 36.54	+4 36.18	+4 36.08	+4 35.79	+4 34.79
	53 46.24	53 46.38	53 47.27	53 47.40	53 45.96	53 43.89
	31.82	31.96	32.85	32.98	31.54	32.47

1872	'	"		
June 29	53	54.1	sin δ	9.81407
July 4		54.2	+6	
9		55.3	.6 cos δ	9.87844
14		55.9	.6	11571n
19		56.5	.6	9.99415n

1873	'	"	
June 9	53	33.2	
14		34.3	+1.1
19		35.3	1.0
24		36.2	.9
29		37.0	.8
July 4		37.7	.7
9		38.4	.7
14		38.9	.5
19		39.4	.5

1872 July 24 −.260 −.27

56 56.0
58.8
1.5
6.9
~~8.3~~
9.6
12.4
15.2
17.8
23.3
25.9
28.6
256.0
136.0 56 49.27
12.364

56 47.7
49.5
50.6

57 12.34
57 8.62
+3.72
+3.71
+3.72
−3.49 −.02
−.23 −.23
−1.16 +1.10
−4.890
12.34
7.46 9.76
57 7.44
~~+0.66~~
A. R.

+23.09
1.36342
1.35757n
−2278

−1815
0.15445

∗− 1.43
−

1873 June 9 −.287 −.29

56 37.2
39.9
42.8
48.1
50.9
53.5
56.2
58.9
57 4.4
7.1
10.0
4090
589.0
53.545 56 31.60

56 29.7
31.7
33.4

56 53.53
57 11.76
−18.23
−18.24
−18.23
+18.47 −.03
−.25 −.25
−2.04
+16.86
53.53
9.71
57 9.68
+1.80

25
3 23.1
33.1
56.2
28 28.10

+21.94
1.34124
1.34539n
−2215
28 28.10
28 5.95
54 42.45

+1° 29' 13" 0.17450

−217
0.17233

∗− 1.49
− .13
+ .10
+ ~~1.46~~ −1.52
54 ~~43.91~~
54 40.93 54 40.65
53 33.3
−1 7.6 7.9

−0.80 − 0.80
−1 6.56 −28 ~~6.84~~
−1 7.36 − 6.73
53 33.57 − .05
−1 7.58
53 33.07

June 11 −.337 −.33

56 38.2
40.9
43.6
49.0
51.4
54.5
57.2
59.9
57 5.3
8.0
10.8
419.1
599.1
54.464 56 33.73

56 32.4
33.6
35.2

56 54.44
57 11.74
−17.30
−17.31
−17.30
+17.57 +.00
−.29 −.29
−2.02
+15.26
54.44
9.70
57 9.70
+1.78

25
3 21.9
33.0
54.9
28 27.45

+20.73
1.31660
1.31075n
−2045
28 27.45
28 7.00
54 41.35

−1062
0.16388

∗− 1.46
− .12
+ .00
+ ~~1.34~~ −1.58
54 ~~42.69~~
54 39.17 39.49
53 33.7
−1 6.1 6.4

−1.20 − 1.20
−1 5.86 −28 ~~6.14~~
−1 7.06 − 5.49
53 32.71 − .05
−1 7.24
53 32.25

June 17 −.350 −.37

56 41.0
43.7
46.3
51.8
54.5
57.3
57 0.0
2.8
8.3
11.0
13.7
330.4
630.4
57.309 56 33.13

56 31.8
33.1
34.5

56 57.29
57 11.69
−14.40
−14.41
−14.40
+14.78 −.02
−.32 −.30
−1.97
+12.49
57.29
9.78
57 9.78
+1.79

25
3 23.9
36.0
59.9
28 29.95

+24.18
1.38346
1.37761n
−2386
28 29.95
28 6.09
54 42.26

−1431
0.16019

∗− 1.45
− .15
+ .00
+ ~~1.30~~ −1.60
54 ~~43.56~~
54 40.66 40.38
53 34.9
−1 5.8 6.1

−2.40 − 2.40
−1 5.83 −28 ~~6.11~~
−1 8.23 − 5.82
53 32.43 − .05
−1 8.27
53 32.11

June 30 −.537 −.55

56 48.0
50.4
53.3
58.8
57 1.5
4.4
7.0
9.7
15.2
17.9
20.6
286.8
46.8
4.255 56 46.17
57 28.80

56 45.1
46.1
47.3
57 27.6
28.8
30.2

57 4.24
57 11.53
−7.29
−7.30
−7.29
+7.74 −.01
−.48 −.47
−1.81
+5.425
4.24
9.69
57 9.69
+1.61

25
3 15.1
30.1
45.2
28 22.60

+18.08 −24.55
1.25720 1.39005n
1.25135n 1.38420
−1784 +24.25
28 22.60
28 4.76
54 43.59

−1751
0.15699

∗− 1.43
− .05
+ .04 .03
+ ~~1.41~~ −1.45
54 ~~45.00~~
54 42.14 41.87
53 37.2
−1 4.9 5.2

−4.70 − 4.70
−1 3.985 −.27 ~~4.22~~
−1 8.65 − 4.15
53 33.49 − .05
−1 8.90
53 32.97

July 5 −.530 −.55
Lost

1873		α		δ
July 6	57	9.72	53	32.33
7		9.70		33.20
10		9.72		32.81
13		9.72		32.53

25
3 22.9
39.1
62.0
28 31.00

ψ Bootis

h	m	s
14	58	56
14	59	00
+ 27°	27′	″
+ 27	26	38

ζ = + 14° 56
+ .26

Long δ = + .52
x = − .017
Corr = − .01 ″
− .02 − 0.1

″ α 1872 57.674 δ = 26 52.08
10″ α 1873 0.245 δ = 26 37.82

dα = + 2.570
dδ = − 14.25

1872		m	s	
June	29	58	59.12	
July	4		59.07	.05
	9		59.01	.06
	14		58.95	.06
	19		58.88	.07

1873		m	s	
June	9	59	2.03	
	14		2.01	2
	19		1.98	3
	24		1.94	4
	29		1.90	4
July	4		1.85	5
	9		1.80	5
	14		1.74	6
	19		1.67	7

Sin δ 9.66368
Cos δ 9.94813
11571 n
0.06384 n

	June 27 1872 − .247 − .25		July 6 1872 − .357 − .35		July 7 1872 − .319 − .31		July 9 − .284 − .29		July 11 1872 − .349 − .35	
14	58 36.6	58 27.8	58 52.4	58 42.8	58 53.7	58 50.1	58 54.5	58 47.8	58 52.8	58 48.5
	38.8	28.8	54.8	44.1	55.9	51.2	56.7	48.7	55.1	49.3
	41.2	29.6	57.0	45.6	58.3	52.2	59.1		57.4	50.3
	45.7		1.7		3.0		3.7		2.2	
	48.1		4.0		5.3		6.1		4.5	
	50.4		6.3		7.6		8.4		6.8	
	52.7		8.7		9.9		10.7		9.0	
	55.1		11.0		12.5		13.0		11.4	
	59.7		15.5		16.9		17.7		15.9	
	2.0		17.9		19.1		19.9		18.3	
	4.4		20.3		21.5		22.3		20.7	
	434.7		249.6		263.5		272.1		254.1	
	554.7		69.6		83.5		92.1		74.1	
	50.427	58 28.73	6.327	58 44.17	7.591	58 51.17	8.373	58 48.25	6.736	58 49.37
	58 50.41		59 6.31		59 7.57		59 8.36		59 6.72	
	58 57.14		58 59.05		58 59.04		58 59.01		58 58.98	
	− 8.73		+ 7.26		+ 8.53		+ 9.35		+ 7.74	
	~~− 8.72~~		~~+ 7.27~~		~~+ 8.54~~		~~+ 9.36~~		~~+ 7.75~~	
	− 8.75		+ 7.26		+ 8.55		+ 9.37		+ 7.76	
	+ 8.83 + .00		+ 7.11 + .01		− 8.43 + .01		− 9.15 + .00		− 8.56 − .01	
	− .13	− .13	− .18	− .18	− .16	− .16	− .15	− .15	− .18	− .18
	− 1.47	+ 1.10	− 1.38	+ 1.19	− 1.37	+ 1.20	− 1.34	+ 1.23	− 1.31	+ 1.26
	58 50.41		59 6.31		7.57		8.36		6.72	
	58 57.64		57.64		57.61		57.72		57.67	
R.A.	58 57.64	59 0.21	58 57.65	0.22	58 57.62	0.19	58 57.72	0.27	58 57.66	0.23
	+ 0.95		+ 0.83		+ 0.82		+ 0.79		+ 0.77	
0	0 48.2		0 48.2		0 41.4		0 46.0		0 42.1	
	42.2		44.1		35.9		40.3		38.7	
	904		923		773		863		808	
	0 45.20		0 46.15		0 38.65		0 43.15		0 40.40	
	+ 21.70		+ 22.16		+ 16.42		+ 20.12		+ 17.37	
	1.33646		1.34557		1.21537		1.30363		1.23980	
	1.40030 n		1.40941 n		1.27921 n		1.36747 n		1.30364 n	
	− 2513		− 2567		− 1902		− 2330		− 2059	
	0 45.20		0 46.15		0 38.65		0 43.15		0 40.40	
	0 20.07		0 20.48		0 19.63		0 19.85		0 19.81	
+ 27°	22 28.28″		22 17.87							
+ 27°	22′ 28.28″		22 27.87		22 28.72		22 28.50		22 28.54	
+ 14°	55′ 35″	1.18610								
	− 885		− 1714		− 1705		− 1640		− 2365	
	1.17725		1.16896		1.16905		1.16970		1.16245	
	*− 15.04		*− 14.76		*− 14.76		*− 14.78		*− 14.54	
	− .10		− .10		− .06		− .09		− .06	
	− .01		+ .06		+ .05		+ .06		+ .06	
	~~+ 14.93~~	15.15	~~+ 14.72~~	14.80	~~+ 14.75~~	14.77	~~+ 14.75~~	14.81	~~+ 14.54~~	14.54
~~+ 27~~	~~22 43.21~~		~~22 42.59~~		~~22 43.47~~		~~22 43.25~~		~~22 43.08~~	
+ 27	22 13.13	22 13.06	22 13.07	12.99	22 13.95	13.89	22 13.69	13.62	22 14.00	13.93
27	26 56.1		26 57.0		26 57.3		26 57.4		26 57.7	
	+ 4 43.0	42.9	+ 4 43.9	43.8	+ 4 43.4	43.3	+ 4 43.7	43.6	+ 4 43.7	43.6
− 0.1	+ 4 42.9	42.8	+ 4 43.8	43.7	+ 4 43.3	43.2	+ 4 43.6	43.5	+ 4 43.6	43.5
	− 18.25		− 19.15		− 19.45		19.55		19.85	
	− 4.00 −	4.00	− 4.90 −	4.90	− 5.20 −	5.20	− 5.30 −	5.30	− 5.60 −	5.60
	+ 4 43.88	− .07 ~~43.81~~	+ 4 44.71	− .08 44.66	+ 4 44.75	− .06 ~~44.69~~	+ 4 44.68	− .07 ~~44.61~~	+ 4 44.89	− .07 ~~44.82~~
	+ 4 39.88	+ 4 44.16	+ 4 39.81	+ 4	+ 4 39.55	+ 44.40	+ 4 39.38	+ 44.80	+ 4 39.29	+ 44.51
		− .24		− .21		− .21		− .20		− .20
+ .27	26 53.01	+ 4 39.92	26 52.88	+ 4 39.55	26 53.50	+ 4 38.99	26 53.07	+ 4 39.00	26 53.29	+ 4 38.71
		+ 27 26 52.98		26 51.54		26 52.88		26 52.62		26 52.64
		38.73		37.29		38.63		38.37		38.39

1872		′	″	
June	29	26	56.3	
July	4		56.8	+.5
	9		57.4	.6
	14		57.9	.5
	19		58.5	.6

1873		′	″ 1873	
June	9	26	36.0	
	14		36.9	+.9
	19		37.8	.9
	24		38.6	.8
	29		39.3	.7
July	4		40.0	.7
	9		40.6	.6
	14		41.1	.5
	19		41.6	.5

subt. 1s

1873 −.287
June 9 −.29

58 29.8 · 58 26.0
32.1 · 27.2
34.6 · 28.3
39.0
41.4
43.7
46.0
48.3
53.0
55.2
57.5
480.6
43.691 · 58 27.17

58 43.67
59 2.03
−18.36
~~−18.35~~
−18.34
+18.47 −.03
− .15 · −.15
−1.78
58 43.67
59 0.23

59 0.~~20~~17

+1.80
55
0 3.7
13.0
16.7
0 8.35

+16.52
1.21801
1.28185n
−1914
55 8.35
54 49.21

27 59.11

+14° 55′ 56″ 1.18630
−196
1.18434

*− 15.29
− .05
+ .00

~~+ 15.24~~ −15.34
~~28 14.35~~
27 43.77 · 27 43.76
26 36.0
−1 7.8 · 7.8
−1 7.9 · 7.9

+1.80 + · 1.80
−1 6.56 −.01 · ~~6.57~~ 6.79 · 46
−1 4.76 —
26 39.01 −1 · 5.39
26 38.37

June 30 −.537 · −.55

58 40.5 · 58 34.2
42.8 · 35.3
45.1 · 36.0
49.7
52.1
54.5
56.8
59.0
59 3.6
6.0
8.5
418.6
598.6
54.419 · 58 35.17

58 54.40
59 1.89
−7.49
~~−7.48~~
−7.47
+ 7.74 −.01
− .29 · −.28
−1.64
54.40
0.21

59 0.21

+1.61
55
0 4.0
18.9
22.9
0 11.45

+19.25
1.28443
1.34827n
−2230
55 11.45
54 49.15

27 59.20

−1732
1.16898

*− 14.76
− .08
+ .00

~~+ 14.68~~ −14.84
~~28 13.88~~
27 44.36 · 44.34
26 39.5
−1 4.9 · 4.9
−1 5.0 · 5.0

− 1.70 − · 1.70
−1 3.985 −.02 · 3.97 · 4.45
−1 5.65 — · .41
26 38.71 −1 · 6.26
26 · 38.08

July 6 −.518 · −.51

58 46.8 · 58 44.3
49.0 · 45.7
51.1
56.0
58.2
59 0.5
2.8
5.2
9.8
12.0
14.6
506.0
600
0.545 · 58 45.00

59 0.53
59 1.83
−4.30
~~−1.29~~
−1.28
+ 1.58 +.02
−.27 · −.27
−1.59
0.53
0.25

59 0.273

+1.57
55
0 3.1
8.1
11.2
0 5.60

+15.54
1.19145
1.25529n
−1801
55 5.60
54 47.59

28 0.76

−1083
1.17547

*− 14.98
− .05
+ .00

~~+ 14.93~~ −15.03
~~28 15.69~~
27 45.73 · 45.72
26 40.2
−1 5.5 · 5.5
−1 5.6 · 5.6

− 2.40 − · 2.40
−1 4.28 −.01 · 4.29 · 4.41
−1 6.68 — · 40
26 39.05 −1 · 7.21
26 38.51

July 7 −.516 · −.51

58 47.7
50.0 · 58 40.0
52.3 · 41.0
56.7 · 42.0
59.1
1.6
3.7
6.2
10.8
13.1
15.5
316.7
16.7
1.522 · 58 41.00

59 1.51
59 1.82
−0.31
~~−0.30~~
−0.29
+ 0.56 +.00
− .27 · −.27
−1.57
1.51
0.23

59 0.23

+1.56
55
0 3.3
16.0
19.3
0 9.65

+20.52
1.31218
1.37602n
−2377
55 9.65
54 45.88

28 2.47

−688
1.17942

*− 15.12
− .08
+ .00

~~+ 15.04~~ −15.20
~~28 17.51~~
27 47.27 · 47.26
26 40.4
−1 ~~7.1~~ 6.9 · 6.9
−1 7.0 · 7.0

− 2.60 − · 2.60
−1 4.60 −.01 · ~~4.61~~ 4.76
−1 7.20 — · 40
26 40.07 −1 · 7.76
26 39.50

July 10 −.428 · −.42

58 49.3
51.7 · 58 43.3
54.0 · 44.4
58.7 · 45.4
1.0
3.4
5.6
7.9
12.6
14.9
17.2
276.3
36.3
3.300 · 58 44.37

59 3.28
59 1.79
+1.49
~~+1.50~~
+1.51
− 1.27 +.00
−.22 · −.22
−1.55
3.28
0.24

59 0.24

+1.56
55
0 2.0
15.1
17.1
0 8.55

+18.93
1.27715
1.34099n
−21.93
55 8.55
54 46.62

28 1.73

−1472
1.17158

*− 14.84
− .08
+ .00

~~+ 14.76~~ −14.92
~~28 16.49~~
27 46.81 · 46.80
26 40.7
−1 6.1 · 6.1
−1 6.2 · 6.2

− 2.90 − · 2.90
−1 4.86 −.01 · ~~4.87~~ 4.71
−1 7.76 — · 40
26 39.05 −1 · 8.01
26 38.79

1873
July 13 −.439 · −.44

58 50.9
53.2 · 58 44.0
55.5 · 45.2
0.2 · 46.3
2.5
4.7
7.0
9.4
14.0
16.4
18.7
232.5
52.5
4.776 · 58 45.17

59 4.76
59 1.75
+3.01
~~+3.02~~
+3.03
−2.79 +.00
− .23 · −.23
−1.50
4.76
0.24

59 0.24

+ 1.56
55
0 2.0
14.9
16.9
0 8.45

+19.60
1.29226
1.35610n
−2270
55 8.45
54 45.75

28 2.60

−1160
1.17470

*− 14.95
− .08
+ .01

~~+ 14.88~~ −15.02
~~28 17.48~~
27 47.58 · 47.57
26 41.0
−1 6.6 · 6.6
−1 6.7 · 6.7

− 3.20 − · 3.20
−1 4.68 −.01 · ~~4.69~~ 4.85
−1 7.88 — · 40
26 39.70 −1 · 8.45
26 39.12

48 H Cephei, tang δ = − ~~4.97~~ 4.92

x = +.069

Corr = +.10 +1!

h	m	s
15	04	09
3	04	17
10°	2′	45″
+ 77	15	54
+ 102°	44′	9″

z = − 60° 21′ 21″

sin z − .87

α 1872 10.062

α 1873 17.411

1872 July 9 & 4^m 8.14^s; 14 8.68 .54; 19 9.23 .55

1872 July 9 15′ 25.2″; 14 25.1 −.1; 19 25.0 −.1

1873 July 9 & 4^m 15.34^s; 14 15.89 .55; 19 16.44 .55

δ 1872 = 15′ 37.03″ = 44′ 22.97″

δ 1873 = 15′ 50.87″ = 44′ 9.13″

dα = +7.348

dδ = +13.85

sin δ 9.98919

cos δ 9.34324

11.571n

9.45898n

15′ 41.9″; 41.7 −.2; 41.6 −.1

1872.0 α	1872.0 δ	1873.0 α	1873.0 δ
10.09	19.23	17.51	3.85
9.98		.62	0.36
10.035	19.23 +2.02	.66	2.71
10.062	22.97	.72	2.54
−.027	−3.74	17.628	2.36 +3.82
	+2.02	.411	9.13
	−1.72	+.217	−6.77

6.18

9.13

−2.95

1872 July 6 −.35 −.357

15 03 54.7; 58.9; 3.9; 8.5; 13.4; 18.0; 23.0; 27.2; 31.9

03 22.0; 24.6; 27.1; 30.3

239.5

119.5

13.278 3 26.00

4 ~~13.21~~ 13.35

4 7.80

+5.55

+5.45

−7.11 +.01

+1.55 +1.58

+2.26 + 9.61

4 −3.30 −3.26

4 13.35

4 10.05

R.A. 4 10.09 17.44

+0.83

40

4 31.1

19.0

50.1

4 25.05

+47.28

1.67468

1.13363n

+ +13.61

44 25.05

44 ~~11.44~~ 38.66

102° 38′ ~~36.57~~ 9.69″

−60° 20′ 34″ 2.00336n

−16.94

1.98642n

+ .02

+ 1 36.92

+ .26

+ .13 .35

−1 36.33 +1 37.55

+102 37 0.58

102 40.39 ~~14.46~~ 47.24 39 46.80

44 ~~34.7~~ 34.7

+4 47.5 47.1

+4 ~~48.6~~ 46.4 46.0

−25.55

−11.70 − 11.70

+4 44.71 −44 44.06

+4 33.00 + .72

+102 44 20.24 +4 33.68

−1.01 44 20.48

44 19.23 6.63

1872 July 7 −.319 −.311

03 55.8; 0.5; 5.2; 10.2; 15.0; 19.6; 24.0; 29.0; 33.6

192.9

132.9

14.767

4 ~~14.70~~ 14.84

4 7.91

+6.93

+6.83

−8.43 +.01

+1.37 +1.41

+2.15 + 9.50

−4.86

14.84

9.93

4 9.98 17.33

+0.82

1873 June 30 −.537 −.55

3 4 26.0; 29.2; 32.7

4.17 / 30 / 13 / 35 / 18 / 4.23 / 4.30

4 59.5 (4); 4.3 (5); 8.8 (6); 13.7 (7); 18.2 (8)

1045

445

~~8.900~~ 4 29.30

4.30

4.37 4.87

4 ~~8.83~~ ~~8.97~~

4 14.58 14.38

−5.19 −10.01

−5.51

+7.74 −.01

+2.43 +2.37

+3.03 ~~10.38~~

+13.20 13

~~8.97~~ 4.37

(4 22.17)

17.87

4 17.51

+1.61

35

4 5.0

23.1

281

4 14.05

−25.0

−20.40

1.30963n 1.39794n

0.76858

+5.87 −7.19

39 14.05

39 ~~19.92~~ 6.86

43 28.43 41.49

−60° 19′ 33″ 2.00304n

−17.13

1.98591n

+ .02

+ 1 36.81

+ .05

+ .04

−1 36.74 +1 37.92

41 51.69

45 ~~5.35~~ 18.41 45 18.07

44 17.8

−1 ~~50.6~~ 0.9

−0 ~~59.5~~ 2.0

−1 1.7

− 8.70

−8.70 −1 4.15

−1 3.965 −34 ~~4.29~~ 1.10

−1 12.65 ±1 17.45

44 5.76 44 0.62

−1.91

3.85

1873 July 7 −.516 −.51

03 53.6; 58.6; 3.0; 7.8; 12.1; 16.9; 22.0; 26.2; 31.4

03 38.7

231.6

111.6

12.400 3 38.70

4 ~~12.33~~ 12.47

4 15.19

−2.63

−2.73

+0.56 +.00

+2.25 +2.28

+2.31

5.12 15

12.47

17.59

4 17.62

+1.56

35

3 50.0

6.6

1166

3 58.30

+33.70

1.52763

0.98658n

−9.70 +9.70

38 58.30

38 48.60 39 8.00

44 0.35 40.35

43 59.75

−24.23

1.97881n

.01

+ 1 35.24

+ .13

+ .04

−1 35.08 +1 35.42

42 24.67

45 35.17 15.77 15.45

44 18.0

−0 57.8 58.4

−0 ~~56.7~~ 59.2

−0 58.9

− 8.90

−8.90 − 4.76

−1 4.60 −32 ~~4.92~~ 1.35

−1 13.50 ±1 12.37

44 2.27 44 3.14

−1.91

0.36

1873 July 10 −.428 −.42

03 56.3; 0.9; 5.6; 10.6; 15.0; 19.5; 24.4; 29.1; 33.4

03 36.0; 39.0; 41.7

194.8

134.8

~~14.978~~ 3 38.90

14.978

4 ~~14.91~~ 15.05

15.42

−0.37

−0.47

−1.27 +.00

+1.86 +1.89

+1.99

+2.58 61

15.00

17.63

4 17.66

+1.56

35

3 48.1

6.0

1141

3 57.05

+36.08

1.55727

1.01622n

−10.38 +10.38

38 57.05

38 46.67 39 7.48

44.3 1.68 40.92

−14.68

1.98836n

.02

+ 1 37.35

+ .15

+ .04

−1 37.18 +1 37.56

42 24.50

45 ~~39.24~~ 18.48 18.17

44 18.1

−1 0.5 0.8

−0 ~~59.4~~ 1.9

−1 1.6

− 9.00

−9.00 − 4.71

−1 4.86 −31 ~~5.14~~ 1.35

−1 13.86 ±1 12.36

44 4.62 44 5.81

−1.91

3.71

1873 July 13 −.439 −.44

04 (58.1); 2.8; 7.4; 12.4; 16.9; 21.7; 26.1; 30.8; 35.5

03 33.8; 38.5; 42.6

211.7

151.7

16.856 3 38.30

4 ~~16.79~~ 16.92

15.76

+1.16

+1.06

−2.79 +.00

+1.94 +1.94

+1.65

+0.80

16.92

17.72

4 17.72

+1.56

35

3 48.7

5.0

1137

3 56.85

+38.56

1.58614

1.04509n

−11.09 +11.09

38 56.85

38 45.76 ~~14.03~~ 7.4

44.3 2.59 40.41

−11.64

1.99140n

.02

+ 1 38.04

+ .17

+ .19

−1 37.70 +1 38.92

42 24.89

45 ~~39.01~~ 18.83 18.52

44 18.3

−1 0.5 0.8

−0 ~~59.4~~ 1.4

−1 1.6

− 9.20

−9.20 − 4.85

−1 4.68 −31 +1.35

−1 13.88 ±1 12.70

44 4.45 44 5.82

−1.91

2.54

√

(B.A.C.) 960 Urs Min = 5 Tang δ' = −10,287 K = +.157

Sin δ 9.99797
Cos δ 8.98419
11571
9.09990n

α 1873 2m 38s.645 32′ 41″.85
δ 28 18.15

h m s
15 02 39
8. 02 28,
95° 38′
+ 84° 27′ 47″
~~z = −42° 4′ 59″~~
+ 95 32 13
z = −53 9 25
−0.80

1873 June 9 −.287 −.29	June 30 −.537 −.55	July 7 −.516 −.51	1873 July 10 −.428 −.42
1 —	1 0 226	01	01
22.0 —	34.7 34.9	43.8 59 45.2	47.9 00 4.2
33.2 —	44.9 43.7	54.2 46.5	57.7 12.1
44.2	56.1	2 5.8 47.5	2 8.0 21.9
55.3	2 7.1	16.0	19.1
2 6.9	17.3	26.2	29.6
15.7	28.5	37.4	40.4
27.2	38.9	47.3	51.5
37.6	49.6	59.1	1.7
48.3	3 00.3	9.5	03 12.7
2914	2674	2993	2686
51.4	1474	23.93	2686
.5711	2 16.378 0 33.73	2 26.589 59 46.40	2 29.844 0 12.73
2 5.87	2 16.53	2 26.75	2 30.00
+18.44	+7.73	+0.56	−1.27
+2.95	+5.47	+5.31	+4.35
+11.97	+7.92	+6.35	+5.65
2 39.23	2 37.65	2 38.97	2 38.73

	June 9	June 30	July 7	July 10
	+1.80	+1.61	+1.56	+1.56
	45	45	45	45
	4 49.1	4 48.0	4 43.9	4 44.2
	0.7	64.2	57.9	59.0
	104.8	112.2	101.8	103.2
	4 54.90	49 am 56.10	49 am 50.90	4 51.60
		+102.65	+100.10	+137.11
		2.01137	2.20439	2.13708
		1.11127n	1.30429n	1.23698n
		+12.92	+20.15	+17.26
		49 56.10	49 50.90	49 51.60
		~~49 43.18~~	~~49 30.75~~	~~49 34.34~~
95°		50 9.02	50 11.65	50 6.86
+ ~~84°~~		33′ 5.17″ 39.83″	33 ~~17.60~~ 37.30	32 ~~14.01~~ 39.49
−53 ~~42°~~		10′ 10″	~~1.71690n~~ 1.88500	
		−1732	−688	−1472
		1.69958n	~~1.71302n~~ 1.71002n	1.70218n
		~~+ 5087~~	~~+ 5129~~	~~+ 5037~~
		+ .55	+ 1.34	+ .98
		+ .05	+ .05	+ .05
		− 49.47 + 50.67	− 49.90 + 52.68	− 49.34 + 51.40
+84		32 15.70	32 27.70	32 24.67
		+84 33 53.84	34 10.28	34 5.41
		− 4.15	− 4.76	−1

	June 30	July 7	July 10
+95	33 ~~5.17~~ 39.83	33 37.30	32 39.49
	−1732	−688	−1472
	1.86768n	1.87812n	1.87028n
	+ .02	+ .01	+ .02
	+1 13.74	+1 15.53	+1 14.18
	+ .55	+ 1.34	+ .98
	+ .05	+ .05	+ .05
	+1 14.36	+1 16.93	+1 15.23
+95	33 ~~4.53~~ 53.65 55.37	33 34.53 54.23 53.92	33 54.22 54.41
	+ 8.95	+ 9.59	+ 9.79
	−1 3.985 −.32 4.27	−1 4.60 −.31 4.91	−1 4.86 −.31
	−0 55.00	−0 55.01	−0 55.07
+95	33 ~~29.03~~ 8.69	33 39.52	~~33~~ 34.17
	*− 8.95	32 59.22 * 9.59	32 56.66 * − 9.79
	−1 4.15	− 4.76	4.91
	+ 1.29	+ 1.25	+ 1.25
	−01 ~~53.91~~ 11.87	− ~~53.42~~ 13.10	53.67 13.5
+95	32 1.46 43.56	32 ~~4.00~~ 40.87	33 ~~4.44~~ 41.16

h m s
3 2 27
+84° 26′ 48″

~~(2213²)~~
Gr 2213 ± 6
15 04 14
+ 84 25
3 = -42 2
-0.67

Red. s
42.54
31.76
21.17
11.59
0.00

Tang δ = 7 10.293
+10.281

K = +.157

Sin δ 9.99793
Cos δ 8.98808
11571n
9.10379n

?

1872 June 27 -.247

15 02 43.2 05 47.4
39 55.9
22.0 – 2.0
23 29.4 17
24
23 50.3 49
mm. 23 8.13 13
12.4 12.4 18
13.8
12.0
88.4
285.9
585.4
53.162 5 55.43 4

-2.49

1872 June 30 -.330

04 12.7 553 52.7 04
23.7 555 5.2
34.5 557 18.5
44.9 555
55.8 558
6.5 559
26.9 551
38.6 561

55.600 4 7.13 4

4 55.44
+4.78
-3.34
-X ~~10.18~~ 8.43
4 ~~44.40~~ 46.20
4845

1872 July 1 -.397

15.3
26.1
37.1
47.6
57.4
8.6
19.2
30.1
40.9
282.3
522.3
58.033

4 57.87 88
+2.13
-4.09
-X ~~10.44~~ 8.25
4 ~~45.47~~ 48
4767

1872 July 6 -.357

04 – 05 52.3
– 58.4
45.7 69 4.7
56.6 70
6.1 61
18.8 82
27.8 66
37.8 64
49.3 68

5 6.800 5 58.47

5 6.64
-7.11
-3.62
-X ~~7.21~~ 7.24
4 ~~46.70~~

1872 July 7 -.319

04 45.6 65 52.9 03
56.2 68 55.9
6.9 67 59.7
17.2 66
28.6 74
38.5 67
49.7 72

5 6.890 5 56.17

5 6.73
-8.42
-3.33
-X ~~8.96~~ 7.24
4 ~~46.02~~

1872 July 9 -.284

57.4
2.2
6.6
11.5
16.0
20.7
25.4
30.2
34.9
204.6
144.6
5 16.067

5 16.91
-7.15
-2.92
-X 8.43

+0.95

0

1 27.7
13.2
40.9
1 20.45

+0.92

1 37.6
26.3
63.9
1 31.95

+~~10~~4 8.47
~~20.3~~ 20.33
7.13912n
-+~~6.07~~
1 31.95
1 28.88
+84 21 ~~30.18~~ 22.47
-42 3 27 1.71524n
-2681
1.68839n

+ 48.89
– .62
– .02

– 49.44 +48.16
+84 20 40.74
+84 22 ~~18.34~~ 10.13 22 ~~18.19~~ 10.48
– 11.85
+4 45.20 -.15 ~~45.05~~
+4 33.35
+84 26 51.69

– 11.85
+4 45.04
+ .61
+4 33.80
26 ~~51.99~~ 44.28

h m s m s
15 4 56.1 5 1
° ′ ″ ′ ″
+84 27 3 26 36

+0.89

1 41.2
29.8
71.0
1 35.50

+0.83

1 25.9
13.2
39.1
1 19.55

-51.67
1.71324n
0.81703
~~-6.56~~ +6.56
1 ~~19.55~~ 7 19.55
1 ~~12.99~~ 1 26.11
21 22.24

-1694
1.69826n

+ 49.92
– .15
+ .10

– ~~49.97~~ +49.87
~~20 32.27~~
22 ~~22.44~~ 12.11 11.98
– 12.57
+4 44.71 -.13 ~~44.58~~
+4 32.14
26 44.25

– 12.57
+ 44.60
+ .55
+4 32.58
26 44.56

+0.82

1 22.5
13.6
36.1
1 18.05

-49.28
1.69267n
0.79646
~~-6.26~~ +6.26
1 ~~18.05~~ 1 18.05
1 ~~11.79~~ 1 24.31
21 24.04

-1688
1.69832n

+ 49.93
– .13
+ .10

– ~~49.96~~ +49.90
~~20 34.08~~
22 ~~13.94~~ 13.81
– 12.67
+4 44.75 -.13 ~~44.62~~
+4 32.08
26 46.02

– 12.67
+ 44.40
+ .54
+4 32.27
26 46.08

1 24.1
11.6
35.7
1 17.85

-1622
1.69898n

+ 50.00
–
+ .10

α 1872 4h 46.275 45.18
1873 39.973 25.78

July 11 1872 – .349	June 30 1873 – .537	July 7 – .516	July 10 1873 – .428
04 28.7 04 9.6	5 – 5 36.9 05	– 05 56.2 04	– 05 6.0
34.4	– 42.4	– 58.1	–
44.4	– 58.0	– 59.6	–
55.6	–	–	55.0 55.0
5.8	–	–	5.2 54.6
16.7	–	–	15.5 54.2
27.7	–	4.6 54.0	26.5 54.7
38.6	–	16.0 54.8	37.4 54.9
48.6	–	26.7 54.9	
	31.20	36.9 54.4	
	–7.30 23.50		
295.4			
55.4			
5 6.156 4 9.60	4 5 54.0 –10.59 5 43.10	4 54.52 5 57.97	4 54.70 5 6.00
5 6.00	4 48.21	4 54.36	4 54.54
– 7.57	+ 7.73	+ 0.56	– 1.27
– 3.54	– 5.47	– 5.30	– 4.35
– 4 ~~4.91~~ 6.19	– * 11.62	– * ~~9.89~~	– * ~~9.120~~
4 44.98	4 (~~49.18~~ 36.75)	~~39.75~~	~~39.80~~2
+0.77	+1.61	+1.56	+1.56
	55	55	55
1 36.9	0 40.2	0 40.0	0 45.2
24.5	55.9	55.7	5.1
61.4	96.1	95.7	11.03
1 30.70	0 48.05	0 47.85	0 55.15
+56.56	+44.40	+63.45	+11.30
1.75251	1.64738n	1.80243n	1.05308n
0.85630n	0.75117	0.90622	0.15687
–718	+564	+806	–143 +1.43
1 30.70	55 48.05	55 47.85	55 ~~55.15~~ 55 55.15
1 23.52	55 53.69	55 55.91	55 ~~53.72~~ 55 56.58
21 24.83	26 54.66	26 52.44	26 51.77
	–42 2 58	1.71510n	
–2350	–17.13	–663	–1468
1.69170n	1.69797n	1.70845n	1.70042n
+ 49.17	+ 49.88	+ 51.10	+ 50.17
– .17	– .11	– .32	– .01
+ .12	+ .01	+ .01	+ .01
– 49.22 +49.12	– 49.98 +49.78	– 51.31 +50.89	– 50.17 +50.17
20 35.61	26 4.68	26 1.13	26 1.60
22 13.95 22 13.80	27 44.4	27 43.33 27 43.27	27 41.94 27 41.87
– 13.04	– 9.11	– 9.95	– 10.24
+4 44.89 –.15 ~~44.74~~	–1 3.985	–1 4.60 –.06 ~~4.66~~	–1 4.86 –.07 ~~4.93~~
+4 31.85	–1 13.06	–1 14.55	–1 15.10
26 45.80	26 31.38	26 28.78	26 26.84

– 13.04	– 9.11	– 9.95	– 10.24
+4 44.51	–1 4.15	– 4.76	– 4.71
+ .51	+ 1.07	+ 1.04	+ 1.04
+4 31.98	–1 12.19	–1 13.67	–1 13.91
26 45.78		26 29.60	26 27.96

3 Serpentis

h	m	s
15	08	51
15	08	53
+	5 −0	23 −1
+	5	24 44

ζ = +36° 58′ 4″
+ .60

tang δ = +.09
x = −.016
conx = −.01 → 0.4

″ α 1872 49.687 δ = 24′ 57″.51 dα = +2.978
4″ α 1873 52.665 δ = 24 43.87 dδ = −13.64

1872	m	s
June 29	8	51.11
July 4		51.08 .03
9		51.04 .04
14		51.00 .04
19		50.95 .05

1873	m	s	
June 9	8	54.32	
14		54.32	0
19		54.31	1
24		54.29	2
29		54.27	2
July 4		54.24	3
9		54.20	4
14		54.16	4
19		54.11	5

Sin δ 8.97496
Cos δ 9.99806
1.1571n
0.11377n

	1872 July 1 −.397 −.40		1872 July 6 −.357		1872 July 7 −.319 −.31		1872 July 9 −.284 −.29		1872 July 11 −.349 −.35		1872 July 14 −.301 −.31	
15	08 36.5		08 ~~45.7~~	08 ~~37.6~~	08 47.1	08 51.1 ?	08 47.8	08 39.4	08 46.2	08 38.7	08 44.4	
	38.6		47.1	58	49.1	56.6	49.9		48.3	39.9	46.5	
	40.6		49.9	39.6	51.1 ?	7.7	52.0		50.2	41.3	48.6	
	44.7		54.0		55.3	53.85	56.1		54.5		52.7	
	46.8				57.3		58.2		56.6		54.7	
	49.0				59.4		0.2		58.7		56.8	
	50.0				1.5		2.3		0.8		58.9	
	53.0				3.6		4.3		2.8		0.9	
	57.1				7.8		8.6		6.9		5.0	
	59.2				9.8		10.6		9.0		7.1	
	1.3				11.8		12.7		11.0		9.2	
	477.8				353.8		302.7		345.2		384.8	
	537.8				653.8		2.7		645.2		624.8	
	48.891				59.436	8 53.85	0.245	8 39.40	58.655	8 39.93	56.800	
	8 48.88				8 59.42		8 9 0.23		8 58.64		8 56.78	
	8 51.10				8 51.06		8 51.04		8 51.02		8 51.00	
	−2.22				+8.36		−9.19		+7.62		+5.78	
	−2.21				+8.37		+9.20		+7.63		+5.79	
	+2.15 −.02				+8.43 +.01		−9.15 +.00		−7.56 +.01		−5.77 +.02	
	−0.04	−.03			−.03	−.03	−.03	−.02	−.03	−.03	−.63	−.03
	−1.41	+1.57			−1.37	+1.61	−1.35	+1.63	−1.33	+1.65	−1.31	+1.67
	+0.70 69				−9.832		−10.532		−9.973		7.11	
	8 48.88				59.42		0.23		58.64		56.78	
	8 49.58				49.5		49.69		49.72		49.67	
R.A	8 49.57	52.55			8 49.60	52.58	49.701	52.69	8 49.731	52.69	8 49.67	52.65
	+0.89				+0.82		+0.79		+0.77		+0.73	

0

July 6	July 7		July 9		July 11	
2 18.7	1 .0		2 20.2		2 17.7	
18.0	57.4		19.6		17.5	
36.7	115.4		39.8		35.2	
2′ 18.35	1 57.70		2 19.90		2 17.60	
	+5.59		+20.84		+18.72	
	0.74741		1.31890		1.27231	
	0.86118n		1.43267n		1.38608n	
	−7.26		−27.08		−24.33	
	1 57.70		2 19.90		2 17.60	
	1 50.44		1 52.82		1 53.27	
	+5° 20′ 57.9″		20 55.53		20 55.08	
	+36° 57′ 5″	1.63640 ~~1.62000~~				
	−1671		−1604		−2535	
	1.61969		1.62036		1.61105	
	− 41.66″		− 41.72		− 40.84	
	− .01		− .02		− .02	
	+ .16		+ .18		+ .18	
	+ 41.81	−41.51	+ 41.88	−~~41.54~~ 41.56	+ 41.00	−40.68
	+5 21 39.72		21 37.41		21 36.08	
	+5 20 16.40	20 16.20	20 13.99	13.97 13.74	20 14.40	14.17
	24 56.5		24 56.6		24 56.8	
	+4 40.1	39.9	+4 42.6	42.4	+4 42.4	42.2
	+4 39.7	39.5	+4 42.2	42.0	+4 42.0	41.8
	−12.64		12.74		12.94	12.94
	+1.00 +	1.00	+0.90 +	0.90	+0.70 +	0.70
	+4 44.75 −20	~~44.55~~	+4 44.68 −23	~~44.45~~	+4 44.89 −23	~~44.66~~
	+4 45.75 −4	44.40 49	+4 45.58	44.50 47	+4 45.59	44.59 46
	+5 25 2.15	+4 44.91	24 59.57	+4 44.93	24 59.99	+4 44.74
		25 1.1		24 58.87		24 58.91
		24 47.47		45.03		45.27

−0.4″

1872	′	″		1873		′	1873 ″	
June 29	24	55.8		June	9	24	37.4	
July 4		56.2	+4		14		37.9	+5
9		56.6	4		19		38.4	5
14		57.0	4		24		38.9	5
19		57.4	4		29		39.4	5
				July	4		39.8	4
					9		40.2	4
					14		40.6	4
					19		41.0	4

	1873 June 11 -.337 -.33	June 17 -.350 -.37	June 30 -.537 -.55	July 7 -.516 -.51	1878 July 13 -.439 -.44
	8 244 8 164	8 272 8 20.2	8 342 8 26.3	08 41.4	08 44.7
	265 176	29.3 21.3	36.4 27.5	43.4 08 32.3	46.7 08 37.7
	285 19.0	31.3 22.3	38.4 28.4	45.4 33.3	49.8 38.8
	325	33.5	42.4	49.5 34.3	52.8 39.8
	34.8	37.5	44.5	51.6	54.9
	36.8	39.7	46.6	53.7	57.0
	38.9	41.8	48.7	55.9	59.1
	409	43.9	50.7	57.8	1.1
	450	48.0	54.8	1.9	5.3
	47.1	50.0	54.0	4.0	7.3
	49.2	52.0	58.1	6.0	9.4
	4046	4362	512.8	40.6	388.1
	36.782 8 17.67	39.655 8 21.27	46.618 8 27.40	53.691 8 33.30	57.100 8 38.77
	8 36.76	8 39.64	8 46.60	8 53.68	8 57.09
	54.32	54.31	54.26	54.20	54.17
	-17.50	-14.67	-7.66	-0.54	+2.91
	-17.55	-14.66	-7.65	-0.53	+2.92
	+17.57 +.00	+14.78 -.02	+7.73 -.01	+0.55 +.00	-2.79 +.00
-.03	-.03 -.03	-.03 -.03	-.05 -.05	-.05 -.05	-.04 -.04
.67	-1.66	-1.64	-1.60	-1.55	-1.51
	+15.88	13.09	+6.087	-1.05	4.34
	8 36.76	39.64	46.60	53.68	57.08
	8 52.64	52.75	52.68	52.63	52.74
2.65	8 52.64	8 52.73	8 52.67	8 52.63	8 52.74
	+1.78	+1.74	+1.61	+1.56	+1.56
	55	55	55	55	56
	1 40.1	1 38.2	1 40.9	1 39.1	1 37.5
	50.9	48.7	54.1	51.2	48.1
	91.0	86.9	95.0	90.3	85.6
	56 45.50	1 43.45	1 47.50	1 45.15	1 42.80
	+19.11	+18.38	+19.22	+20.39	+18.33
	1.28126	1.26435	1.28375	1.30942	1.26316
	1.39503n	1.37812n	1.39752n	1.42319n	1.37693n
	-2484	-2388	-24.98	-2650	-2382
	56 45.50	56 43.45	56 47.50	56 45.15	56 42.80
	56 20.66	56 19.57	56 22.52	56 18.65	56 18.98
	26 27.99	26 28.78	26 25.83	26 29.70	26 29.37
+36°	57′ 28″ 1.63650 +.62060				
	-1028	-1419	-1713	-665	-1164
	1.62622	1.62231	1.61937	1.62985	~~1.61486~~ 1.62486
	✗ — 42.29	✗ — 41.91	✗ — 41.63	✗ — 42.64	✗ — 42.16
	— .02	— .01	— .02	— .02	— .01
	+ .00	+ .00	+ .02	+ .02	+ .08
	+ 42.27 - 42.31	+ 41.90 - 41.92	+ 41.63 - 41.63	+ 42.64 - 42.64	+ 42.23 - 42.09
	27 10.26	27 10.68	27 7.46	27 12.34	27 11.60
	25 45.68 25 45.54	25 48.86 46.72	25 44.20 44.06	25 47.06 46.92	25 47.28 47.14
	24 37.6	24 38.2	24 39.5	24 40.1	24 40.5
	-1 8.8 8.2	-1 8.7 8.8	-1 4.7 4.8	-1 7.0 7.1	-1 6.8 6.9
	-1 8.5 8.6	-1 9.1 9.2	-1 5.1 5.2	-1 7.4 7.5	-1 7.2 7.3
	+6.30 + 6.30	+5.70 + 5.70	+4.40 + 4.40	+3.80 + 3.80	+3.40 + 3.40
	-1 5.86 -14 6.00	-1 5.83 -14 5.97	-1 3.985 -14 4.04	-1 4.60 -14 4.76	-1 4.68 -14 4.85
	-0 59.56 -1 5.99 1.07	-1 0.15 — 5.82 1.04	-0 59.55 — 4.15 .97	-1 0.80 — .94	-1 1.28 — .94
	-24 46.12 -1 0.76	24 46.73 -1 1.16	24 44.65 -1 0.72	24 46.26 -1 1.90	24 46.50 -1 2.39
	24 44.78	24 45.56	24 43.34	24 45.02	24 44.75

δ · Bootis

h	m	s	
15	10	19	
+	33	48	
+	33	47	23"

z = + 8° 35' 25"

sin z = + .15

tang δ = +.67

x = -.019

cos x = -~~.05~~

α 1872 20.585 δ = 47 37.00

α 1873 23.006 δ = 47 23.38

dα = +2421
dδ = -13.63

1872

		m	s	
June	29	10	22.16	
July	4		22.10	6
	9		22.04	6
	14		21.97	7
	19		21.89	8

1873

		m	s	
June	9	10	24.94	
	14		.91	3
	19		.88	3
	24		.84	4
	29		24.79	5
July	4		.74	5
	9		.68	6
	14		.61	7
	19		24.54	7

Sin δ 9.74512
Cos δ 9.91968
11571n
0.03539n

1872
June
July

-.25 -.40 -.31 -.29 -.35 -.31

1872 .247
June 27 -.25

15 09 58.5 09 53.3 10
1.0 54.3
3.6 55.5
8.4
11.0
13.4
15.9
18.4
23.3
25.9
28.2
207.6
147.6
13.418 9 54.37

10 13.40
10 22.18
- 8.78
- ~~8.73~~

+ 8.82 +.00
- .17
- 1.60
+7.05 ~~12.45~~
+ ~~7.05~~6
13.40
20.45

R.A 10 20.46 22.88
~~+0.95~~
-.16
+ 0.82

40
0 6.4
0.2
6.6
0 3.30

+19.05
1.27989
1.31328n
-2067
40 3.30
39 42.63"
+33° 43' 5.72"
+8° 34' 57"

-858
0.93052

~~+~~- 8.52
- .09
- .00

+ ~~8.43~~ - 8.61
+33 ~~43~~ ~~14.15~~
+33 42 57.13' 42 57.11
47 42.0
+4 44.9 44.9
- 18.63
- 5.00 - 5.00
+4 ~~43.88~~ .00 ~~43.88~~
+4 38.88 ~~.44~~ 44.16
+33 47 35.99 - .14
+17 +4 39.02
+33 47 36.16 47 36.13
22.50

1872 .397
July 1 -.40

10 5.3 10 41.3
7.8
10.4
15.2
17.7
20.2
22.7
25.2
30.0
32.6
35.0
221.1
20.191 10 41.30

10 20.17
10 22.13
- 1.96
- ~~1.91~~

+2.14 -.02
- .27
- 1.54
+ 0.33
+0.3~~1~~2
20.17
20.54

10 20.54 22.91
~~+0.89~~
-.26
+ 0.88

35
4 23.5
21.2
44.7
4 22.35

-21.11
1.32449n
1.35988
+2290
39 22.35
39 45.25
43 3.10

0.93910

-2709
0.91201

~~+~~- 8.17
- .10
- .04

+ ~~8.03~~ - 8.31
~~43 11.13~~
42 54.79 54.35
47 42.6
+4 47.8 47.4
- 19.23
- 5.60 - 5.60
+4 ~~45.70~~ -.44 ~~45.46~~
+4 40.30 45.21
47 35.09 - .13
+.17 +4 39.48
47 35.26 47 33.83
20.20

1872 .319
July 7 -.31

10 15.8 09 39.4 10
18.2 0.5
20.7 1.7
23.6
28.2
30.6
33.1
35.6
40.6
43.0
45.5
336.9
30.627 10 0.53

10 30.61
10 22.06
+8.55
+~~8.60~~

-8.44 +.01
- .21
- 1.48
-10.1~~8~~2
30.61
20.48

10 20.4~~8~~9 22.91
~~+0.80~~
+0.82
-.21
+ 0.94

40
0 16.5
12.9
29.4
0 14.70

+30.10
1.47857
1.51396n
-3266
40 14.70
39 42.04
43 6.31

-1654
0.92256

~~+~~- 8.37
- .22
+ .02

+ ~~8.17~~ - 8.57
~~43 14.48~~
42 57.74 57.72
47 43.4
+4 45.7 45.7
20.03
- 6.40 - 6.40
+4 ~~44.75~~ -.62 ~~44.73~~
+4 38.35 44.40
47 36.09 - .12
+.17 +4 37.88
47 36.26 47 35.60
21.97

1872 .284
July 9 -.29

10 16.5 10 11.8 10
19.0 13.0
21.4 14.3
26.5 15.4
29.0
31.4
33.9
36.3
41.2
43.8
46.3
345.5
31.409 10 13.62

10 31.39
10 22.04
+9.35
+~~9.40~~

-9.15 +.00
- .19
- 1.45
10.79
31.39
20.60

10 20.60 23.02
+0.79
-.19
+ 0.97

0 1.8
0.0
1.8
0 0.90

+17.79
1.25018
1.28557n
-19.30
40 0.90
39 41.60
43 6.75

-1586
0.92324

~~+~~- 8.38
- .08
+ .00

+ ~~8.30~~ - 8.46
~~43 15.05~~
42 58.29 58.29
47 43.6
+4 45.3 45.3
20.23
- 6.60 - 6.60
+4 ~~44.68~~ .00 ~~44.68~~
+4 38.08 44.50
47 36.37 - .11
+.17 +4 37.79
47 36.54 47 36.08
22.45

1872 .349
July 11 -.35

10 24.8 10 40.5 10
25.9 41.5
27.2 43.5
28.5
29.7
31.0
32.3
33.5
34.7
267.6
29.733 10 41.83

10 29.71
10 22.01
+7.70
+~~7.75~~

+ ~~5.55~~ -.01
- .23
- 1.43
-10.2~~1~~2
29.71
20.50

10 20.49 22.91
+0.77
-.23
+ 0.99

35
4 33.0
29.7
62.7
4 31.35

-12.10
1.08279n
1.11818
+1313
39 31.35
39 44.48
43 3.87

-2320
0.91590

~~+~~- 8.24
- .03
+ .36

+ ~~8.57~~ - 7.91
~~43 12.44~~
42 55.96 55.51
47 43.9
+4 47.9 47.5
20.53
- 6.90 - 6.90
+4 ~~44.89~~ -.45 ~~44.44~~
+4 37.99 44.51
47 33.95 - .10
+.17 +4 37.50
47 34.12 47 33.01
19.38

1872 .301
July 14 -.31

10 23.0 10
24.2
25.4
26.7 10 35.8
27.9 37.2
29.2 38.5
30.4
31.6
32.8
251.2
27.911 10 37.17

10 27.89
10 21.97
+5.92
+~~5.97~~

-5.76 +.00
- .21
- 1.38
- 7.3~~5~~4
27.89
20.54

10 20.56 22.97
+0.73
-.20
+ 1.04

35
4 33.6
29.5
63.1
4 31.55

-9.26
0.96661n
1.00200
+1005
39 31.55
39 41.60
43 6.75

-2006
0.91904

~~+~~- 8.30
- .02
+ .45

+ ~~8.73~~ - 7.87
~~43 15.48~~
42 ~~58.88~~ 58.43
47 44.3
+4 45.4 44.9
20.93
- 7.30 - 7.30
+4 44.14 -.45 43.69
+4 36.84 43.81
47 35.72 - .10
+.17 +4 36.41
47 35.89 47 34.84
21.21

1872	′	″			1873
June 29	47	42.3		June	9
July 4		43.0	+.7		14
9		43.6	.6		19
14		44.3	.7		24
19		44.9	.6		29
				July	4
					9
					14
					19

′	1873 ″		1872.0 α	δ	1873.0 α	δ
47	22.1		20.46	36.16	22.97	22.38
	23.1	+1.0	.49	35.26	23.00	22.33
	24.1	1.0	.49	36.26	22.98	22.88
	25.0	.9	.60	36.54	.89	23.92
	25.8	.8	.49	34.12	.90	22.30
	26.6	.8	.55	35.89		
	27.3	.7	20.513	35.70 -.34	22.948	22.76 -.66
	27.9	.6	.585	37.00	23.006	23.38
	28.5	.6	-.072	-1.30	-.058	-.62
				35.56		22.10
				37.00		23.38
				-1.64		-1.28

	1873 June 11 -.337 -.33		June 17 -.350 -.37		June 30 -.537 -.55		July 7 -.516 -.51		1873 July 13 -.439 -.44	
	9 52.7	9 43.6	9 53.5	9 51.9	10 2.6	9 57.7	10		10 12.8	
	55.3	44.8	57.9	53.2	5.0	58.9	9.4	10 1.0	15.2	10 2.4
	57.6	46.2	10 0.5	54.5	7.5	10 0.2	12.0	2.3	17.8	3.7
35.8	10 2.6		5.4		12.4		14.7	5.1	22.7	5.0
37.2	5.0		7.9		14.9		19.6		25.1	
38.5	7.5		10.4		17.4		22.0		27.6	
	9.9		12.9		19.9		24.5		30.0	
	12.5		15.3		22.4		26.9		32.7	
	17.5		20.3		24.3		29.5		37.2 ~~34.8~~	
	20.0		22.6		29.9		34.1		40.0	
	22.5		25.3		32.2		36.6		42.6	
	263.1		234.0		191.5		39.0		303.7	
	83.1		114.0		17.409		268.3			
37.17	7.555	9 44.87	10.364	9 53.20		9 58.93	24.391	10 2.80	27.609	10 3.70
	10 7.54		10 10.35		10 17.39		10 24.37		10 27.59	
	10 24.93		10 24.89		10 24.78		10 24.70		10 24.62	
	-17.39		-14.54		-7.39		-0.33		+2.97	
	~~-17.34~~		~~-14.49~~		~~-7.34~~		~~-0.29~~		~~+3.02~~	
	+17.57 +.00		+14.78 -.02		+7.73 -.01		+0.55 +.00		-2.79 +.00	
-20	- .22	-.22	- .25	-.23	- .37	-.36	- 34	-.34	- .39	-.29
1.04	-1.92		-1.88		-1.77		-1.69		-1.61	
	+15.43		+12.65		+5.59		-1.48		-4.69	
	10 7.54		16.35		17.39		24.37		27.59	
	10 +22.97		23.00		22.98		22.89		22.90	
97	10 22.97		10 23.00		10 22.98		10 22.89		22.90	
	+1.78		+1.74		+1.61		+1.56		+1.56	
	30									
	4 31.3		24.0		23.9		25.0		28.6	
	43.3		36.7		37.9		37.5		41.1	
	74.6		60.7		61.8		62.5		69.7	
	4 37.30		4 30.35		4 30.90		4 31.25		4 34.85	
	+22.68		+17.16		+18.48		+21.59		+23.91	
	1.35564		1.23452		1.26670		1.33425		1.37858	
	1.39103n		1.26991n		1.30209n		1.36964n		1.41397n	
	-24.60		-18.62		-20.05		-23.43		-25.94	
	34 37.30		34 30.35		34 30.90		34 31.25		34 34.85	
	34 12.70		34 11.73		34 10.85		34 7.82		34 8.91	
	48 35.65		48 36.62		48 37.50		48 40.53		48 39.44	
+8°	35′ 19″	0.93940								
	-1020		-1413		-1694		-642		-1169	
	0.92920		0.92527		0.92246		0.93298		0.92771	
	~~+~~ - 8.50		~~+~~ - 8.42		~~+~~ - 8.36		~~+~~ - 8.57		~~+~~ - 8.47	
	- .14		- .07		- .08		- .11		- .18	
	+ .00		+ .00		+ .04		+ .04		+ .23	
7	~~+ 8.36~~ -8.64		~~+ 8.35~~ -8.49		~~+ 8.32~~ -8.40		~~+ 8.50~~ -8.64		~~+ 8.55~~ -8.39	
	~~48 44.01~~		~~48 44.97~~		~~48 45.82~~		~~48 49.03~~		~~48 47.99~~	
58.43	48 27.01	48 26.64	48 28.13	27.77	48 29.10	28.74	48 31.89	31.53	48 31.05	30.68
	47 22.5		47 23.7		47 26.0		47 27.0		47 27.8	
9	-1 4.5	4.9	-1 4.4	4.8	-1 3.1	3.5	-1 4.8	5.2	-1 3.2	3.6
7.30	+0.90 +	.90	-0.30 -	.30	-2.60 -	2.60	-3.70 -	3.70	-4.40 -	4.40
43.69	-1 5.86 -37	~~6.23~~	-1 5.83 -36	~~6.19~~	-1 3.985 -36	~~4.21~~	-1 4.60 -36	~~4.96~~	-1 4.68 -37	~~5.05~~
43.81	-1 4.96 -1	5.99	-1 6.13 -	5.82	-1 6.55 -	4.15	-1 8.30 -	4.76	-1 9.08 -	4.85
.10	47 22.05 -	.26	47 22.00 -	.26	47 22.55 -	.24	47 23.59 -	.23	47 21.97 -	.23
36.41	+.33 -1	5.35	+.33 -1	6.38	+.33 -1	6.99	+.33 -1	8.69	+.33 -1	9.48
34.84	47 22.38	47 21.24	47 22.33	47 21.39	47 22.88	47 21.75	47 23.92	47 22.84	47 22.30	47 21.20
21.21										

1 Hev, Urs, Min,

h	m	s	
15	13	08	
15	13	11	
+	67°	50'	
+	67	49'	46"
z =	−25°	26	58"
	−.43		

tang δ = +2.45

x = −.039

Conx = −.03 − 0.6

α1872 = 10.669 δ = 49 59.52

α1873 = 11.328 δ = 49 45.79

dα = +0.659

dδ = −13.73

1872	m	s	
June 29	13	13.43	
July 4		13.23	20
9		13.02	21
14		12.79	23
19		12.54	25

1873	m	s		'	1873 "	
June 9	13	15.07		49	48.9	
14		14.93	14		50.1	+1.2
19		14.78	15		51.3	1.2
24		14.61	17		52.3	1.0
29		14.42	19		53.3	1.0
July 4		14.22	20		54.1	.8
9		14.01	21		54.8	.7
14		13.78	23		55.3	.5
19		13.54	24		55.8	.5

1872
~~June 27~~ July 1 −.397 −.40

15
12 39.5 12 25.8
45.0 27.7
50.3 30.3
1.4
6.9
12.2
17.6
23.0
34.0
39.5
44.9
314.3
134.3
12.209 12 27.93
13 12.17
13 13.34
−1.17
−1.14
+2.14 −.02
−.98 −.97
−2.67 −2.01
−1.52
13 12.17
13 10.66
R.A. 13 10.65 13 11.31
+0.89
35
3 16.0
6.7
22.7
3 11.35
+44.28
1.64621
1.33861n
−21.81
38 11.35
37 49.54
+67° 34' 58.81"
−25° 26' 56" 1.43770n
−2709
1.41061n
+ 25.74
− .37
− .03
− 26.14 +25.34
+67 44 32.67
+67 45 24.15 45 23.83
50 ~~49~~ 10.1
−0.6"
+4 46.0 45.7
+4 45.4 45.1
−24.33
−10.60 10.60
+4 45.90 −.32 ~~45.58~~
+4 35.30 ±4 45.21 .38
+67 49 59.45 +4 34.99
49 58.82
49 45.09

1872
July 7 −.319 −.31

13 11.5 12 43.7
14.1 46.7
16.8 49.3
19.3
22.3
25.1
27.7
30.7
33.4
201.1
22.344 12 46.23
13 22.31
13.10
+9.21
+9.24
+8.44 +.01
−.76 −.78
−2.43 +1.77
−11.634
22.31
10.68
13 10.67 11.33
+0.82
3 12.9 2 32.3
2.3 22.9
15.2 65.1
~~3 11.10~~ 2 32.55
38 ~~5.60~~
7.60
36.11
1.55763
1.25003n
−17.79
38 7.60
37 49.81
44 58.54
−1654
1.42116n
+ 26.37
− .25
+ .25
− 26.37 +26.37
44 32.17
45 24.91 24.60
50 ~~49~~ 10.09
+4 45.1 44.8
+4 44.5 44.2
24.23
−10.50 10.50
+4 44.75 −.31 + 44.40
+4 34.25 + .35
49 59.16 +4 34.25
49 58.85
45.12

1872
July 9 −.284 −.29

13 12.2 12 17.9
14.8 19.8
17.6 22.6
20.2
23.0
25.9
28.5
31.2
33.9
207.3
23.033 12 20.00
13 22.99
13.01
+9.98
+10.01
−9.15 +.00
−.71 −.69
−2.34 −1.68
−12.20 18
22.99
10.79
13 10.81 11.47
+0.79
3 24.1
15.8
39.9
3 19.95
+63.03
1.79955
1.49195n
−31.04
38 19.95
37 48.91
44 59.44
−1586
1.42184n
+ 26.41
− .76
+ .26
− 26.91 +25.91
44 32.53
45 25.35 25.02
50 ~~49~~ 11.1
+4 45.8 45.5
+4 45.2 44.9
25.33
−11.60 11.60
+4 44.68 .33 ~~44.35~~
+4 33.08 ± 44.50 .33
49 58.43 +4 33.23
49 58.25
44.52

1872
July 14 −.301 −.35

13 8.2 12 36.9
11.0 38.2
13.8 40.5
16.6 41.4
19.4
22.2
24.9
27.6
30.4
179.1
19.344 12 39.25
13 19.31
12.78
+6.53
+6.56
−5.76 +.00
−.86 −.74
−2.11 −1.45
~~−11.52~~ 8.78 .61
19.31
10.58
13 10.70 11.36
+0.73
3 11.7
1.9
13.6
3 6.80
+40.09
1.60304
1.29544n
−19.74
38 6.80
37 47.06
45 1.29
−2006
1.41764n
+ 26.16
− .30
+ .31
− 26.15 +26.17
44 35.14
45 27.46 27.15
50 ~~49~~ 11.7
+4 44.2 43.9
+4 43.6 43.3
25.93
−12.20 12.20
+4 44.14 −.31 + 43.83
+4 31.94 + .31
49 59.40 +4 31.92
49 59.07
45.34

1873
June 11 −.337 −.33

12 12 20.5
47.4 22.3
50.2 24.7
52.8
55.6
58.3
13 1.0
3.7
6.5
9.2
284.7
524.4
58.300 12 22.50
12 58.26
13 15.01
−16.75
−16.72
+17.57 +.00
−.84 −.82
−3.68
+13.08 7
12 58.26
13 11.34
13 11.33
+1.78
30
2 32.0
46.8
77.8
2 38.90
+35.80
1.55388
1.24628n
−17.63
32 38.90
32 21.27
50 27.08
−25° 33' 28" 1.43980
26 −1820
1.42750n
+ 26.76
− .25
+ .00
− 27.01 +26.51
50 0.07
50 53.59 50 53.38
~~49~~ 49.4
~~+4 45.8~~ −1 4.2 4.4
−1 4.8 5.0
−3.60 3.60
−1 5.86 −.21 ~~6.07~~
−1 9.46 +1 5.99 .76
49 44.13 −1 8.83
49 44.55

1872

				′	″	
Sin δ	9.96665	June	29	49	69.8	
Cos δ	9.57669	July	4		70.5	+.7
	11571n		9		71.1	.6
	9.69240n		14		71.7	.6
			19		72.3	.6

1873 June 17 –.37 –.350

12
50.0
52.8
55.6
58.3
13 1.0
3.8
6.5
9.0
12.0

12 24.8
26.5
29.2

2490
9.00
1.000 12 26.83

13 0.96
13 14.84
–13.88
–13.85

+14.78 –.02
– .91 –.86
–3.51
+10.36 9
0.96
11.32

13 11.35

+1.74

30
2 30.0
43.1
73.1
2 36.55

+34.17
1.53364
1.22604n
–1683
32 36.55
32 19.72

50 28.63

–1413
1.42357n

+ 26.52
– .22
+ .00

– 26.74 + 26.30
50 1.89
50 54.93 50 54.72
49 50.9
–1 4.0 4.2
–1 4.6 4.8

– 5.10 – 5.10
–1 5.83 –.21 6.04
–1 10.93 + 5.82 .74
49 44.00 –1 10.18
49 44.54

June 30 –.55 –.537

12
59.1
59.7
13 2.7
5.4
8.2
11.6
13.3
16.2
19.1

13 14.3
16.8
18.5

1943
74.3
8255 12 16.53

13 8.22
14.37
– 6.15
– 6.12

7.73 –.01
– 1.35 –1.31
–3.04
+3.39 7
8.22
11.56

13 11.59

+1.61

30
2 35.9
51.9
87.8
2 43.90

+51.72
1.71366
1.40606n
–2547
32 43.90
32 18.43

50 29.92

–1694
1.42076n

+ 26.35
– .30
+ .03

– 26.82 + 25.88
50 3.10
50 55.80 55.58
49 53.5
–1 2.3 2.5
–1 2.9 3.1

– 7.70 – 7.70
–1 3.985 –.22 4.15
–1 11.65 + .69
49 44.15 –1 11.16
49 44.42

July 6 –.51 –.518

12
3.0
5.7
8.7
11.2
13.7
16.6
19.3
22.2
24.8

12 16.5
20.6
24.7

1249
x
13878 12 20.60

13 13.84
14.13
– 0.29
– 0.26

+ 1.57 +.02
– 1.25 –1.27
– 2.80
– 2.48
13.84
11.36

13 11.36

+1.57

30
2 35.2
51.0
86.2
2 43.10

+53.28
1.72656
1.41896n
–26.24
32 43.10
32 16.86

50 31.49

–1045
1.42725n

+ 26.75
– .55
+ .03

– 27.27 + 26.23
50 4.22
50 57.72 57.50
49 54.34
–1 3.43 3.5
–1 3.9 4.1

– 8.60 – 8.60
–1 4.28 –.22 4.50
–1 12.88 + 4.41 .67
49 44.84 –1 12.34
49 45.16

July 7 –.51 –.516

13
3.9
6.4
9.2
12.2
14.9
17.5
20.1
23.2
25.8

12 44.0
45.3
47.4

1332
14800 12 45.57

13 14.76
14.09
+ .67
+0.70

+ 0.55 +.00
– 1.25 –1.26
– 2.76
– 3.46 7
14.76
11.30

13 11.29

+1.56

30
2 24.1
38.8
62.9
2 31.45

+29.23
1.46583
1.15823n
–1440
32 31.45
32 17.05

50 31.30

–6.42
1.43128n

+ 27.00
– .17
+ .02

– 27.15 + 26.85
50 4.15
50 58.15 57.95
49 54.46
–1 3.6 3.8
–1 4.2 4.4

– 8.80 – 8.80
–1 4.60 –.20 4.80
–1 13.40 + 4.76 .67
49 44.75 –1 12.89
49 45.06

July 9 –.49 –.496

13
5.0
7.8
10.5
13.4
16.1
18.5
21.4
24.0
26.7

12 42.6
44.6
47.7

1434
15.933 12 44.97

13 15.89
14.00
+1.89
+1.92

– 0.71 +.00
– 1.20 –1.21
– 2.67
– 4.58 9
15.89
11.31

13 11.30

+1.56

30
2 24.2
39.7
63.9
2 31.95

+30.96
1.49080
1.18320n
–13.25
32 31.95
32 16.70

50 31.65

–881
1.42889n

+ 26.85
– .18
+ .02

– 27.01 + 26.69
50 4.64
50 58.34 58.14
49 54.8
–1 3.5 3.7
–1 4.1 4.3

– 9.00 – 9.00
–1 4.70 –.20 4.90
–1 13.70 + 4.75 .67
49 44.64 –1 13.08
49 45.06

July 13 –.44 –.439

13
~~45.0~~ ~~50.5~~
~~50.5~~ 56
~~56.0~~ 7.0
9.5
12.3
15.0
17.7
20.4
23.0
25.8
28.5
159.2

12 32.1
34.0
36.2

17.689 12 34.10

13 17.65
13.81
+3.84
+3.87

– 2.42 .79 +.00
– 1.08 –1.07
– 2.48
– 6.35 4
17.65
11.30

13 11.31

+1.56

30
2 31.5
44.6
76.1
2 38.05

+43.59
1.63939
1.33179n
–2147
32 38.05
32 16.58

50 31.77

–1169
1.42601n

+ 26.67
– .36
+ .13

– 26.90 + 26.44
50 4.87
50 58.21 58.00
49 55.2
–1 3.0 3.2
–1 3.6 3.8

– 9.40 – 9.40
–1 4.68 –.21 4.85
–1 14.08 + .67
49 44.13 –1 13.58
49 44.42

-.140 Urs Min.

51 4~~8~~ Urs. Min. =7

15 19 26

+ 87 43

z = -45 20

-0.71

Red.

m	s
.1	43.4
1	17.6
	51.7
	25.8
	0.11

Yang δ = +25.338

25.080

K = -.183

Sin δ 9.99966

tan δ 8.60033

.11571n

8.71604n

Ch. f.

June 11 1872 -.194

15	19	—	19 26.8
		—	
		18.7	44.5
		44.5	44.5
		10.1	44.3

19 44.433 19 26.80

19 44.25
+13.93
-4.91
-28.86

19 24.41

June 30 1872 -.330

18	58.5	50.2
	23.5	49.3
	-48.9	48.9
	—	—
	41.2	49.5

19 49.480

19 49.30
+4.76
-8.34
-21.04

19 24.68

July 7 1872 -.31~~8~~9

18	16.1	17	8.5
	43.7		36.3
	7.0		1.7
	32.6		
	57.9		
	24.2	~~22~~	~~23.4~~
	50.8		32.9
	17.1		39.2
	43.0	22	31.83

291.9

531.9

19 59.100 17 35.50

19 58.92
-8.43
-8.08
+17.62

19 24.79

July 9 1872

June 11 1873 -.337

18		18	16.5
	—		25.3
	—		39.5
	31.7		
	58.4		
19	23.3		
	49.3		
20	15.0		
	—		
	—		

19 23.54 18 27.10

19 23.36
+17.56
-8.43
-+30.64

19 18~~7~~5

45

+1.21

0	16.0
	0.9
	16.9
0'	8.45

+17.63

1.24625

9.96229n

~~-9.17~~ -0.92

45 ~~8.45~~ 45 8.45

44 ~~59.28~~ 45 7.53

87 37 40.82

-45 19 41 1.76470n

-1388

1.75085n

+ 56.34

+ - .01

+ .00

~~56.35~~ + 56.33

+87 ~~- 36 44.47~~

+87 38 37.15 38 37.04

+ 7.51

+4 45.21 - 01 ~~45.15~~

+4 ~~37.70~~ 52.72

87 43 ~~14.85~~

22.87 - 7.51

+4 45.02

+ .85

h	m	s		m	s
15	19	43		19	38.34
0	"	"	"	"	43
+87	43	22		43	3

~~53.38~~ 38.36

~~30.52~~ 15.50

+0.92

~~+56.44~~

+0.82

0	22.0	0	15.3
	11.3		4.1
	33.3		19.4
0	16.65	0	9.70

+14360 -15275

2.15715 2.18392n

0.87319n 0.89956

- 7.47 + 7.54

45 16.65 9.70

45 9.18 17.64 -

37 35.17 30.[illegible]

-1637

1.74833n

+ 56.02

+ .45

+ .02

~~56.45~~ + 55.59

~~36 42.72~~

38 34.76 38 34.73

+ 11.91

+4 44.78 -03

+4 ~~32.84~~ 6.66

43 ~~7.60~~

31.32 - 11.91

+4 44.40

+ .58

+4 ~~56.84~~ 53.07

43 ~~31.62~~

[illegible] make [illegible]

+1.78

35	
4	29.9
	44.1
	74.0
4	37.00

56.44

1.75159

0.46763n

~~-29.35~~ -2.93

39 ~~37.00~~ 39 37.00

39 ~~7.65~~ 39 34.07

43 14.28

-45 19 18

-1011

1.75459n

+ 56.83

+ - .07

+ .00

~~56.90~~ + 56.76

~~42 17.38~~

44 11.04 44 10.67

+ 4.70

-1 5.86 - .37 ~~6.23~~

-1 ~~10.56~~ 1.16

~~43 0.48~~

43 8.88 Ge - 4.70

-1 5.99

+ 1.26

-1 9.43

43 9.24

2 1872 19 ~~24.545~~ 24.627 43 ~~31.67~~ 15.50
1873 19 1.914 43 0.57

1873
June 17 -.350

17
42.3 257
18 8.9 265
33.9 256
58.4 242
19 25.0 250
50.8 250
20 17.8 26!

16 40.8
43.2

July 7 -.516

18 41.3
19 7.0 328
33.0 330
58.3 325
2 5.0 333

July 10 -.428

19
40.0?
41.8
3rd 31.2
8. 58.4
23.9

18 32.0

1873
July 13 -.439

18
316 14.0
324 40.7
323 6.5
315 31.9
311 56.9
314 23.1
323 49.6
317 15.1

18
11.0
13.4
16.1

19 25.443
19 25.443 16 42.00 19 33.867 18 41.30 19 31.66 18 32.00 19 31.838 18 13.50

19 25.26
+14.75
-8.73
-* 28.42

19 2.86

19 33.6968
+0.55
-12.90
-* 19.33

19 2.0100

19 31.48
-1.28
-10.70
-* 17.77

19 1.73

19 31.676
-2.80
-10.98
-* 16.75

19 1.193

+1.74
35
4 35.0
49.9
84.9
4 42.45

+163.44
2.21337
0.92941
-8.50
39 42.45
39 33.95

43 14.40

-1407
1.75083m
6

+ 56.32
*- .58
+ .00

- ~~56.70~~ 56.69 +55.74
42 17.50
44 10.14
5.77
-1 5.83 -38
-1 11.60
42 58.50

44 9.76
~~6.21~~
- 5.77
-1 5.82
+ 1.23
-1 10.36
42 59.40

+1.56
35
4 17.5
52.9
70.4
4 35.20

+52.57
1.72074
0.43678
-2.73
39 35.20
39 32.47

43 15.88

-619
1.75854m

+ 57.35
*- .06
+ .05

- ~~57.36~~ +57.34
42 ~~18.52~~
44 13.22
- 9.18
-1 4.60 -37
-1 13.78
42 59.44

12.85
~~4.97~~
- 9.18
- 4.76
+ 1.10
-1 12.84
43 0.01

+1.56
35
4 27.0
41.1
68.1
4 34.05

+59.66
1.77568
0.49172
-3.10
39 34.05
39 30.95

43 17.40

-1460
1.75010m

+ 56.25
*- .08
+ .05

- ~~56.28~~ +56.22
42 ~~21.12~~
44 13.62
- 9.50
-1 4.86 -37
-1 14.36
42 59.26

13.25
~~5.23~~
- 9.50
- 4.71
+ 1.10
-1 13.11
43 0.14

+1.56
35
4 26.0
40.3
66.3
4 33.15

+78.34
1.89398
0.61002
-4.07
39 33.15
39 29.08

43 19.27

-1174
1.75296m

+ 56.62
*- .13
+ .23

- ~~56.52~~ +56.72
42 ~~22.75~~
44 15.99
- 9.80
-1 4.68 -37
-1 14.48
43 1.51

15.62
~~5.05~~
- 9.80
- 4.85
+ 1.10
-1 13.55
43 2.07

γ2 Urs. Min.

h	m	s	
15	21	00	
15	20	57	
+	72°	18′	″
+	72	17	09
z = −	~~30°~~ 29	54′	21″

sin. z = −.50

tang δ = +3.13
x = −.049
cos x = −.10
α 1872 57.129 δ = 17 22.08
α 1873 56.994 δ = 17 9.27

dα = −0.135
dδ = −12.81

1872

1872	m s	
June 29	20 60.48	
July 4	60.22	26
9	59.94	28
14	59.65	29
19	59.34	31
24	59.02	32
29	58.69	33

1872

Sin δ 9.97890
Cos δ 9.48332
.11571n
9.59903n

′	″	
16	92.5	
	93.3	+.8
	94.0	.7
	94.6	.6
	95.1	.5
	95.4	.3
	95.7	.3

1872.0
α 56.63
57.00
56.97
56.91
56.88
56.878
57129
−.251

δ
19.70
20.19
21.17
20.35 +1.16 21.51
22.08 22.08
−1.73 −.57

1873.0
α 56.75
56.92
56.98
56.95
56.900
.994
−.094

δ 8.42
842
9.27
−85

1872 June 27 −.247 −.25

15 20 38.5 20 125 21
41.9 151
45.3 17.6
48.5 19.6
52.2
55.3
58.9
2.2
5.8

348.6
468.6
52.067 20 16.20

20 52.02
20 60.57
−8.55
−8.45

+8.82 +.00
−.78 −.77
−3.44 −3.57
+4.60
20 52.02
20 56.62 ?

20 56.63 20 56.50

+0.95

1873 June 30

−2.80

1872 July 9 −.284 −.29

20 56.3 20 0.4
59.6 4.3
21 3.0 7.2
6.6
9.9
13.4
16.9
20.0
23.3

209.0
89.0
9.889 20 3.97

21 9.84
20 59.93
+9.91
+10.01

−9.15 +.00
−.91 −.89
−2.80 −2.93
−12.864
9.84
56.98

20 57.00 56.87

+0.79

1872 July 11 −.349 −.35

20 54.8
58.1
1.5
5.1
8.4
11.8
15.0
18.5
21.9

195.1
75.1
8.344

21 8.30
20 59.81
+8.49
+8.59

−8.85 −.01
−1.10 −1.09
−2.68 −2.81
−12.33
8.30
56.97

20 56.97 56.84

+0.77

1872 July 14 −.301 −.31

20 52.3 20 23.5
56.1 26.4
59.5 30.0
2.7
6.1
9.6
13.0
16.4
19.6

235.5
55.5
6.167 20 26.63

21 6.12
21 59.64
+6.48
+6.58

−5.76 +.00
−.97 −.94
−2.51 −2.64
−9.241
6.12
56.88

20 56.91 56.78

+0.73

1872 July 24 −.260 −.27

20 49.6 20 27.1
53.2 32.3
56.5 38.4
59.7
2.8
6.4
9.8
13.4
16.7

268.1
28.1
3.122 20 32.60

21 3.07
20 59.00
+4.07
+4.17

−3.459 −.02
−.85 −.81
−1.87 −2.00
−6.20 −.19
3.07
56.87

20 56.88 56.75

+0.66

20
0 53.9
42.8
967
0 48.35

+35.87
1.55473
1.15376n
−14.25
Eric. Red. 20 48.35
10 34.10
+72° 3′ 14.25″
+72° 12′ 14.25″

δ −29° 54′ 11″ 1.51990n
−849
1.51141n

″
+ 32.46
− .20
− .01

− 32.67 + 32.25
+72 11 41.58
+72 12 48.50 12 46.42
17 ~~16~~ 32.2
+4 45.7 45.6
− 22.91
− 10.10 − 10.10
+4 43.88 −.08 ~~45.80~~
+4 33.78 +4 44.16
+72 17 20.28 + .48
−.58 +4 34.54
+72 17 19.70 17 20.96
8.15

10
1 1.7
53.7
55.4
1 27.70
10 57.70

+65.92
1.81902
1.41805n
−26.19
10 57.70
10 31.51

12 16.84

−15.68
1.50422n

+ 31.93
− .86
+ .08

− 32.71 + 31.15
11 44.17
12 47.99 47.89
17 34.0
+4 46.0 45.9
24.71
− 11.40 − 11.90
+4 44.68 −.10 ~~44.58~~
+4 32.78 + 44.50
17 20.77 + .40
− .58 +4 33.00
17 20.19 17 20.89
8.48

10
0 50.6
40.3
908
0 45.40

+39.54
1.59704
1.19607n
−15.71
10 45.40
10 29.69

12 18.66

− 19.91
1.49999n

+ 31.62
− .25
+ .08

− 31.79 + 31.45
11 46.87
12 50.11 50.03
17 ~~16~~ 34.6
+4 44.5 44.4
− 25.31
− 12.50 − 12.50
+4 44.14 −.08 ~~44.06~~ +4 43.88
+4 31.64 + 43.81
17 21.75 + .36
− .58 +4 31.67 − .58
17 21.17 17 21.70
8.69

1873		α		δ
July 7	20	56.75	17	7.76
10		56.92		8.81
12		56.98		9.89
21		56.95		

+30.57
1.48530
1.08433n
−12.14

− 17.42
1.50248n

+ 31.80
− .15

√ Gr 642 = δ

Yang δ = −15.196
−15.155

k = +.067

Sin δ 9.99908
Cos δ 8.81367
11571n
8.92938

α 1872 24 48.106
1873 25 8.720

43.5692 1638
3018 2981

k/3 23 57
93 44
− 51 22
−078

10.62
9.27
+1.35

1872 June 27 −233 −.25

15 23 21.1 25 31.7
35.9 39.3
51.9 46.0
8.1 56.3
22.8
38.9
54.4
10.2
25.9

269.2
209.3
24 23.244 25 43.32
24
24 23.31
+8.81
+3.54
+13.08

25 ~~18.74~~
48.74

+0.95

40
3 5.5
52.7
18.2
3 29.10
42 59.10
−80.08
1.90352n
0.83290n
−681
42 59.10
42 52.29
93 39 56.06

−51° 21′ 53″ = 1.85690n
−840
1.84850n
+ .00
+1 10.55
+ .23
− .03

+93 −1 10.35 +1 10.75
~~38 45.71~~
+93 41 6.81 41 6.51
+ 10.21
+4 43.88 −.30 ~~43.58~~
+4 54.09
+93 46 0.90
+ 10.21
+4 44.16
+ .54
+4 ~~54.69~~
40 41.20
86 14 16

h m s
3 23 38
° ′ ″
+86 14 8

1872 July 7 −319 −.31

28 39.2 22 23.4
54.8 32.9
10.4 39.2
26.9
41.5
57.0
12.7
27.2
44.4

314.1
374.1
41.567 22 21.83
24 41.643
−8.43
+4.85
+10.00

24 48.065

~~+0.82~~

2 42.1
31.3
73.4
2 36.70
+129.74
2.11294
1.04232
+11.02
42 36.70
42 47.72
40 0.63

−619
1.85071n
+ .01
+1 10.91
+ .59
+ .21

−1 10.12 +1 ~~10.82~~ 11.72
~~38 50.51~~
~~41 11.45~~ 12.35 12.09
+ 11.51
+4 44.75 −.26 ~~44.49~~
+4 56.26
46 8.61
+ 11.51
+ 44.40
+ .63
+4 ~~56.54~~ 33.52
45.61

1872 July 9 −284 −.29

23 40.7 21 53.9
55.2 4.6
24 12.5 26.6
28.2
43.4
59.3
14.9
30.7
45.4

330.3
390.3
43.367 27 2 8.37
24 43.443
−9.15
+4.31
+9.36

24 47.965

+0.79

2 41.0
32.9
73.9
2 36.95
+215.00 +155.00
2.33244 2.19033
1.26182 1.11971
+18.28 +13.17
42 36.95 36.95
42 ~~55.23~~ 50.12
39 ~~53.12~~ 58.23

−1568
1.84122n
+ .01
+1 9.38
+ 1.64
+ .21

−1 7.54 +1 11.24
38 45.58
41 ~~4.36~~ 9.47 9.21
+ 11.72
+4 44.68 −.26 ~~44.42~~
+4 56.40
46 ~~0.76~~ 6.87
+ 11.72
+ 44.50
+ .61
+4 ~~56.83~~ 33.39
42.60

1872 July 11 −349 −.35

23 38.6 22 17.7
54.7
24 10.2
24.6
41.9
57.9
12.5
28.6
44.2

315.2
375.2
41.689 22 17.70
24 41.76
−7.56
+5.30
+8.69

24 48.19

+0.77

2 39.5
29.8
69.3
2 34.65
+142.99
2.15836
1.08774
+12.24
42 34.65
42 46.89
41 1.46

−2305
1.83385n
+ .01
+1 8.21
+ .73
+ .26

−1 7.28 +1 9.16
38 54.18
41 10.62 10.36
+ 11.91
+4 44.89 −.26 ~~44.63~~
4 56.80
46 7.42
+ 11.91
+ 44.51
+ .60
+4 ~~57.42~~ 33.20
43.56

1872 July 14 −301 −.31

23 38.4 21 43.3
54.5
24 9.1
25.4
41.8
56.3
12.1
28.2
43.8

309.6
369.6
41.067 21 43.30
24 41.143
−5.76
+4.57
+7.66

24 47.680

+0.73

2 38.0
26.9
64.9
2 32.45
+177.77
2.24993
1.17931
+15.11
42 32.45
42 47.56
40 0.79

−1991
1.83699n
+ .01
+1 8.70
+ 1.12
+ .25

−1 7.34 +1 10.08
38 53.45
41 10.87 10.62
+ 12.15
+4 44.14 −.25 ~~43.89~~
+4 56.59
46 7.96
+ 12.15
+ 43.81
+ .56
+4 ~~56.52~~ 32.32
Ex Red. ~~App. Pl.~~
4294

1873 July 7 −516 −.51 see S.L.

23 21 37.5
46.4 41.0
24 3.2 49.1
17.8 64.8
33.6
48.2
4.0
20.6
33.8
53.3

260.9
480.9
48.989 21 48.10
24 49.06
+0.55
+7.82
+10.72

25 8.15

δ		α
29.72	Jul 10	7.43
30.75	12	7.46
30.43	13	7.54

+1.56

35
1 57.7
01.1
~~12.88~~
59.40
+180.89
2.25744
1.18682
+15.38
36 59.40
37 −5.78
14
46 ~~28.67~~ 33.57

−51° 22′ 32″ = 1.85700n
−2377
1.83323n
+ .00
+1 8.11
+ 1.16
+ .02

−1 6.93 +1 9.29
45 21.64
46 ~~37.86~~ 42.69 46 42.69
+ 9.27
−1 4.60 −.17 4.77
−0 55.33
46 42.53
+ 9.27
−1 4.76
+ 1.21
−0 ~~54.25~~ 12.82
45 28.57
~~37 56.47~~

V, Bootis

tang δ = + 8.8
x = -.021
Corr α = +.01

h m s
15 26 18
15 26 22
+ 41° 16′
+ 41 16 02
z = + 1° 6′ 46″
+.02

α 1872 19.896
α 1873 22.049

1872 m s
June 9 26 21.81
14 .78 03
19 .74 4
24 .69 5
29 21.64 5
July 4 .57 7
9 .50 7
14 .42 8
19 21.33 .09

1873 m s
June 29 26 24.01
July 4 23.95 6
9 23.88 7
14 23.80 8
19 23.71 9

δ 1872 = 16 14.36
δ 1873 = 16 1.91

Sin δ 9.81926
Cos δ 9.87601
.11571n
9.99172n

V¹ (dα = +2.153
(dδ = -12.45

V² (dα = +2.144
(dδ = -12.39

June 4.9 1872 -.20 | July 7 1872 -.319 -.31 | July 9 1872 -.284 -.29 | July 11 1872 -.349 -.35 | July 14 1872 -.301 -.31 | July 16 1872 -.336 -.33

15 25 51.1 25 46.6 26 13.8 26 10.2 26 14.5 26 21.0 26 23.8 26 20.3 26 22.0 26 40.5 26 10.3 26 0.3
54.2 48.7 16.5 11.2 17.3 25.2 21.3 23.3 41.6 12.9 1.4
57.0 49.7 19.3 12.5 20.1 26.6 22.2 24.6 43.1 15.6 2.5
2.5 51.6 24.8 25.4 27.9 26.1 21.2
5.2 27.5 28.2 29.4 27.5 24.0
7.9 30.3 26 58.4 31.0 30.7 28.8 26.6
10.7 26 37.0 33.0 59.0 33.8 31.9 30.1 29.4
13.5 38.1 35.8 59.6 36.5 33.5 31.4 32.1
18.9 39.2 41.2 41.9 34.9 32.9 37.6
21.6 43.9 44.7 40.3
24.5 46.7 47.4 43.0
266.1 332.8 340.8 263.9 246.7 293.0
88.1
7.827 25 49.15 30.255 26 11.30 30.982 26 21.00 29.322 26 21.27 27.411 26 41.73 26.636 26 1.40
26 38.10 26 59.00

26 7.84 26 30.23 26 30.96 26 29.30 26 27.39 26 26.61
26 21.80 26 21.88 26 21.50 26 21.47 26 21.42 26 21.41
-13.99 +8.70 +9.46 +7.83 +5.97 +5.21
~~-14.00~~ ~~+8.69~~ ~~+9.45~~ ~~+7.82~~ ~~+5.96~~ ~~+5.20~~

+13.93 +.00 | +8.44 +.01 | -9.15 +.00 | -8.55 -.01 | -8.76 +.00 | -4.94 +.00
-.18 -.17 | -.27 -.28 | -.26 -.25 | -.31 -.31 | -.27 -.26 | -.29 -.29
-1.90 +0.95 | -1.63 +0.52 | -1.60 +0.55 | -1.57 +0.58 | -1.52 +0.63 | -1.30 -0.65
+11.856 | -10.34 | -11.010 | -9.43 -10.44 | -9.554 | -6.73
26 7.750 | 30.23 | 30.96 | 29.30 | 27.39 | 26.61
26 19.75 | 19.89 | 19.95 | 19.87 | 19.84 | 19.86

26 19.76 26 21.91 26 19.89 22.04 26 19.96 22.11 26 19.86 22.01 26 19.85 22.00 26 19.88 22.03

+1.21 +0.82 +0.79 +0.77 +0.73 +0.72

10

1 39.1 0 51.5 1 32.1 0 46.2 1 21.8 1 21.4 1 57.5 1 35.1
29.1 41.9 26.9 40.2 18.9 16.9 52.7 31.7
682 934 590 864 407 383 1102 668
1 34.10 0 46.70 1 29.50 0 43.20 1 20.35 1 19.15 1 55.10 1 33.40

+18.67 -30.28 +18.95 -28.75 +9.98 +8.05 +14.32 +25.24
1.27114 1.48116n 1.27761 1.45864n 0.99913 0.90580 1.15594 1.40209
1.26286n 1.47288 1.26933n 1.45036 0.99085n 0.89752n 1.14766n 1.39381n
-18.32 +29.71 -18.59 +28.21 -9.79 -7.90 +14.05 -24.77
11 34.10 10 46.70 11 29.50 10 43.20 11 20.35 11 19.15 11 53.10 10 33.40
11 15.78 11 16.41 11 10.91 11 11.41 11 10.56 11 11.25 12 41.05 11 8.63
9.15

+41° 11′ 32.57″ 11′ 31.94″ 11′ 37.44″ 11′ 36.94″ 11′ 37.79″ 11′ 37.10″ 11′ 7.30″ 11′ 39.72″
39.20

+1° 6′ 31″ 0.04690
-1369 -1620 -1550 -2290 -1976 -2241
0.03321 0.03070 0.03140 0.02400 0.02714 0.02449

x - 1.08 | x - 1.07 | x - 1.07 | x - 1.06 | x - 1.06 | x - 1.06
- .10 | - .10 | - .03 | - .03 | - .05 | - .17
+ .03 | + .12 | + .10 | + .10 | + .19 | + .16

+ ~~1.01~~ -1.15 | + ~~1.09~~ -1.05 | + ~~1.14~~ -1.00 | + ~~1.13~~ -0.99 | + ~~1.20~~ -0.92 | + ~~1.05~~ -1.07
+41 11 ~~33.58~~ | 11 ~~38.53~~ | 11 ~~38.93~~ | 11 ~~38.23~~ | 11 ~~8.50~~ | 11 ~~40.77~~
+41 11 31.42 11 31.26 11 36.39 36.24 11 36.79 36.66 11 36.11 35.98 11 38.28 38.09 11 38.65 38.49
16 16.9 22.2 22.4 22.7 23.0 23.1
+4 45.5 45.3 +4 45.6 45.7 +4 45.6 45.5 +4 46.6 46.5 +4 44.7 44.5 +4 44.5 44.3

-2.50 - 2.50 | -7.80 - 7.80 | -8.00 - 8.00 | -8.30 - 8.30 | -8.60 - 8.60 | -8.70 - 8.70
+4 45.21 -16 ~~45.05~~ | +4 44.75 -15 ~~44.0~~ | +4 44.68 -13 ~~44.55~~ | +4 44.89 -13 ~~44.76~~ | +4 44.14 -19 ~~43.95~~ | +4 44.67 -16 44.45
+4 42.71 +4 45.02 | +4 36.95 44.40 | +4 36.68 44.50 | +4 36.59 44.51 | +4 35.54 43.81 | +4 35.91 44.15
+41 16 14.13 - .02 | 16 13.34 - .02 | 16 13.47 - .01 | 16 12.70 - .01 | 16 13.82 - .01 | 16 14.56 - .01
+4 42.30 | +4 36.58 | +4 36.49 | +4 36.20 | +4 35.20 | +4 35.44
16 13.76 | 16 12.82 | 16 13.15 | 16 12.18 | 16 13.29 | 16 13.93
16 1.31 | 0.37 | 0.70 | 59.79 | 0.84 | 1.48

γ²

α 1872 12.012

α 1873 14.156

1873
June 9
14
19
24
29
July 4
9
14
19

June 29 15′ 65″.3
July 4 66.1 +.8
9 66.9 .8
14 67.7 .8
19 68.4 .7

1873
4′ 65″.3
68.4

1872 ′ ″
June 9 15 76.4
14 77.6 +1.2
19 78.8 1.2
24 79.8 1.0
29 80.7 .9
July 4 81.6 .9
9 82.4 .8
14 83.0 .6
19 83.6 .6

1873
July 3 −.546 −.55

26 3.2 25 55.3
6.0 56.7
8.8 58.3
14.1
17.0
19.6
22.5
25.1
30.5
33.4
36.0
216.2
×
19.655 25 56.77

26 19.63
26 23.96
− 4.33
~~− 4.34~~

+ 4.81 +.01
− .48 −.48
− 1.91
+ 2.423
19.63
26 22.05

26 22.06

+1.59

5
0 53.0
6.9
119.9
0 59.95

+ 22.88
1.35946
1.35718n
− 22.45
5 59.95
5 37.50

17 10.85

+1° 6 44″
− 1880
0.02940

× − 1.07
− .14
+ .01

~~+ 0.94~~ − 1.20
~~17 11.79~~
17 9.65 17 9.57
16 6.0
− 1 3.6 3.7

− 4.10 − 4.10
− 1 3.18 − .08 ~~3.26~~
− 1 7.28 − 3.70
17 2.37 − .03
− 1 7.83
16 1.74

July 7 −.516 −.51

26 (~~7.9~~)
10.1 26 42.2
12.7 43.0
18.4 44.2
21.1
24.0
26.7
29.3
34.9
37.7
40.3

23.873 26 43.13

26 23.85
26 23.91
− 0.06
~~− 0.07~~

+ 0.55 +.00
− .45 −.45
− 1.86
− 1.786
23.85
22.07

26 22.079

+1.56

5
0 12.6
25.0
37.6
0 18.80

− 19.26
1.28466n
1.27638
+ 18.90
5 18.80
5 37.70

17 10.65

0.04820
− 597
0.04223

× − 1.10
− .10
+ .00

~~+ 1.00~~ − 1.20
~~17 11.65~~
17 9.45 9.43
6.5
− 1 3.0 3.0

− 4.60 − 4.60
− 1 4.60 − .02 ~~4.62~~
− 1 9.20 − 4.76
16 0.25 − .03
− 1 9.33
16 0.10

July 9 −.496

5
1 56.2
9.1
125.3
2 2.65

July 10 −.428 −.42

26 8.8
11.9 26 17.3
14.6 18.5
20.0 19.7
22.8
25.6
28.4
31.0
36.5
39.3
42.0
280.9
25.544
25.544 26 18.50

26 25.52
26 23.86
+ 1.66
~~+ 1.65~~

− 1.28 +.00
− .37 −.38
− 1.81
− 3.467
25.52
22.06

26 22.05

+1.56

5
0 36.8
49.7
86.5
0 43.25

+ 7.04
0.84757
0.83929n
− 6.91
5 43.25
5 36.34

17 12.01

− 1456
0.03364

× − 1.08
− .03
+ .01

~~+ 1.06~~ − 1.10
~~17 13.07~~
17 10.91 10.85
7.0
− 1 3.9 4.0

− 5.10 − 5.10
− 1 4.86 − .06 ~~4.92~~
− 1 9.96 − 4.71
16 0.95 − .03
− 1 9.84
16 1.01

July 13 −.439 −.44

26 10.8
13.3 26 16.7
18.4 17.9
21.5 19.4
24.2
26.9
29.8
32.5
26.980
26.980 26 18.00

26 26.96
26 23.81
+ 3.15
~~+ 3.14~~

− 2.80 +.00
− .39 −.39
− 1.76
− 4.95
26.96
22.01

26 22.01

+1.56

5
0 39.0
50.5
89.5
0 44.75

+ 8.98
0.95328
0.94500n
− 8.81
5 44.75
5 35.94

17 12.41

− 1179
0.03641

× − 1.09
− .03
+ .03

~~+ 1.09~~ − 1.09
~~17 13.50~~
17 11.32 11.26
7.6
− 1 3.7 3.8

− 5.70 − 5.70
− 1 4.68 − .06 ~~4.74~~
− 1 10.38 − 4.85
16 0.94 − .03
− 1 10.58
16 0.68

July 15 −.517 −.53

26 11.8
14.7 26 0.1
17.4 1.6
22.8 3.0
25.5
28.3
31.0
33.7
39.3
42.0
44.7
311.2
28.291 26 1.57

26 28.27
26 23.78
+ 4.49
~~+ 4.48~~

− 3.96 −.03
− .47 −.45
− 1.73
− 6.167
28.27
22.11

26 22.10

1873 α
July 21 26 22.10

+1.56

5
0 55.0
9.4
124.4
1 2.20

+ 26.72
1.42684
1.41856n
− 26.22
6 2.20
5 35.98

17 12.37

− 2349
0.02471

× − 1.06
− .20
+ .05

~~+ 0.91~~ − 1.21
~~17 13.28~~
17 11.16 11.08
7.9
− 1 3.3 3.4

− 6.00 − 6.00
− 1 2.75 − .08 ~~2.83~~
− 1 8.75 − 3.14
16 2.41 − .03
− 1 9.17
16 1.91

α * Coronae

h m s
15 29 12
15 29 19
+ 27° 09′ ″
+ 27 08 37
z = + 15 14 11
sin z = +.26

tang δ = +.51
x = −.017
corr = −.01
α1872 16.123
α1873 18.661

1872 m s
June 9 29 17.80 .01
14 .79
19 .77 2
24 .74 3
29 17.71 4
July 4 .67 4
9 .62 5
14 .56 6
19 17.50 6

1873 m s
June 29 29 20.45
July 4 .42 .03
9 .37 5
14 .31 6
19 20.25 6

δ1872 = 8′ 49.13″
δ1873 = 8 36.80

dα = +2.539
dδ = −12.32

June 11 1872 −.20 −.794
July 7 1872 −.319 −.31
July 9 1872 −.284 −.29
July 11 1872 −.349 −.35
July 14 1872 −.301 −.31
July 15 1872 −.336 −.33

15 29 30.1 28 44.1 | 29 12.5 29 2.2 | 29 13.0 29 6.1 | 29 11.5 29 1.7 | 29 (9.6) 29 12.8 | 29 8.9 29 3.7
28 52.5 45.1 | 14.7 3.1 | 15.5 6.9 | 13.7 2.6 | 11.9 | 11.1 4.7
54.7 46.2 | 17.1 4.2 | 17.7 8.0 | 16.1 3.7 | 14.2 | 13.4 5.8
59.3 | 21.7 | 22.4 | 20.7 | 18.8 | 18.1
1.6 | 24.0 | 24.7 | 23.0 | 21.1 | 20.4
3.9 29 24.3 | 26.3 | 26.9 | 25.3 | 23.6 | 22.8
6.8 25.2 | 28.6 | 29.3 | 27.8 | 25.7 | 25.0
8.6 26.6 | 31.0 | 31.6 | 29.9 | 28.1 | 27.3
13.1 | 35.6 | 36.2 | 34.6 | 32.7 | 31.9
15.5 | 37.9 | 38.5 | 36.8 | 35.0 | 34.3
17.8 | 40.2 | 40.8 | 39.2 | 37.3 | 36.6
283.4 | 289.6 | 296.6 | 278.6 | 257.9 | 249.8
43.4
3.945 28 45.13 | 26.327 29 3.17 | 26.964 29 7.00 | 25.327 29 2.67 | 23.445 29 12.80 | 22.~~436~~ 709 29 4.73
29 25.37

29 3.93 | 29 26.31 | 29 26.95 | 29 25.31 | 29 23.43 | 29 22.69
29 17.80 | 29 17.64 | 29 17.62 | 29 17.60 | 29 17.56 | 29 17.55
−13.87 | +8.67 | +9.33 | +7.71 | +5.87 | +5.14
− ~~13.86~~ | + ~~8.68~~ | + ~~9.34~~ | + ~~7.72~~ | + ~~5.88~~ | + 5.15

+13.93 +.00 | −8.44 +.01 | −9.15 +.00 | −8.55 −.01 | −5.76 +.00 | −4.94 +.00
−.10 −.10 | −.16 −.17 | −.15 −.14 | −.18 −.18 | −.16 −.15 | −.17 −.17
−1.68 + 0.86 | −1.52 + 1.02 | −1.50 + 1.04 | −1.48 + 1.06 | −1.44 + 1.10 | −1.43 + 1.11
+13.15 | −10.12 1 | −10.80 79 | −10.21 2 | −10.36 5 | −6.54
29 3.93 | 26.31 | 26.95 | 25.31 | 23.43 | 22.69
29 16.08 | 16.19 | 16.15 | 16.10 | 16.07 | 16.15

R.A. 29 16.08 29 18.62 | 29 16.20 18.74 | 29 16.16 18.70 | 29 16.09 18.63 | 29 16.08 18.62 | 29 16.15 .18.69
+1.21 | +0.82 | +0.79 | +0.77 | +0.73 | +0.72

15

3 55.3 3 9.1 | 3 55.1 | 3 50.0 | 3 53.2 | 3 37.9 | 3 45.9
46.5 59.0 | 48.8 | 44.7 | 48.3 | 31.8 | 41.9
101.8 68.1 | 103.9 | 94.7 | 101.5 | 69.7 | 87.8
3 50.90 3 04.05 | 3 51.95 | 3 47.35 | 3 50.75 | 3 ~~35.35~~ | 3 43.90
18 34.85

+18.81 −21.43 | +23.16 | +19.96 | +22.66 | +10.64 | +17.98
1.27439 1.33102 | 1.36474 | 1.30016 | 1.35526 | 1.02694 | 1.25479
1.33940_n 1.39603_n | 1.42975_n | 1.36517_n | 1.42027_n | 1.09195_n | 1.31980_n
−21.85 +24.89 | −26.90 | −23.18 | −26.32 | −12.36 | −20.88
18 50.90 18 4.05 | 18 51.95 | 18 47.35 | 18 50.75 | 18 34.85 | 18 43.90
18 29.05 18 28.94 | 18 25.05 | 18 24.17 | 18 24.43 | 18 22.49 | 18 23.02

+27° 4′ 19.30″ 4 19.41 | 4 23.30 | 4 24.18 | 4 23.92 | 4 25.86 | 4 25.33

+15° 13′ 44″ 1.19520
−13.53 | −16.03 | −15.32 | −22.75 | −19.61 | −22.34
1.18167 | 1.17917 | 1.17988 | 1.17245 | 1.17559 | 1.17286

x − 15.19″ | x − 15.11 | x − 15.13 | x − 14.87 | x − 14.98 | x − 14.89
− .08 | − .12 | − .08 | − .12 | − .03 | − .08
+ .08 | + .30 | + .30 | + .30 | + .36 | + .37

+ ~~15.19~~ −15.19 | + ~~15.29~~ −14.93 | + ~~15.35~~ −14.91 | + ~~15.15~~ −14.69 | + 15.31 −14.65 | + 15.18 −14.60
+27 4 ~~34.49~~ | 4 ~~38.59~~ | 4 ~~39.53~~ | 4 ~~39.07~~ | 4 41.17 | 4 40.51
+27 4 4.11 4 3.73 | 4 8.37 7.98 | 4 9.27 8.89 | 4 9.23 8.85 | 4 11.21 10.85 | 4 10.73 10.36
8 49.3 | 8 53.9 | 8 54.2 | 8 53.9 | 8 54.8 | 8 55.0
+4 45.2 44.8 | +4 45.6 45.1 | +4 44.9 44.5 | +4 45.3 44.9 | +4 43.6 43.2 | +4 44.2 43.9
−12.52 | −17.12 | −17.42 ~~17.42~~ | −17.72 | −18.02 | −18.22
−0.20 − .20 | −4.80 − 4.80 | −5.10 − 5.10 | −5.40 − 5.40 | −5.70 − 5.70 | −5.90 − 5.9
+4 45.21 −.38 ~~44.83~~ | +4 44.75 −.39 ~~44.36~~ | +4 44.68 −.38 ~~44.30~~ | +4 44.89 −.38 ~~44.51~~ | +4 44.14 −.36 ~~43.78~~ | +4 44.61 −.37 44.24
+4 45.01 +4 45.02 | +4 39.95 44.40 | +4 39.58 44.50 | +4 39.49 44.51 | +4 38.44 43.81 | +4 38.71 44.1
+27 8 49.12 − .31 | 8 48.32 − .21 | 8 48.85 − .20 | 8 48.72 − .20 | 8 49.65 − .18 | 8 49.44 − .1
+.30 +4 44.51 | +.30 +4 39.39 | +.30 +4 39.20 | +.30 +4 38.91 | +.30 +4 37.93 | +.30 +4 38.0
+27 8 49.42 8 48.24 | 8 48.62 8 47.37 | 8 49.15 8 48.09 | 8 49.02 8 47.76 | 8 49.95 8 48.78 | 8 49.74 8 48.9
8 35.92 | 35.05 | 35.77 | 35.44 | 36.46 | 36.1

15
3
3′

1872pnae.proj.1460.

Sin δ 9.65927
Cos δ 9.94930
11571 n
.06501 n

1872		1872	
June	9	8' 48.9"	
	14	49.9	+1.0
	19	50.9	1.0
	24	51.8	.9
	29	52.6	.8
July	4	53.4	.8
	9	54.2	.8
	14	54.8	.6
	19	55.3	.5

1873			
June 29	δ	37.4"	
Aug 4		38.1	+.7
9		38.8	.7
14		39.5	.7
19		40.1	6

37.4
40
40.1

1872.0 α	δ	1873.0 α	δ
16.08	49.42	18.64	38.12
.20	48.62	.66	36.90
.16	49.15	68	37.93
.09	49.02	60	37.69
08	49.95	59	37.15
15	49.74	54	39.86
		66	37.73
		62	37.66
16.127	49.32 =.60	18.624	37.88 -.14
.123	49.13	+.661	36.80
+.004	~~+.19~~	-.037	~~+1.08~~
	48.72		36.74
	49.13		36.80
	-.41		-.06

1872 July 23

1873 July 3 -.546 -.55		July 6 -.518 -.51		July 7 -.516 -.51		July 9 -.496 -.49		1873 July 10 -.428 -.42	
29 1.9	28 56.3	29 5.3	28 54.5	29 6.4		29 7.3	29 0.0	29 8.0	
4.4	57.9	7.6	56.0	8.6	28 53.0	9.8	1.0	10.4	29 1.0
6.6	59.1	9.9	57.5	10.9	54.1	12.0	2.2	12.7	2.0
11.4		14.2		15.4	55.3	16.7		17.3	3.0
13.5		16.8		17.9		19.0		19.6	
16.0		19.2		20.2		21.4		22.0	
18.2		21.5		22.5		23.7		24.2	
20.6		23.5		24.7		26.0		26.6	
25.0		28.5		29.3		30.5		30.0	
27.5		30.6		31.7		32.8		33.4	
29.8		33.0		34.0		35.1		35.7	
174.9		210.1		221.6		234.3		289.9	
15.900	28 57.77	19.100	28 56.00	20.145	28 54.13	21.300	29 1.07	21.809	29 2.00

See Sup. List

July 3		July 6		July 7		July 9		July 10	
29 15.88		29 19.08		29 20.13		29 21.28		29 21.79	
29 20.43		29 20.40		29 20.39		29 20.87		29 20.36	
-4.55		-1.32		-0.26		+0.91		+1.43	
-4.54		-1.31		-0.25		+0.92		~~+1.42~~	
-.28		-.26		-.26		-.20		-.21	
+4.80 +.01		+1.56 +.02		+0.54 +.00		-0.72 +.00		-1.28 +.00	
-.28	-.28	-.26	-.26	-.26	-.26	-.20	-.25	-.21	-.22
-1.77		-1.74		-1.73		-1.71		-1.70	
+2.76		-0.442		-1.45		-2.68		-3.19 20	
29 15.88		19.08		20.13		21.28		21.79	
29 18.63		18.64		18.68		18.60		18.60	
29 18.74 (6) 18.64		29 18.66		29 18.68		29 18.60		29 18.59	
+1.59		+1.57		+1.56		+1.56		+1.56	

1873		α	δ
July 12	29	18.54	8 37.24
13		1866	36.33
15		1862	36.04

15
3 57.6
53.1
110.7
3 55.35

July 3		July 6		July 7		July 9		July 10	
10		10		10		10		10	
3 4.9		3 9.9		3 12.7		3 5.7		3 5.9	
19.9		25.2		25.9		19.5		19.1	
24.8		35.1		38.6		25.2		26.0	
3 12.40		3 17.55		3 19.30		3 12.60		3 12.50	
+18.13		+23.10		+26.01		+20.23		+19.81	
1.25840		1.36361		1.41514		1.30600		1.29688	
1.32341 n		1.42862 n		1.48015 n		1.37101 n		1.36189 n	
-2106		-2683		-3021		-2350		-2301	
13 12.40		13 17.55		13 19.30		13 12.60		13 12.50	
12 51.34		12 50.72		12 49.09		12 49.10		12 49.49	
9 57.01		9 57.63		9 59.26		9 59.25		9 58.86	
+15° 13' 58"	1.19540								
-1854		-988		-574		-832		-1452	
1.17686		1.18552		1.18966		1.18708		1.18088	
+- 15.03		+- 15.33		+- 15.48		+- 15.38		+- 15.17	
- .08		- .12		- .15		- .08		- .08	
+ .03		+ .03		+ .03		+ .03		+ .03	
+ 14.98	-15.08	+ 15.24	-15.42	+ 15.36	-15.40	+ 15.33	-15.43	+ 15.12	-15.22
10 11.99		10 12.87		10 14.62		10 14.58		10 13.98	
9 41.93	9 41.67	9 42.21	41.95	9 43.66	43.40	9 43.82	43.56	9 43.64	43.38
8 38.0		8 38.4		8 38.5		8 38.8		8 39.0	
-1 3.9	4.2	-1 3.8	4.1	-1 5.2	5.5	-1 5.0	5.3	-1 4.6	4.9
-1.20 -	1.20	-1.60 -	1.60	-1.70 -	1.70	-2.00 -	2.00	-2.20 -	2.20
-1 3.18 -.26	~~3.44~~	-1 4.28 -.26	~~4.54~~	-1 4.60 -.26	~~4.86~~	-1 4.70 -.26	~~4.96~~	-1 4.86 -.26	~~5.12~~
-1 4.38 -1	3.70	-1 5.88 -	4.41	-1 6.30 -	4.76	-1 6.70	4.75	-1 7.06	4.71
8 37.55 -	.41	8 36.33 -	.40	8 37.36 -	.40	8 37.12 -	.40	8 36.58 -	.40
+.57 -1	5.31	+.57 -1	6.41	+.57 -1	6.86	+.57 -1	7.15	+.57 -1	7.31
8 38.12	8 36.36	8 36.90	8 35.54	8 37.93	8 36.54	8 37.69	8 36.41	8 37.15	8 36.07

φ Bootis 1

h	m	s
15	33	13
15	33	16
+7	40°	46′ ″
+	40	46 06

η = − +1 36 42
+.03

tang δ = +.86
x = −.020
cos α = +.04 − 1.7
α 1872 13.808
α 1873 15.961

1872	m	s	
June 9	33	15.73	
14		.70	.03
19		.67	3
24		.62	5
29		15.57	5
July 4		.51	6
9		.44	7
14		.36	8
19		15.28	.08
24			

1873	m	s	
June 29	33	17.94	
July 4		.88	.06
9		.81	7
14		.73	8
19		17.65	8

δ 1872 = 46 17.48″
δ 1873 = 46 5.58

dα = +2.153
dδ = −11.90

	June 11 1872 −.20 −.194		July 11 1872 −.35 −.349		July 14 1872 −.31 −.301		July 16 1872 −.33 −.336		June 29 1873 −.47 −.472	
15	32 45.6	32 37.6	33 7.0	33 0.9	33 5.7	32 53.9	33 4.4	32 39.2	33 —	32 41.0
	48.4	38.7	9.6	2.2	7.6	56.0	7.0	0.2	—	42.5
	51.0	39.9	12.4	3.2	10.6	57.1	9.7	1.5	—	44.3
	56.5		17.8		15.9		15.2		4.5	
	59.2		20.6		18.6		17.9		7.2	
	1.9		23.3		21.4		20.6		9.9	
	4.5		25.9		24.1		23.3		12.7	
	7.3		28.7		26.9		26.0		15.4 √	
	12.7		34.1		32.2		31.4		—	
	15.5		36.7		35.0		34.2		—	
	18.3		39.5		37.6		36.9		—	
	320.9		255.6		235.0		226.6		50.7 49.7	
	20.9									
	1.900	32 38.73	23.236	33 2.10	21.364	32 55.67	20.600	33 0.30	10.140 9.940 9.92	32 42.60
	33 1.88		33 ~~22.22~~ 23		33 21.34		33 20.58		33 10.12	
	33 15.72		33 15.41		33 15.36		33 15.34		33 17.94	
	−13.84		+6.81		+5.98		+5.24		−7.82	
	−13.88 +.00		+6.77 −.01		+5.94 +.00		+5.20 +.00		−7.86 +.00	
	−.17	−.17	−.30	−.30	−.27	−.26	−.28	−.29	−.40	−.40
	+13.94		−8.54		−5.75		−4.94		+ 8.40 ~~7.72~~	
	−1.91	+0.24	−1.60	+0.55	−1.55	+0.60	−1.53	+0.62	−1.98	
	+11.86		−10.44 ?		−7.57		−6.75		+5.94 602	
	33 1.88		22.22		21.34		20.58		10.12 9.92	
	33 13.74 ~~1.62~~		13.78		13.77		13.83		15.46 15.94	
R.A.	33 13.74	33 15.89	33 13.77	15.92	33 13.78	15.93	33 13.82	15.97	33 15.94	
	+1.21		+0.77		+0.73		+0.72		+1.63	
40										
	1 41.1		1 31.4		1 34.1		1 28.2			
	33.1		26.3		30.2		25.1			
	74.2		57.7		64.3		53.3			
	1 37.10		1 28.85		1 32.15		1 26.65			
	+23.17		+21.14		+25.69		+20.30		+27.34	
	1.36493		1.32510		1.40976		1.30750		1.43680	
	1.35995n		1.32012n		1.40478n		1.30252n		1.43182n	
	−22.91		−20.90		−25.40		−20.07		−27.03	
	41 37.10		41 28.85		41 32.15		41 26.65			
	41 14.19		41 7.95		41 6.75		41 6.58			
+40°	41′ 34.16″		41 40.40		41 41.60		41 41.77			
+41°	36′ 29″	0.~~41~~890 20860								
	−1353		−2275		−1961		−2234			
	0.19507		0.18585		0.18899		0.18626			
	*− 1.57″		*− 1.53		*− 1.54		*− 1.54			
	− .14		− .12		− .18		− .11			
	+ .~~03~~ .01		+ .12		+ .15		+ .14			
	~~+ 1.44~~	−1.70	~~+ 1.53~~	−1.53	~~+ 1.51~~	−1.57	~~+ 1.57~~	−1.51		
+40	~~41 35.60~~		~~41 41.93~~		~~41 43.11~~		~~41 43.34~~			
+40	41 32.46	41 32.30	41 38.87	38.72	41 40.03	39.88	41 40.26	40.12		
	~~+~~ 46 19.7		46 25.5		46 25.9		46 26.0			
−1.7″	+4 47.2		+4 46.8		+4 45.9		+4 45.8			
	+4 45.5	45.3	+4 44.9	44.7	+4 44.2	44.1	+4 44.1	44.0		
	−14.10		19.90		20.30		20.50			
	−2.20	2.20	−8.00	8.00	−8.40	8.40	−8.60	8.60		
	+4 45.21 −.16	+4 45.02	+4 44.89 −.15	~~44.74~~ 44.51	+4 44.14 −.15	~~43.99~~ 43.81	+4 44.61 −.14	~~44.47~~ 44.15		
	+4 43.01 —	.04	+4 36.89 —	.02	+4 35.74 —	.02	+4 36.01 —	.02		
+40	46 15.47	+4 42.78	46 15.76	+4 36.49	46 15.77	+4 35.39	46 16.27	+4 35.53		
		46 15.08		46 15.21		46 15.27		46 15.65		
		46 3.18		3.31		3.37		3.75		

Sin δ 9.81490
Cos δ 9.87931
11571 n
9.99602 n

1872				
June	9	45	79.2	
	14		80.4	+1.2
	19		81.5	1.1
	24		82.5	1.0
	29		83.5	1.0
July	4		84.4	.9
	9		85.2	.8
	14		85.9	.7
	19		86.6	.7

1873		′	″	
June	29	45	68.7	
July	4		69.5	+.8
	9		70.3	.8
	14		71.1	.8
	19		71.9	.8

July 3 −.546
−.55

32 57.3 32 43.9
33 0.0 45.3
2.7 46.9
8.1
10.9
13.6
16.4
19.0
24.5
27.2
29.9
216.6
149.6
13.600 32 45.37

33 13.58
17.89
−4.31
−4.35

+4.80 +.01
−.47 −.47
−1.93
2.481
13.58
15.98

33 15.99
+1.69
35
0 54.3
9.1
129.4
1 2.20
36 1.70
+28.23
1.45071
1.44573 n
−27.91
36 1.70
35 33.79

47 14.56
+1° 36′ 40″
−1854
0.19106

*− 1.55
− .21
+ .01

+ 1.35 −1.75
47 15.91
47 12.81
46 9.4
−1 3.4
−1 5.1

− 3.80
−1 3.18
−1 6.98
46 5.83

July 6 −.518
−.51

33 33 9.5
11.2 10.0
12.6
14.0
16.4
16.6
18.0
19.4
21.8
22.0
150.0
14.667 33 9.75

33 16.65
17.85
−1.20
−1.24

+1.55 +.0x²
−.44 −.44
−1.89
−0.786
16.65
15.87

33 15.89
Jul 3 +1.59
36
0 53.2
9.0
122.2
1 1.10
+6.92
0.84011
0.83513 n
−684 −27.91
36 1.10 36 1.10
35 54.26 35 33.19
46 54.09 47 15.16
20960
~~0.41920~~
−988
0.19972

*− 1.58
− .02
+ .01

+ 1.57 −1.59
46 55.66
46 ~~52.50~~ 13.57
46 9.9 3.7 13.49
6

− 4.30 4.30
−1 4.28 −.08 ~~4.36~~
−1 8.58 4.41
~~43.92~~ −1 .51 8.76
46 4.99 46 4.73

July 7 −.516
−.51

33 1.4
4.2 32 55.2
6.9 56.5
12.3 58.0
15.0
17.7
20.5
23.2
28.7
31.4
34.0
195.3
17.755 32 56.57

33 17.74
17.84
−0.10
−0.14

+0.54 +.00
−.44 −.44
−1.88
−1.78
17.74
15.96

33 15.96
+1.57
35
0 31.9
46.9
78.8
0 39.40
+21.78
1.32593
1.32095 n
−2094 −6.84
35 39.40 35 39.40
35 18.46 35 32.56
47 29.89 47 15.79

−574
0.20386

*− 1.60
− .12
+ .01

+ 1.49 −1.71
47 31.38
47 ~~28.18~~ 14.08
46 10.0 4.1 14.02

− 4.40 − 4.40
−1 4.60 −.06 ~~4.66~~
−1 9.00 4.76
46 19.18 −1 .05 9.21
46 5.08 46 4.81

July 9 −.496
−.49

33 2.9 32 58.6
5.4 33 0.9
8.2 33 1.4
13.6
16.2
19.0
21.7
24.4
29.8
32.6
35.4
209.2
19.018 32 59.75

33 19.00
17.81
+1.19
+1.15

−0.72 +.00
−.42 −.43
−1.85
−~~2.99~~ 3.00
19.00
16.01

33 16.00
7
+1.56
35 4
0 26.9
0.1
87.0
0 53.50
+19.27
1.28488
1.27990 n
−1905 20.94
35 43.50 35 53.50
35 24.45 32.56
47 ~~23.90~~ 15.79

−832
0.20128

*− 1.59
− .10
+ .01

+ 1.50 −1.68
47 25.40
47 22.22 14.08
46 10.3 3.8 14.04

− 4.70 − 4.70
−1 4.70 −.07 ~~4.77~~
1 9.40 − 4.95
46 ~~12.82~~ −1 .05 9.56
46 4.71 46 4.54

July 10 −.428
−.42

33 3.1
6.0 32 52.0
8.7 53.0
14.0 54.3
16.7
19.4
22.3
24.9
30.4
33.0
35.7
214.2
19.473 32 53.10

33 19.45
17.79
+1.66
+1.62

−1.28 +.00
−.36 −.37
−~~1.83~~ 2.47
−~~3.38~~ ~~2.47~~ 3.48
19.45
16.92

33 ~~16.91~~ 15.97
9
+1.56
35
0 43.9
58.5
102.4
0 51.20
+26.37
1.42111
1.41613 n
−2607 19.05
35 51.20 35 51.20
35 25.13 35 32.15
47 23.22 47 16.20

−1452
0.19508

*− 1.57
− .18
+ .01

+ 1.40 −1.74
47 24.62
47 21.48 14.46
46 10.5 4.0 14.39

− 4.90 − 4.90
−1 4.86 −.07 ~~4.93~~
−1 9.76 − 4.71
46 ~~11.42~~ −1 .05 9.66
46 ~~14.70~~ 46 4.73

1873
July 12 −.408
−.40

33 4.3
6.9 32 54.0
9.6 55.2
15.0 56.6
17.8
20.5
23.1
26.0
31.4
34.1
36.9
235.6
20.509 32 55.27

33 20.49
17.76
+2.73
+2.69

−2.43 +.00
−.34 −.35
−1.80
−4.57
20.49
15.92

33 15.91
10
+1.56
35
0 52.1
5.8
117.9
58.95
+25.24
1.40209
1.39711 n
−24.93
35 58.95
35 34.00
47 14.35
47 14.35

−822
0.20138

*− 1.59
− .17
+ .01

+ 1.43 −1.75
47 15.78
47 ~~12.60~~ 14.72
46 10.8 14.64
−1 1.8 1.9
−1 3.5 3.6

− 5.20 − 5.20
−1 4.14 −.08 ~~4.22~~
−1 9.34 − 4.63
~~46 3.26~~ −1 .05 9.75
46 5.38 46 4.89

1873		α		δ
July 13	33	15.92	46	4.33
15		15.96		4.72
21		15.98		

1.2
~~11.56~~
35 0 50.7
3.9
57.30

−26.07
35 48.95
35 31.88
35 16.47

15 Nurb Min = g

15ʰ 35ᵐ 25ˢ
15 35 14
+ 77° 46′ ″
+ 77 46 17
z = −35° 23′ 29″
−0.58

Sin δ 9.99002
Cos δ 9.32612
11571n
9.44183n

1/tang δ = +4.616
+4.613

K = −.073

June 11 1872 −.194
15 34 49.1 33 49.8
53.4 55.0
58.5 56.9
35 3.4 0.6
8.5
13.1
18.3
23.1
27.9
255.8
176.8
8.422 33 55.58
35 8.35
+13.94
−.90
−*5.87
35 15.48
52

June 27 1872 −.247
34 53.3 33 55.6
57.9 58.5
2.8 2.5
8.1
12.7
17.5
22.3
27.3
32.3
234.2
114.2
12.689 33 58.87
35 12.62
+8.81
−1.14
−*4.88
35 15.41

June 30 1872 −.330
34 57.7 35 41.6
2.6 47.6
7.4 50.7
12.2
17.0
21.8
27.0
31.6
36.6
213.9
153.9
17.100 35 46.63
35 17.03
+4.74
−1.52
−*4.66
35 15.59

July 6 1872 −.357
35 9.1 33 58.2
14.2 0.3
18.7 3.2
24.1
28.9
33.5
37.7
42.7
47.8
286.0
~~30.7~~ 34 0.57
28.502
35 28.45
−7.13
−1.65
−*4.19
35 15.48

July 7 1872 −.319
35 10.2 33 28.4
15.1 36.0
20.2 38.7
24.8
29.5
34.5
39.2
44.2
49.1
266.8
29.644 33 34.37
35 29.57
−8.44
−1.47
−*4.10
35 15.56

July 9 1872 −.284
35 10.6 33 43.1
15.5 46.3
20.5 51.2
25.1
29.9
34.7
40.1
44.5
49.4
270.3
30.033 33 46.93
35 29.96
−9.15
−1.31
−*3.93
35 15.57

40

+1.21
2 7.1
51.0
158.1
2 29.05
41 57.05
+72.84
1.86237
1.30420n
−2015
41 57.05
41 38.50
+77° 41′ 9.45″
−35° 23′ 6″ 1.61160n
−1387
1.59823n
+ 39.65
− .60
+ .04
39.09
− 40.21 + 39.01
+77 40 29.24
+77 41 ~~48.46~~ 48.54
− 5.87 41 48.34
+4 45.21 −.20 ~~45.01~~
+4 39.34
+77 46 27.88
− 5.87
+4 45.02
+ .70
+4 ~~39.86~~
46 28.19

h m s m s
15 35 21 35 17
° ′ ″ ″
77 46 33 18

+0.95
2 2.2
49.0
151.2
2 25.60
41 55.60
+73.82
1.86817
1.31060n
−2042
41 55.60
41 35.78
41 13.17
−822
1.60338n
+ 40.12
− .61
− .02
− 40.75 + 39.49
40 32.42
41 52.66 52.47
− 8.52
+4 43.88 −.19 ~~43.69~~
+4 35.36
46 28.02
− 8.52
+ 44.16
+ .55
+4 ~~36.19~~
46 28.66

+0.92
1 30.7
19.6
50.3
1 25.15
+ ~~30.47~~ −29.59
~~1.48387~~ 1.47026
0.92570n 0.91209n
−8.43 + 8.15
41 25.15 25.15
41 ~~16.72~~ 33.30
41 ~~31.63~~ 15.05
−2586
1.58574n
+ 38.52
− .11
− .01
− 38.64 + 38.40
40 52.99
42 10.03 53.45
− 10.11 53.31
+4 45.20 −.14 ~~45.06~~
+4 35.09
46 ~~45.12~~ 28.54
− 10.11
+ 45.04
+ .53
+4 ~~35.46~~
46 28.77

+0.83
2 2.1
50.9
153.0
2 26.50
41 56.50
+87.95
1.94424
1.38607n
−2433
41 56.50
41 32.17
41 16.18
−1572
1.59588n
+ 39.44
− 1.10
+ .15
− 40.39 + 38.49
40 35.79
41 54.67 54.48
− 11.12
+4 44.71 −.19 ~~44.52~~
+4 33.59
46 28.26
− 11.12
+ 44.66
+ .48
+4 ~~34.02~~
46 29.50

+0.82
2 9.1
58.0
127.1
~~2 33.55~~
42 3.55
+115.27
2.06183 6
1.50386n
−31.91 3 −31.89
42 3.55 42 3.55
41 31.64 41 31.56
41 16.79
−1586
1.59574n
+ 39.42
− 1.50
+ .16
− 40.76 + 38.08
40 36.03
41 54.87 54.66
− 11.27
+4 44.75 −.21 ~~44.54~~
+4 33.48
46 28.35
− 11.27
+ 44.40
+ .47
+4 ~~33.60~~
46 28.26

+0.79
2 59.3
55.0
114.3
2 57.15
+103.10
2.01326
1.45509n
−28.51
42 57.15
41 28.64
41 19.71
−1514
1.59646n
+ 39.49
− 1.20
+ .24
− 40.45 + 38.53
40 39.26
41 58.24 57.94
− 11.58
+4 44.68 −.30 ~~44.38~~
+4 33.10
46 31.34
− 11.58
+ 44.60
+ .15
+4 ~~33.27~~
46 31.31

2 1872 m 35 s 15.51
1873 13.68
″ 29.37 29.27
16.89

July 11 1872 -.349	July 14 1872 -.301	July 15 1872 -.336	June 29 1873 -.472	July 3 -.546	July 7 1873 .516
35 8.9 34 59.8 14.2 4.7 18.9 4.6 23.5 28.4 33.0 38.1 42.9 48.5	35 7.0 34 17.8 11.8 18.6 16.4 20.1 21.4 26.1 31.0 36.0 40.8 45.8	35 6.2 34 7.3 10.9 8.9 15.8 20.7 25.3 30.2 35.2 39.8 45.0	34 34 22.8 53.2 26.2 58.2 32.1 35 3.3 8.1 12.7 17.4 22.5 27.4 32.3	34 34 0.8 56.7 4.2 35 2.4 10.7 6.4 11.1 16.2 21.1 26.0 31.0 35.6	35 0.0 34 13.4 5.3 19.0 10.4 25.5 15.2 19.7 24.8 29.5 34.7 39.4
256.4	236.3	229.1	235.1 115.1	206.2 146.2	179.0
28.489 35 2.03	26.256 34 18.83	~~26.567~~ 25.455 34 8.10	12.789 34 27.03	16.244 34 5.23	19.889 34 19.30
35 28.42 - 7.55 - 1.61 -* 3.76	35 25.198 - 5.75 - 1.39 -* 3.50	35 25.38 - 4.93 - 1.55 -* 3.41	35 12.72 + 8.40 - 2.18 -* 5.123	35 16.17 + 4.81 - 2.52 -* 4.82	35 19.82 + 0.54 - 2.38 -* 4.49
35 15.50	35 15.554	35 15.49	35 13.81	35 13.64	35 13.49

July 9 13.70 15.88″
12 13.67 16.36
13 13.55 16.12
15 13.83 16.50
21 13.77
22 13.72 17.20

+1

+0.77	+0.73	+0.72	+1.62	+1.59	+1.56
1 44.5 32.2 76.7 1 38.35	1 53.9 43.6 97.5 1 48.75	1 56.5 46.6 103.1 1 51.55	35 1 7.0 20.9 27.9 1 13.95	35 1 11.2 26.9 38.1 1 19.05	35 1 10.1 22.0 32.1 1 16.05
+26.46 1.42259 0.86442n -7.32 41 38.35 41 31.03 41 17.32	~~+7.43~~ 17.43 0.87099 0.31282n ~~-20.55~~ - 18.65 41 48.75 48.75 41 ~~28.20~~ 30.10 41 ~~20.15~~ 18.25	~~+17.35~~ 17.35 1.23930 1.82894 0.68113n 1.27017 - 4.80 - 18.63 41 ~~51.65~~ 51.55 41 46.75 32.92 41 ~~4.60~~ 15.42	+45.76 1.66049 1.10232n -12.66 36 13.95 36 1.29 46 47.06	+71.01 1.85132 1.29315 -19.64 36 19.05 35 59.41 46 48.94	+60.59 1.78240 1.22423n -16.76 36 16.05 35 59.29 46 59.06

-35° 22′ 52″ 1.61150

-22.60 1.58900n	-19.46 1.59214n	-22.28 1.58932n	-18.27 1.59323n	-18.28 1.59322n	-5.51 1.60599
+ 38.82 - .08 + .13	+ 39.10 - .01 + .18	+ 38.84 - .03 + .19	+ 39.20 - .24 + .00	+ 39.19 - .57 + .01	+ 40.36 - .41 + .01
~~- 38.77~~ + 38.87 ~~40 38.55~~ 41 56.19 41 56.03 - 11.87 +4 44.89 -.16 ~~44.73~~ +4 33.02 46 29.21 - 11.87 +4 44.51 + .44 +4 ~~33.08~~ 46 29.11	~~- 38.93~~ + 39.27 ~~40 41.22~~ 41 ~~59.42~~ 57.52 57.34 - 12.24 +4 44.14 -.18 ~~42.96~~ +4 31.90 46 ~~31.32~~ 29.42 - 12.24 + 43.81 + .42 +4 32.99 46 30.33	~~- 38.68~~ + 39.00 ~~40 32.92~~ 41 ~~40.60~~ 54.43 54.24 - 12.36 +4 44.61 -.19 ~~44.42~~ +4 32.25 46 ~~12.85~~ 26.68 - 12.36 +4 44.15 + .41 +4 32.20 46 ~~27.44~~ 26.	~~- 39.44~~ + 38.96 ~~46 7.62~~ 47 26.02 47 25.92 - 7.05 -1 3.06 -.10 ~~3.16~~ -1 10.11 46 15.91 - 7.05 -1 3.64 + .93 -1 9.76 46 16.16	~~- 39.75~~ + 38.63 ~~46 9.19~~ 47 27.57 27.47 - 7.77 -1 3.18 -.10 ~~3.28~~ -1 10.95 46 16.62 - 7.77 -3.70 + .92 -1 10.55 46 16.92	~~- 40.76~~ + 39.96 ~~46 8.30~~ 47 29.02 28.92 - 8.43 -1 4.60 -.10 ~~4.70~~ -1 13.03 46 15.99 - 8.43 - 9.96 + .90 -1 11.29 46 17.62

5 H Camelop.

h m s
15 36 52
3 36 59

10° 9' 04"
+ 70 56 15
109° 3' 45"
δ = −66° 40' 57"
−.92

Tang ψ = $\bar{7}$.289
x = +.044
corr = +.12 −.01
α1872 52.916 δ = 56 2.89
α1873 59.126 δ = 56 14.56
dα = +6.209
dδ = +11.67

1872

		m s	
June	9.8	36 49.61	
	14	49.87	.26
	19	50.14	.27
	24	50.45	.31
	29	50.77	.32
July	4	51.11	.34
	9	51.46	.35
	14	51.83	.37
	19	52.21	.38

1873

		m s	
June	29	36 57.01	
July	4	57.35	.34
	9	57.70	.35
	14	58.08	.38
	19	58.46	.38
	24	58.85	.39
	29	59.25	.40

1872 δ = 56' 2".89 = 3' 57".11
1873 δ = 56 14.56 3 45.44

June 11 1872 −.70 −.794

15 36 22.5 36 20.2
26.0
28.9
32.1
35.3
38.4
41.6
44.8
47.5

317.1
35.233 36 20.20

36 ~~35.19~~
35.28
36 49.40
−14.42
−14.54

+13.94 +.00
+ .58 +.56
+ 3.22 + 9.43
+17.742
36 35.28
36 53.02

36 53.00 36 59.21
+1.21

0 42.9
26.0
67.9
0 33.95

+15.03
1.17696
0.80678n
−~~6.41~~ + 6.41
25 ~~33.95~~ 25 33.95
25 ~~27.54~~ 25 40.36

109 57 109° 57' 7.99"
−66° 39' 5"

−1337
2.10913n
+ .04
+2 8.56
+ .04
+ .01

−2 8.55 +2 8.65
~~+108 54 59.44~~
+108 59 16.64 59 16.58
109 4 3.2
+4 46.6 46.5
+.01 +4 46.5 46.6
+4 46.7
−17.77 6.10
−6.10 +4 45.02
+4 45.21 −.06 ~~45.15~~
+4 39.11 + 1.11
109 3 55.75 +4 40.03
3 56.61
3 44.94

1872 −.247
June 27 −.25

36 28.9 36 7.2
31.9 10.3
35.3 13.2
38.2
41.3
44.5
47.6
50.7
53.9

372.3
41.367 36 10.23

36 ~~41.32~~
41.41
50.62
−9.21
−9.33

+8.81 +.00
+ .72 +.71
+2.30 +8.51
+11.832
41.41
53.24

36 53.23 59.44
+0.95

0 32.8
18.7
51.5
0 25.75

+31.14
1.49332
1.12314n
−13.28 +13.28
25 ~~28.75~~ 25 28.75
25 1~~2.47~~ 25 39.03

57 9.32
2.12250n
~~2.14340~~

−822
2.11428n
+ .03
+2 10.10
+ .16
− .0100

−2 9.97 +2 10.29
54 59.35
59 19.61 19.57
4 5.6
+4 46.0 46.0
~~+4 45.9~~ 46.1
+4 46.1
−20.17 8.50
−8.50 + 44.16
+4 43.88 −.04 ~~43.84~~
+4 35.38 + .87
3 54.99 +4 36.53
3 56.10
14.43

1872 −.330
June 30 −.33

36 32.7
35.8
39.0
42.2
45.3
48.3
51.3
54.6
58.0

407.2
45.244

36 ~~45.20~~
45.29
51.82
−5.53
−5.65

+4.76 −.02
+ .95 +.95
+2.10 + 8.31
+7.81 79
45.29
53.20

36 53.16 59.39
+0.92

0 57.1
45.2
102.3
0 51.15

−2986
2.09664n
+ .07
+2 4.99
− .01

4 5.9

July 6 1822 −.351 −.35

36 44.8 36 24.0
48.0 30.1
51.2 32.6
54.2
57.4
0.3
3.4
6.7
10.4

276.4
516.4
57.378 {36 28.90}

36 ~~57.33~~
57.42
51.23
+6.19
+6.07

−7.105 +.01
+1.01 +1.03
+1.69 +7.90
−4.405
57.423
52.987

36 53.00 59.21
+0.83

0 29.8
17.9
47.7
0 23.85

+28.48
1.25454
1.08436n
−~~12.15~~ +12.15
23.85 25 23.85
25 11.70 25 36.00

57 12.35

−1572
2.10678n
+ .05
+2 7.87
+ .14
+ .03

−2 7.75 +2 8.09
55 4.60
59 20.44 20.40
4 6.6
+4 46.2 46.2
~~+4 46.1~~ 46.3
+4 46.3
−21.17 9.50
−9.50 + 44.66
+4 44.71 −.04 ~~44.67~~
+4 35.21 + .76
3 55.65 +4 35.92
3 56.32

July 11 1872 −.349 −.357

36 45.6 37 15.4
48.9 18.2
51.8 22.8
55.1
58.3
1.4
4.6
7.8
11.1

284.6
524.6
58.289 37 18.80

36 ~~58.25~~
58.33
51.58
+6.75
+6.63

−7.54 −.01
+1.01 +1.01
+1.34 +7.55
−7.20
58.33
53.14

36 53.13 59.34
+0.77

0 47.0
36.9
82.9
0 41.45

−20.51
1.31197
0.94179n
−8.74 +8.74
41.45 25 41.45
25 22.71 25 32.71

56 ~~58.16~~
10.64

−2260
2.09990n
+ .06
+2 5.87
+ .07
+ .06

−2 5.80 +2 6.06
54 52.36
59 ~~0.72~~ 21.70 21.63
4 7.0
2.8 +4 45.3 45.2
~~+4 45.2~~ 45.3
+4 45.4
−21.57 9.90
−9.90 + 44.51
+4 44.89 −.07 ~~44.82~~
+4 34.99 + .70
3 56.69 +4 35.31
3 56.84

July 15 1822 −.336 −.33

36 43.4 36 22.6
46.7 26.3
49.6 28.3
52.7
56.0
59.0
2.2
5.4
8.5

323.5
503.5
55.944 36 25.73

36 ~~55.90~~
55.99
51.89
+4.10
+3.98

−4.94 +.00
+ .95 +.97
+1.03 +7.24
−2.964
55.99
53.03

36 53.05 59.26
+0.72

0 24.1
13.1
37.2
0 18.60

+30.21
1.48015
1.10997n
−12.88 +12.88
18.60 25 18.60
25 5.72 25 31.48

57 16.87

−2228
2.10022n
+ .06
+2 5.95
+ .05
+ .03

−2 5.83 +2 6.19
55 11.04
59 23.06 23.03
5 7.2
+4 44.1 44.1
~~+4 44.0~~ 44.2
+4 44.2
−21.77 10.10
−10.10 +4 44.15
+4 44.61 −.03 ~~44.58~~
+4 34.51 + .66
3 54.57 +4 34.71
3 57.14
46.07

Sin δ 9.97500
Cos δ 9.51411
11571
9.62982

1872		′	″	
June	9	55	57.1	
	14		56.2	−.9
	19		55.4	.8
	24		54.7	.8
	29		54.1	.6
July	4		53.6	.5
	9		53.2	.4
	14		52.9	.3
	19		52.7	.2

1873		′	″	
June	29	56	8.6	
July	4		8.1	−.5
	9		7.7	.4
	14		7.4	.3
	19		7.2	.2
	24		7.1	.1
	29		7.1	.0

1873 June 29 −.472 −.47
36 34.5 37.9 41.0 44.0 47.2 50.2 53.4 56.5 59.7
36 25.6 29.6 33.7
4244
47.155 · 36 29.63
36 ~~47.14~~ 47.20
36 57.00
−9.80
−9.92
+8.40 +.00
+1.36 +1.36
+2.13
+11.89
36 47.20
36 59.09
36. 59.09
+1.62
15 4 47.7 5.4 23.1
5 56.55 4
+17.52
1.24353
0.87335n
~~747~~ +7.47
20 ~~1.55~~ 20 56.55 19
19. 5~~7~~.08 20 4.02 19
02 39.33 44
−66° 38′ 44″ 2.12236n
−1827
2.10409n
+ .05
+ 2 7.08
+ .05
+ .00
−2 7.08 +2 7.18
+109 0 32.25
4 ~~51.51~~ 51.51
3 51.3 4 51.12
−1 0.2 0.6
~~−1 0.3~~ 0.5
−1 0.1
— 5.90
−5.90 −3.64
−1 3.076 −.39 ~~3.45~~
−1 8.96 + 1.49
3. 42.55 −1 8.05
3 43.07

July 6 −.518 −.51
36 42.2 45.4 48.4 51.6 54.5 57.8 37 1.0 4.0 7.1
35 59.4 36 4.1 8.5
3120
4920
54.667 36 4.00
36 ~~54.62~~ 54.71
57.47
−2.76
−2.88
+1.55 +.02
+1.47 +1.50
+1.66
+4.6873
54.7~~3~~
57.39
36 59.44
+1.57
15 4 35.0 52.1 87.1
4 43.55
+50.67
1.70475
1.33457n
~~2161~~ +21.61
19 ~~43.55~~ 19 43.55
19 ~~21.94~~ 20 5.76
2 43.19
−969
2.11267n
+ .03
+ 2 9.62
+ .43
+ .05
−2 9.17 +2 10.13
0 34.02
4 53.32 52.94
3 52.1
−1 1.2 1.6
~~−1 1.3~~ 1.5
−1 1.1
— 6.70
−6.70 − 4.41
1 4.28 −.38 ~~4.66~~
−1 10.98 + 1.44
3 42.34 −1 9.67
3 43.27

July 7 −.516 −.51
36 43.2 46.4 49.3 52.5 56.0 58.9 2.1 5.4 8.3
36 16.6 21.6 25.4
3221
5021
55.789 36 21.20
36 ~~55.75~~ 55.83
57.54
−1.81
−1.83
+0.583 +.00
+1.47 +1.49
+1.59
+3.6060
55.83
59.42
36 59.44
+1.56
15 4 43.9 59.9 103.8
4 51.90
+34.59
1.53895
1.16877n
~~1475~~ +14.75
19 51.90 19 51.90
19 ~~37.15~~ −20 6.65
2 41.70
−551
2.11685n
+ .02
+ 2 10.86
+ .20
+ .05
−2 10.63 +2 11.13
0 31.07
4 52.83 52.44
3 52.2
−1 0.6 1.0
~~−1 0.7~~ 0.9
−1 0.5
— 6.80
−6.80 − 4.75
1 4.60 −.39 ~~4.99~~
−1 11.40 + 1.43
3 41.43 −1 10.12
3 42.32

July 9 −.496 −.49
36 44.6 47.9 50.5 53.7 56.9 37 0.1 3.1 6.4 9.8
36 10.9 13.9 17.0
2730
5130
57.000 36 13.93
36 ~~57.96~~ 57.94
57.69
−.25
−0.22
−0.72 +.00
+1.42 +1.43
+1.44
+2.145
57.04
59.18
36 59.19
+1.56
15 4 37.9 36.0 193.9
19 46.95
+43.07
~~1.60606~~ 1.63417
~~1.23588n~~ 1.26399n
~~1721~~ +1836
~~46.95~~ 19 46.95
~~29.74~~ 20 5.31
2 43.04
−870
2.11466n
+ .03
+ 2 10.21
+ .31
+ .05
−2 9.88 +2 10.60
0 33.16
4 53.64 53.26
3 52.2
−1 1.4 1.8
~~−1 1.5~~ 1.7
−1 1.3
— 6.80
−6.80 − 4.53
1 4.70 −.38 ~~5.08~~
−1 11.50 + 1.43
3 42.14 −1 9.90
3 43.36

July 12 −.408 −.40
36 46.6 49.9 52.9 56.3 59.3 2.2 5.4 8.9 12.1
36 23.8
2936
5336
59.289 36 23.80
36 ~~59.25~~ 59.33
57.90
+1.43
+1.31
−2.43 +.00
+1.16 +1.18
+1.23
−0.042
59.33
59.29
59.31
+1.56
15 4 40.1 56.1 96.2
4 ~~48.10~~
19 48.10
+35.49
1.55011
1.17993n
~~1513~~ +15.13
19 48.10 ~~19~~ 48.10
19 32.97 20 3.23
2 45.12
−792
2.11444n
+ .04
+ 2 10.19
+ .21
+ .05
−2 9.92 +2 10.44
0 35.20
4 55.56 55.18
3 52.5
−1 3.1 3.5
~~−1 3.2~~ 3.4
−1 3.0
— 7.10
−7.10 −4.53
1 4.14 −.38 ~~4.52~~
1 11.24 + 1.43
3 44.32 −1 10.20
3 44.98

1873 July 13 −.439 −.44
36 46.8 50.1 53.3 56.5 59.9 2.9 6.0 9.1 12.1
36 45.2
2967
5367
59.632 36 45.20
36 ~~59.54~~ 59.68
57.99
+1.69
+1.57
July 15 21 22
−2.80 +.00
+1.27 +1.27
+1.14
−0.39
59.68
59.29
36 59.29
+1.56
15 4 49.2 5.1 114.3
4 57.15
+14.43
1.15927
0.78969n
~~615~~ +6.15
19 ~~57.15~~ 19 57.15
19 57.00 20 3.30
2 45.05
−1188
2.11048n
+ .04
+ 2 8.96
+ .03
+ .25
−2 8.72 + 2 9.28
0 36.33
4 54.33 53.94
3 52.6
−1 1.8 2.2
~~−1 1.9~~ 2.1
−1 1.7
— 7.10
−7.10 − 4.85
1 4.68 −.39 ~~5.07~~
1 10.78 + 1.43
3 42.55 −1 10.52
3 43.42

1873		α		δ
July 15	36	59.11	3	44.30
21		59.25		
22		59.31		44.81

a Serpentis

Tang δ = +1.2
x = −016
corr = + ~~.02~~
α1872 57.838
α1873 0.788

h	m	s	
15	37	53	
15	38	01	
+	6	56	
+	6	49	36

z = +35° 33′ 12″
sin. z = +.58

1872

	m	s	
June 9	37	59.41	0
14		.41	0
19		.41	0
24		.40	1
29		59.39	1
July 4		.36	3
9		.33	3
14		.29	4
19		59.25	4

1873

	m	s	
June 29	38	2.52	.02
July 4		.50	2
9		.48	4
14		.44	5
19		2.39	

δ1872 = 49′ 47.77″
δ1873 = 49 36.19
dα = +2.950
dδ = −11.59

Reject

June 11 1872 −.20 −.194
1872 July 15 −.33 −.336
1873 June 29 −.472 −.47
July 3 −.546 −.55
July 6 −.518 −.51
July 7 −.516 −.51

15 37 33.2 | 37 19.8 | 37 52.0 | 38 50.6 | 37 41.7 | 37 32.1 | 37 45.4 | 37 36.6 | 37 48.6 | 37 41.5 | 37 49.7
35.2 | 53.9 | 7 51.3 | 43.9 | 33.2 | 47.5 | 38.0 | 50.7 | 42.6 | 51.7 37 44.0
37.4 | 55.9 | 52.4 | 45.9 | 34.6 | 49.6 | 39.3 | 52.7 | 43.7 | 53.8 45.1
41.5 | 38 0.1 | 50.0 | 53.6 | 56.9 | 56.0 46.4
43.5 | 2.3 | 52.1 | 55.8 | 59.1 | 1.1
45.5 | 4.3 | 54.2 | 57.9 | 38 1.0 | 4.2
47.6 | 6.4 | 56.3 | 38 0.0 | 3.2 | 6.3
49.6 | 8.4 | 58.3 | 2.0 | 5.2 | 10.4
53.8 | 12.7 | 38 2.5 | 6.2 | 9.4 | 12.6
55.9 | 14.7 | 4.6 | 8.2 | 11.5 | 14.5
57.9 | 16.7 | 6.6 | 10.3 | 13.5
501.1 | 227.4 | 416.1 | 336.5 | 311.8
47.4 | 596.1 | 636.5 | 11.8

45.555 37 19.80 | 4.309 38 51.43 | 54.191 37 33.30 | 57.864 37 37.97 | 1.078 37 42.60 | 37 45.17

37 45.54 | 38 4.29 | 37 54.18 | 37 57.85 | 38 1.06
37 59.41 | 37 59.41 | 38 2.52 | 2.50 | 2.49
−13.87 | + 4.88 | − 8.34 | − 4.65 | − 1.43
− ~~13.89~~ | + ~~4.86~~ | − ~~8.36~~ | − ~~4.67~~ | − ~~1.45~~

+ 13.94 +.00 | + 4.94 +.00 | + 8.40 +.00 | + 4.80 .79 +.01 | + 1.55 +.02
− .02 −.02 | − .04 −.04 | − .06 −.06 | − .07 −.07 | − .06 −.06
− 1.57 + 1.38 | − 1.57 + 1.38 | − 1.73 + 1.22 | − 1.71 + 1.24 | − 1.70 + 1.23
+ 12.35 | − 6.55 | + 6.61 | + 3.07 2 | − 0.19
37 45.54 | 1.29 | 37 54.18 | 57.85 | 1.06
37 57.89 | 57.74 | 38 0.80 .79 | 0.86 | 0.85

37 57.89 38 0.84 | 37 57.74 0.69 | 38 0.79 | ~~2.74~~ 38 0.87 | 38 0.87

+1.24 | +0.72 | +1.62 | +1.59 | +1.57

35 | 30 | ~~30~~ | 30 | 30
2 43.1 | 2 20.7 | 1 52.5 | 1 51.1 | 1 46.8 | 1 44.8
28.2 | 21.1 | 4.9 | 4.0 | 58.9 | 56.6
71.3 | 41.8 | 117.4 | 115.1 | 105.7 | 101.4
2 35.65 | 2 20.90 | 1 58.70 | 1 57.55 | 1 52.85 | 1 50.70

+ 25.75 | − ~~47.12~~ +12.88 | + 20.89 | + 19.89 | + 18.47
1.41078 | 1.67321n 1.10992 | 1.31994 | 1.29863 | 1.26647
1.52339n | 1.78582 1.2325 3 | 1.43255n | 1.41124n | 1.37908n
−3337 | +61.07 −16.8 | −27.08 | −25.78 | −23.94
37 35.65 | 37 ~~+20.90~~ 20.80 | 31 58.70 | 31 57.55 | 31 52.85
37 2.28 | 38 21.97 37 4.22 | 31 31.62 | 31 31.77 | 31 28.91

+6 45 46.07 | 45 26.38 44.8 | 51 16.73 | 51 16.58 | 51 19.44

+35° 32′ 17″ | 1.61400 | +35° 32′ 39″
1337 | −2228 | −1827 | −1828 | −969
1.60063 | 1.59172 | 1.59573 | 1.59572 | 1.60431

~~+~~− 39.87 | ~~+~~− 39.06 | ~~+~~− 39.42 | ~~+~~− 39.42 | ~~+~~− 40.21
− .04 | − .14 | − .03 | − .03 | − .01
+ .05 | + .23 | + 00 | + .02 | + 02

+ ~~39.88~~ − 39.86 | + ~~39.15~~ − 38.97 | + ~~39.39~~ − 39.45 | + ~~39.41~~ − 39.43 | + ~~40.22~~ − 40.20
+6 ~~46 25.95~~ | ~~45 55.3~~ 5.16 | ~~51 56.12~~ | ~~51 55.99~~ | ~~51 59.66~~
+6 45 6.21 45 5.95 | 45 47.41 4.93 | 50 37.28 50 37.12 | 50 37.15 37.00 | 50 39.24 39.09
49 44.4 | 49 45.0 | 49 32.1 | 49 32.5 | 49 32.8
+4 38.2 √ 37.9 | +4 39.6 √ 39.6 | −1 5.2 5.4 | −1 4.8 11.8 | −1 6.4 6.6

+ 3.40 + 3.40 | +2.80 + 2.80 | + 4.10 + 4.10 | + 3.70 + 3.70 | + 3.40 + 3.40
+4 45.21 −.26 ~~44.95~~ | +4 44.61 −.23 ~~44.38~~ | −1 3.06 −.16 ~~3.22~~ | −1 3.18 +.15 ~~3.33~~ | −1 4.28 −.15 ~~4.43~~
+4 48.61 +4 45.02 | +4 47.41 + 44.15 | −0 58.96 −1 3.64 | −0 59.48 − 3.70 | −1 0.88 4.41
+6 49 54.82 − .70 | 47 52.57 − .41 | 49 38.32 − .93 | 49 37.67 − .92 | 49 38.36 − .91
+.67 +4 47.72 | +.67 +4 46.54 | +1.28 −1 0.47 | +1.28 −1 0.92 | +1.28 −1 1.92
+6 49 55.49 49 53.67 | 47 53.24 49 51.47 | 49 39.60 49 36.65 | 49 38.95 49 36.08 | 49 39.64 49 37.17
49 42.08 | 39.88

Sin δ 9.07548
Cos δ 9.99690
1.1671 n
.11261 n

1872		′	″	
June	9	49	44.1	
	14		44.8	+7
	19		45.4	.6
	24		46.0	.6
	29		46.5	.5
July	4		47.0	.5
	9		47.5	.5
	14		47.9	.4
	19		48.3	.4

1873		′	″	
June	29	49	32.1	
July	4		32.6	+5
	9		33.0	4
	14		33.5	5
	19		33.9	4

1872.0 α	δ	1873.0 α	
57.89	55.49	0.79	39.60
.74	53.24	.87	38.95
		.87	39.64
		78	39.65
		72	39.80
		.82	39.29
		.76	39.36
		.79	39.06
		.80	
57.815	54.36 +3	0.800	−25 39.42
.838	47.77	.788	36.19
−.023	+6.59	+.012	+3.23
	53.02		36.86
	47.77		36.19
	+5.25		+.67

July 9 −.49 −.496

37 50.7 37 43.1
52.9 45.0
55.0 46.2
59.1
38 1.2
3.3
5.8
7.4
11.6
13.7
15.7
27.50
35.0
3,264 37 44.77

38 3.25
2.48
+0.77
~~+0.75~~

−0.72 +.00
−.06 −.06
−1.69
−2.47
3.25
0.78

38 0.78

~~+1.57~~6

30
1 46.4
57.8
104.2
1 52.10

+18.49
1.26694
1.37953n
−23.96
31 52.10
31 28.14

51 20.21

−816
1.60574 8

× − 40.35
.01
∓ .02

± ~~40.36~~ −40.34
~~52 0.57~~
50 39.87 50 39.72
49 33.0
−1 6.9 7.0

+3.20 + 3.20
−1 4.70 −.15 ~~4.85~~
−1 1.50 −1 4.75
49 38.37 − .90
+1.28 −1 1.45
49 39.65 49 38.27

July 12 −.40 −.408

37 52.4
54.5 37 48.2
56.7 49.2
0.7 50.2
2.8
4.9
7.0
9.0
13.1
15.2
17.4
23 3.7
53.4
4,882 37 49.20

38 4.87
2.46
+2.41
~~+2.39~~

−2.43 +.00
−.05 −.05
−1.67
−4.15
4.87
0.72

38 0.72

+1.576

30
1 43.2
53.9
97.1
1 ~~53.55~~
31 48.55

+15.68
1.19535
1.30796n
−20.32
31 48.55
31 28.23

51 20.12

−792
1.60608

× − 40.37
.01
∓ .02

± ~~40.38~~ −40.36
~~52 0.50~~
50 39.76 39.62
49 33.3
−1 6.5 6.6

+2.90 + 2.90
−1 4.14 −.14 ~~4.28~~
−1 1.24 − 4.53
49 38.52 − .90
+1.28 −1 2.53
49 39.80 49 37.07

July 13 −.44 −.439

37
53.0 37 49.6
55.0 50.4
57.0 51.3
1.1
3.2
5.3
7.6
9.5
13.6
15.7
17.8
23 8.8
58.8
5,845 37 50.43

38 5.33
2.45
+2.88
~~+2.86~~

−2.80 +.00
−.05 −.05
−1.66
−4.51
5.33
0.82

38 0.82

+1.576

30
1 42.7
53.0
95.7
1 ~~52.85~~
31 47.85

+14.91
1.17348
1.28609n
−19.32
31 47.85
31 28.53

51 19.82

−1188
1.60212

× − 40.01
.01
∓ .09

± ~~40.09~~ −39.93
~~51 59.94~~
50 39.89 39.75
49 33.4
−1 6.5 6.6

+2.80 + 2.80
−1 4.68 −.14 ~~4.82~~
−1 1.88 − 4.85
49 38.01 − .90
+1.28 −1 2.95
49 39.29 49 36.80

July 15 −.53 −.517

37 54.0
56.1 37 44.3
58.1 45.5
2.3 46.6
4.4
6.4
8.6
10.7
14.8
16.8
18.9
251.1
71.1
6,464 37 45.47

38 6.45
2.43
+4.02
~~+4.00~~

−3.96 −.03
−.06 −.06
−1.64
−5.66 9
6.45
0.79

38 0.76

+1.576

30
1 52.0
4.8
116.8
1 58.40

+20.99
1.32201
1.43462n
−27.20
31 58.40
31 31.20

51 17.15

−2300
1.59100

× − 38.99
.03
∓ .10

± ~~39.06~~ −38.92
~~51 56.21~~
50 ~~38.33~~ 38.23 38.07
49 33.6
−1 4.6 4.8

+2.60 + 2.60
−1 2.75 −.16 ~~2.91~~
−1 0.15 3.14
49 38.08 − .90
+1.28 −1 1.44
49 39.36 49 36.63

July 21 −.37 −.374

37 58.0
0.1
2.1
6.2
8.3
10.4
12.3
14.5
18.6
20.8
22.8
174.1
114.1
10,373

38 10.36
2.37
+7.99
~~+7.97~~

−7.94 −.01
−.04 −.04
−1.58
−9.56 7
10.36
0.80

38 0.79

~~+1.576~~

A. R.

1873 July 22 −.41 −.413

37 58.5
0.5 37 51.7
2.6 52.6
6.7 53.5
8.8
10.9
12.9
15.0
19.1
21.1
23.2
179.3
119.3
10,845 37 52.60

38 10.83
2.86
+8.47
~~+8.45~~

−8.42 +.00
−.05 −.05
−1.57
−10.04 3
10.83
0.79

38 0.80

+1.58

30 47.4
1 57.9
105.3
52.65

+18.24
1.26102
1.37363n
−23.64
31 52.65
31 29.01

51 19.34

−1495
1.59905

× − 39.72
± ~~38.82~~
.02
∓ 10

± ~~39.80~~ −39.64
~~51 59.14~~
50 39.70 39.55
49 ~~39~~.2
−1 5.5 5.7

+2.00 + 2.00
−1 3.92 −.15 ~~4.07~~
−1 1.92 − 4.35
49 37.78 − .90
+1.28 −1 3.25
49 39.06 49 36.30

β Serpentis

h m s
15 40 16
15 40 20
+ 15 49
+ 15 49 14
n = + 26 33 34
+ .45

♃ Tang δ = +.28
x = −.016
Corr = .00
α 1872 16.836 δ = 49′ 26.03″ dα = +2.767
α 1873 19.603 δ = 49 14.48 dδ = −11.54

1872 June 29 40m 18.41s
July 4 .38 .03
9 .34 4
14 .30 4
19 18.25 5

1873 June 29 40m 21.36s
July 4 .33 .03
9 .30 3
14 .26 4
19 21.21 5

1872 −.247
June 27 −.25
15 39 56.8 39 48.2
58.9 49.3
1.2 50.3
5.4
7.5
9.7
11.8
13.9
18.2
20.4
22.5
226.3
106.3
9.664 39 49.27
40 9.65
40 18.42
No corr. −8.77
+ 8.80 +.00
− .07 −.07
− 1.58 +1.19
+ 7.15
40 9.65
40 16.80
40 16.80 40 19.57
+0.95
35
3 4.0
2.3
6.3
~~3 31.50~~
38 3.15
+ 20.39
1.30942
1.40837n
−25.61
38 3.15
37 37.54
+15° 45′ 10.81″
+26° 32′ 52″ 1.45890
−813
1.45077
+ − 28.23″
− .05
− .03
~~+ 28.15~~ −28.31
~~+15 45 38.96~~
+ 15 44 42.50 44 42.20
49 26.5
+4 44.0 43.7
−12.04
− 0.50 − .50
+4 43.88 −30 ~~43.58~~
+4 43.38 +4 49.16
+15 49 25.88 − .42
+4 43.24
49 25.44
49 13.90

1872 −.301
July 14 −.31
40 11.3 40 6.3
13.5 7.3
15.7 8.2
19.9
21.9
24.2
26.3
28.4
32.7
34.9
37.0
265.8
24.164 40 7.27
40 24.15
40 18.30
+5.85
− 5.75 +.00
− .09 −.08
− 1.46 +1.31
−7.30 .29
24.15
16.85
40 16.86 19.63
+0.73
2 58.7
57.9
1.66
37 58.30
+16.89
1.22763
1.32658n
−2121
37 58.30
37 37.09
45 11.26
−1931
1.43959
+ − 27.52
− .04
+ .30
~~+ 27.78~~ −27.26
~~45 39.04~~
44 44.00 43.70
49 28.5
+4 44.5 44.2
14.64
−2.50 − 2.50
+4 44.14 −30 ~~43.84~~
+4 41.64 + 43.81
49 25.64 − .32
+4 40.99
49 24.69
13.15

1872 −.336
July 15 −.33
40 10.6 40 3.1
12.6 4.4
14.8 5.2
19.1
21.2
23.4
25.5
27.5
31.9
34.1
36.3
257.0
23.364 40 4.23
40 23.35
40 18.29
+5.06
− 4.94 +.00
− .09 −.09
−1.45 +1.32
−6.48
23.35
16.87
40 16.87 19.64
+0.72
3 1.1
1.1
2.2
3 1.10
+19.13
1.28171
1.38066n
−2403
38 1.10
37 37.07
45 11.28
−2221
1.43669
+ − 27.33
− .05
+ 30
~~+ 27.58~~ −27.08
~~45 38.86~~
44 44.20 43.90
49 28.7
+4 44.5 44.2
14.24
− 2.70 − 2.70
+4 44.61 −30 ~~44.31~~
+4 41.91 + 44.15
49 26.11 − .32
+4 41.13
49 25.03
13.49

1873 −.406
June 26 −.40
39 58.6 39 49.9
40 0.6 51.0
2.9 52.2
7.1
9.3
11.5
13.5
15.7
20.0
22.1
24.3
185.6
126.6
11.418 39 51.03
40 11.40
40 21.38
−9.98
+ 10.08 +.00
− .11 −.11
− 1.78
+8.19
11.40
19.59
40 19.59
+1.66
30
2 25.3
33.5
58.8
2 29.40
+20.39
1.30942
1.40837n
−25.61
32 29.40
32 3.79
50 44.26
+26° 33′ 11″ 1.45900
−952
1.44948
+ − 28.15
− .05
+ .00
~~+ 28.10~~ −28.20
~~51 12.66~~
50 18.36 50 16.16
49 12.0
−1 4.4 4.6
+2.50 + 2.50
−1 3.52 −.20 ~~3.72~~
−1 1.02 −1 4.09
49 15.34 − .74
−1 2.33
49 13.83

− .472
June 29 −.47
40 0.3 39 57.0
2.4 58.7
4.6 59.9
8.8
11.0
13.2
15.3
17.4
21.6
23.7
25.9
144.2
13.109 39 58.53
40 13.09
21.36
− 8.27
+ 8.40 +.00
−.13 −.13
−1.76
+6.51
13.09
19.60
40 19.60
+1.62
30
2 18.2
37.9
46.1
2 23.05
+24.58
~~1.39058~~ 1.16376
~~1.48953~~n 1.26271
−30.87 −18.31
32 ~~23.05~~ 23.05
31 ~~52.18~~ 32 4.74
50 ~~56.17~~ 43.61
−1801
1.44099
+ − 27.60
− .08
+ .00
~~+ 27.52~~ −27.68
~~51 23.69~~
50 ~~28.49~~ 15.93 15.74
49 12.3
−1 3.6 3.8
+2.20 + 2.20
−1 3.06 −.19 ~~3.25~~
−1 0.86 − 3.64
49 15.67 − .42
−1 2.16
49 13.58

		1872		′	″		1873			″	
Sin δ	9.43544	June	29	49	26.7		June	29	48	72.3	
		July	4		27.3	+6	July	4		72.9	+6
Cos δ	9.98324		9		27.9	.6		9		73.5	.6
	1157′n		14		28.5	.6		14		74.1	.6
	.09895n		19		29.1	.6		19		74.7	.6

1873		α		δ
July 15	44	19.67	49	14.08
21		19.65		14.73
22		19.70		13.86

July 3 −.546 −.55		July 6 −.518 −.51		July 7 −.516 −.51		July 9 −.496 −.49		July 12 −.408 −.40		July 13 −.439 −.44	
40 3.9	39 55.0	40 7.0	39 58.6	40 8.2		40 9.4	39 59.0	40 10.8		40 11.4	
6.0	56.4	9.2	40 0.3	10.3	39 57.2	11.6	40 0.3	13.1	40 4.0	13.6	40 1.3
8.2	57.5	11.5	1.8	12.3	58.6	13.7	1.3	15.2	5.1	15.7	2.6
12.4		15.6		16.7	59.8	18.0		19.4	6.4	20.0	3.7
14.6		17.7		18.8		20.0		21.7		22.1	
16.7		19.9		21.0		22.3		23.8		24.3	
18.9		22.0		23.0		24.3		25.9		26.3	
21.0		24.2		25.2		26.6		28.0		28.4	
25.3		28.4		29.5		30.8		32.4		32.8	
27.3		30.6		31.6		32.9		34.4		35.0	
29.6		32.8		33.7		35.0		36.7		37.0	
183.9		218.9		230.3		244.6		261.4		266.6	
16.718	39 56.30	19.900	40 0.23	20.936	39 58.53	22.236	40 0.20	23.764	40 5.17	24.236	40 2.53
40 16.70		40 19.88		40 20.92		40 22.22		40 23.75		40 24.22	
21.34		21.32		21.31		21.30		21.28		21.27	
−4.64		−1.44		−0.39		+0.92		+2.47		+2.95	
+4.79 +.01		+1.55 +.00		+0.53 +.00		−0.72 +.00		−2.43 +.00		−2.80 +.00	
−.15	−.15	−.14	−.14	−.14	−.14	−.14	−.14	−.11	−.11	−.12	−.12
−1.74		−1.72		−1.71		−1.70		−1.68		−1.67	
+2.90		−0.31 29		−1.32		−2.56		−4.22		−4.59	
16.70		19.88		20.92		22.22		23.75		24.22	
19.60		19.57		19.60		19.66		19.53		19.63	
40 19.61		40 19.59		40 19.60		40 19.66		40 19.53		40 19.63	
+1.59		+1.57		+1.56		+1.56		+1.56		+1.56	
30		30		30		30		30		30	
2 24.0		2 22.0		2 25.8		2 24.6		2 20.9		2 24.9	
35.0		31.1		34.0		32.7		28.9		31.2	
59.0		53.1		59.8		57.3		49.8		56.1	
2 29.50		2 26.55		2 29.90		2 28.65		2 24.90		32 28.05	
+20.42		+19.67		+22.41		+22.04		+18.59		+21.71	
1.31006		1.29380		1.35044		1.34321		1.26928		1.33666	
1.46901n		1.39275n		1.44939n		1.44216n		1.36823		1.43561n	
−25.65		−24.70		−28.14		−27.68		−23.35n		−27.26	
32 29.50		32 26.55		32 29.90		32 28.65		32 24.90		32 28.05	
32 3.85		32 1.85		32 1.76		32 0.97		32 1.55		32 0.79	
50 44.50		50 46.50		50 46.59		50 47.38		50 46.80		50 47.56	
−1802		−950		−529		−800		−742		−1192	
1.44098		1.44950		1.45371		1.45100		1.45158		1.44707	
*− 27.60		*− 28.15		*− 28.43		*− 28.25		*− 28.29		*− 27.99	
− .05		− .05		− .07		− .07		− .05		− .07	
+ .02		+ .02		+ .02		+ .02		+ .02		+ .12	
~~+ 27.57~~	−27.63	~~+ 28.12~~	−28.18	~~+ 28.38~~	−28.48	+ 28.20	−28.30	+ 28.26	−28.32	~~+ 28.04~~	−27.94
~~51 12.07~~		~~51 14.62~~		~~51 14.97~~		51 15.58		51 15.06		51 15.60	
50 18.87	50 16.67	50 18.32	18.13	50 18.11	17.91	50 19.08	18.88	50 18.48	18.29	50 19.62	19.42
49 12.8		49 13.2		49 13.3		49 13.5		49 13.9		49 14.0	
−1 4.1	11.3	−1 5.1	5.3	−1 4.8	5.0	−1 5.6	5.8	−1 4.6	11.8	−1 5.6	5.8
+1.70	+ 1.70	+1.30	+ 1.30	+1.20	+ 1.20	+1.00	+ 1.00	+0.60	+ .60	+0.50	+ .50
−1 3.18	−20 ~~3.28~~	−1 4.28	−19 ~~4.47~~	−1 4.60	−20 ~~4.80~~	−1 4.70	−20 ~~4.90~~	−1 4.14	−.19 ~~4.33~~	−1 4.68	−.20 ~~4.88~~
−1 1.48	−1 3.70	−1 2.98	− 4.41	−1 3.40	4.76	−1 3.70	4.75	−1 3.54	4.53	−1 4.18	4.85
49 15.39	− .71	49 15.34	− .70	49 14.71	− .70	49 15.38	− .70	49 14.94	− .70	49 15.44	− .70
	−1 2.71		−1 3.81		−1 4.26		−1 4.45		−1 4.63		−1 5.05
	49 13.96		49 14.32		49 13.65		49 14.43		49 13.66		49 14.37

w Serpentis

h	m	s	
16	42	53	
15	43	00	
—	3	02	
—	3	02	23
δ = +45		25	11
	+.71		

tang δ = −.05
x = −.015
Cos x = −.06

α 1872 56.522 δ = 2′ 11.73″ dα = +3.126
dδ = −11.32
α 1873 59.647 δ = 2 23.05

1872	m	s	
June 29	42	58.09	
July 4		.07	2
9		.04	3
14		.01	3
19		57.97	4

1873	m	s	
June 29	43	1.39	
July 4		.37	2
9		.35	2
14		.32	3
19		1.28	4

Sin δ 8.72359n
Cos δ 9.99939
.11571n
.11510n

	1872 −.247 June 27 −.25		~~July~~ ~~1872~~	1873 −.324 June 25 −.32		June 26 −.406 −.40		June 29 −.472 −.47		July 3 −.546 −.55	
15	42 36.9	42 25.8	42	42 38.6	42 33.6	42 39.0	42 30.1	42 40.5	42 32.2	42 44.1	42 32.0
	38.9	26.8		40.6	34.7	40.9	31.0	42.6	33.7	46.2	33.3
	41.1	27.7		42.6	35.6	43.1	31.7	44.7	34.8	48.4	34.4
	45.2			46.8		47.1		48.9		52.5	
	47.2			48.9		49.3		51.0		54.5	
	49.3			50.9		51.4		53.0		56.6	
	51.5			53.0		53.4		55.0		58.6	
	53.5			55.1		55.5		57.0		43 0.8	
	57.6			57.3		59.6		43 1.0		4.8	
	59.6			43 1.3		1.6		3.3		7.0	
	1.7			3.4		3.7		5.3		9.0	
	482.5			440.5		444.6		402.3		382.5	
	542.5			560.5		564.6		582.3		622.5	
	49.318	42 26.77		50.955	42 34.63	51.327	42 30.93	52.936	42 33.57	56.591	42 33.23
	42 49.30			42 50.94		42 51.31		42 52.92		42 56.58	
	42 59.10			43 1.41		43 1.41		43 1.39		1.37	
	− 8.80			− 10.47		− 10.10		− 8.47		− 4.79	
	~~− 8.74~~			~~− 10.41~~		~~− 10.04~~		~~− 8.41~~		~~− 4.73~~	
	+ 8.80 +.00			+ 10.43 +.01		+ 10.08 +.00		+ 8.40 +.00		+ 4.79 +.01	
	+ .01	+.01		+ .02	+.02	+ .02	+.02	+ .02	+.02	+ .03	+.03
	− 2.58	+ 1.55		− 1.76		− 1.76		− 1.74		− 1.72	
	+ 1.23			+ ~~12.21~~ 8.69 .70		+ 8.34		+ 6.68		+ 3.10 11	
	42 49.30			50.94		51.31		52.92		56.58	
	42 56.53	42 59.66		~~53.15~~ 59.63		59.65		59.60		59.68	
	42 55.53			42 59.64		42 59.65		42 59.60		42 59.69	
	+0.95			+1.68		+1.66		+1.62		+1.59	
25				20		20		20		20	
	4 20.0			3 33.9		3 40.3		3 37.1		3 42.6	
	19.8			42.4		48.9		49.2		54.8	
	39.8			76.3		89.2		86.3		97.4	
	4 19.90			3 38.15		3 44.60		3 43.15		3 48.70	
	+ 22.55			+ 16.32		+ 20.40		+ 19.37		+ 23.36	
	1.35316			1.21272		1.30963		1.28713		1.36847	
	1.46826n			1.32782n		1.42473n		1.40223n		1.48357n	
	−29.39			−21.28		−26.59		−25.25		−30.45	
	29 19.90			23 38.15		23 44.60		23 43.15		23 48.70	
	28 50.57			23 16.87		23 18.01		23 17.90		23 18.25	
−3°	36 2.16″			0 28.52		0 29.66		0 29.55		0 29.90	
+45°	24′ 5″	1.76590		+45° 24′ 24″	1.76600						
	−813			−244		−952		−1801		−1802	
	1.75777			1.76356		1.75648		1.74799		1.74798	
	x − 57.25″			x − 58.02		x − 57.08		x − 55.97		x − 55.97	
	+ .01			+ .01		+ .01		+ .01		+ .02	
	− .04			+ .00		+ .00		+ .00		+ .04	
	~~+ 57.22~~ − 57.28			~~+ 58.03~~ − 58.01		~~+ 57.09~~ − 57.07		~~+ 55.98~~ − 55.96		~~+ 56.03~~ − 55.91	
~~− 3~~	~~5 4.94~~		2	~~59 30.49~~		~~59 32.57~~		~~59 33.57~~		~~59 33.87~~	
− 3	6 59.44	6 59.87		1 26.53	1 26.82	1 26.73	27.03	1 25.51	25.81	1 25.81	26.11
	2 15.94			2 29.9		2 29.8		2 29.6		2 29.3	
	+ 4 44.0	43.6		− 1 3.6	3.7	− 1 3.1	3.4	− 1 4.1	4.4	− 1 3.5	3.8
	− 7.62										
	+ 3.70 +	3.70		+ 6.90 +	6.90	+ 6.70 +	6.70	+ 6.60 +	6.60	+ 6.30 +	6.30
	+ 4 43.88 − 43	~~43.45~~		− 1 3.87 − .29	~~4.16~~	− 1 3.52 − .30	~~3.82~~	− 1 3.06 − .30	~~3.56~~	− 1 3.18 − .30	~~3.48~~
	+ 4 47.58 + 4	44.16		− 0 56.97 − 1	4.63	− 0 56.82 −	4.09	− 0 56.46 −	3.64	− 0 56.88	3.70
− 3	2 11.86 −	.67		2 23.50 −	1.19	2 23.55 −	1.17	2 21.97 −	1.15	2 22.69 −	1.12
	+ 4	47.19		− 0	58.92	−	58.56	−	58.19	−	58.52
	3 2	12.68		2	25.74	2	25.59	2	24.00	2	24.63
		2 24.00									

1872		°	'	"	
June	29	- 3	2	15.3	
July	4			14.9	- .4
	9			14.6	.3
	14			14.3	.3
	19			14.0	.3

1873		'	"	
June	29	2	29.6	
July	4		29.3	- .3
	9		29.0	.3
	14		28.7	.3
	19		28.4	.3

1873	"
July 20	42 59.64
21	59.57
22	59.66

July 6 - .518
- .51
42 47.5 42 33.6
49.6
51.7
55.7
57.7
59.7
43 1.9
4.0
8.0
10.0
12.0
57.8
65 7.8
59.800 42 33.60
42 59.79
1.36
- 1.57
~~- 1.51~~
+ 1.55 + .02
+ .03 + .03
- 1.71
- 0.1481
59.79
59.686
42 59.678
+ 1.57
20
3 45.0
55.9
100.9
3 50.45
+ 26.20
1.41830
1.53340n
- 34.15
23 50.45
23 16.30
0 27.95
- 950
1.75650
× - 57.08
+ .02
+ .04
+ 57.14 - 57.02
59 38.81
1 24.97 1 25.27
2 29.2
- 1 4.2 4.5
+ 6.00 + 6.10
- 1 4.28 - .30 ~~4.58~~
- 0 58.18 - 1 4.41
- 2 23.16 - 1.11
- 0 57.42
2 24.69

July 7 - .516
- .51
42 48.4
50.7 42 38.4
52.6 39.6
56.6 40.5
58.7
0.8
2.9
4.9
9.0
11.0
13.1
308.7
8.4
0.791 42 39.50
43 0.78
1.36
- 0.58
~~- 0.52~~
+ 0.53 + 00
+ .03 + .03
- 1.71
- 1.145
0.78
59.683
42 59.683
+ 1.56
20
3 37.9
48.1
86.0
3 43.00
+ 21.29
1.32818
1.44328n
- 27.75
23 43.00
23 15.25
0 26.90
- 529
1.76071
× - 57.64
+ .01
+ .04
+ 57.69 - 57.59
59 29.21
1 24.49 24.79
2 29.1
- 1 4.6 4.9
+ 6.00 + 6.00
- 1 4.60 - .30 ~~4.90~~
- 0 58.60 - 4.76
2 23.09 - 1.10
- 59.86
2 24.65

July 9 - .496
- .49
42 49.8 42 42.0
51.9 43.0
53.8 44.0
57.9
43 0.0
2.1
4.1
6.3
10.4
12.4
14.5
263.2
23.2
2.109 42 43.00
43 2.09
1.35
+ 0.74
~~+ 0.80~~
- 0.72 + 00
+ .02 + .02
- 1.70
- 2.38 √40
2.09
59.69
42 59.69
+ 1.56
20
3 34.0
44.1
78.1
3 39.05
+ 19.11
1.28126
1.39636n
- 24.91
23 39.05
23 14.14
0 25.89
- 800
1.75800
× - 57.28
+ .01
+ .04
+ 57.33 - 57.23
59 28.56
1 23.12 23.41
2 29.0
- 1 5.9 6.2
+ 6.00 + 6.00
- 1 4.70 - .29 ~~4.99~~
- 0 58.70 - 4.75
2 21.82 - 1.10
- 59.85
2 23.26

July 12 - .408
- .40
42 51.5
53.4 42 37.8
55.5 39.0
59.7 40.2
1.7
3.8
5.8
7.9
12.0
14.0
16.1
281.4
41.4
3.764 42 39.00
43 3.75
1.33
+ 2.42
~~+ 2.48~~
- 2.43 + 00
+ .02 + .02
- 1.68
- 4.09
3.75
59.66
42 59.66
+ 1.56
20
3 42.3
52.1
94.4
3 47.20
+ 24.76
1.39375
1.50885n
- 32.27
23 47.20
23 14.93
0 26.58
- 762
1.75838
× - 57.33
+ .02
+ .04
+ 57.39 - 57.27
59 29.19
1 23.85 1 24.15
2 28.8
- 1 5.0 5.3
+ 5.70 + 5.70
- 1 4.14 - .30 ~~4.44~~
- 0 58.44 - 4.53
2 22.29 - 1.10
- 0 59.93
2 24.08

July 13 - .439
- .44
42 51.8
53.8 42 43.1
55.9 44.4
0.0 45.7
2.1
4.1
6.3
8.3
12.4
14.5
16.5
225.7
45.7
4.155 42 44.40
43 4.14
1.33
+ 2.81
~~+ 2.87~~
- 2.80 + 00
+ .02 + .02
- 1.68
- 4.46
4.14
59.68
42 59.68
+ 1.56
20
3 37.2
45.2
82.4
3 41.20
+ 19.75
1.29557
1.41067n
- 25.74
23 41.20
23 15.46
0 27.19
- 1193
1.75407
× - 56.76
+ .01
+ .18
+ 56.85 - 56.57
59 30.26
1 23.68 23.98
2 28.7
- 1 5.0 5.3
+ 5.70 + 5.70
- 1 4.68 - 30 ~~4.98~~
- 0 58.98 - 4.85
2 22.66 - 1.10
- 1 0.25
2 24.23

1873
July 15 - .547
- .53
42 52.8
54.9 42 44.5
56.9 45.6
1.1 46.7
3.1
5.2
7.2
9.3
13.4
15.5
17.6
234.0
54.0
5.182 42 45.60
43 5.17
1.31
+ 3.86
~~+ 3.92~~
- 3.96 - .03
+ .03 + .03
- 1.66
- 5.02 .5962
5.17
59.58
42 59.55
+ 1.56
20
3 38.7
51.2
89.9
3 44.95
+ 19.58
1.29181
1.40691n
- 25.52
23 44.95
23 19.43
0 31.08
- 2276
1.74324
× - 55.37
+ .01
+ .18
+ 55.56 - 55.18
59 35.52
1 26.26 25.96
2 28.6
- 1 2.3 2.6
+ 5.50 + 5.30
- 1 2.75 - 30 ~~3.05~~
- 0 57.25 - 3.14
2 23.51 - 1.10
- 0 58.74
2 24.70

12 N Draconis

12 [illegible]

h	m	s
15	44	42
15	44	44
+ 63°	00'	
+ 62	59	33

δ = − 20° 36' 45"

− .35

Tang ν = +1.96

x = −.034

corr = −.10 +0.0

α 1872 43.305 δ = 59 43.93"

α 1873 44.205 δ = 59 32.71

1872	m	s	
June 29	44	45.90	
July 4		.76	.14
9		.60	.16
14		.43	.17
19		45.25	.18
24			
29			
3			
8		44.44	

1873	m	s	
June 29	44	47.05	
July 4		46.91	.14
9		.75	.16
14		.58	.17
19		46.41	.17

dα = +0.900

dδ = −11.22

	1872 June 27 −.247 −.25	1872 June 30 −.330 −.33	1872 July 6 −.357 −.35	1872 July 7 −.319 −.31	1872 July 9 −.284 −.29	1872 July 11 −.349 −.35
15	44 5 37.6 44 55.1	44 32.7 44 8.1	44 44.4 44 13.4	44 25.6 44 6.8	44 46.2 44 7.6	44 44.6 44 18.4
	6 39.7 57.1	35.0 9.8	46.6 18.0	48.1 8.9	48.3 11.0	46.9 19.0
	7 42.2 59.7	37.0 12.0	48.9 21.2	50.3 11.1	50.7 13.0	49.2
	8 44.8	39.4	51.1	52.5	53.0	51.3
	9 46.8	41.7	53.4	54.8	55.2	53.7
	37.60	44.0	55.8	57.0	57.4	55.8
	.43	46.2	57.9	59.2	59.8	58.1
	.66	48.5	0.3	1.4	2.7	0.4
	.49	50.8	2.7	3.7	4.4	2.8
	.72					
	37.58					
	37.55					
	210.6	375.3	361.1	372.6	377.1	362.8
			481.1	492.6	497.1	482.8
	42.120 44 57.30	41.702 44 9.97	53.455 44 17.53	54.733 44 8.93	55.238 44 10.53	53.644 44 18.70
	37.55					
	44 42.09	44 41.67	44 53.42	44 54.70	44 55.20	44 53.61
	44 45.94	45.86	45.69	45.66	45.59	45.53
	~~−3.85~~ 8.39	−4.19	+7.73	+9.04	+9.61	+8.08
	−3.75 8.29	−4.09	+7.83	+9.14	+9.71	+8.18
	+ 8.80 +.00	+ 4.75 −.02	− 7.15 +.01	− 8.45 +.01	− 9.15 +.00	− 8.54 −.01
	− .49 −.48	− .65 −.64	− .69 −.70	− .61 −.62	− .57 −.56	− .69 −.68
	− 2.64 − 1.74	− 2.55 − 1.65	− 2.39 − 1.49	− 2.35 − 1.45	− 2.29 − 1.39	− 2.23 − 1.33
	+ 5.67 5.68	+1.554	−10.23	−11.41	−12.01	−10.46
	44 42.09 37.55	41.67	53.42	54.70	55.20	53.61
	44 47.76 43.22	43.22	43.19	43.29	43.19	43.15
	44 43.23 44 44.13	44 43.21 44.11	44 43.19 44.19	44 43.29 44.19	44 43.20 44.10	44 43.15 44.05
	+0.95	+0.92	+0.83	+0.82	+0.79	+0.77
25	2 57.1	3 24.0	3 25.3	3 32.2	3 30.8	3 25.1
	46.8	15.0	16.5	23.5	22.8	16.8
	10.39	3 9 0	4 1 8	5 5 7	5 3 6	4 1 9
	2 51.95	28 19.50	3 20.90	3 27.85	3 26.80	3 20.95
	− 15.18	+ 31.73	+ 35.92	+ 45.80	+ 44.70	+ 34.94
	1.18127n	1.50147	1.55532	1.66087	1.65031	1.54332
	0.95403n	1.27423n	1.32808n	1.43363n	1.42307n	1.31608n
	+900	−1881	−2129	−2714	−2649	−2071
	27 51.95	28 19.50	28 20.90	28 27.85	28 26.80	28 20.95
	28 0.95	28 0.69	27 59.61	28 0.71	28 0.31	28 0.24
+62°	54 47.40"	54 47.66	54 48.74	54 47.64	54 48.04	54 48.11
−20° 36' 45"	1.33560n					
	−813	−2567	−1552	−1569	−1496	−2245
	1.32747n	1.30993n	1.32008n	1.31991n	1.32064n	1.31315n
	+ 21.26"	+ 20.41	+ 20.90	+ 20.89	+ 20.92	+ 20.57
	− .05	− .23	− .28	− .47	− .45	− .27
	− .03	− .03	+ .26	+ .28	+ .27	+ .26
	− 21.34 +21.18	− 20.67 +20.15	− 20.92 +20.88	− 21.08 +20.70	− 21.10 +20.74	− 20.58 +20.56
+62	54 26.06	54 26.99	54 27.82	54 26.56	54 26.94	54 27.53
+ 62	55 8.58 55 8.29	55 7.81 7.48	55 9.62 9.29	55 8.34 8.00	55 8.78 55 8.44	55 8.67 55 8.34
+0.0"	59 51.9	59 52.5	59 53.7	59 53.9	59 54.2	59 54.6
	+4 43.3 43.0	+4 44.7 44.4	+4 44.1 43.8	+4 45.6 45.3	+4 45.4 45.0	+4 45.9 45.6
	− 19.22	− 19.82	− 21.02	− 21.22	− 21.32	− 21.92
	− 8.00 8.00	− 8.60 8.60	− 9.80 9.80	− 10.00 10.08	− 10.30 10.30	− 10.70 10.70
	+ 4 43.88 −.29 ~~43.59~~	+ 4 45.20 −.33 ~~44.87~~	+ 4 44.71 −.33 ~~44.38~~	+ 4 44.75 −.34 ~~44.41~~	+ 4 44.68 −.34 ~~44.34~~	+ 4 44.89 −.33 ~~44.56~~
	+ 4 35.88 +4 44.16	+ 4 36.60 + 45.04	+ 4 34.91 + 44.66	+ 4 34.75 + 44.40	+ 4 34.38 + 44.50	+ 4 34.19 + 44.51
+62	59 44.46 + .33	59 44.41 + .32	59 44.53 + 35.29	59 43.09 + .28	59 43.16 + .27	59 42.86 + .26
	+4 36.49	+4 36.76	+4 40.15	+4 34.68	+4 34.47	+4 34.07
	59 44.78	59 44.24	59 44.44	59 42.68	59 42.91	59 42.41
	59 33.56	33.02	33.22	31.46	31.69	31.19

Sin δ 9.94988
Cos δ 9.65705
,1571
9.77276n

1872		′	″	
June	29	59	52.3	
July	4		53.3	+10
	9		54.2	.9
	14		55.0	.8
	19		55.7	.7
	24		56.2	.5
	29		56.7	.5
Aug.	3		57.0	.3
	8		57.3	.3

1873		′	″	
June	29	59	38.2	
July	4		39.1	+9
	9		40.0	.9
	14		40.9	.9
	19		41.7	.8

1873				
July 7	44	4400	59	31.93
9		4410		32.58
12		4405		32.26
13		4413		31.07
15		44.05		31.95
20		4400		32.31
21		4407		31.46
22		4410		31.56

July 15 −336 −.33

44 41.8 44 15.6
44.2 17.1
46.3 19.4
48.7
51.0
53.2
55.3
57.6
0.0

398.1
458.1
50.901 44 17.37

44 50.87
45.39
+5.48
+5.58

−4.93 +.00
−.65 −.66
−2.09 −1.19
−7.68
50.87
43.20

44 43.19 44.09

+0.72

3 21.2
14.4
35.6
3 17.80

+33.53
1.52543
1.29819n
−1987n
28 17.80
27 57.93

54 50.42

−2221
1,31339n

+ 20.58
− .24
+ .33

− 20.49 + 20.67
54 29.93
55 11.09 55 10.76
59. 55.2
+4 44.1 43.8
− 22.52
−11.30 — 11.30
+4 44.61 −.33 ~~44.28~~
+4 33.31 +4 44.15
59 44.10 + .25
+4 33.10
59 43.86
32.64

1873 June 25 −324 −.32

44 44 10.2
28.0 11.9
(30.4) 15.1
32.9
34.9
37.2
39.4
41.5
44.2
46.5

3350
37.222 44 12.40

44 37.19
47.15
−9.96
−9.86

+ 10.42 +.01
− .63 −.63
−2.95
+6.845
37.19
44.03

44 44.04

+1.68

20
2 37.5
49.9
87.4
2 43.70

+ 24.82
1.39480
1.16756n
−1471n
22 43.70
22 28.99

0 19.36

−20° 36′ 24″

−244
1,33306n

+ 21.53
− .13
+ .00

− 21.66 + 21.40
59 57.70
0 40.76 0 40.54
59 37.5
−1 3.3 3.5
−4.80 — 4.80
−1 3.87 −.22 ~~4.09~~
−1 8.67 −1 4.63
59 32.09 + .58
−1 8.85
59 31.69

June 26 −406 −.40

44 10.5 44 0.8
15.1 2.7
19.6 4.5
28.7
33.3
37.8
42.3
46.8
55.9
45 0.5
5.0

295.5
415.5
37.773 44 2.67

44 37.74
48.12
−10.38
−9.28

+ 10.08 +.00
− .78 −.79
−2.91
+6.388
37.74
44.13

44 44.12

+1.66

20
2 42.5
56.9
99.4
~~2 54.70~~
22 49.70

+ 35.10
1.54531
1.31807n
−2080
22 49.70
22 28.90

0 19.45

1.33550n

−952
1,32598n

+ 21.18
− .27
+ .00

− 21.45 + 20.91
59 58.00
0 40.36 40.14
59 37.7
−1 2.7 2.9
−5.00 — 5.00
−1 3.52 −.22 ~~3.74~~
−1 8.52 4.09
59 31.84 + .58
−1 8.51
59 31.63

June 29 −472 −.47

44 44 11.8
30.5 13.5
32.6 18.1
35.0
37.3
39.6
41.7
44.0
46.3
48.7

355.7
39.522 44 13.47

44 39.49
47.04
−7.55
−7.45

+ 8.40 +.00
− .92 −.92
−2.84
+4.64
39.49
44.13

44 44.13

+1.62

20
2 36.0
52.2
88.2
2 44.10

+ 26.05
1.41581
1.18857n
−1544
22 44.10
22 28.66

0 19.69

−1801
1,31749n

+ 20.77
− .15
+ 00

− 20.92 + 20.62
59 58.77
0 40.31 40.29
59 38.2
−1 2.1 2.3
−5.50 — 5.50
−1 3.86 −.22 ~~3.28~~
−1 8.56 3.64
59 31.75 + .56
−1 8.58
59 31.51

July 3 −546 −.55

44 44 8.0
34.0 9.5
(36.8) 11.0
38.6
41.0
43.1
45.5
47.6
49.8
52.0

43.155 44 9.50

44 43.12
46.93
−3.81
−3.71

+ 4.79 +.01
−1.08 −1.07
−2.72
+0.99 +1.01
43.12
44.11

44 44.13

+1.59

20
2 39.8
56.1
95.9
2 47.95

+ 33.65
1.52699
1.29975n
−1994
22 47.95
22 28.01

0 20.34

−1802
1,31748n

+ 20.77
− .26
+ .03

− 21.00 + 20.54
59 59.34 0 63
0 40.88 40.66
59 38.9
−1 2.0 2.2
−6.20 — 6.20
−1 3.18 −.22 ~~3.40~~
−1 9.38 — 3.70
59 31.50 + .55
−1 9.35
59 31.31

1873 July 6 −518 −.51

44 44 14.8
37.3 16.9
39.4 19.5
41.7
43.9
46.0
48.6
50.8
53.0
55.3

416.0
46.222 44 17.07

44 46.19
46.85
−0.66
−0.56

+ 1.54 +.02
−1.00 −1.01
−2.65
+2.170
46.19
44.08

44 44.09

+1.57

20
2 26.0
51.0
77.0
2 ~~38.50~~ 43.50

+ 29.15
1.46464
1.23740n
−17.27
22 44.50
22 26.23

0 22.12

−950
1,32600n

+ 21.18
− .19
+ .03

− 21.34 + 21.02
0 5.78
0 43.14 42.93
59 39.5
−1 3.6 3.8
−6.80 — 6.80
−1 4.28 −.21 ~~4.49~~
−1 11.08 — 4.41
59 32.06 + .34
−1 10.67
59 32.26

(~~16~~) ζ Urs, Min.

h	m	s
15 −	48	38
+	78°	11′

15 48 38
+ 78° 11′ 6″.2
ζ = − 35° 48′ 14″
sin ζ = −.58

tang δ = +4.98
x = −.069
cos x = + .31
α 1872 40.406 δ = 11 13.33 dα = −2.303
α 1873 38.104 δ = 11 2.44 dδ = −10.89

1872	m	s	
June 29	48	45.49	
July 4		45.10	39
9		44.69	41
14		44.25	44
19		43.79	46

1873	m	s
June 29	48	43.55
July 4		43.36 .19
9		43.16 .21
14		42.96 .30
19		42.75 .21

	1872 −.247 June 27 −.25	1872 −.349 July 3 −.32	1872 −.319 July 7 −.31	1872 −.284 July 9 −.29	1872 −.349 July 11 −.35	1872 −.301 July 14 −.31
15	48 18.2 · 48 31.3 23.4 27.9 32.9 38.6 43.3 48.5 53.5 58.9	48 29.4 · 47 52.7 34.3 · 57.5 39.1 · 1.9 44.3 49.4 54.3 59.3 4.4 9.4	48 34.9 · 47 41.3 40.2 · 43.9 45.1 · 46.7 50.0 · 48.9 55.4 0.3 5.3 10.6 15.7	48 35.3 · 47 27.7 40.2 · 33.0 45.4 · 38.1 50.5 55.3 0.2 5.6 10.5 15.7	48 34.2 · 47 31.7 39.2 · 36.4 44.3 · 39.2 49.4 54.1 59.2 4.3 8.9 14	48 31.8 · 47 55.8 36.6 · 0.5 41.6 · 3.0 46.7 51.6 56.7 1.6 7.0 12.0
	345.2	323.9 443.9	257.5 497.5	258.7 498.7	308.2 488.2	285.6 465.6
	38.355 · 48 31.30	49.322 · 47 57.37	55.278 · 47 45.20	55.411 · 47 32.93	54.244 · 47 35.77	51.283 · 47 59.77
	48 38.29 48 45.62 −7.33 −7.64	48 49.25 45.16 +4.09 +3.78	48 55.21 44.84 +10.37 +10.06	48 55.34 44.67 +10.67 +10.36	48 54.18 44.50 +9.68 +9.37	48 51.66 44.23 +7.43 +7.12
	+8.80 +.00 −1.20 · −1.18 −5.22 · −7.52 +2.38 .40 48 38.29 48 40.67	−2.31 +.03 −1.53 · −1.67 −4.75 · −7.05 −8.57 .70 49.25 40.66	−8.45 +.01 −1.48 · −1.52 −4.44 · −6.74 −14.37 .40 55.21 40.84	−9.15 +.00 −1.39 · −1.36 −4.26 · −6.56 −14.80 .77 55.34 40.54	−8.54 −.01 −1.67 · −1.67 −4.10 · −6.40 −14.37 .2 54.18 40.47	−5.75 +.00 −1.48 · −1.44 −3.83 · −6.13 −11.08 .2 51.66 40.60
	48 40.69 · 48 38.39	48 40.55 · 38.25	48 40.81 · 38.51	48 40.57 · 38.27	48 40.86 · 38.56	48 40.64 · 38.34
	+0.95	+0.87	+0.82	+0.79	+0.77	+0.73
15	2 2.6 47.0 107.6 1 53.80	2 8.8 58.2 127.0 2 3.50	2 12.8 1.8 14.7 17 7.35	2 16.8 5.0 21.8 2 10.90	2 13.1 3.1 16.2 2 8.10	2 6.2 55.1 121.3 2 0.65
	+7.05 0.84819 0.27579n −1.88 16 53.80 16 ~~34.96~~ 51.92	+51.95 1.71559 1.14259n −1389 17 3.50 16 49.61	~~+10.08~~ +70.08 1.00346 1.84559 1.27259n −18.73 17 7.35 16 48.62	+82.48 1.91635 1.34335n −2205 17 10.90 16 48.85	+78.47 1.89470 1.32170n −20.97 17 8.10 16 47.13	+51.96 1.71567 1.14267n −1389 17 0.65 16 46.76
+78°	6′ ~~43.37~~ 56.44″	5 58.74	5 59.73	5 59.50	6 1.22	6 1.59
−35°	48 10 · 1.61820					
	−804 1.61016n	−2128 1.59692n	−1552 1.60268n	−1478 1.60342n	−2230 1.59590n	−1916 1.59904n
	+ 40.75 − .01 − .02	+ 39.53 − .30 + .16	+ 40.06 − .53 + .17	+ 40.13 − .73 + .18	+ 39.44 − .68 + .17	+ 39.72 − .30 + .20
+78	− ~~40.78~~ +40.72 5 ~~32.61~~	− ~~39.67~~ +39.39 5 ~~19.07~~	− ~~40.42~~ +39.70 5 ~~19.31~~	− ~~40.68~~ +39.58 5 ~~18.82~~	− ~~39.95~~ +38.93 5 ~~21.27~~	− ~~39.82~~ +39.62 5 ~~21.77~~
+78	6 54.1 37.15 · 6 36.96	6 38.13 · 37.93	6 39.43 · 6 39.22	6 39.08 · 38.86	6 40.15 · 39.94	6 41.21 · 41.01
	11 22.1 +4 ~~28.0~~ 45.8 ∫ 44.8 − 19.64 − 8.80 · 8.80	11 23.1 +4 45.0 · 44.8 − 20.69 − 9.80 · 9.80	11 23.9 +4 44.5 · 44.3 − 21.49 − 10.60 · 10.60	11 24.2 +4 45.1 · 44.9 − 21.79 − 10.90 · 10.90	11 24.6 +4 44.5 · 44.3 − 22.19 − 11.30 · 11.30	11 24.9 +4 43.7 · 43.5 − 22.49 − 11.60 · 11.60
	+4 43.88 −.19 · ~~43.69~~ +4 35.08 +4 · 44.16	+4 45.23 −.20 · ~~45.03~~ +4 35.43 + · 44.84	+4 44.75 −.21 · ~~44.54~~ +4 34.15 + · 44.40	+4 44.68 −.22 · ~~44.46~~ +4 33.78 + · 44.50	+4 44.89 −.21 · ~~44.68~~ +4 33.59 + · 44.51	+4 44.14 −.20 · ~~43.94~~ +4 32.54 + · 43.81
+78	11 12.23 + · .55 −.67 +4 · 35.91	11 13.56 + · .50 −.67 +4 · 35.54	11 13.58 + · .47 −.67 +4 · 34.27	11 12.86 + · .45 −.67 +4 · 34.05	11 13.74 + · .44 −.67 +4 · 33.65	11 13.75 + · .42 −.67 +4 · 32.63
+78	11 11.56 · 11 12.87 11 1.98	11 12.89 · 11 13.47 2.58	11 12.91 · 11 13.44 2.60	11 ~~11.19~~ 12 · 11 12.91 2.02	11 13.07 · 11 13.59 2.70	11 13.08 · 11 13.64 2.75

43.55
43.16 40
42.75 41
42.36 44
41.84 47

Sin δ 9.99070
Cos δ 9.31129
11571
9.42700n

1872

		′	″	
June	29	10	82.4	
July	4		83.3	+.9
	9		84.2	.9
	14		84.9	.7
	19		85.6	.7

1873

		′	″		1872.0 α	δ	1873.0 α	δ
June	29	10	68.6					
July	4		69.6	+1.0	40.69	11.56	38.36	0.74
	9		70.5	.9	.55	12.89	.42	1.50
	14		71.3	.8	.81	12.91	.14	0.83
	19		71.9	.6	.57	12 ~~11~~.19	.40	59.98
					.86	13.07	29	59.99
					.64	13.08	41	0.12
					.66	13.48	51	0.46
							41	
							46	0.81
							46	1.78
							56	1.12
							43	6.45
							44	
					40.683	~~13.00~~	38.407	0.79
					405	13.33	.104	2.44
					+.278	−0.33	+.303	−1.65

+1.34
12.74
3.35
3.44
+.91
+2.56

1873

July 7	48	38.41	11	1.88
9		38.51		2.12
12		38.41		2.33
13		38.46		2.34
15		38.46		2.48
20		38.56		3.12
21		38.43		2.66
22		38.44		3.09

1872
July 16 −.336 −.33
48 31.1 47 29.2
36.0 33.4
40.8 37.2
45.9
50.9
56.3
1.1
6.0
11.1
279.2
459.2
51.022 47 33.27
48 50.95
43.14
6+8.81
6+8.50
−4.94 +.00
−1.58 −1.61
−2.74 −5.04
−9.27 9
50.95
40.69
48 40.66 38.36
+0.72
2 11.9
1.9
1 3.8
2 6.90
+77.75
1.89070
1.31770n
−20.79
17 6.90
16 46.11
6 2.24
−22.15
1.59605n
+ 39.45
− .66
+ .21
~~− 39.90~~ +39.00
~~5 22.34~~
6 41.24 6 41.83
11 25.0
+4 4.38 43.6
−22.59
−11.70 −
+4 44.61 −.21 − 11.70
+11 32.91 +4 44.15
11 14.15 + 41
−.67 +4 32.86
11 13.48 11 13.89
300

1873
June 25 −.324 −.32
48 47 30.6
15.3 35.1
20.4 40.5
25.0
30.3
35.7
39.6
45.5
50.5
55.3
317.6
35.289 47 35.40
48 35.22
43.84
−8.62
−8.93
+10.42 +.01
−1.53 −1.55
−5.74
+3.15 4
35.22
38.37
48 38.36
+1.68
10
1 27.8
40.1
67.9
1 33.95
+59.89
1.77735
1.20435n
−16.01
11 33.95
11 17.94
11 30.41
−35° 47′ 23″ 1.61790n
−21.9
1.61571n
+ 41.28
− 40
+ .00
~~− 41.68~~ +40.88
~~10 48.73~~
12 11.29 12 11.16
11 7.8
−1 3.5 3.6
− 5.40 − 5.40
− 1 3.87 − 13 ~~4.00~~
− 1 9.27 − 1 4.63
11 2.02 + .97
− 1.28 − 1 9.06
11 0.74 11 2.10

June 26 −.406 −.40
48 47 35.0
14.7 37.7
21.1 41.4
26.0
31.1
36.0
40.9
46.0
51.2
56.1
324.1
36.011 47 38.03
48 35.94
43.76
−7.82
−8.13
+10.08 +.00
−1.91 −1.94
−5.66
+2.51 48
35.94
38.45
48 38.42
+1.66
10
1 25.9
38.5
64.4
1 32.20
+57.98
1.76328
1.19028n
−15.50
11 32.20
11 16.70
11 31.65
−9.27
1.60863n
+ 40.61
− .36
+ .00
~~− 40.97~~ +40.25
~~10 50.68~~
12 11.90 11.78
11 8.0
− 1 3.9 4.0
− 5.60 − 5.60
− 1 3.52 − 12 ~~3.64~~
− 1 9.12 − 4.09
11 2.78 + .96
−1.28 − 1 8.73
11 1.50 11 3.05

June 29 −.472 −.47
48
17.5
22.6
27.5
32.0
37.2
42.1
47.4
52.5
57.6
337.5
37.500
48 37.43
43.53
−6.10
−6.41
+ 8.40 +.00
− 2.25 − 2.26
−5.43
+0.72 1
37.43
38.15
48 38.14
+1.62
A. R.

July 3 −.546 −.55
48 47 27.0
21.6 33.5
26.3 38.3
31.7
36.3
41.4
46.2
51.4
56.5
49 1.2
312.6
372.6
41.400 47 32.93
48 41.33
43.22
−1.89
−2.20
+4.79 +.01
−2.63 −2.61
−5.12
−2.93
41.33
38.37
48 38.40
+1.59
10
1 26.0
41.6
67.6
1 33.80
+68.47
1.83550
1.26250n
−18.30
11 33.80
11 15.50
11 32.85
−17.76
1.60014n
+ 39.82
− .50
+ .02
~~− 40.30~~ +39.34
~~10 52.55~~
12 12.19 12.06
11 9.4
−1 2.8 2.9
− 7.00 − 7.00
−1 3.18 − 13 ~~3.31~~
−1 10.18 − 3.70
11 2.01 + .92
− 1.28 − 1 9.78
11 0.83 11 2.28

1873
July 6 −.518 −.51
14.08
13.33
+ .75
48 47 36.2
24.0 40.3
29.0 45.7
34.1
39.3
43.9
48.9
54.4
59.5
49 4.3
337.4
397.4
44.155 47 40.73
48 44.09
42.98
+1.11
+0.80
+1.54 +.02
−2.44 −2.48
−4.88
−5.78 .80
44.09
38.31
48 38.29
+1.57
10
1 24.7
40.0
64.7
1 32.35
+63.42
1.80228
1.22923n
−16.95
11 32.35
11 15.40
11 32.95
−9.31
1.60859n
+ 40.61
− .44
+ .02
~~− 41.03~~ + 40.19
~~10 51.92~~
12 13.14 13.02
11 10.0
− 1 3.1 3.2
− 7.60 − 7.60
− 1 4.28 − 12 ~~4.40~~
− 1 11.88 − 4.41
11 1.26 + .91
− 1.28 − 1 11.10
10 59.98 11 1.92

J Serpentis

tang δ = +.29

x = −.016

cos α = ~~+.02~~

h	m	s
15	50	33
15	50	35
+	16°	04
+	16	04. 40
δ = + 26°	18′	8″
+ .44		

α 1872 32.513 δ = 4′ 51.54 dα = +2.768

dδ = −12.00

α 1873 35.281 δ = 4 39.53

1872	m	s	
June 29	50	34.13	.03
July 4		.10	3
9		.07	3
14		.03	4
19		33.99	.04

1873	m	s	
June 29	50	37.08	
July 4		37.05	3
9		37.02	3
14		36.98	4
19		36.94	4

	1872 June 27 −.247 −.25		1872 July 8 −.349 −.32		1872 July 11 −.349 −.35		1872 July 14 −.301 −.31		1872 July 15 −.336 −.33	
15	50 12.6	50 0.5	50 23.7	50 19.0	50 28.9	50 22.0	50 27.1	50 18.2	50 26.2	50 15.0
	14.7	1.4	25.8	19.3	30.9	23.1	29.2	19.1	28.4	
	16.8	2.3	28.0	20.0	33.2	24.0	31.2	20.1	30.5	
	21.2		32.2		37.3		35.5		34.7	
	23.3		34.4		39.6		37.6		36.9	
	25.4		36.5		41.7		39.9		39.1	
	27.5		38.6		43.8		42.0		41.2	
	29.8		40.9		46.0		44.2		43.3	
	33.9		45.1		50.3		48.4		47.5	
	36.1		47.2		52.3		50.6		49.7	
	38.4		49.3		54.5		52.7		52.0	
	279.7		401.7		458.5		438.4		429.5	
	25.427	50 1.40	36.518	50 19.43	41.682	50 23.03	39.855	50 19.13	39.045	50 15.00
	50 25.41		50 36.50		50 41.57		50 39.84		50 39.03	
	50 34.14		34.11		34.05		34.03		34.02	
	−8.73		+2.39		+7.52		+5.81		+5.01	
	~~−8.71~~		~~+2.41~~		+7.54		~~+5.83~~		~~+5.03~~	
	+8.80 +.00		−2.32 +.03		+8.53 −.01		−5.75 +.00		−4.93 +.00	
	− .07	−.07	− .09	−.10	− .10	−.10	− .09	−.09	− .10	−.10
	−1.63	+1.14	−1.60	+1.17	−1.54	+1.23	−1.52	+1.25	−1.51	+1.26
	+7.10		−4.01 3.99		−10.18		−7.36		−6.54	
	50 25.41		36.50		41.57		39.84		39.03	
	50 32.51		32.49		32.40		32.48		32.49	
	50 32.51	50 35.28	50 32.51	35.28	50 32.39	35.16	50 32.48	35.25	50 32.49	35.26
	+0.95		+0.87		15^20 +0.77		+0.73		+0.72	
20	2 45.0		2 36.8		2 36.2		20 2 39.0		2 42.0	
	42.9		36.6		36.7		37.2		42.9	
	87.9		73.4		72.9		76.2		84.9	
	2 43.95		2 36.70		2 36.45		2 38.10		2 42.45	
	+24.03		+17.09		+18.65		+20.72		+24.04	
	1.38075		1.23274		1.27068		1.31639		1.38093	
	1.47912n		1.33141n		1.36905n		1.41476n		1.47930n	
	−3014		−2143		−2339		−2599		−3015	
	22 43.95		22 36.70		22 36.45		22 38.10		22 42.45	
	22 13.81		22 15.27		21 13.06		22 12.11		22 12.30	
+16°	0′ 34.54″		0 33.08		0 35.29		0 36.24		0 36.05	
+26	17 28	1.45390								
	−804		−2128		−2230		−1916		−2215	
	1.44586		1.43262		1.43160		1.43474		1.43175	
	+− 27.92		+− 27.08		+− 27.01		+− 27.21		+− 27.02	
	− .08		− .04		− .05		− .06		− .08	
	− .03		+ .21		+ .21		+ .26		+ .27	
	+ ~~27.81~~	−28.03	+ ~~27.25~~	−26.91	+ ~~27.17~~	−26.85	+ ~~27.41~~	−27.01	+ ~~27.21~~	−26.73
+16	1 ~~2.35~~		1 ~~1.33~~		6 ~~2.46~~		1 ~~3.65~~		1 ~~3.26~~	
+16	0 6.57	0 6.24	0 6.17	5.91	0 8.44	8.18	0 9.23	8.97	0 ~~9.32~~	~~9.22~~ 9.32 9.05
	4 51.4		4 52.1		4 53.1		4 53.4		4 53.5	
	+4 44.9	44.6	+4 45.9	45.6	+4 44.7	44.4	+4 44.2	43.9	+4 44.2	43.9
	−12.90		−12.60		−13.60		−13.90		−14.00	
	+0.10	+ .10	−0.60	− .60	−1.60	− 1.60	−1.90	− 1.90	−2.00	− 2.00
	+4 43.88	−27 ~~43.61~~	+4 45.23	−26 ~~44.97~~	+4 44.89	−26 ~~44.63~~	+4 44.14	−26 ~~43.88~~	+4 44.61	−27 ~~44.34~~
	+4 43.98	+4 44.16	+4 44.63	+ 44.84	+4 43.29	+ 44.50	+4 42.24	+ 43.81	+4 42.61	+ 44.15
+16	4 50.59	− .41	4 50.80	− .38	4 51.73	− .33	4 51.47	− .32	4 51.93	− .31
		+4 43.85		+4 43.86		+4 42.57		+4 41.59		+4 41.84
		4 50.09		4 49.77		4 50.75		4 50.56		4 50.89
		4 38.09		37.77		38.75		38.56		38.89

Sin δ 9.44253
Cos δ 9.98266
.11571n
.09837n

1872		′	″	
June	29	4	51.6	
July	4		52.2	+.6
	9		52.8	.6
	14		53.4	.6
	19		54.0	.6

1873			″	
June	29	4	36.6	
July	4		37.3	+.7
	9		37.9	.6
	14		38.5	.6
	19		39.1	.6

1873			α		δ
July	15	50	35.21	5	38.56
	20		35.25		38.47
	21		35.24		38.41
	22		35.26		38.71

1

1873 June 29 −.47 −.472

50 16.1 18.1 20.3 24.4 26.8 28.7 31.0 33.0 34.3 39.5 41.6 — 316.8
50 15.0 16.6
28.800 50 15.80
50 28.78
37.08
−8.30
~~−8.28~~
+8.40 +.00
−.14 −.14
−1.80
+6.46
28.78
35.24
50 35.24
+1.62
15
1 51.9
2.0
11.39
1 56.95
+13.00
1.11394
1.21231n
−1631
16 56.95
16 40.64
6 7.71
+26° 17′ 47″ 1.45400
−1775
1.43625
α − 27.31
− .02
+ .00
+ ~~27.29~~ −27.33
6 ~~35.00~~
5 40.38 5 40.23
4 36.6
−1 3.8 4.0
+2.90 + 2.90
−1 3.086 −.15 ~~3.21~~
−1 0.16 −1 3.64
4 40.22 − .71
−1 1.45
4 38.78

July 3 −.55 −.546

50 19.6 21.7 23.8 28.1 30.3 32.4 34.6 36.7 40.9 43.2 45.4 — 356.7
50 11.7 12.9 14.0
32.427 50 12.87
50 32.41
37.06
−4.65
~~−4.63~~
+4.79 +.01
−.16 −.16
−1.78
+2.856
32.41
35.26
50 35.27
+1.59
15
1 59.8
10.0
129.8
2 4.90
+19.56
1.29137
1.38974n
−2453
17 4.90
16 40.37
6 7.98
−1776
1.43624
α − 27.31
− .05
+ .02
+ ~~27.28~~ −27.34
6 ~~35.26~~
5 40.64 40.47
4 37.2
−1 3.0 3.6
+2.30 + 2.30
−1 3.18 −.17 ~~3.35~~
−1 0.88 − 2.70
4 39.66 − .69
−1 2.69
4 38.38

July 7 −.51 −.516

50 24.0 26.0 28.1 32.3 34.7 36.7 38.9 41.0 45.2 47.3 49.6 — 403.8
50 10.4 11.7 12.7
36.709 50 11.60
50 36.69
37.08
−0.34
~~−0.32~~
+0.53 +.00
−.15 −.15
−1.75
~~−2.43~~ −1.37
36.69
35.~~36~~ 32
50 35.32
+1.56
15
2 4.5
11.4
15.9
2 7.95
+25.11
1.39985
1.49822n
−3150
17 7.95
16 36.45
6 11.90
−506
1.44894
α − 28.11
− .09
+ .02
+ ~~28.04~~ −28.18
6 ~~39.94~~
5 43.72 43.55
4 37.7
−1 6.0 6.2
+1.80 + 1.80
−1 4.60 −.17 ~~4.77~~
−1 2.80 − 4.76
4 40.92 − .68
−1 3.64
4 39.91

July 9 −.49 −.496

50 25.0 27.4 29.4 33.6 35.8 37.9 40.0 42.3 46.4 48.7 50.9 — 417.4
50 13.3 14.8 16.4
37.945 50 14.83
50 37.93
37.02
+0.91
+0.93
−0.73 +.00
−.14 −.14
−1.74
−2.61
37.93
35.32
50 35.32
+1.56
15
1 2.1
11.0
13.1
2 6.55
+23.11
1.36380
1.46217n
−2898
17 6.55
16 37.57
6 10.78
−800
1.44600
α − 27.93
− .08
+ .02
+ ~~27.87~~ −27.99
6 ~~37.65~~
5 42.79 42.62
4 37.9
−1 4.9 5.1
+1.60 + 1.60
−1 4.70 −.17 ~~4.87~~
−1 3.10 − 4.75
4 39.69 − .68
−1 3.83
4 38.79

July 12 −.40 −.408

50 26.7 28.8 31.0 35.2 37.4 39.5 41.7 43.8 48.2 50.3 52.4 — 435.0
50 18.7 19.8 21.0
39.545 50 19.83
50 39.53
37.00
+2.53
~~+2.55~~
−2.44 +.00
−.12 −.12
−1.72
−4.28
39.53
35.25
50 35.25
+1.56
15
1 57.1
5.1
122.2
2 1.10
+19.71
1.29469
1.39366n
−2472
17 1.10
16 36.38
6 11.97
−732
1.44668
α − 27.97
− .06
+ .02
+ ~~27.93~~ −28.01
6 ~~39.90~~
5 43.96 43.80
4 38.3
−1 5.7 5.9
+1.20 + 1.20
−1 4.14 −.16 ~~4.30~~
−1 2.94 − 4.53
4 41.02 − .68
−1 4.01
4 39.79

July 13 −.44 −.439

50 27.1 29.3 31.3 35.7 37.8 40.0 42.1 44.3 48.6 50.7 52.8 — 439.7
50 18.9 20.0 21.1
39.973 50 20.00
50 39.96
36.99
+2.97
~~+2.99~~
−2.81 +.00
−.13 −.13
−1.71
−4.65
39.96
35.31
50 35.31
+1.56
15
1 58.3
6.1
124.4
2 2.20
+19.97
1.30038
1.39875n
−2504
17 2.20
16 37.16
6 11.19
−1193
1.44207
α − 27.67
− .06
+ .10
+ ~~27.71~~ − ~~27.63~~ ~~27.59~~ −27.63
6 ~~38.90~~
5 ~~43.56~~ ~~43.60~~ 43.56
4 38.4
−1 5.2 5.4
+1.10 + 1.10
−1 4.68 −.16 ~~4.84~~
−1 3.58 − 4.85
4 39.98 − .68
−1 4.43
4 39.13

1872phae.proj.1460.

ε Coronae

h	m	s
15	52	18
15	52	20
+	27°	16′
+	27	14 49

z = + 15° 7′ 59″

sin. z = + .26

Tang ϑ = +.52

x = -.017

Cos x =

α 1872 17.377 δ = 15′ 0.84″

α 1873 19.861 δ = 14 49.41

dα = +2.484

dδ = -10.63

1872		m	s	
June	29	52	19.05	
July	4		.01	.04
	9		.97	4
	14		.92	5
	19		18.86	6
	24		.80	6
	29		.73	7
Aug	3		.65	8
	8		18.57	.08

1873		m	s	
June	29	52	21.73	
July	4		69	.04
	9		65	4
	14		60	5
	19		21.54	6
	24		48	6
	29		41	7
Aug	3		33	8
	8		21.25	.08

1872 June 27 -.247 -.25 | 1872 July 5 -.349 -.32 | 1872 July 11 -.349 -.35 | 1872 July 14 -.301 -.31 | 1872 July 15 -.336 -.33 | 1872 July 29 -.21 -.20

15

51 56.4 52 29.2 | 52 ~~7.7~~ 51 59.2 | 52 22.0 52 6.2 | 52 10.9 52 1.5 | 52 10.1 52 1.2 | 52 8.2
58.8 30.5 | ~~9.9~~ 0.3 | 23.2 7.3 | 13.2 2.7 | 12.3 2.3 | 10.5
1.1 31.5 | ~~12.2~~ 1.5 | 24.3 8.4 | 15.5 3.9 | 14.7 3.4 | 12.5
5.6 | 16.9 | 25.4 | 20.2 | 19.2 | 14.3
6.2 | 19.2 | 26.6 | 22.6 | 21.6 | 19.6
10.5 | 21.4 | 27.7 | 24.7 | 24.0 | 21.9
12.7 | 23.8 | 28.9 | 27.1 | 26.3 | 24.3
15.1 | 26.2 | 30.1 | 29.3 | 28.6 | 26.6
19.7 | | 31.3 | 34.0 | 33.3 | 31.2
21.9 | | | 36.3 | 35.6 | 33.6
24.3 | | | 38.7 | 37.9 | 35.9
234.3 | | 239.5 | 272.5 | 263.6 | 241.6
114.3

52 10.391 52 30.40 | 52 21.500 52 0.33 | 26.611 52 7.30 | 24.773 52 2.70 | 23.964 52 2.30 | ~~22.145~~ 21.982

52 10.37 | 52 21.48 | 52 26.59 | 52 24.76 | 52 23.95 | 52 21.97
52 19.06 | 19.02 | 18.95 | 18.92 | 18.91 | 18.73
no Corr. - 8.69 | +2.46 | +7.64 | +5.84 | +5.04 | +3.24

+ 8.79 +.00 | - 2.32 +.03 | - 8.53 -.01 | - 5.74 +.00 | - 4.93 +.00 | - 3.16 +.01
- .13 -.13 | - .17 -.18 | - .18 -.18 | - .16 -.16 | - .17 -.17 | - .10 -.11
-1.68 + 0.80 | -1.64 + 0.84 | -1.57 + 0.91 | -1.54 + 0.94 | -1.53 + 0.95 | -1.35 +1.13
+ 6.98 | - 4.181 | - 10.289 | - 7.44 | - 6.63 | - 4.61
52 10.37 | 21.48 | 26.59 | 24.76 | 23.95 | 21.97
52 17.35 | 17.35 | 17.31 | 17.32 | 17.32 | 17.36

52 17.35 52 19.83 | 52 17.37 17.85 | 52 17.30 19.78 | 52 17.32 19.60 | 52 17.32 19.80 | 52 17.36 19.84

+0.95 | +0.87 | +0.77 | +0.73 | +0.72

10

1 55.2 | 2 41.9 | 2 38.2 | 2 41.0 | 2 40.8
48.9 | 38.5 | 35.0 | 36.1 | 37.1
104.1 | 80.4 | 73.2 | 77.1 | 77.9
1 52.05 | 2 40.20 | 2 36.60 | 2 38.55 | 2 38.95

- 20.01 | +21.17 | +19.31 | +22.07 | +21.66
1.30125n | 1.32572 | 1.28578 | 1.34380 | 1.33566
1.36587 | 1.39034n | 1.35040n | 1.40842n | 1.40028n
+23.22 | -24.57 | -22.41 | -25.61 | -25.14
11 52.05 | 12 40.20 | 12 36.60 | 12 38.55 | 12 38.95
12 15.27 | 12 15.63 | 12 14.19 | 12 12.94 | 12 13.81

+27° 10′ 33.08″ | 10 32.72 | 10 34.16 | 10 35.41 | 10 34.34

+15° 7′ 30″ 1.19210
-804 | -2117 | -2215 | -1901 | -2208
1.18406 | 1.17093 | 1.16995 | 1.17309 | 1.17002

x - 15.28″ | x - 14.82 | x - 14.79 | x - 14.90 | x - 14.79
- .09 | - .09 | - .08 | - .10 | - .10
- .02 | + .22 | + 21 | + .26 | + .26

+ ~~15.17~~ -15.39 | + ~~14.95~~ -14.69 | + ~~14.92~~ -14.66 | + ~~15.06~~ -14.74 | + ~~14.95~~ -14.63
+27 ~~10 48.23~~ | ~~10 47.67~~ | ~~10 49.08~~ | ~~10 50.47~~ | ~~10 49.49~~
+27 10 17.69 10 17.50 | 10 18.03 17.76 | 10 19.50 19.24 | 10 20.67 20.41 | 10 19.91 19.65
15 2.6 | 15 3.7 | 15 4.9 | 15 5.3 | 15 5.5
+4 44.9 44.7 | +4 45.7 45.4 | +4 45.4 45.1 | +4 44.6 44.3 | +4 45.6 45.3
- 18.23 | - 14.33 | - 15.53 | - 15.93 | - 16.13
- 2.60 - 2.60 | - 3.70 - 3.70 | - 4.90 - 4.90 | - 5.34 - 5.30 | - 5.50 - 5.50
+4 43.88 -.19 ~~43.69~~ | +4 45.23 -.27 ~~44.96~~ | +4 44.89 -.26 ~~44.63~~ | +4 44.14 -.26 ~~43.88~~ | +4 44.61 -.26 ~~44.35~~
+4 41.28 + 44.16 | +4 41.53 + 44.84 | +4 39.99 + 44.51 | +4 38.84 + 43.81 | +4 39.11 + 44.15
+27 14 58.97 - 24 | 14 59.56 - 22 | 14 59.49 - 46 | 14 59.51 - 44 | 14 59.02 - 44
+.30 +4 41.32 | +.30 +4 40.92 | +.30 +4 39.15 | +.30 +4 38.07 | +.30 +4 38.21
+27 14 59.27 14 58.82 | 14 59.86 14 58.68 | 14 59.79 14 58.39 | 14 59.81 14 58.48 | 14 59.32 14 57.86
14 48.19 | 48.05 | 47.76 | 47.85 | 47.25

1872.0 α	δ
17.35	59.27
37	.86
30	.79
.32	.81
.32	.32
36	
17.337	59.61 −.60 59.01
.377	.004 0.04
−.040	−0.43 − 1.03

Sin δ 9.66075
Cos δ 9.94891
1.1571 n
.06462 n

1872		′	″	
June	29	14	62.9	
July	4		63.8	+.9
	9		64.6	.8
	14		65.3	.7
	19		65.9	.6
	24		66.5	.6
	29		67.0	.5
Aug.	3		67.4	.4
	8		67.7	.3

		′	″	
June	29	14	49.4	
July	4		50.2	+.8
	9		51.0	.8
	14		51.7	.7
	19		52.4	.7
	24		53.0	.6
	29		53.5	.5
Aug.	3		53.9	.4
	8		54.3	.4

1873.0 α	δ
19.82	50.58
.76	50.78
76	50.97
76	51.11
79	49.61
76	50.42
78	50.97
87	50.98
78	50.20
19.787	50.62 −1.14
.861	49.41
−.074	+ +1.21

49.48
.41
+.07

1872
7.27
7.20

1873 June 29 −.472 −.47	July 3 −.546 −.55	July 7 −.516 −.51	July 12 −.408 −.40	July 13 −.439 −.44	July 15 −.517 −.53
51 59.6 51 44.2	52 3.2 51 55.4	52 7.4	52 10.3	52 10.8	52 11.8
52 2.0 48.4	5.6 57.2	9.8 52 1.9	12.6 51 56.5	13.0 52 2.0	14.2 52 6.8
4.2 49.5	7.9 58.3	12.0 2.0	14.9 57.7	15.3 3.1	16.6 7.8
8.8	12.4	16.7 3.4	19.5 59.0	20.0 4.4	21.0 9.0
11.1	14.8	19.0	22.0	22.3	23.5
13.5	17.0	21.2	24.3	24.7	25.8
(15.8)	19.4	23.7	26.6	27.0	28.1
18.0	21.8	26.0	28.9	29.1	30.5
22.6	26.3	30.6	33.4	33.8	35.0
25.1	28.6	32.9	35.8	36.1	37.3
27.4	31.0	35.3	38.1	38.5	39.7
	188.0	234.6	266.4	270.6	283.5
52 13.555 51 48.37	17.091 51 57.07	21.327 52 2.10	24.218 51 57.73	24.600 52 3.17	25.778 52 7.87
52 13.54	52 17.08	52 21.31	52 24.20	52 24.58	52 25.76
21.73	21.70	21.66	21.65	21.61	21.59
−8.19	−4.62	−0.35	+2.55	+2.97	+4.17
+8.39 +00	+4.79 +01	+0.52 +00	−2.44 +00	−2.81 +00	−3.97 −.05
−.24 −.24	−.29 −.28	−.27 −.27	−.21 −.21	−.23 −.23	−.28 −.27
−1.87	−1.84	−1.80	−1.79	−1.75	−1.73
+6.28	+2.68	−1.55	−4.44	−4.79	−5.98 6.00
13.54	17.08	21.31	24.20	24.58	25.76
19.82	19.74	19.76	19.76	19.79	19.78
52 19.82	52 19.76	52 19.76	52 19.76	52 19.79	52 19.76
+1.62	+1.59	+1.56	+1.56	+1.56	+1.56
5?	5	5	5	5	5
2 1.9	1 54.9	1 52.2	1 0.2	2, 1 55.1	1 51.8
16.19	10.0	5.6	13.5	7.9	6.7
1.88	124.9	117.8	13.7	123.0	118.5
2 9.40	2 2.45	1 58.90	1 6.85	8 1.50	1 59.25
				4	
+25.18	+20.02	+19.23	+26.49	+21.43	+17.90
1.40106	1.30146	1.28398	1.42308	1.33102	1.25285
1.46568n	1.36608n	1.34860n	1.48770n	1.39564n	1.31747n
−2922	−2323	−2232	−3074	−2487	−2077
7 9.40	7 2.45	6 58.90	6 6.85	? 87 1.50	6 59.25
6 40.18	6 39.22	6 36.58	6 36.11	6 36.93	6 38.48
16 8.17	16 9.13	16 11.77	16 12.24	16 11.42	16 9.87
+15° 7′ 47″ 1.19230					
−1749	−1750	−483	−702	−1202	−2227
1.17481	1.17480	1.18747	1.18528	1.18028	1.17003
× − 14.96	× − 14.96	× − 15.40	× − 15.32	× − 15.15	× − 14.77
− .14	− .10	− .09	− .15	− .10	− .08
+ .00	+ .02	+ .02	+ .01	+ .05	+ .10
+ ~~14.82~~ −15.10	+ ~~14.88~~ −15.04	+ ~~15.33~~ −15.47	+ ~~15.18~~ −15.46	+ ~~15.20~~ −15.10	+ ~~14.81~~ −14.77
16 ~~22.99~~	16 ~~24.01~~	16 ~~27.40~~	16 ~~27.42~~	16 26.62	16 ~~34.68~~
15 53.07 15 52.90	15 54.09 53.93	15 56.30 56.14	15 56.78 56.71	15 56.32 56.16	15 55.10 54.94
14 49.4	14 50.1	14 50.7	14 51.5	14 51.6	14 51.9
−1 3.7 3.9	−1 4.0 4.2	−1 5.6 5.8	−1 5.3 5.5	−1 4.7 4.9	−1 3.2 3.4
+ 0.00 + 0.00	× − 0.70 − 0.70	+ ~~6.90~~ − 1.30	+ ~~7.40~~ − 2.10	+ ~~6.90~~ − 2.60	+ ~~5.70~~ − 2.50
		+ 1.30	− 2.10	− 2.60	− 2.50
−1 3.076 −17 ~~3.23~~	−1 3.18 −16 ~~3.34~~	−1 4.60 −16 ~~4.76~~	−1 4.14 −17 ~~4.31~~	−1 4.68 −16 ~~4.84~~	−1 2.75 −16 ~~2.91~~
−1 3.06 −1 3.64	−1 3.88 − 3.70	−1 5.90 − 4.76	−1 6.24 − 4.53	−1 4.28 − 4.85	−1 6.25 − 3.14
14 50.01 − .42	14 50.21 − .41	14 50.40 − .40	14 50.54 − .40	14 49.04 − .40	14 49.85 − .40
+.57 −1 4.06	+.57 −1 4.81	+.57 −1 6.46	+.57 −1 7.03	+.57 −1 7.85	+.57 −1 6.84
14 50.58 14 48.84	14 50.78 14 49.12	14 50.97 14 49.68	14 51.11 14 49.68	14 49.61 14 48.31	14 50.42 14 48.90

−.11
.13
9.84

1873				
July	20	52	19.78	14 49.13
	21		19.87	49.31
	22		19.78	48.63

Gr, 2296

h m s
15 54 45
15 54 47
+ 55 07
+ 55 06 2.2
δ = −12° 43' 34"
−.22

Corr δ = +1.43
x = −.07
Corr α = ~~+.14~~ +.16 − 0.1
α 1872 45.129 δ = 6 43.32
α 1873 46.538 δ = 6 33.00
dα = +1.409
dδ = −10.32

1872	m	s'	
June 29	54	47.35	
July 4		47.25	10
9		47.15	10
14		47.03	12
19		46.90	13
24		"	

1873	m	s	
June 29	54	48.98	.10
July 4		.88	14
9		.78	12
14		.65	12
19		48.53	13
24		.40	14
29		.26	16
Aug 3		.10	16
8		47.94	

Sin δ 9.91389
Cos δ 9.75751
1.1571 n
9.87322 n

July 3 1872 −.32 −.349

15 54 28.8 54 16.3
32.3 17.9
35.9 19.4
43.1
46.6
50.4
53.8
57.4
4.6
8.3
11.7
372.9
552.9
50.264 54 17.87

54 50.24
54 47.27
+ 2.97
+ ~~2.88~~ 2.81
− 2.32 +.03
− .46 −.50
− 2.14 − 0.73
− 4.923
54 50.24
54 45.32

54 45.31 54 46.72
+0.87
20
1 21.5
14.8
36.3
1 18.15
+32.39
1.51041
1.38363 n
−2419
21 18.15
20 53.96
+55° 1' 54.39"
−12° 43' 57" 1.11430
−2117
1.09313 n
+ 12.39"
− .26
+ .10
− 12.55 +12.23
+55 1 41.84
+56 2 6.62 2 6.49
6 51.4
−0.1" +4 44.8 44.7
+4 44.7 44.6
− 18.42
− 8.11 8.11
+4 45.23 −.13 ~~45.10~~
+4 37.12 +4 44.54 .19
+55 6 43.74 +4 36.92
43.41
6 33.09

July 15 1872 −.33 −.336

54 31.1 54 17.7
34.6 19.4
38.1 20.4
45.5 22.5
49.0
52.6
56.3
59.9
7.0
10.7
14.3
399.1
579.1
52.645 54 20.00

54 52.62
47.00
+5.62
~~+5.48~~
+5.46
− 4.93 +.00
− .47 −.48
− 1.87 − 0.46
− 7.278
52.62
45.35

54 45.34 46.75
+0.72
1 18.2
11.2
29.4
1 14.70
+32.64
1.51375
1.38697 n
−2438
21 14.70
20 50.32
1 58.03
−2208
1.09222 n
+ 12.37
− .28
+ .12"
− 12.53 +12.21
1 45.50
2 10.24 2 10.12
6 53.6
+4 43.1 43.3
+4 43.3 43.2
− 20.62
− 10.30 10.30
+4 44.61 −.12 ~~44.49~~
+4 34.31 44.15
6 44.55 +4 .15
34.00
6 44.12
33.80

June 29 1873 −.47 −.472

54 19.9 54 5.0
23.6 6.7
27.2 8.7
34.2
37.8
41.5
45.2
48.7
56.0
59.5
55 3.0
390.6
456.6
41.509 54 6.80

54 41.48
48.98
−7.50
~~−7.64~~
−7.66
+ 8.39 +.00
− .67 −.67
−2.44 ~~+1.03~~
+5.28
41.48
46.76

54 46.76
+1.62
15
0 37.9
51.1
11.90 ~~8.90~~
0 24.50
~~14 59.50~~ 15 14.50
+34.71
1.54045
1.41367 n
−25.92
15 14.50
14 48.58
8 19.77
−12° 44' 20" 1.11450
−1749
1.09701 n
+ 12.50
− .31
+ .00
− 12.81 +12.19
8 1.96
8 7 41.96 7 41.95
6 37.3 4.7 4.6
7
4.6
− 4.30 4.30
−1 3.076 −.01 ~~3.07~~
−1 7.36 8.64
7 ~~16.60~~ −1 7.59
6 34.36

July 3 1873 −.55 −.546

54 ~~26.7~~ 54 33.0
~~30.6~~ 33.6
~~34.2~~
37.7
41.6
45.1
48.8
52.3
~~59.4~~
55 ~~3.1~~
~~6.7~~
45.10 54 33.30

54 45.07
48.90
−3.89
~~−3.97~~
−3.99
+ 4.78 +.01
− .79 −.78
−2.36
+1.635
45.07
46.70

54 46.72
+1.59
15
0 18.1
34.3
52.4
0 26.20
+11.80
1.07188
0.94370 n
−881
15 26.20
15 17.39
7 30.96
−1750
1.09700 n
+ 12.50
− .04
+ .01
− 12.53 +12.47
7 18.43
7 43.43 4340
6 38.2
−1 5.2 5.2
−1 5.3 5.3
15.52
−5.20 520
−1 3.18 −.03 ~~3.21~~
−1 8.38 3.79
6 35.05 −1 .34
8.56
6 34.84

July 12 1873 −.40 −.408

54 30.3
34.0 54 9.5
37.5 11.3
44.7 13.0
48.4
51.8
55.6
59.0
6.2
10.0
13.5
391.0
541.0
51.909 54 11.27

54 51.88
48.70
+3.18
~~+3.04~~
+3.07
− 2.44 +.00
− .57 −.58
−2.16
−5.178
51.88
46.71

54 46.70
+1.56
15
0 39.8
52.8
92.6
0 46.30
+40.64
1.60895
1.48217 n
−3033
15 46.30
15 15.95
7 32.40
−702
1.10748 n
+ 12.81
− .43
+ .01
− 13.23 +12.39
7 19.17
7 44.79 4473
6 40.0
−1 4.8 4.9
−1 4.9 5.0
−7.00 7.00
−1 4.14 −.06 4.20
−1 11.14 4.83
6 33.65 −1 .34
11.19
6 33.54

July 13 1873 −.44 −.439

54 30.8
34.3 54 22.0
38.0 23.0
45.1 24.7
48.8
52.4
56.0
59.5
6.8
10.3
14.0
396.0
576.0
52.364 54 23.23

54 52.34
48.68
+3.66
~~+3.52~~
+3.50
− 2.81 +.00
− .63 −.63
−2.14
−5.58
52.34
46.76

54 46.76
+1.56
15
0 30.9
43.2
74.1
0 37.05
+29.13
1.46434
1.33756 n
−2176
15 37.05
15 15.29
7 33.06
−1202
1.10248 n
+ 12.66
− .22
+ .03
− 12.85 +12.47
7 20.21
7 45.53 4548
6 40.2
−1 5.3 5.3
−1 5.4 5.4
−7.20 7.20
−1 4.68 −.05 4.73
−1 11.88 4.85
6 33.65 −1 .34
11.71
6 33.41

4195

1872		'	"	
June	29	6	50.5	
July	4		51.6	+1.1
	9		52.6	1.0
	14		53.4	.8
	19		54.2	.8
	24		54.8	.6
	29		55.4	.6
Aug.	3		55.8	.4
	8		56.1	.3

1873			"	
June	29	6	37.3	
July	4		38.4	+1.1
	9		39.4	1.0
	14		40.3	.9
	19		41.0	.7
	24		41.6	.6
	29		42.2	.6
Aug.	3		42.6	.4
	8		42.9	.3

-.439 .44	July 15 -.517 -.53		July 20 -.354 -.38		July 21 -.374 -37		July 22 1873 -.443 -.41	
	54		54 35.0		54 35.5		54 36.0	
22.0	46.4	54 15.0	36.7	54 15.3	39.1	54 31.5	39.6	54 24.6
23.0	48.1	16.7	42.1	16.8	42.9	32.8	43.2	26.0
24.7	50.0	18.7	49.5	18.6	50.0	34.8	50.4	27.7
	51.8		53.0		53.7		54.0	
	53.7		56.7		57.1		57.7	
	55.4		0.3		0.6		1.1	
	57.1		2.9		4.3		5.0	
	59.0		11.0		11.5		12.1	
	0.7		14.7		15.1		15.8	
			18.2		18.8		19.2	
	422.2		323.1		328.6		334.1	
	482.2		623.1		628.6		634.1	
2323	53.578	54 16.80	56.645	54 16.90	57.145	54 33.03	57.645	54 26.10
	54 53.55		54 56.62		54 57.12		54 57.62	
	48.62		48.50		48.47		48.45	
	+4.93		+8.12		+8.65		+9.17	
	+4.79		~~+7.98~~		~~+8.51~~		~~+9.03~~	
	+4.77		+7.96		+8.49		+9.01	
	-3.97 -.03		-7.43 -.01		-7.95 -.01		-8.42 +.01	
-.63	-.76	-.74	-.84	-.51	-.53	-.53	-.59	-.59
	-2.08		-1.96		-1.93		-1.91	
	-6.81√2		-9.981		-10.412		-10.921	
	53.55		56.62		57.12		57.62	
	46.74		46.69		46.71		46.70	
	54 46.73		54 46.71		54 46.70		54 46.71	
	+1.56		+1.56		+1.57		+1.58	
	15		15		15		15	
	0 35.9		0 37.0		0 24.1		0 30.7	
	50.3		49.3		38.0		44.2	
	86.2		86.3		62.7		74.9	
	0 43.10		0 43.15		0 31.35		0 37.45	
	+36.78		+39.74		+24.11		+31.54	
	1.56561		1.59923		1.38220		1.49886	
	1.43883n		1.47245n		1.25342n		1.37208n	
	-2747		-2968		-1801		-2356	
	15 43.10		15 43.15		15 31.35		15 37.45	
	15 15.63		15 13.47		15 13.34		15 13.89	
	7 32.72		7 34.88		7 35.01		7 34.46	
	-2227		-1442		-1348		-1448	
	1.09223n		1.10008n		1.10102n		1.10002n	
	+ 12.37		+ 12.59		+ 12.62		+ 12.59	
	− .36		− .41		− .15		− .25	
	+ .03		+ .03		+ .03		+ .03	
7	− 12.70 +12.04		− 12.97 +12.21		− 12.74 +12.50		− 12.81 +12.37	
	7 20.02		7 21.41		7 22.27		7 21.65	
45.46	7 44.76	44.70	7 47.09	47.03	7 47.51	47.47	7 46.83	46.78
	6 40.5		6 41.2		6 41.3		6 41.4	
3	-1 4.3	4.4	-1 5.9	6.0	-1 6.2	6.2	-1 5.4	5.5
4	-1 4.4	4.5	-1 6.0	6.1	-1 6.3	6.3	-1 5.5	5.6
7.20	-7.50 -	7.50	-8.20 -	8.20	-8.30 -	8.30	-8.40 -	8.40
4.73	-1 2.75 -.06	~~2.81~~	-1 4.15 -.06	~~4.21~~	-1 4.30 -.04	~~4.34~~	-1 3.92 -.05	~~2.97~~
4.85	-1 10.25 +	3.14	-1 12.35 +	4.86	-1 12.60 +	4.84	-1 12.32 +	4.35
.34		.34		.34		.34		.34
11.71	6 34.51	-1 10.30	6 34.44	-1 12.72	6 34.91	-1 12.80	6 34.51	-1 12.41
33.71		6 34.40		6 34.31		6 34.67		6 34.37

1235 Urs. Min (P.B.) = A

Gr. 750 = 10

Sin δ 9.99843

Cos δ 8.92110n

11571n

9.03681n

Yang δ = -11.93~~8~~

-11.955

K = +.182

h	m	s
15	56	50
3	57	24
94°		47'
+85	13	00"

corr α = +35 .5

δ =

dα = +16.792

dδ = +10.28

δ = +94° 47' 00"

δ = -52° 24 12"

sin z = -.79

1872 June 30 -.330	1872 July 3 -.349	1872 July 6 -.357	1872 July 7 -.319	1872 July 9 -.284	1872 July 15 -.336
15 55 58.4	56 28.8 55 52.2	56 12.3 57 43.3	56 24.6 (15.3) 56 25.5	56 15.0 56 7.0	56 12.5
12.0	6.5 32.3	24.3	38.3 26.7	28.5	24.3
24.2	19.5 36.9	36.0	51.7	40.0	49.7
36.2	31.2 48.1	49.1	2.8	52.2	1.3
48.4	43.5 46.6	0.9	15.7 56 32.8	4.3	13.9
1.2	56.8 50.4	14.1	27.4	17.5	26.4
13.5	8.1 53.9	26.2	40.6	30.7	38.5
25.6	20.7 59.4	38.7	52.7	40.5	50.7
38.1	32.5 4.6	51.3		54.9	
	45.1				
257.6	263.9	252.9		283.6	
437.6	503.9	12.9		43.6	
48.622	55.989 55 52.20	1.433 57 43.30	3.003 56 26.10 56 32.80	4.844 56 7.00	1.544
56 48.80	56 56.17	57 1.61	57 3.20	57 5.073	57 1.723
+4.72	-2.29	-7.15	-8.45	-9.15	-4.93
+3.93	+4.17	+4.26	+3.81	+3.39	+4.01
+10.53	+9.87	+9.17	+8.93	+8.45	+6.94
57 7.98	57 7.92	57 7.89	57 7.49	57 7.72	57 7.745

40

	+0.87	+0.83	+0.82	+0.79	+0.72
1 41.2	1 23.8	1 37.1	1 28.1	1 25.0	1 21.0
31.1	14.4	25.9	17.8	14.5	11.1
723	382	630	459	395	321
1 36.15	1 19.10	1 31.50	1 22.95	1 19.75	1 16.05
+	+63.79	-41.87	+36.92 +30.22	+57.84	
	1.80475	1.62190n	1.56726 1.48029	1.76223	
	0.84156n	0.65871	0.60407n 0.51710n	0.79904n	
	+694	~~+~~456	+402 +329	+630	
	41 19.10	41 31.50	41 22.95	41 19.75	
	~~41 13.16~~	~~41 36.06~~	~~41 18.93~~	~~41 13.45~~	
	41 26.04	41 26.94	41 26.97	41 26.05	
	+94° 41' 22.31"	41 21.41	41 21.38	41 22.30	

-52° 22' 19"   1.87250n

	-2117	-1511	-1535	-1460	
	1.85133n	1.85739n	1.85715n	1.85490n	
	+ .01	+ .01	+ .01	+ .01	
	+1 11.01	+1 12.01	+1 11.97	+1 12.09	
	+ .18	+ .08	+ .06	+ ~~.15~~	
	+ .10	+ .12	+ .11	+ .10	
	~~-1 10.74~~ +1 11.30	~~-1 11.82~~ +1 12.22	~~-1 11.81~~ +1 12.15	~~-1 11.85~~ +1 12.35	
~~+94~~	~~40 11.57~~	~~40 9.59~~	~~40 9.57~~	~~40 10.45~~	
+94	42 33.61 42 33.48	42 33.63 33.48	42 33.53 33.39	42 34.65	34.52
	* -918	* -966	* -981	* -10.12	
	+4 45.23 -13 ~~45.10~~	+4 44.71 -15 ~~44.56~~	+4 44.75 -14 ~~44.61~~	+4 44.68 -13 ~~44.55~~	
	+4 54.41	+4 54.37	+4 54.56	+4 54.80	
+94	47 28.02 - 918	~~47 28.00~~ - 966	47 ~~28.09~~ - 981	47 29.45 - 10.12	
	47 9.66 +4 44.84	8.68 + 44.66	8.47 + 44.40	9.21 + 44.50	
	- .92 + .68	- .92 + .65	- .92 + .64	- .92 + .62	
	47 8.74 +4 36.34	7.76 +4 35.65	7.55 +4 35.23	8.29 +4 35.00	
	47 9.82	47 9.13	47 8.62	47 9.52	

To be examined

h	m	s	m	s
15	56	57.3	57	16.8
°	'	"	'	"
+85	12	41	13	00

m 57.771
α 1872 57 ~~7.636~~ √ δ 12 ~~49.61~~ 50.43 47 ~~10.39~~ 9.27
α 1873 24.436 √ δ 13 59.88 0.18 46 ~~0.17~~ 59.82

α 1872 57 7.771
1873 24.436

1872.0 α	δ	1873.0 α	δ
7.98	8.74	24.59	57.13
.92	7.76	.69	56.35
.89	7.55	.05	57.49
.49	8.29	.41	58.63
.72		.44	
.75			
.65			
7.771	8.085 +1.64	24.436	57.40 +3.48
7.636	10.39	24.438	0.12
+ .135	−2.31	−.002	−2.72
	+1.84		+3.148
	−.47		+.76

July 16 1872 −.308
55 12.6 53 24.7
24.7 34.0
37.3 (57.2) ?
49.0
1.8
13.5
26.4
38.8
50.5
234.6
64.6
1.622 53 (36.63) ?
57 1.80
−4.51
+3.68
+6.68
57 7.65

July 3 1873 −.546
56 14.5 55 58.5
26.8 56 59.8
39.0 1.8
51.0
57 3.0
15.1
29.1
41.0
(53.3)
3.034 56 0.03
57 3.21
+4.82 79
+6.53
+10.06
57 24.62 59

July 12 1873 −.408
56 24.3 56 39.0
37.0
49.3
2.3
139> 27.1
38.4
51.1
4.3
244.4
127.7
14.189 58 ? 39.00
57 14.37
−2.44
+4.88
+7.88
57 24.69

July 15 1873 −.517
56 25.4 55 22.5
37.7 34.2
49.6 45.9
2.1
14.2
26.5
39.2
52.1
4.5
257.3
131.3
14.589 55 34.20
57 14.77
−4.00
+6.17
+7.11
57 24.05

July 20 1873 −.354
56 32.4 55 43.2
44.4 45.2
57.0
9.3
(21.6)
34.1
46.4
58.6
58 11.0 ?
~~5?~~
21.644 55 44.20
57 21.883
−7.43
+4.23
+5.78
57 24.401

July 21 1873 −.374
56 33.8 56
45.2
57.4
10.0 ?
22.0 ?
34.6
47.5
58.2
11.4
220.1
200.1
22.233
57 22.41
−7.96
+4.47
+5.32
57 24.44

1 13.8
64.8
18.6
1 9.30
+ .01
+ .41
+ 10.98
+4 9.71
+4 54.89

+1.59
35
0 36.1
53.9
90.0
35 45.00
+63.00
1.79934
0.83615n
+6.86
35 45.00
~~35 38.14~~
35 51.86
46 56.49
−52° 23′ 1″
−1750
1.85520n
+ .01
+ 1 11.65
+ .18
+ .01
~~−1 11.47~~ +1 11.85
~~45 45.02~~
48 8.34 48 8.28
− * ~~56.29~~
−1 3.18 −.06 ~~3.24~~
−0 56.89
47 ~~11.45~~ − 6.29
46 58.87 −1 − 3.70
−1.74 + 1.25
46 57.13 −1 8.74
46 59.54

+1.56
35
0 34.9
49.1
84.0
0 42.00
+95.19
1.97859
1.01540n
+10.36
35 42.00
~~35 31.64~~
35 52.36
46 55.99
1.87270n
−702
1.86568n
+ .01
+ 1 13.40
+ .41
+ .01
~~−1 12.99~~ +1 13.83
~~45 43.00~~
48 9.82 9.76
− * ~~7.59~~
−1 4.14 −.06 ~~4.20~~
−0 54.55
47 ~~13.27~~ − 7.59
46 58.09 −1 4.53
−1.74 + 1.23
56.35 −1 10.89
46 58.87

+1.56
35
0 29.9
47.8
77.7
0 38.85
+100.39
2.00173
1.03854n
+10.93
35 38.85
~~35 27.92~~
35 49.78
46 58.57
−2227
1.85043n
+ .01
+ 1 10.86
+ .46
+ .03
~~−1 10.38~~ +1 11.36
~~45 48.19~~
48 9.93 9.88
− * ~~7.95~~
−1 2.75 −.05 2.80
−0 54.80
47 ~~15.13~~ − 7.95
46 59.23 − 3.14
−1.74 + 1.23
57.49 −1 9.86
47 0.02

+1.56
35
0 29.8
44.9
74.7
0 37.35
+97.44
1.98874
1.02555n
+10.61
35 37.35
~~35 26.74~~
35 47.96
47 0.39
−1442
1.85828n
+ .01
+ 1 12.16
+ .43
+ .03
~~−1 11.71~~ +1 12.63
~~45 48.68~~
48 13.02 12.97
− * 8.50
−1 4.15 −.05 4.20 −1 4.30
−0 55.65
47 ~~17.37~~ − 8.50
46 60.87 − 4.86
1.74 + 1.23
58.63 −1 12.13
47 0.84

35
0 30.8
46.8
77.6
0 38.80
35 38.80
−1348
1.85922n
+ .01
+ 1 12.31
+
+ .03

θ Draco

15h 59m 28s
15 59 31
+ 58° 54'
+ 58 54 17
ʒ = − 16° 31' 29"
− .28

tang δ = +1.66
x = −.030
cos x = −.02
α 1872 29.520 δ = 54' 27.14"
α 1873 30.634 δ = 54 17.41
dα = +1.113
dδ = −9.74

1872	m s		1873	m s	
June 29	59 31.94		June 29	59 33.27	
July 4	.82	.12	July 4	.16	.11
9	.70	.12	9	.04	.12
14	.56	.14	14	.90	.14
19	31.42	.14	19	32.76	.14
			24	.60	.16
			29	.44	.16
			Aug. 3	.26	.18
			8	32.08	.18

Sin δ 9.93261
Cos δ 9.71310
1157/n
9.82881n

1872 June 27 −.247 −.25
15 58 59.7 58 48.7
50.3
52.3
3.7
7.6
15.6
19.6
23.7
27.7
31.7
39.6
43.6
47.5
320.0
260.0
23.636 58 .5043
59 23.61
59 31.98
−8.37
~~−8.35~~
+8.79 +.00
− .42 −.41
−2.46 −1.35
+5.91 2
59 23.61
59 29.52
59 29.53 59 30.64
+0.95
3 42.2
32.2
744
3 37.20
+33.21
1.52127
1.35008n
−2239
33 37.20
33 14.81
+58° 49 33.54
−16° 31' 30"
1.23260
−786
1.22474n
+ 16.78
± .26
− .04
− ~~17.08~~ +16.48
~~+58 49 16.46~~
+58 49 50.02 49 49.66
54 34.2
+4 44.2 43.8
−1684
−7.10 7.10
+4 43.88 −.36 ~~43.52~~
+4 36.78 +4 44.16
+58 54 26.80 + .26
+4 37.32
54 26.98
54 17.24

1872 July 1 −.397 −.40
59 22.5 59 20.6
24.6
26.6
28.6
30.5
32.6
34.7
36.7
38.6
275.4
30.600 59 20.60
59 30.57
31.89
−1.32
~~−1.30~~
+2.06 −.02
− .66 −.66
−2.37 −1.26
−0.97 9
30.57
29.60
59 29.58 30.69
+0.89
3 25.3
16.8
421
3 21.06
+10.00
1.00000
0.82881n
−674
33 21.05
33 14.31
49 34.04
−2522
1.20738n
+ 16.12
± .02
− .04 .03
− 16.17 +16.07
49 17.87
49 50.11 49.78
54 35.1
+4 45.0 44.7
−17.74
−8.00 8.00
+4 45.90 −.33 ~~45.57~~
+4 37.90 + 45.21
54 28.01 + .24
+4 37.45
54 27.23
17.49

1872 July 3 −.349 −.32
59 ~~10~~ 58 56.4
58.1
59.8
~~14.9~~
~~19.0~~
27.0
30.8
34.7
38.7
42.8
34.800 58 58.10
59 34.77
31.84
+2.93
~~+2.95~~
−2.33 +.03
− .53 −.58
−2.32 −1.21
−5.18 .20
34.77
29.59
59 29.57 30.68
+0.87
3 42.8
34.0
768
3 38.40
+36.70
1.56467
1.39348n
−2474
33 38.40
33 13.66
49 34.69
−2106
1.21154n
+ 16.28
± .32
+ .29
− 16.31 +16.25
49 18.38
49 50.94 50.58
54 35.5
+4 44.6 44.2
−18.14
−8.40 8.40
+4 45.23 −.36 ~~44.87~~
+4 36.83 + 44.84
54 27.77 + .24
+4 36.68
54 27.26
17.52

1872 July 11 −.349 −.35
59 15.7 59 11.1
12.4
14.3
19.9
23.9
31.9
35.8
39.7
43.8
47.9
56.0
59.9
3.8
378.3
438.3
39.845 59 12.60
59 39.81
31.65
+8.16
~~+8.18~~
−8.53 −.01
− .58 −.58
−2.13 −1.02
−10.24 .5
39.81
29.57
59 29.56 30.67
+0.77
3 34.9
27.1
620
3 31.00
+27.24
1.43521
1.26402n
−1837
33 31.00
33 12.63
49 35.72
−2197
1.21063n
+ 16.24
± .17
+ .28
− 16.13 +16.35
49 19.59
49 52.07 51.72
54 37.1
+4 45.0 44.6
−19.74
−10.00 10.00
+4 44.89 −.35 ~~44.54~~
+4 34.89 + 44.51
54 26.96 + .21
+4 34.72
54 26.44
16.70

1872 July 14 −.301 −.31
59 30.0 58 54.4
55.7
57.4
31.9
33.8
36.0
38.0
39.9
42.0
44.0
45.9
341.5
37.944 58 55.83
59 37.91
31.55
+6.36
~~+6.38~~
−5.74 +.00
− .51 −.50
−2.03 −0.92
−8.28 .7
37.91
29.63
59 29.64 30.75
+0.73
3 43.6
34.9
784
3 39.20
+42.11
1.62439
1.45320n
−2839
33 39.20
33 10.81
49 37.54
−1884
1.21376n
+ 16.36
± .42
+ .37
− 16.41 +16.31
49 21.13
49 53.85 53.48
54 37.6
+4 43.7 43.3
−20.24
−10.50 10.50
+4 44.14 −.37 ~~43.77~~
+4 33.64 43.81
54 27.49 + .20
+4 33.51
54 26.99
17.25

1872 July 16 −.308 −.31
58 28.6 57 56.1
58.8
0.8
30.5
32.5
34.6
36.5
38.5
40.7
42.5
44.5
328.9
36.544 57 58.57
58 36.51
31.50
+5.01
~~+5.03~~
−4.50 −.01
− .51 −.51
−1.98 −0.87
−6.99 7.00
36.51
29.52
59 29.51 30.62
+0.72
3 39.2
32.4
716
3 35.80
+37.97
1.57944
1.40825n
−25.60
33 35.80
33 10.20
49 38.15
−2093
1.21167n
+ 16.28
± .35
+ .36
− 16.27 +16.29
49 21.88
49 54.44 54.08
54 38.0
+4 43.6 43.2
−20.64
−10.90 10.90
+4 43.91 −.36 43.55
+4 33.01 43.28
54 27.45 + .20
+4 32.58
54 26.66
16.92

1872					1873.			
June	29	54′	34.6″		June 29	53	81.9″	
July	4		35.7	+1.1	July 4		82.0	+1.1
	9		36.7	1.0	9		84.1	1.1
	14		37.6	.9	14		85.0	.9
	19		38.4	.8	19		85.8	.8
	24		39.0	.6	24		86.4	.6
	29		39.6	.6	29		87.0	.6
Aug.	3		40.0	.4	Aug. 3		87.4	.4
	8		40.4	.4	8		87.8	.4

Tr. ←

July 3 1873 −.546 −.55
59 1.1
2.6
4.5
59
21.3
23.5
25.4
27.4
29.4
31.3
33.4
35.4
37.4
264.5
29.389 59 2.73
59 29.36
33.20
−3.84
−3.82
+4.78 +.01
−.91 −.91
−2.57
+1.301
29.36
30.66
59 30.67
+1.59
25
2 48.1
3.2
111.3
2′ 55.65″
+26.66
1.42586
1.25467n
−17.98
27 55.65
27 37.67
55 10.68
−16° 31′ 15″ 1.23250n
−17.24
1.21526n
+ 16.42
− .17
+ .03
− 16.56 +16.28
54 54.12
55 26.96 55 26.73
54 22.8
−1 4.2 4.4
− 5.40 − 5.40
−1 3.18 −.23 3.41
−1 8.58 − 3.70
54 18.38 + .44
−1 8.66
54 18.07

1873 July 12 −.408 −.40
59
58 59.5
1.4
3.1
28.3
32.3
36.0
40.1
44.2
180.9
36.180 59 1.33
59 36.15
32.95
+3.20
+3.22
−2.44 +.00
−.66 −.68
−2.32
−5.424
36.15
30.73
59 30.71
+1.56
25
2 53.2
65.9
119.1
2′ 59.55″
+34.85
1.54220
1.37101n
−23.50
27 59.55
27 36.05
55 12.30
−6.73
1.22577n
+ 16.82
− .29
+ .03
− 17.08 +16.56
54 55.22
55 28.86 28.62
54 24.7
−1 4.2 4.4
− 7.30 − 7.30
−1 4.14 −.24 4.38
−1 11.44 − 4.53
54 17.42 + .43
−1 11.40
54 17.22

1873 July 15 −.517 −.53
59 14.0
18.0 59 6.5
22.0 8.6
29.8 10.1
33.9
38.0
41.8
45.8
53.9
57.8
1.9
356.9
416.9
37.900 59 8.40
59 37.87
32.87
+5.00
+5.02
−3.97 −.03
−.88 −.86
−2.24
−7.0910
37.87
30.78
59 30.77
+1.56
25
2 49.2
4.1
113.3
2 56.65
+29.50
1.46982
1.29863n
−19.89
27 56.65
27 36.76
55 11.59
−22.03
1.21047n
+ 16.24
− .21
+ .14
− 16.31 +16.17
54 55.28
55 27.76 27.53
54 25.2
−1 2.6 2.8
− 7.80 − 7.80
−1 2.75 −.23 2.98
−1 10.55 − 3.14
54 17.21 + .43
−1 10.51
54 17.02

July 20 1873 −.354 −.38
59
32.9 58 58.8
34.9 0.6
36.9 3.0
38.9
40.9
42.8
44.8
46.7
48.9
367.7
40.855 59 0.80
59 40.83
32.72
+8.11
+8.13
−7.43 −.01
−.63 −.59
−2.09
−10.152
40.83
30.68
59 30.71
1.56
25
2 54.2
66.9
121.1
3 0.55
+40.05
1.60260
1.43141n
−27.01
28 0.55
27 33.54
55 14.81
−14.19
1.21831n
+ 16.53
− .39
+ .15
− 16.77 +16.29
54 58.04
55 31.10 30.86
54 26.0
−1 5.1 5.3
− 8.60 − 8.60
−1 4.15 −.24 4.39
−1 12.75 4.86
54 18.35 + .43
−1 13.03
54 17.83

July 24 1873 −.498 −.48
35.2 59 19.1
37.1 21.0
39.1 22.5
41.1
43.1
45.1
47.0
49.0
51.0
387.7
43.078 59 20.87
59 43.05
32.59
+10.46
+10.48
−9.70 +.00
−.80 −.83
−1.96
−12.469
43.05
30.59
59 30.56
+1.60
25
2 43.0
59.4
102.4
2 51.20
+22.21
1.34665
1.17546n
−14.98
27 51.20
27 36.22
55 12.13
−20.56
1.21194n
+ 16.29
− .11
+ .14
− 16.26 +16.32
54 55.87
55 28.45 28.22
54 26.4
−1 2.0 2.2
− 9.00 9.00
−1 3.54 −.23 3.44
−1 12.54 −3.68
54 15.91 + .45
−1 12.23
54 15.99

July 21 1873 −.374 −.37
59
33.4 59 9.3
35.5 11.1
37.5 13.3
39.4
41.3
43.4
45.5
47.5
49.3
372.8
41.422 59 11.23
59 41.39
32.69
+8.70
+8.72
−7.95 −.01
−.61 −.62
−2.06
−10.624
41.39
30.78
59 30.75
1.57
25
2 48.0
1.0
109.0
2 54.50
+30.19
1.47986
1.30867n
−20.36
27 54.50
27 34.14
55 14.21
−13.25
1.21925n
+ 16.57
− .21
+ .14
− 16.64 +16.50
54 57.57
55 30.71 30.98
54 26.1
−1 4.6 4.8
− 8.70 8.70
−1 4.30 −.23 ~~4.5~~
−1 13.00 − 4.84
54 17.71 + .43
−1 13.11
54 17.37

July 22 1873 .48 −.41
59 59
33.8 11.3
35.9 12.8
37.9 15.6
39.9
41.9
43.8
45.6
47.8
49.8
376.4
41.822 8
59 13.23
59 41.79
32.66
+9.13
+9.15
−8.42 +.01
−.68 −.68
−2.03
−11.182
41.79
30.66
59 30.67
+1.58
25
2 46.1
0.2
106.3
2 53.15
+28.59
1.45621
1.28502n
−19.28
27 53.15
27 33.87
55 14.48
−14.31
1.21819n
+ 16.53
− .19
+ .14
− 16.58 +16.4
54 57.90
55 30.96 30.73
54 26.3
−1 4.8 4.9
− 8.90 8.90
1 3.92 −.23
1 12.82 4.35
54 18.14 +
−1 12.8
59 17.72

10.90
43.35
43.28
.20
32.58
26.66
16.92

φ Herculis

h	m	s
16	04	45
16	04	46
+	46 0	16 ?
+	45	16 ; 08

z = − 2° 53′ 20″

sin. z = −.05

tang ν = +1.01

x = −.022

cor α = +.16

α1872 44.088 δ = 16 17.52

α1873 45.967 δ = 16 7.89

1872	m s	
June 29	4 46.06	
July 4	.00	.06
9	.94	.06
14	.86	8 9
19	45.77	.10
24	.67	.10
29	57	.11
Aug 3	46	.13
8	33	

1873	m s	
June 29	4. 48.14	
July 4	.07	.08
9	.00	7
14	.92	8
19	47.84	8
24	.74	10
29	.64	10
3	.53	11
8	47.41	.12

dα = +1.879
dδ = −9.63

1872 July 1 − .40 (397)

16 04 27.0
29.9
32.9
38.7
41.7
44.6
47.5
50.4
56.3
59.2
2.1
430.3
490.3
44.573

no corr.
4 44.55
4 46.03
−1.48
−1.64
+2.05 −.02
− .40 −.40
−1.94 −0.06
−0.37 31
4 44.55
4 44.26

4 44.24 4 46.12

1872 July 15 − .33 (−336)

04 45.4 04 32.5 04
48.4 36.3
51.3
54.3
57.1
256.5
51.300 4 34.40

4 51.28
45.84
+5.44
+5.28
−4.93 +.00
− .33 −.34
−1.75 +0.13
−7.01 2
51.28
44.27

4 44.26 46.14

+0.72

1 28.1
23.1
512
1 23.60

+16.90
1.22789
1.19105n
−1553
11 23.60
11 10.07
+45° 11′ 38.28″
−2° 52′ 35″ 0.46150n
−2260
0.43890n
+ 27.47
− .09
+ .14 ~~+2.70~~ +2.80
− 2742 +27.52
+45 11 10.86
+45 12 5.80 ~~12 5.60~~
16 26.2
+45 11 ~~40.98~~ 41.08 41.00
+4 ~~45.2~~ 45.1 −.14 45.0
−18.33
−8.70 − 8.70
+4 44.61 −.14 ~~44.44~~ 44.15
+4 35.91 74 .04
+45 16 16.99 +4 35.49
−06 16 16.49
+45 16 16.93 16 6.86

1872 July 16 − .31 (−308)

04 33.3 04 19.9
36.2 21.2
39.1 22.4
44.9
47.9
50.8
53.7
56.8
2.6
5.3
8.3
378.8
558.8
50.800 4 21.17

4 50.78
45.82
+4.96
+4.80
−4.50 −.01
− .31 −.31
−1.73 +0.15
−6.54 5
50.78
44.24

4 44.23 46.11

+0.72

1 39.3
34.2
735
1 36.75

+29.63
1.47173
1.43489n
−2722
11 36.75
11 9.53
11 38.82
−2090
0.44060n
+ 27.58
− .25
+ .16 +2.67
− 2767 +27.49
11 11.15
12 6.31
16 26.4
11 41.49 11 41.33
4 44.9 −.16 ~~44.7~~
−18.53
−8.90 − 8.90
+4 43.91 −.16 ~~43.40~~ 43.28
+4 35.01 + .04
16 16.50 +4 34.42
−.06 16 15.75

1872 July 22 − .28 (−285)

04 32.6 ~~05~~ ~~20.0~~
35.4 ~~21.3~~
38.5 ~~21.9~~
44.2 4 30.9
47.1 33.1
50.1 33.6
53.1
55.9
1.8
4.7
7.6
371.0
551.0
50.091 ~~5 21.47~~ 4 32.53

4 50.07
45.71
+4.36
+4.20
−3.97 +.00
− .28 −.29
−1.62 +0.26
−5.87 8
50.07
44.20

4 44.19 46.07

+0.68

1 27.0
22.2
492
1 24.60

− ~~31.38~~ +18.38
1.49665n 1.26435n
1.45981 1.22761
+2883 +1689
11 24.60 24.60
11 53.43? ~~14.8~~ 7.71
10 ~~54.92~~ 40.64
−0874
0.45276n
+ 28.36
− .26
+ .03 ~~+2.64~~ +2.58
− 2859 +28.13
10 26.33
6.15 11 23.05
16 27.3
10 ~~57.50~~ 43.22 43.08
−.14
−19.43
−9.80 − 9.80
+4 43.31 −.14 ~~43.17~~ 42.99
+4 33.51 + .03
16.73 +4 33.12
−.06 16 16.20

1872 July 28 − .23 (−234)

4 4 15.7 4
43.0 16.8
45.9 17.8
49.0
51.8
54.8
244.5
48.900 4 16.77

4 48.88
45.59
+3.29
+3.13
−2.93 +.00
− .23 −.24
−1.50 +0.38
−4.67
48.88
44.22

4 44.21 46.09

+0.63

10
1 40.6
33.0
736
1 36.80

+32.13
1.50691
1.47007n
+2952
11 36.80
11 7.28
11 41.07
−1179
0.44971n
+ 28.16
− .28
+ .03 +2.57
− 2841 +27.90
11 12.66
~~22.91~~ 12 8.97 ~~8.82~~
16 28.0
11 43.64 43.48
+4 44.4 −.16 44.2
−20.13
−10.50 − 10.50
+4 44.50 −.16 +44.36
+4 34.00 + .03
16 17.64 +4 33.89
−.06 16 17.37

1872 July 29 − .20 (−211)

31.8
34.5
37.4
~~43.3~~
~~48.0~~
~~48.6~~ ✓
5 1.0
3.9
6.4
49.11

4 49.10
45.56
+3.54
+3.38
−3.16 +.01
− .20 −.21
−1.47 +0.41
−4.83
49.10
44.27

4 44.27 46.15

+0.62
A.R

1872.0

α	δ
44.24	16.93
.26	16.44
.23	16.67
.19	17.58
.21	
.27	
44.233	16.90 +.12 17.02
.088	17.52 .52
+ .145	− 0.62 −.50

Sin δ 9.85150
Cos δ 9.84745
.11571 n
9.96316 n

1872

		′	″	
June	29	15	83.0	
July	4		84.1	+1.1
	9		85.1	1.0
	14		86.0	.9
	19		86.8	.8
	24		87.5	.7
	29		88.1	.6
	3		88.6	.5
	8		89.0	.4

1873

		′	″	
June	29	15	70.4	
July	4		71.5	+1.1
	9		72.5	1.0
	14		73.4	.9
	19		74.2	.8
	24		74.9	.7
	29		75.5	.6
Aug.	3		76.0	.5
	8		76.4	.4

1873.0

α	δ
46.12 (.14)	7.06
.14	7.34
.14	7.69
.14	7.77
.15	8.25
.15	7.01
.16	8.08
46.143	7.60 +.22 7.82
45.967	7.89 .89
+.176	−0.29 −.07

SEE Suk. list

1873
June 25
No Record

1873
July 3 −5.46 −.55
4 26.5 4 14.3
29.4 15.5
32.3 16.7
38.1
41.1
44.0
47.0
50.0
55.7
58.8
5 1.5
484.4
44.036 4 15.50
4 44.01
48.08
−4.07
−4.23
+ 4.78 +.01
− .56 −.55
− 2.11
+2.11 3
44.01
46.12 1873 July 12 4 46.15 16 7.97
15 46.15 6.83
20 46.16 7.48
4 46.14
+1.59
5 0 48.5 5 0 54.5
0.9 10.0
109.4 124.5
0 54.70 1 2.25
+28.54
1.45546
1.41861 n
−26.22
5 54.70
5 28.48
17 19.87
−2° 53′ 25″ 0.46350 n
−17.24
0.44626 n
+ 27.94
− .23
+ .01 +2.57
− 28.16 +27.72
16 51.71
17 47.59
16 11.3
17 22.44 22.36
−.11

1873 tr.
July 24 −4.98 −.48
04 40.7
43.5 44 28.6
46.5 29.8
52.2 31.1
55.1
58.0
1.1
4.0
7.8
12.8
15.7
339.4
639.4
58.127 4 29.83
4 58.11
47.74
+10.37
+10.27
− 9.70 +.00
− .48 −.50
− 1.77
−11.95 7
58.11
46.16
4 46.14
+1.60
5 0 51.8
66.7
118.5
0 59.25
+28.30
1.45179
1.41495 n
−26.00
5 59.25
5 33.25
17 15.10
−20.38
0.44312 n
+ 27.74
− .21
+ .05 +2.61
− 27.90 +27.58
16 47.20
17 42.68 +17 ~~44.60~~
16 14.9
17 17.71 17 17.63
−1 2.8 −.08 2.9
−7.00 − 7.00
−1 3.54 −.08 ~~3.64~~ 3.68
−1 10.54 + .08
16 7.17 −1 10.60
− .11 16 7.03
16 7.06

1873 tr.
July 23 −5.04 −.48
04 39.9
42.8 04 29.9
45.7 31.2
51.7 33.4
54.4
57.3
0.4
3.1
9.2
12.0
14.9
331.4
631.4
57.40 4 31.50
4 57.38
47.76
+9.62
+9.46
− 8.93 −.01
− .48 −.57
− 1.79
−11.20 4
57.38
46.18
4 46.14
+1.60
5 0 48.9
5.1
114.0
0 57.00
+25.90
1.41330
1.37646 n
−23.79
5 57.00
5 33.21
17 15.14
−18.84
0.44466 n
+ 27.84
− .18
+ .05 +2.65
− 27.97 +27.71
16 47.17
17 42.85 ~~44.77~~
16 14.8
17 17.79 17.71
−1 3.0 −.08 3.1
−6.90 − 6.90
−1 3.44 −.08 ~~3.52~~ 3.14
−1 10.34 + .08
16 7.45 −1 9.96
− .11 16 7.75
16 7.34

1873
July 21 −3.74 −.37
04 38.8
41.8 04 28.9
44.7 30.9?
50.6 31.7
52.5
56.5
59.3
2.2
8.1
11.0
13.9
379.4
619.4
56.309 4 30.50
4 56.29
47.80
+8.49
+8.33
− 7.95 −.01
− .37 −.38
− 1.83
−10.18 57
56.29
46.14
4 46.12
+1.57
5 0 50.0
2.1
112.1
0 56.05
+25.81
1.41179
1.37495 n
−23.71
5 56.05
5 32.34
17 16.01
−13.02
0.45048 n
+ 28.21
− .18
+ .05 +2.69
− 28.34 +28.08
16 47.67
17 44.09 ~~44.02~~
16 14.5
17 18.70 18.63
−1 4.2 −.07 4.3
−6.60 − 6.60
1 4.30 −.07 ~~4.37~~ 4.84
−1 10.90 + .08
16 7.80 −1 11.36
− .11 16 7.27
16 7.69

1873
July 22 −.41
39.1 04
42.1 25.7
45.0 27.0
51.0 28.1
53.9
56.9
59.8
2.7
8.5
11.4
14.4
284.8
624.8
56.800 4 26.93
4 56.78
47.78
+9.00
+8.84
− 8.43 2 +.01
− .41 −.42
− 1.81
−10.65 4
56.78
46.14
4 46.14
+1.58
5 0 53.8
6.0
119.8
0 59.90
+27.87
1.47524
1.43840 n
−27.44
5 59.90
5 32.46
17 15.89
−14.15
0.44935 n
+ 28.14
− .25
+ .05 +2.61
− 28.34 +27.94
16 47.55
17 43.93 43.73
16 14.6
17 18.42
− 1 3.1 −.08 .40
−6.70 − 6.70
1 3.92 −.08
−1 10.62 +.08
16 4.88 11.07
− .11 7.35
16 7.77

√ Gr 2320 =11

Sin δ 9.96762 Tang δ = +2,493
Cos δ 9.57075 K = -.039
11671 n
9,68646 n

h m s
16 6 00
16 05 59
+ 68° 9' "
+ 68 08 41
z = - 25° 45' 53"
-0.43

	July 1 1872 -.397		July 3 1872 -.349		July 15 1872 -.336		July 6 1872 -.308		July 28 1872 -.234	
16	05 49.8	~~06 12.8~~	05 54.0	05 12.3	05 56.3	05 46.6	05 53.7	05 36.2	5	05 43.6
	52.8	5 44.7	56.9	14.5	59.0	48.0	58.5	38.3	53.4	46.2
	55.4	46.1	59.6	12.3	1.8	50.0	1.2	40.7	56.2	49.9
	58.3	47.6	2.3		4.4		4.0		59.9	
	6 1.0		5.1		7.2		6.7		6 1.7	
	3.9		7.9		10.0		9.2		4.4	
	6.7		10.7		12.8		12.2		7.2	
	9.3		13.4		15.4		14.9		9.8	
	12.2		16.3		18.3		18.0		12.5	
									15.4	
	249.4		226.2		185.2		180.4		220.5	
	9.4		46.2		65.2		60.4		40.5	
	1.044	~~6 12.80~~ 5 46.00	5.133	5 14.70	7.244	5 48.20	6.711	5 38.40	4.500	5 46.57
	6 1.00		6 5.09		6 7.20		6 6.67		6 4.46	
	+2.03		-2.31		-4.93		-4.51		-2.93	
	-.99		-.87		-.84		-.77		-.58	
	-*3.10		-*3.03		-*2.55		-*2.51		-*1.94	
	~~6 1.07~~		~~6 1.12~~		~~6 1.12~~		~~6 1.12~~		~~6 0.99~~	
	5 58.94		5 58.88		5 58.88		5 58.88		5 59.01	
	+0.89		+0.87		+0.72		+0.72		+0.63	
15									15	
	4 14.0		4 29.9		4 11.6		4 15.2		4 10.3	
	3.8		21.1		3.7		6.8		-0.7	
	17.8		51.0		15.3		22.0		9.6	
	4 8.90		4 25.50		4 7.65		4 11.00		4 4.80	
	-11.76	+15.00	+50.43		+19.04		+28.31		+17.93	
	1.07041 n	1.17609	1.70269		1.27967		1.45194		1.25358	
	0.75687	0.88255	1.38915 n		0.96613 n		1.13840 n		0.94004 n	
	+5.71	-7.28	-24.50		-9.25		-13.75		-8.71	
	19 8.90	8.90	19 25.50		19 7.65		19 11.00		19 4.80	
	19 14.61	19 1.62	19 1.00		18 58.40		18 57.25		18 56.09	
+68°	3' ~~33.7~~4"	46.73	3 27.35		3 49.95		3 51.10		3 52.26	
-25°	45' 30"	1.44370 n								
	-2499		-2095		-2260		-2090		-1179	
	1.41871 n		1.42275 n		1.42110 n		1.42280 n		1.43191 n	
	+ 2622		+ 2647		+ 2637		+ 2647		+ 2703	
	- .03		- .68		- .06		- .14		- .06	
	- .04		+ .35		+ .41		+ .42		+ .08	
	~~- 2629~~	+26.15	~~- 26.60~~	+26.34	~~- 2602~~	+26.72	~~- 2619~~	+26.75	~~- 2701~~	+27.05
+68	~~3 7.44~~		~~3 20.75~~		~~3 23.93~~		~~3 24.91~~		~~3 25.25~~	
+68	4 ~~54.89~~	12.88 12.47	4 13.69	4 13.25	4 16.67	16.26	4 17.85	17.43	4 19.31	18.90
	- 8.15		- 8.59		- 10.93		- 11.09		- 12.74	
	+4 45.90	-.41 ~~45.49~~	+4 45.23	-.44 ~~44.77~~	+4 44.61	-.41 ~~44.20~~	+4 43.91	-.42 ~~43.49~~	+4 44.50	-.41 44.09
	+4 37.75		+4 36.64		+4 33.68		+4 32.82		+4 31.76	
+68	8 34.64		8 50.33		8 50.35		8 50.67		8 51.07	
	50.68	- 8.15		- 8.59		- 10.93		- 11.09		- 12.74
		+4 45.21		+ 44.84		+ 44.15		+ 43.28		+ 44.36
		+ .38		+ .37		+ .30		+ .30		+ .27
		+4 37.44		+4 36.62		+4 33.52		+4 32.49		+4 31.79
		8 49.91		8 49.87		8 49.78		8 49.92		8 50.69

h m s m s
16 6 20 5 56
+68 8' 45 42"

α 1872 = 5 58.918 (5) 50″.~~0~~03
1873 59.0~~70~~ (8) 48.7~~3~~4

1873 June 25
No Record

1873 .546
July 3 -~~.349~~

5 5 31.0
47.7 34.7
58.8 37.4
53.5
56.2
58.9
6 1.7
4.6
7.2
10.1

290.7
530.7
58.966 5 34.37

5 58.93
+4.79
-1.36
-4 3.25

~~6 0.89~~
5 59.11

see Suk. list
^

July 12	5	59.05	8	40.08
15	5	59.18		41.06
20		59.02		41.55
21		59.04		40.10
22		59.08		40.97
23		59.07		41.26

1873
July 24 -.498

06
1.1 05 43.7
4.1 48.0
6.8 50.0
9.6
12.4
15.0
17.9
20.8
23.5

111.2
12.355
5 47.23

6 12.51 32
-9.70
-1.24
-1 2.37

~~6 0.80~~
5 59.01

10
3 33.0
46.9
79.9
3′ 39″.95

+1.59
10
3 29.0
45.3
74.3
3 37.15

+24.60
1.39094
1.07740n
-11.95
13 37.15
13 25.20

9 23.15

-25° 46′ 28″ 1.44410n
-16.98
1.42712n

+ 26.74
- .12
+ .04

~~- 26.82~~ +26.66
~~8 56.33~~
9 49.81 9 49.52
- 5.67
-1 3.18 -29 ~~3.47~~
-1 8.85
8 41.96

- 5.67
-1 3.70
+ .68
-1 8.69
8 40.83

+1.60
10
3 26.0
42.8
68.8
3 34.40

+25.12
1.40002
1.08648n
-12.20
13 34.40
13 22.20

9 26.15

-20.38
1.42372n

+ 26.53
- .12
+ .18

~~- 26.47~~ +26.59
~~8 59.68~~
9 52.74 9 52.45
- 9.38
-1 3.54 -29 ~~3.83~~
-1 12.92
8 39.82

- 9.38
3.68
+ .68
-1 12.38
8 40.07

δ Ophiuchi

h m s
16 07 38
16 07 42
— 3 24
— 3 21 56

λ = +45 44 44
+.72

tang δ = −.06
x = −.015
corr = ~~+.02~~
α1872 38.364
α1873 41.504
δ 1872 = 21 46.58
δ 1873 = 21 56.17
dα = +3.139
dδ = −9.59

1872			
June 29	7m	40.03	.01
July 4		02	
9		00	2
14		97	3
19		39.94	3
24		90	4
29		.85	5
Aug. 3		39.79	6
8		39.73	.06

1873			
June 29	7m	43.34	
July 4		.33	1
9		.31	2
14		.28	3
19		43.25	3
24		.21	4
29		.16	5
Aug. 3		.11	5
8		43.05	6

1872 July 3 −.349 −.32
16 07 (38.0) 07 54.9
(39.2) 55.8
40.3 56.7
41.1
42.3
43.3
44.4
45.4
46.4
42.267 7 55.80
7 42.25
40.02
+2.23
~~+2.21~~
− 2.34 +.03
+ .02 +.02
− 1.66 +1.48
− 3.98 5
7 42.25
38.27
7 38.30 7 41.44
+0.87
45 3 8.0
10.0
18.0
3 9.00
− 13.53
1.13130n
1.24626n
+1763
48 9.00
48 26.63
−3° 25′ 38.28″
+45° 43′ 41″ 1.77080
−2095
1.74985
+− 56.21
+ .01
+ .25
~~+ 56.47~~ − 55.95
−3 ~~24 41.81~~
−3 26 34.23 26 34.54
21 49.8
+4 44.4 44.1
− 6.39
+ 3.20 + 3.20
+4 45.23 −.31 ~~44.92~~
+4 48.43 +4 44.84
−3 21 45.80 − .62
+4 47.42
21 47.12
21 37.53

1872 July 15 −.336 −.33
07 32.5 07 25.9
34.7 27.1
36.7 28.9
40.9
42.8
44.8
47.0
49.0
53.2
55.3
57.3
494.2
44.927 7 27.30
7 44.91
39.96
+4.95
~~+4.93~~
− 4.93 +.00
+ .02 +.02
− 1.60 +1.54
− 6.51
44.91
38.40
7 38.40 41.54
+0.72
3 47.2
48.9
96.1
3 48.05
+ 17.63
1.24625
1.36121n
−2298
48 48.05
48 25.07 8
25 36.73
−2260
1.74820
+− 56.08
+ .01
+ .38
~~+ 56.34~~ − 55.61
~~24 40.34~~
26 32.34 32.72
21 49.0
+4 43.3 42.9
− 7.19
+ 2.40 + 2.40
+4 44.61 −.38 ~~44.23~~
+4 41.01 + 44.15
21 45.33 − .51
+4 46.04
21 46.68
37.09

1872 July 24 −.260 −.27
07 31.1 07 22.1
33.1 22.9
35.2 23.9
39.3
41.2
43.3
45.5
47.4
51.8
53.7
55.8
477.4
43.400 7 22.97
7 43.39
39.90
+3.49
~~+3.47~~
− 3.48 −.02
+ .02 +.02
− 1.54 +1.60
− 5.00 2
43.39
38.39
7 38.37 41.51
+0.66
45 3 49.0
51.3
100.3
3 50.15
+ 20.43
1.31027
1.42523n
−2662
48 50.15
48 23.53
25 35.18
−1597
1.75483
+− 56.86
+ .01
+ .08
~~+ 56.95~~ − 56.77
~~24 38.23~~
26 31.95 32.33
21 48.5
+4 43.4 43.0
− 7.69
+ 1.90 + 1.90
+4 43.88 −.38 ~~43.50~~
+4 45.78 + 43.81
22 46.17 − .47
+4 45.24
21 47.09
37.50

1872 July 29 −.241 −.26
07 30.6
32.6
34.8
38.9
40.9
43.0
45.0
47.1
51.3
53.3
55.3
472.8
42.982
7 42.97
39.85
+3.12
~~+3.10~~
− 3.16 +.01
+ .01 +.01
− 1.49 +1.65
− 4.64 3
42.97
38.33
7 38.34 41.48
A.R

Inf. C.

1873 July 12 −.408 −.40
33.4
35.4 07 24.4
37.6 25.7
41.7 27.3
43.7
45.8
47.8
49.9
54.0
56.1
58.3
503.7
45.791 7 25.80
7 45.78
43.29
+2.49
~~+2.47~~
− 2.44 +.00
+ .02 +.02
− 1.79
− 4.21
45.78
41.57
7 41.57
+1.56
40
3 7.9
16.9
24.8
43 12.40
+ 19.99
1.30081
1.41577n
−2605
43 12.40
42 46.35
19 58.00
+45° 43′ 53″ 1.77090
−643
1.76447
+− 58.14
+ .01
+ .03
~~+ 58.18~~ − 58.10
~~18 54.82~~
20 56.10 20 56.36
22 1.7
−1 5.6 5.9
+ 5.50 + 5.50
−1 4.14 −.26 ~~4.40~~
−6 58.64 −1 4.53
21 54.74 − 1.12
−1 0.15
21 56.57

1873 July 15 −.517 −.53
07 34.8
37.0 07 26.5
39.0 27.7
43.1 28.8
45.1
47.3
49.3
51.4
55.4
57.5
59.7
519.6
47.236 7 27.67
7 47.22
43.27
+3.95
~~+3.93~~
− 3.97 −.03
+ .03 −.03
− 1.77
− 5.74
47.22
41.51
7 41.48
+1.56
40
3 9.0
20.0
29.0
3 14.50
+ 19.57
1.29159
1.40655n
−2550
43 14.50
42 49.00
20 0.65
−2179
1.74911
+− 56.12
+ .01
+ .16
~~+ 56.29~~ − 55.95
~~19 43.6~~
20 56.60 56.86
22 1.5
−1 4.9 5.2
+ 5.30 + 5.30
−1 2.75 −.26 3.01
−0 57.45 − 3.14
21 54.05 −
−0
21 55.8

		1872				1873		
Sin δ	8.76883n	June	29	−3° 21′ 50.1″		June 29	22 2.6″	
		July	4	49.7	+4	July 4	2.2	+4
Cos δ	9.999251		9	49.4	.3	9	1.9	.3
	.11571n		14	49.1	.3	14	1.6	.3
	.11496n		19	48.8	.3	19	1.3	.3
			24	48.5	.3	24	1.0	.3
			29	48.3	.2	29	0.8	.2
		Aug.	3	48.0	.3	Aug. 3	0.5	.3
			8	47.8	.2	8	0.3	.2

1873 .354
July 20 −.38
07 38.2
40.4 07 28.6
42.5 28.9
46.5 29.8
48.7
50.7
52.7
54.7
59.8
1.0
3.0
438.2
558.2
50.745 7 28.90
7 50.73
43.24
+7.49
~~+7.47~~
−7.43 −.01
+ .02 +.02
−1.74
−9.156
50.73
41.58
7 41.57
+1.56
40
3 10.9
20.0
8.09
3 15.45
+21.84
1.33925
1.45421n
−2846
43 15.45
42 46.99
19 58.64
−1396
1.75694
~~+~~− 57.14
+ .02
+ .16
~~+ 57.32~~ − 56.96
~~19 1.32~~
20 55.60 55.86
22 1.2
−1 5.6 5.9
+5.00+ 5.00
−1 4.15 −.26 4.41
−0 59.15 −.1 4.86
21 54.75 − 1.12
−1 0.98
21 56.84

1873 .374
July 21 −.37
07 38.8
40.8 07 36.5
42.9 37.3
47.0 38.1
51.1
53.1
55.2
59.5
1.5
3.5
(5.6)
Reject.
7 37.30
−7.95
+.02
40
2 0.6
8.9
9.4
~~2 4.45~~
42 4.70

1873 .413
July 22 −.41
07 39.1
41.3 07 32.9
43.3 33.9
47.5 34.8
49.6
51.6
53.7
55.7
59.9
2.0
4.0
447.7
567.7
51.609 7 33.87
7 51.59
43.23
+8.36
~~+8.34~~
−8.42 +.01
+.02
+ .02 +.02
−1.73
−10.132
51.59
41.46
7 41.47
+1.58
40
3 5.1
14.1
19.2
43 9.60
+17.74
1.24895
1.36391n
−2312
43 9.60
42 46.48
19 58.13
−1415
1.75675
~~+~~− 57.11
+ .01
+ .16
~~+ 57.28~~ − 56.94
~~19 0.85~~
20 53.07 55.33
22 1.1
−1 6.0 6.3
+4.90+ 4.90
−1 3.92 −.26 4.18
−0 59.02 − 4.35
21 54.09 − 1.13
−1 0.58
21 55.91

1873 .504
July 23 −.48
07 39.9
41.9 44.0 07 33.5
48.1 34.6
50.1 35.8
52.1
54.2
56.3
0.4
2.6
4.6
394.2
544.2
52.250 7 34.63
7 52.19
43.22
+8.97
~~+8.95~~
−8.93 −.01
+ .03 +.03
−1.72
−10.623
52.19
41.57
7 41.56
+1.60
40
3 7.9
17.9
25.8
3 12.90
+17.57
1.24477
1.35973n
−2289
43 12.90
42 50.01
20 51.66
−1884
1.75206
~~+~~− 56.50
+ .01
+ .16
~~+ 56.67~~ − 56.33
~~19 12.99~~
21 ~~57~~ 57.99 58.25
22 1.0
~~−1 5.0~~ − 0 55.0 55.3
+4.80+ 4.80
−1 3.07 −.26 ~~3.33~~
−0 58.27 − 3.14
21 4.26 56.26 − 1.14
−0 59.48
21 57.73

1873 .498
July 24 −.48
07 40.6
42.5 07 35.3
44.8 36.4
48.9 37.6
50.9
52.8
54.9
57.0
1.0
3.1
5.2
401.7
581.7
~~51.064~~ 7 36.43
52.882
7 52.87
43.21
+9.66
~~+9.64~~
−9.70 +.00
+ .03 +.03
−1.71
−11.38 δ
52.87
41.49
7 41.49
+1.60
40
3 4.9
16.1
21.0
3 10.50
+16.45
~~1.24180~~ 1.21617
1.35676n 1.33113n
~~−2274~~ −2144
43 10.50 43 10.50
~~42 47.76~~ 42 49.06
20 0.71
−2038
1.75052
~~+~~− 56.30
+ .01
+ .16
~~+ 56.47~~ − 56.13
~~19 4.24~~
20 56.84 57.10
22 1.0
−1 4.2 4.5
+4.80+ 4.80
−1 3.54 −.26 ~~3.80~~
−0 58.74 − 3.68
21 55.58 − 1.14
−1 0.02
21 57.12

1873 .546
July 30 −.55
7 46.6 7 40.8
48.7 41.8
50.8 42.9
54.8
56.9
59.0
8 1.0
3.0
7.2
9.3
11.3
348.6
648.6
58.964 7 41.83
7 58.95
43.15
+15.80
~~+15.78~~
−15.80 −.03
+ .03 +.03
−1.65
−17.425
58.95
41.53

1873
July 3 7 41.53 21 57.24
6 41.48 57.34
9 41.50 56.41

7 41.50
+1.67
40
3 5.5
16.9
23.4
3 11.20
+17.13
1.23376
1.34872n
−2232
43 11.20
42 48.88
20 0.53
−2257
1.74833
~~+~~− 56.02
+ .01
+ .13
~~+ 56.16~~ − 55.88
~~19 4.37~~
20 56.41 56.67
22 0.7
−1 4.3 4.6
+4.50+ 4.50
−1 3.22 −.26 ~~3.46~~
−0 58.72 − 3.44
21 55.13 − 1.20
−1 0.14
21 56.81

ε Ophiuchi

h	m	s
16	11	31
16	11	36
—	4°	23 ?
—	21	22 1

52

z = +46° 45' 40"

+.73

tang δ = −.08

x = −.016

cos x = +1.06

″ α 1872 32.974 δ = 22 43 17.2

α 1873 36.142 δ = 22 52.28

dα = +3.168

dδ = −9.11

1872	m s		1873	m s	
June 29	11 34.67		June 29	11 38.01	
July 4	66	1	July 4	38.00	1
9	64	2	9	37.98	2
14	.61	3	14	37.96	2
19	34.58	3	19	37.93	3
24	54	4	24	37.89	4
29	49	5	29	37.84	5
Aug 3	44	5	Aug. 3	37.79	5
8	34.38	6	8	37.73	6

	July 1 1872 −.397 −.40		July 15 1872 −.336 −.33		July 22 1872 −.285 −.28		July 24 1872 −.260 −.27		July 28 1872 −.234 −.23		July 29 1872 −.211 −.20
16	11 20.4		11 27.2	11 20.6	11 26.1	11 19.0	11 25.6	11 28.1	11 25.1	11 16.3	11 25.2
	22.5		29.3	21.7	28.2	19.9	27.7		27.2	17.6	27.3
	24.5		31.3	23.0	30.3	20.9	29.8		29.2	18.6	29.4
	28.7		35.4		34.5		34.0		33.3		33.6
	30.7		37.5		36.4		36.0		35.3		35.7
	32.8		39.7		38.5		38.1		37.5		37.7
	34.8		41.7		40.7		40.1		39.5		39.8
	36.9		43.7		42.6		42.2		41.5		41.9
	41.0		47.7		46.8		46.4		45.7		45.9
	43.0		49.8		48.9		48.4		47.8		47.9
	44.9		52.0		50.9		50.4		49.9		50.1
	360.2		435.3		423.9		418.7		412.0		414.5
	32.745		39.573	11 21.77	38.536	11 19.93	38.064	11 28.10	37.455	11 17.50	37.682
T+x	11 32.73		11 39.56		11 38.52		11 38.05		11 37.44		11 37.67
R.A.	11 34.67		34.60		34.56		34.54		34.50		34.49
T−R.A.	−1.94		+4.96		+3.96		+3.51		+2.94		+3.18
	~~−2.00~~		~~+4.90~~		~~+3.90~~		~~+3.45~~		~~+2.88~~		~~+3.12~~
	+2.04 −.02		−4.92 +.00		−3.97 +.00		−3.48 −.02		−2.93 +.00		−3.16 +.01
	+ .03	+.03	+ .03	+.03	+ .02	+.02	+ .02	+.02	+ .02	+.02	+ .02
	−1.70	+1.47	−1.63	+1.54	−1.59	+1.58	−1.57	+1.60	−1.53	+1.64	−1.52
	+0.385		−6.52		−5.54		−5.085		−4.44		~~−4.5~~ −4.655
	11 32.73		39.56		38.52		38.05		37.44		37.67
	11 33.10		33.04		32.98		33.02		33.00		33.01
	11 33.08	11 36.25	11 33.04	36.21	11 32.98	36.15	11 33.00	36.17	11 33.00	36.17	11 33.02

36.19

	July 15	July 22	July 24	July 28
	+0.72	+0.68	+0.66	+0.63
45 N.R			45	45
	4 42.1	4 41.1	4 31.1	4 44.0
	44.5	43.1	33.1	45.0
	86.6	84.2	64.2	89.0
	4 43.30	4 42.10	4 32.10	4 44.50
	+17.80	+18.61	+9.96	+19.95
	1.25042	1.26975	0.99826	1.29994
	1.36486n	1.38419n	1.11270n	1.41438n
	−2317	−2422	−1296	−26.96
	49 43.30	49 32.10	49 32.10	49 44.50
	49 20.13	49 7.88	49 19.14	49 18.54
−4°	26 31.78	26 29.45	26 30.79	26 30.19
+46° 44' 35"	1.78620			
	−2254	−896	−1579	−1161
	1.76366	1.77724	1.77041	1.77459
	×− 58.03	×− 59.88	×− 58.94	×− 59.51
	+ .01	+ .01	+ .01	+ .02
	+ .47	+ .09	+ .09	+ .09
	~~+ 58.51~~ −57.55	~~+ 59.98~~ −59.78	~~+ 59.04~~ = 58.84	~~+ 59.62~~ −59.40
−4	~~26 33.21~~	~~25 19.55~~	~~25 21.75~~	~~25 20.57~~
−4	27 29.33 / 27 29.80	27 29.31 / 29.78	27 29.63 / 30.08	27 29.59 / 30.46
	22 45.67	22 45.3	22 45.2	22 45.0
	+4 43.7 / 43.1	+4 44.0 / 43.5	+4 44.4 / 43.9	+4 44.6 / 44.1
	−6.61	−7.01	−7.11	−7.31
	+2.50 + / 2.50	+2.10 + / 2.10	+2.00 + / 2.00	+1.80 + / 1.80
	+4 44.61 −.47 / ~~44.44~~	+4 43.31 −.47 / ~~42.84~~	+4 43.88 −.45 / ~~43.43~~	+4 44.50 −.47 / ~~44.03~~
	+4 44.11 +4 / 44.15	+4 45.11 + / 42.99	+4 45.88 + / 43.81	+4 46.30 + / 44.36
−.4	22 42.22 − / .52	22 43.90 − / .49	22 43.75 − / .48	22 43.29 − / .45
	+4 46.13	+4 44.60	+4 45.33	+4 45.71
	22 43.67	22 45.18	22 44.75	22 44.75
	22 34.56	36.07	35.64	35.64

N.R

		1872	° ′ ″			1873	″	
Sin δ	8.88326	June 29	−4 22 46.8		June 29	22	58.8	
		July 4	46.4	+.4	July 4		58.5	+.3
Cos δ	9.99873	9	46.1	.3	9		58.2	.3
	1157/n	14	45.8	.3	14		57.9	.3
	.11444n	19	45.5	.3	19	″	57.6	.3
		24	45.2	.3	24		57.3	.3
		29	45.0	.2	29		57.1	.2
		Aug. 3	44.8	.2	Aug. 3		56.8	.3
		8	44.6	.2	8		56.6	.2

1872 −.211 −.20

Σ list ∧

1873 July 12 −.408 −.40	1873 July 15 −.517 −.53	1873 July 20 −.354 −.38	1873 July 21 −.374 −.37	1873 July 23 −.504 −.48	1873 July 24 −.498 −.48	~~July 30~~
11 28.2	11 29.6	11 32.9	11 33.4	11 34.6	11	
30.2 11 18.0	31.6 11 19.3	35.0 11 58.9	35.5 11 24.6	36.6 11 26.7	11 48.5	
32.1 19.3	33.7 20.7	37.0 59.8	37.6 25.8	38.7 27.8		
36.4 20.5	37.8 22.0	41.1 1.0	41.8 26.6	42.8 28.6	43.5	
38.4	39.8	43.2	43.8	44.8	45.5	
40.6	41.9	45.2	45.9	46.8	47.8	
42.6	44.0	47.4	48.0	49.0	49.6	
44.6	46.1	49.5	50.0	51.0	51.8	
48.8	50.2	53.6	54.1	53.0		
50.9	52.3	55.7	56.1	57.1		
52.9	54.2	57.8	58.3	59.2		
445.7	461.2	498.4	504.5	515.6	238.0	
40.518 11 19.27	41.927 ~~11 20.70~~ 11 20.67	45.309 11 59.90	45.864 11 25.73	46.873 11 27.70	47.600 11 48.50	
11 40.50	11 41.91	11 45.29	11 45.85	11 46.86	11 47.58	
11 37.97	37.95	37.92	37.92	37.90	37.89	
−2.53	+3.96	+7.37	+7.93	+8.96	+9.69	
~~+2.47~~	~~+3.90~~	~~+7.31~~	~~+7.87~~	~~+8.90~~	~~+9.63~~	
−2.44 +.00	−3.97 −.03	−7.43 −.01	−7.95 −.01	−8.93 −.01	−9.70 +.00	
+.03 +.03	+.04 +.04	+.03 +.03	+.03 +.03	+.04 +.04	+.04 +.04	
−1.83	−1.81	−1.78	−1.78	−1.76	−1.75	
−4.24	−5.74	−9.18	−9.70	−10.65	−11.41	
40.50	41.91	45.29	45.85	46.86	47.58	
36.26	36.17	36.11	36.15	36.21	36.17	
11 36.26	11 36.14	11 36.10	11 36.14	11 36.20	11 36.17	
+1.56	+1.56	+1.56	+1.57	+1.60	+1.60	
40	40	40	40	40	40	
3 3.1	4 6.4	3 18.9	3 2.1	3 3.4	3 36.4	
12.9	17.7	28.0	11.9	13.8	47.9	
16.0	24.1	46.9	14.0	17.2	84.3	
8 8.00	4 12.05	43 23.45	3 7.00	43 8.60	3 42.15	
+21.25	+21.26	−14.59	+20.13	+19.17	−0.90	
1.32736	~~1.32654~~ 1.32756	1.16406n	1.30384	1.28262	9.95425n	
1.44180n	1.44098n 1.44200	1.27850	1.41828n	1.39706n	0.06869	
−27.66	−27.60 −27.67	+18.99	−26.20	−24.95	+11.71	
44 8.00	44 12.05 44 12.05	43 23.45	44 7.00	43 8.60	43 42.15	
43 40.34	43 44.45 43 44.38	43 42.44	43 40.80	42 43.65	43 ~~53.86~~ 43.32	
20 51.99	20 56.03	20 54.09	20 52.45	20 56.30	21 ~~5.51~~ 54.97	
46° 44′ 47″ 1.78620						
−613	−2155	−1373	−1279	−1870	−2020	
1.78007	1.76465	1.77247	1.77341	1.76750	1.76600	
~~+~~−1 0.27	~~+~~0 58.16	~~+~~− 59.22	~~+~~− 59.35	~~+~~− 58.55	~~+~~− 58.34	
+ .02	+ .02	+ .01	+ .01	+ .01	+ .00	
+ .03	+ .21	+ .17	+ .15	+ .15	+ .18	
~~+1 0.32~~ −1 0.22	~~+ 58.39~~ −57.93	~~+ 59.40~~ −59.04	~~+ 59.51~~ −59.19	~~+ 58.71~~ −58.39	~~+ 58.52~~ −58.16	
~~19 51.67~~	~~19 57.64~~	~~19 54.69~~	~~+19 52.94~~	~~19 56.59~~	~~20 6.99~~	
21 52.21 21 52.54	21 53.96 54.30	21 53.13 53.48	21 51.64 51.97	21 53.69 54.02	21 ~~3.67~~ 53.13 53.43	
22 58.0	22 57.8	22 57.5	22 57.5	22 57.4	22 57.3	
−1 5.8 6.1	−1 3.8 4.1	−1 4.4 4.7	−1 5.9 6.2	−1 3.7 4.0	~~6.6~~ 6.9	
+5.70 + 5.70	+5.50 + 5.50	+5.20 + 5.20	+5.20 + 5.20	+5.10 + 5.10	+5.00 + 5.00	
−1 4.14 −.33 4.47	−1 2.75 −.34 ~~3.09~~	−1 4.15 −.35 ~~4.50~~	−1 4.30 −.33 ~~4.63~~	−1 3.07 −.33 ~~3.40~~	−1 3.54 −.30 ~~3.84~~	
−0 58.44 −1 4.53	−0 57.25 − 3.14	−0 58.95 − 4.86	−0 59.10 − 4.84	−0 57.97 − 3.14	−0 58.54 ~~−3.8~~	
22 50.65 — 1.13	22 51.21 — 1.13	22 52.08 — 1.13	22 50.74 — 1.14	22 51.66 — 1.16	~~23 2.21~~ 22 51.67 — 1.16	
−0 59.96	−0 58.77	−1 0.79	−1 0.78	−0 59.20	−0 59.84	
22 52.50	22 53.07	22 54.27	22 52.75	22 53.22	22 53.27	

1873			
July 3	11 36.15	22	53.15
6	36.12		57.74
9	36.08		53.74
30	36.13		53.09

+.02
1.65
.5
36.19

19 Urs Min

	h	m	s	
	16	14	32	
	16	14	28	
	+	76°	12'	
	+	76	11	46"
ʒ =		−33°	48'	58"
		−,56		

tan δ = +4.07

1/x = −.064

cos α = +.01 +0.5

α 1872 30.227 δ = 11 55.14

α 1873 28.426 δ = 11 46.22

dα = −1.802

dδ = −892

1872		m	s	
June	29	14	34.23	
July	4		34.64	29
	9		34.32	32
	14		33.97	35
	19		33.60	37
	24		33.20	40
	29		32.79	41

1873		m	s	
July	9	14	32.75	
	14		32.40	35
	19		32.03	37
	24		31.63	40
	29		31.22	41
Aug.	3		30.79	43
	8		30.34	45

1872 July 1 −.40 −.397

16 14 17.3 14 52.0
21.4
25.9
30.2
34.6
38.9
43.3
47.3
51.6

310.5

34.500 14 53.00

14 34.44
14 34.81
−0.37
−0.38

+2.04 −.02
−1.63 −161
−4.58 −6.38
−4.17
14 34.44
14 30.27

14 30.27 14 28.47
+0.89

15
1 7.0
56.0
123.0
1 1.50

−18.50
1.26717n
0.76043
+5.76 −3.35
16 1.50 16 27.40
16 7.26 16 24.05
+76° 6' 41.09" 6 24.30
−38° 48' 28" 1.58590n
−2476
1.56114n

+ 36.40
− .64
− .01

− 36.45 + 36.35
+76 6 4.64
+76 7 17.44 7 17.34
12 3.1
+0.5"
+4 45.7 45.6
+4 46.2 46.1
−16.92
−8.00 8.00
+4 45.90 −10 ~~45.80~~ 45.21
+4 37.90 +4 49
+76 11 55.34 +4 37.70
11 55.04
11 46.12

1872 July 3 −.32 −.349

14 21.2 13 24.8
25.4 27.0
29.6 31.4
34.2
38.7
42.8 14 10.8
47.2 15.3
51.4 19.2
56.0

346.5

38.500 13 27.73
14 15.10

14 38.44
34.69
+3.75
+3.74

−2.35 +.03
−1.30 −142
−4.46 −6.26
−8.11 20
38.49
30.33

14 30.24 28.44
+0.87

1 31.9 1 18.8
22.9 8.9
54.8 27.7
1 27.40 1 13.85

+10.77 +23.40
1.03222 1.36922
0.52548n 0.86248n
~~−3.353~~ −7.29
16 27.40 16 13.86
16 53.87 16 6.56
6 41.79
−2084
1.56506n

+ 36.73
− .02
+ .12

− 36.63 + 36.83
7 18.62 18.48
12 3.5
+4 44.9 44.8
+4 45.4 45.3
−17.32
−8.40 8.40
+4 45.23 −14 ~~45.09~~ 44.84
+4 36.83 +4 48
11 55.45 +4 36.92
11 55.40
46.48

1872 July 15 −.33 −.336

14 23.0 13 46.0
27.3 49.2
31.5 52.1
36.2
40.2
44.8
48.8
53.2
57.6

362.6

40.289 13 49.10

14 40.23
33.88
+6.35
+6.34

−4.92 +.00
−1.34 −137
−3.65 −5.45
−9.91 4
40.23
30.32

14 30.29 28.49
+0.72

1 23.1
14.9
38.0
1 19.00

+51.19
1.70919
1.20245n
−15.94
16 19.00
16 3.06
6 45.29
2254
1.56336n

+ 36.57
− .33
+ .13

− 36.79 + 36.39
6 8.50
7 21.68 21.55
12 5.9
+4 44.2 44.1
+4 44.7 44.6
−19.72
−10.80 10.80
+4 44.61 −13 ~~44.48~~ 44.13
+4 33.81 +7 40
11 55.49 +4 33.75
11 55.30
46.38

1872 July 16 −.31 −.338

14 22.5 13 40.0
26.6 44.3
30.8 47.4
35.2
39.5
43.9
48.4
52.4
56.8

356.1

39.567 13 43.90

14 39.50
33.81
+5.69
+5.68

−4.50 −.01
−1.26 −125
−3.58 −5.38
−9.34
39.50
30.16

14 30.16 28.36
+0.72

1 23.9
15.7
39.6
1 19.80

+55.67
1.74562
1.23888n
−17.34
16 19.80
16 2.46
6 45.89
−2086
1.56504n

+ 36.73
− .38
+ .13

− 36.98 + 36.48
6 8.91
7 22.37 22.24
12 6.1
+4 43.7 43.6
+4 44.2 44.1
−19.92
−11.00 11.00
+4 43.91 −13 ~~43.78~~ 43.48
+4 32.91 +4 40
11 55.28 +4 32.68
11 54.92
46.00

1872 July 24 −.27 −.260

14 20.4 13 35.9
24.8 40.8
29.2 44.9
33.4
37.6
42.0
46.3
50.6
54.9

339.2

37.689 13 40.53

14 37.63
33.18
+4.45
+4.44

−3.48 −.02
−1.10 −106
−2.95 −4.75
−7.531
37.63
30.10

14 30.12 28.32
+0.66

15
1 23.2
16.0
39.2
1 19.60

+57.16
1.75709
1.25035n
−17.80
16 19.60
16 1.80
1.80
6 46.55
−1579
1.57011n

+ 37.16
− .41
+ .03

− 37.54 + 36.78
6 9.01
7 23.33 23.20
12 4.2
+4 43.9 43.8
+4 44.4 44.3
21.02
−12.10 12.10
+4 43.88 +13 ~~43.75~~ 43.81
+4 31.78 +4
11 55.11 +4 32.07 36
11 55.27
46.35

1872 July 28 −.23 −.234

14 19.5
24.1
27.7
32.2
36.9
41.0
45.3
49.7
53.8

330.2

36.689

14 36.63
32.85
+3.78
+3.77

−2.93 +.00
−0.94 −.95
−2.62 −4.42
−6.49 50
36.63
30.14

14 30.13 28.33
+0.63

15
1 13.3
34.2
47.5
1 23.75

sin δ 9.98728
cos δ 9.37755
11571 n
9.49326 n

1872		′	″	
June	29	11	62.6	
July	4		63.7	+11
	9		64.8	11
	14		65.7	.9
	19		66.5	.8
	24		67.2	.7
	29		67.8	.6
Aug	3			
	8			

1873			″	
July	9	11	52.9	
	14		53.8	+.9
	19		54.7	.9
	24		55.4	.7
	29		56.0	.6
Aug.	3		56.4	.4
	8		56.8	.4

1873		α	δ
July	6	14 28.24	11 46.74
	9	28.26	45.92
	24	28.36	45.60
	30	28.35	46.78
Aug	4	28.51	46.70

July 29 1872 −.26 .21
14
19.5
23.9
28.2
32.7
36.9
41.2
45.4
49.9
54.3

332.0

36.889

14 36.83
32.77
+4.06
+4.05

−3.17 +.01
−.81 −.86
−2.54 4.34
−6.526
36.83
30.31

14 30.27 28.47

A.R

S list
14 ~~181 +9.4~~
23.7 ~~44.9~~ 13 6.3
28.0 ~~59.6~~ 10.6
32.7 15.4
36.7
41.0
45.2
49.6
54.5

July 12 1873 −.40 .408

36.755 13 10.77

14 36.69
32.53
+4.16
+4.15

−2.44 +.00
−1.63 −1.66
−4.10
−8.17 .20
36.69
28.52

14 28.49

+1.56

10
0 49.0
0.1
1091
0 54.55

+85.98
1.93440
1.42766 n
−26.77
10 54.55
10 27.78

12 20.57

−33° 48′ 25″ 1.58590 n
−613
1.57977 n

+ 38.00
1.20
+ .01
36.81
− 39.19 + ~~37.01~~
11 41.38
12 57.58 57.38 } 12 57.31
11 53.5
−1 4.4 3.9 4.0
−1 3.4 3.5

−7.30 7.30
−1 4.14 −.07 ~~4.21~~ 4.53
−1 11.44 + .87
11 45.94 −1 10.96
11 46.35

July 15 1873 −.58 .517
14
21.0 13 46.3
25.6 49.3
30.0 54.7
34.5
38.7
43.3
47.5
51.4
55.8

347.8

38.644 13 50.10

14 38.58
32.31
+6.27
+6.26

−3.98 −.03
−2.16 −2.19
−3.88
−10.02 9.99
38.58
28.56

14 28.59

+1.56

10
0 36.1
49.9
86.0
0 43.00

+48.54
1.68610
1.17936 n
−15.11
10 43.00
10 27.89

12 20.46

−21.55
1.36435 n

+ 36.67
.31
+ .03
− 36.95 + 36.39
11 43.51
12 56.85 56.79
11 54.0
−1 2.8 2.9
−1 2.3 2.4

−7.80 7.80
−1 2.75 −.06 ~~2.81~~ 3.14
−1 10.55 + .87
11 46.30 −1 10.07
11 46.72

July 20 1873 −.38 .354
14
24.0 13 38.0
28.0 40.0
32.2 46.0
36.6
40.6
45.1
49.2
53.8
58.0

367.5

40.833 13 41.33

14 40.77
31.94
+8.83
+8.82

−7.44 −.01
−1.55 −1.44
−3.51
−12.50 .40
40.77
28.27

14 28.37

+1.56

10
0 38.0
51.1
89.1
0 44.55

+59.50
1.77452
1.26978 n
−18.53
10 44.55
10 26.02

12 22.33

−13.73
1.57217 n

+ 37.34
.45
+ .03
− 37.76 + 36.92
11 41.57
12 59.25 59.19
11 54.9
−1 4.4 4.5
−1 3.9 4.0

−8.70 8.70
−1 4.15 −.06 ~~4.21~~ 4.86
−1 12.83 + .87
11 46.40 −1 12.69
11 46.50

July 21 1873 −.37 .374
14
24.0 13 23.4
28.6 28.6
32.9 32.6
37.3
41.4
46.0
50.0
54.1
59.0

373.3

41.478 13 28.20

14 41.41
31.86
+9.55
+9.54

−7.95 −.01
−1.51 −1.52
−3.43
−12.89 .91
41.41
28.52

14 28.50

+1.57

10
0 42.8
65.2
98.0
0 49.00

+73.28
1.86499
1.35823 n
−22.82
10 49.00
10 26.18

12 22.17

−12.79
1.57311 n

+ 37.42
.68
+ .04
− 38.06 + 36.78
11 44.11
12 58.95 58.89
11 55.1
−1 3.8 3.9
−1 3.3 3.4

−8.90 8.90
−1 4.30 −.06 ~~4.36~~ 4.84
−1 13.20 + .87
11 45.75 −1 12.87
11 46.02

July 22 1873 −.41 .413
14
24.7 13 43.6
28.9 46.6
33.3 51.0
37.6
41.9
46.0
50.4
54.9
59.2

376.9

41.878 13 47.07

14 41.81
31.78
+10.03
+10.02

−8.42 +.01
−1.67 −1.68
−3.35
−13.44
41.81
28.37

14 28.37

+1.58

10
0 36.6
50.0
86.6
0 43.30

+54.81
1.73886
1.23212 n
−17.07
10 43.30
10 26.23

12 22.12

−13.99
1.57191 n

+ 37.32
.38
∓ .03
− 37.67 + 36.97
11 44.45
12 59.09 59.03
11 55.2
−1 3.9 4.0
−1 3.4 3.5

−9.00 9.00
1 3.92 −.06 ~~3.98~~ 4.85
1 12.92 + .88
11 46.17 −1 12.47
11 46.56

γ Herculis

h m s
16 16 15
16 16 19
+ 19° 27′ ″
+ 14 27 10
ʒ = +22° 55′ 38″
0.1 sin. ʒ = +.~~42~~ 39

tan δ = +.35
χ = −.016
cos χ = −.01
α1872 16.429 δ = 27 18.65″ dα = +26.44
dδ = −8.72
α1873 19.073 δ = 27 9.93

1872	m s	
Jan 29	16 18.14	
July 4	.12	2
9	.09	3
14	.05	4
19	18.01	4

1873	m s	
Jan 29	16 20.96	
July 4	.94	2
9	.91	3
14	.88	3
19	20.84	4
24	.79	5
29	.73	6
Aug. 3	.66	7
8	20.59	7

July 1 1872 −.397 −.40
16 16 3.2 15 54.8
5.4 55.8
7.6 56.9
12.0
14.1
16.3
18.5
20.8
25.1
27.2
29.5
179.7
16.336 15 55.83
16 16.32
16 18.13
−1.81
~~−1.80~~
+2.03 −.02
−.14 −.14
−1.70 +0.94
+0.187
16 16.32
16 16.51
16 16.49 16 19.13
+0.89
0
0 16.6
16.1
32.7
0 16.35
+20.51
1.31197
1.40216n
−2524
0 16.35
59 51.11
+19° 22′ 57.24″
+22° 55′ 6″
−2453
1.36197
+ − 23.01
− .07
+ .00
− 23.08
+19 22 34.16 22 34.13
27 20.0
+4 45.8 45.8
−1.40
+4 45.90 −.03 ~~45.87~~
+4 44.50 − 1.40
+19 27 18.66 +4 48.21
+49.45 − 34
+19 27 19.15 +4 43.47
11 27 17.60
27 8.88

July 3 1872 −.349 −.32
16 7.6 15 59.7
9.7 0.6
11.9 1.6
16.3
18.4
20.7
22.8
24.8
29.4
31.5
33.7
226.8
20.618 16 0.63
16 20.60
18.13
+2.47
~~+2.48~~
−2.35 +.03
−.11 −.12
−1.70 +0.94
−4.164
20.60
16.44
16 16.46 19.10
+0.87
0 14.9
14.1
29.0
0 14.50
+19.99
1.30081
1.39100n
−2460
0 14.50
59 49.90
22 58.45
1.38650
~~1.40710~~
−2073
1.36577
+ − 23.21
− .07
+ .02
− 23.26
22 35.19 35.17
27 20.3
+4 45.1 45.1
−1.60
+4 45.23 −.02 ~~45.21~~
+4 43.63 − 1.60
27 18.82 + 44.84
+49.45 − .33
27 19.31 +4 42.91
27 27 18.08
9.36

July 5 1872 −.336 −.33
16 10.0 15 59.4
12.3 0.5
14.5 1.6
18.8
20.9
23.2
25.3
27.5
31.8
34.1
36.2
254.6
23.145 16 0.50
16 23.13
18.04
+5.09
~~+5.10~~
−4.92 +.00
−.12 −.12
−1.61 +1.03
−6.65
23.13
16.48
16 16.48 19.12
+0.72
0 15.2
14.9
30.1
0 15.05
+22.64
1.35488
1.44507n
−2787
0 15.05
59 57.18
4
23 1.17
−2248
1.36402
+ − 23.12
− .09
+ .02
− 23.19
22 37.98 37.95
27 22.1
+4 45.1 45.1
−3.50
+4 44.61 −.03 ~~44.58~~
+4 41.11 − 3.50
27 19.09 + 44.15
+49.45 − .28
27 19.58 +4 40.37
54 27 18.32
9.60

July 12 1873 −.408 −.40
16 10.5
12.6 16 0.5
14.8 1.7
19.1 2.9
21.3
23.5
25.6
27.8
32.2
34.4
36.6
258.4
23.491 16 1.70
16 23.48
20.89
+2.59
~~+2.60~~
−2.45 +.00
−.14 −.14
−2.16 1.82
−4.75 4.41
23.48
(18.73) 19.07
16 19.07
+1.56
50
4 31.9
42.5
74.4
4 37.20
+21.79
1.33826
1.42845n
−2682
54 37.20
54 10.38
28 37.97
+22° 55′ 17″
1.38650
~~1.40720~~
−583
1.38067
+ − 24.03
− .08
+ .05
− 24.06
28 13.91 28 13.54
27 20.1
−1 3.8 4.2
−0.20
−1 4.14 −.37 ~~4.51~~
−1 4.34 − 0.20
27 9.57 −1 4.53
+9.286 − .60
27 10.49 −1 5.33
43 27 8.21

July 15 1873 −.517 −.53
16 12.0
14.1 16 4.5
16.4 5.6
20.8 6.8
22.9
25.0
27.2
29.4
33.9
36.0
38.1
275.8
25.073 16 5.63
16 25.06
20.87
+4.19
~~+4.20~~
−3.98 −.03
−.19 −.18
−2.14 1.80
−6.31 5.979
25.06
19.09
16 19.07
+1.56
50
4 29.2
42.5
71.7
4 35.85
+19.44
1.28870
1.37889n
−2393
54 35.85
54 11.92
28 36.43
−2131
1.36519
+ − 23.18
− .06
+ .23
− 23.01
28 13.42 13.05
27 10.0
−1 2.9 3.3
−0.60
−1 2.75 −.37 ~~3.12~~
−1 3.35 − .60
27 10.07 − 3.14
+9.286 − .60
27 10.99 −1 4.34
93 27 8.71

July 20 1873 −.354 −.38
16 15.6
17.5 16 5.2
19.8 6.4
24.0 8.0
26.1
28.4
30.6
32.8
37.0
39.3
41.5
312.4
28.400 16 6.53
16 28.39
20.83
+7.56
~~+7.57~~
−7.44 −.01
−.13 −.12
−2.10 1.76
−9.67 9.33
28.39
19.06
16 19.06
+1.56
50
4 32.0
41.7
73.7
36.85
+21.87
1.33985
1.43004n
−2692
54 36.85
54 9.93
28 38.42
−1351
1.37299
+ − 23.60
− .08
+ 23
− 23.45
28 14.97 14.60
27 11.2
−1 3.8 4.2
−1.30
−1 4.15 −.37 4.52
−1 5.45 − 1.30
27 9.52 − 4.86
+9.286 − .60
27 10.44 −1 6.78
38 27 4.82

		1872	°	′	″	
Sin δ	9.52242	June 29	19	27	19.6	
		July 4			20.4	+.8
Cos δ	9.97448	9			21.1	.7
	11571 n	14			21.9	.8
	.09019 n	19			22.6	.7
		24				
		29				
		Aug 3				
		8				

1873		″		1872.0 α	δ	1873.0 α	δ
June 29	26	68.0					
July 4		68.8	+.8	16.49	19.15	19.07	10.49
9		69.6	.8	.46	.31	.07	10.99
14		70.3	.7	.48	.58	.06	10.44
19		71.0	.7			.06	11.46
24		71.6	.6			.11	10.80
29		72.1	.5			.08	10.56
Aug. 3		72.5	.4			.07	10.75
8		72.9	.4			.16	12.09
				16.477	19.35 -.04	19.085 -.178	10.95
				.429	18.65	.073	9.93
				+.048	+0.70 -.04	+.012	+1.02
					~~+0.66~~		-.06
							+0.96
					18.41		9.17
					18.65		.93
					-.24		-.76

	July 21 1873 -.374 -.37	July 22 1873 -.413 -.41	July 24 1873 -.498 -.48	July 30 1873 -.546 -.55	Aug 4 1873 -.549 -.55
54 5					
	16 15.7	16 16.3	16 17.6	16 23.7 16 11.4	16 26.4
5.2	18.0 16 8.0	18.5 16 7.1	19.8 16 8.6	25.8 12.5	28.7 16 13.6
.4	20.3 9.1	20.7 8.3	22.0 9.8	28.0 13.5	30.9 14.9
.0	24.5 10.1	25.0 9.3	26.3 11.0	32.4	35.1 15.9
	26.8	27.2	28.6	34.6	37.4
	29.0	29.6	30.7	36.8	39.7
	31.1	31.6	32.8	39.0	41.8
	33.3	33.8	35.0	41.0	43.8
	37.7	38.1	39.4	45.5	48.2
	39.8	40.4	41.7	47.6	50.4
	42.0	42.5	43.8	49.9	52.6
	318.2	323.7	327.7	404.3	435.0
6.53	28.927 16 9.07	29.427 16 8.23	30.700 16 9.80	36.755 16 12.47	39.545 16 14.80
	16 28.91	16 29.41	16 30.68	16 36.74	16 39.53
	20.82	20.81	20.79	20.71	20.64
	+8.09	+8.60	+9.89	+16.03	+18.89
	~~+8.11~~	~~+8.61~~	~~+9.90~~	~~+16.04~~	~~+18.90~~
	-7.96 -.01	-8.43 +.01	-9.71 +.00	-15.81 -.03	-18.61 +.00
-.12	- .13 -.13	- .14 -.14	- .17 -.17	- .19 -.19	- .19 -.19
	-2.09 1.75	-2.08 1.74	-2.06 1.72	-1.98 1.64	-1.91 1.57
	-10.18 9.845	-10.66 10.31 .30	-11.94 11.58 60	-17.98 17.64 67	-20.7 20.37
	28.91	29.41	30.68	36.74	39.53
	19.07	19.09 10	19.08	19.10	19.16
	16 19.06	16 19.11	16 19.05	16 19.07	16 19.16
	+1.57	+1.58	+1.60	+1.67	+1.69
	50	50	50	50	50
	4 28.3	4 30.5	4 29.3	4 33.8	4 29.7
	39.8	40.9	42.9	45.9	44.1
	6.81	714	722	797	738
	4 34.05	4 35.70	4 36.10	4 39.85	4 36.90
	+19.86	+21.20	+20.90	+24.28	+24.74
	1.29798	1.32684	1.32015	1.38525	1.39340
	1.38817 n	1.41653 n	1.41034 n	1.47544 n	1.48359 n
	-2444	-2609	-2573	-2988	-3045
	54 34.05	54 35.70	54 36.10	54 39.85	54 36.90
	54 9.61	54 9.61	54 10.37	54 9.96	54 6.45
	28 39.74	28 38.74	28 37.98	28 38.39	28 41.90
	-1256	-1383	-2002	-2223	-1078
	1.37394	1.37267	1.36648	1.36427	1.37572
	x- 23.16	x- 23.59	x- 23.25	x- 23.13	x- 23.75
	- .07	- .08	- .08	- .10	- .11
	+ .23	+ .23	+ .23	+ .19	+ .18
	- 23.50	- 23.44	- 23.10	- 23.04	- 23.68
14.60	28 16.24 28 15.87	28 15.30 14.93	28 14.88 14.51	28 15.35 14.97	28 18.22 17.85
	27 11.3	27 11.4	27 11.6	27 11.2	27 12.6
	-1 4.9 5.3	-1 3.9 4.3	-1 3.3 3.7	-1 3.1 3.5	-1 5.6 6.0
	-1.40	-1.50	-1.70	-2.30	-2.70
4.52	-1 4.30 -.37 ~~4.67~~	-1 3.92 -.37 ~~4.29~~	-1 3.54 -.37 ~~3.91~~	-1 3.22 -.38 ~~3.60~~	-1 4.35 -.37 ~~4.72~~
1.30	-1 5.70 – 1.40	-1 5.42 – 1.50	-1 5.24 – 1.70	-1 5.52 – 2.30	-1 4.05 – 2.70
4.86	27 10.54 – 1 4.84	27 9.88 – 4.85	27 9.64 – 3.68	27 9.83 – 3.44	27 11.17 – 4.52
.60	+.92 86 – .61	+.92 86 – .61	+.92 86 – .62	+.92 86 – .65	+.92 86 – .65
6.78	27 11.46 40 – 1 6.85	27 10.80 74 – 1 6.46	27 10.56 50 – 1 6.06	27 10.75 69 – 1 6.39	27 12.09 03 – 1 7.87
7.82	27 9.02	27 8.47	27 8.51	27 8.58	27 9.98

Gr 828 = 12

h m s
16 18 40
~~16~~ 18 43
107° 45
+ 72 15 03
z = ~~−29° 52 15"~~
107 44 57
z = −65 22 9
−.191

Reduction. Tang δ = −5.122
−5.124
1 13.52
2 10.13
3 6.76
4 3.38
5 0.00

k = +.049

Sin δ 9.97882
Cos δ 9.48411
11.571n
9.59982n

	1872 July 3 −.349	1872 July 11 −.349	1872 July 14 −.301	1872 July 15 −.336	1872 July 16 −.308	1872 July 22 −.285
16	18 27.4 18 0.0 30.8 1.3 34.0 3.5 37.2 41.0 44.6 47.9 50.0 54.5	18 — 19 8.7 — 9.5 — 43.4 46.8 46.7 46.7 49.6 46.2 53.3 46.5 56.7 46.6 59.9 46.4	18 31.5 18 49.8 34.9 38.3 41.8 45.1 48.5 51.9 55.3 58.5	18 30.8 17 57.6 34.2 59.7 37.6 3.6 41.0 44.2 47.5 50.9 54.6 58.1	18 30.4 18 29.2 33.8 37.4 40.7 44.0 47.4 50.7 54.0 57.5	18 30.8 18 7.6 34.2 9.6 37.5 12.9 40.9 43.7 47.8 50.8 54.6 57.9
	368.4	405.6	405.8	398.9	395.9	398.2
	18 40.933 18 1.60	46.533 ~~45.089~~ 19 ~~6.07~~ 19 9.10	45.089 18 49.80	44.322 18 0.30	43.989 18 29.20	44.244 18 10.03
16	18 40.98 −2.32 +1.79 ~~+3.67~~ +2.47	18 46.58 −7.53 +1.79 ~~+3.28~~ +1.92	18 45.14 −5.73 +1.54 ~~+3.13~~ +1.70	18 44.37 −4.921 +1.72 ~~+3.07~~ +1.62	18 44.04 −4.51 +1.58 ~~+3.02~~ +1.55	18 44.29 −3.97 +1.46 ~~+2.68~~ +1.08
16	18 ~~42.92~~ 42.50	18 42.76	18 42.65	18 ~~42.79~~ 42.80	18 42.66	18 42.86
	+0.87	+0.77	+0.73	+0.72	+0.72	+0.68
40	4 10.3 359.1 129.4 4 4.70	4 31.8 21.4 53.2 4 26.60	4 25.0 14.8 39.8 4 19.90	4 5.2 54.8 60.0 4 00.00	4 15.2 6.2 21.4 4 10.70	4 9.8 38.0 12.78 4 3.90
107 −65° 20 56	+39.33 1.59472 1.19454n +15.63 44 4.70 43 ~~49.06~~ 4 20.35 38 ~~59.29~~ 8 28.00	−22.57 1.35353 0.95336n +8.98 44 26.60 44 ~~36.58~~ 17.62 38 12.77 8 30.73 .09621n 2.11 ~~632~~n	−4.71 0x.67302n 0x.27284 ~~+1.874~~ 1.87 44 19.90 44 ~~38.64~~ ~~2.77~~ 18.03 38 ~~4.71~~ 26.58 7 30.32	+44.02 1.64365 1.24347n +17.52 44 00.00 44 ~~+2.48~~ 17.52 38 ~~36.87~~ 8 30.83	+14.79 1.16997 0.76959n +5.88 44 10.70 44 ~~4.82~~ 16.58 38 ~~47.53~~ 8 31.88	+34.21 1.53415 1.13397n +13.61 44 3.90 43 ~~50.29~~ 4 17.51 38 ~~59.06~~ 8 30.84
	−2073 2.07548n + .03 +1 58.97 + .24 + .33	−1397 2.08224n + .03 +2 0.84 + .08 + .35	−1839 2.07782n + .03 +1 59.62 + .00 + .43	−2248 2.07373n + .04 +1 58.50 + .31 + ~~.44~~ .45	−2083 2.07538n + .03 +1 58.95 + .03 + .42	−918 2.08703n + .02 +2 2.19 + .18 + .08
107 + 107	+1 59.57 40 ~~58.86~~ 27.57 − 7.03 +4 45.23 −.41 +4 52.26 38.20 45 ~~51.12~~ 45 5.77 40 27.16 ~~44.82~~	+2 1.30 40 14.07 32.03 − 8.10 +4 44.89 .14 +4 52.99 36.79 ~~45 7.06~~ 46 ~~8.82~~ 31.59 ~~44.45~~	+2 0.08 40 ~~26.66~~ 30.40 − 8.43 +4 44.14 35.91 43 +4 52.57 45 ~~19.23~~ 45 6.11 29.97 ~~44.41~~	+1 59.30 40 ~~35.17~~ 30.13 − 8.54 +4 44.61 36.07 40 +4 53.15 45 48.32 45 6.20 29.73 ~~44.21~~	+1 59.43 40 ~~42.96~~ 31.20 − 8.64 +4 43.91 35.27 42 +4 52.55 ~~45 35.54~~ 45 6.47 30.78 43.49	+2 2.47 40 ~~0.53~~ 33.31 − 9.18 +4 43.31 34.13 40 +4 52.49 45 53.02 46 7.44 34.91 42.91
h m s 16 18 40 18 4 5 ° ' " +72 14 16 28"	− 7.03 +4 44.84 + 8.79 +4 3X.60 45 ~~4.76~~	− 8.10 + 44.51 + .10 +4 37.11 45 8.70	− 8.43 + 43.81 + .66 +4 36.04 45 6.01	− 8.54 + 44.15 + .65 +4 36.26 45 5.99	− 8.64 + 43.28 + .65 +4 35.29 45 6.07	− 9.18 + 42.99 + .61 +4 34.42 45 7.33

m s
α 1872 18 42.765 δ 45 593 54.07
1873 49.906 44 5847 1.53

July 24 1872 -.260		July 28 1872 -.234		July 12 1873 -.408		July 15 1873 -.517		July 20 1873 -.354		July 22 1873 -.413	
18 30.4	17 57.0	18	17 46.6	18		18		18		18 41.7	
34.0	0.3	30.7	52.3	34.8	18 2.2	36.3	17 46.0	40.6	18 2.3	45.2	18 4.0
37.2	4.3	33.6	56.3	38.2	6.6	39.7		44.1	5.0	48.3	6.0
40.7		37.0		41.8	9.3	42.9		47.3	6.3	9 51.8	11.0
44.1		40.2		45.0		46.3		50.8		55.0	
47.3		43.6		48.5		49.7		54.0		58.3	
50.8		46.8		51.6		53.0		57.3		2.3	
54.2		50.3		55.1		56.4		0.7		5.4	
57.6		54.0		58.8		59.8		4.0		8.7	
		57.3		2.0		3.0		7.6			
396.3		393.5		375.8 435.8		387.1 447.1		306.4 486.4		316.7 406.7	
44.033	18 0.53	43.722	17 51.73	48.422	18 6.03	49.678	17 46.00	54.044	18 5.20	~~55~~.188	18 7.00
44.08		43.77		48.47		18 49.73		54.09		18 55.24	
-3.50		-2.93		-2.45		-4.01		-7.45		-8.42	
+1.33		+1.20		+2.09		+2.65		+1.81		+2.11	
~~+2.56~~		~~+2.31~~		~~+3.44~~		~~+3.28~~		~~+3.40~~		~~+1.03~~ 0.93	
+0.92		+0.60		+1.70		+1.48		+1.09			
18 ~~42.53~~ 42.83		18 42.64		18 49.81		18 49.85		18 49.54		18 ~~49.96~~ 49.86	

Jul 23	50.17	58.94
24	50.03	58.29
30	49.77	59.34
Aug 4	50.22	57.49

+0.66	+0.63	+1.56	+1.56	+1.56	+1.58
40	40	35	35	35	35
4 8.4	4 5.1	3 21.2	3 5.1	3 18.9	3 13.8
57.9	54.0	35.8	22.8	29.4	30.1
126.3	119.1	56.5	27.9	48.3	43.9
4 3.15	3 59.55	3 28.25	3 13.95	3 24.15	3 21.95
+43.50	+51.99	+42.39	+63.69	+48.84	+48.19
1.63849	1.71592	1.62726	1.80400	1.68878	1.68296
1.23831n	1.31574n	1.22708n	1.40382n	1.28860n	1.28278n
+1731	+2069	+1687	+2534	+1944	+1917
44 3.15	43 59.55	38 28.25	38 13.95	38 24.15	38 21.95
43 45.84 4 20.46	43 ~~38.86~~ 4 20.24	38 ~~41.38~~ 43.12	38 ~~48.61~~ 39.29	38 ~~24.71~~ 43.59	38 ~~2.78~~ 47.12
~~39 2.51~~ 38 27.89	39 ~~85.49~~ 38 28.11	~~44~~ 4 ~~36.97~~ 3.23n	44 4 ~~59.74~~ 9.06	44 4 ~~43.64~~ 4.76	44 4 ~~45.87~~ 7.23
		-65° 20′ 42	2. ~~11622~~ 09514n		
-1561	-1143	-583	-2131	-1351	-1383
2.08060n	2.08478n	2.09938n	2.07383n	2.08163n	2.08131n
.03	.03	.02	.04	.02	.03
+ 2 0.89	+ 2 1.55	+ 2 2.83	+ 1 58.53	+ 2 0.67	+ 2 0.59
+ .30	+ .43	+ .28	+ .64	+ .38	+ .37
+ .08	+ .08	+ .04	+ .16	+ .17	+ .17
+2 0.80	+2 2.09	+2 3.17	+1 59.37	+2 1.24	+2 1.16
40 ~~3.31~~ 28.69 28.29	40 ~~11.58~~ 30.20 29.80	46 ~~40.14~~ 6.40 6.12	46 ~~59.11~~ 8.43 8.18	46 ~~44.88~~ 6.00 5.73	46 ~~46.73~~ 8.39 8.13
+ - 9.31	+ - 9.55	+ - 5.28	+ - 5.62	+ - 6.10	+ - 6.27
+4 43.88 -.40 34.57 ~~43.48~~	+4 ~~44.50~~ -.40 34.95 ~~44.10~~	-1 4.14 -.28 ~~4.42~~ 4.42	-1 2.75 -.25 ~~3.00~~	-1 4.15 -.27 ~~4.42~~	-1 3.92 -.26 4.18
+4 53.19	+4 ~~54.05~~	-0 58.86 69.42	-0 57.13 68.37	-0 58.05 70.25	-0 57.65 71.57
~~45 56.50~~	46 15.63	~~45 41.28~~	~~46 1.98~~	45 46.83	45 49.08
46 5 - 3.26	46 5 - 5.15	44 56.98	45 1 0.06	44 56.75	44 56.82

- 9.31	- 9.55	- 5.28	- 5.62	- 6.10	- 6.27
+4 43.81	+ 44.36	-1 4.53	- 3.14	- 4.86	- 4.35
+ .60	+ .57	+ 1.41	+ 1.41	+ 1.41	+ 1.43
+4 35.10	+4 35.38	-1 5.40	-1 7.35	-1 9.55	-1 9.19
45 3.39	45 5.18	44 57.72	45 0.83	44 56.18	44 58.74

ω Herculis

16 19 30.
16 19 33
+ 14° 20′ ″
+ 14 19 39

Tang δ = +.26
x = −.016
Corr = +.11
+.13 − 1.6
α 1872 30.442 δ = 19 47.89
α 1873 33.206 δ = 19 39.35

z = + 28 03 9
+ .47

dα = +27.64
dδ = −8.54

1872	m s		1873	m s	
June 29	19 32.14	2	June 29	19 35.08	2
July 4	.12	2	July 4	.06	2
9	.10	2	9	.04	2
14	.07	3	14	.01	3
19	32.04	3	19	34.98	3
24	.99	5	24	.93	5
29	.99	5	29	.88	5
Aug. 3	.88	6	Aug. 3	.82	6
8	31.81	7	8	34.76	6

July 1 1872 − .40 −.357

16 19 26.0 19 23.4
27.2
28.2
29.2
30.5
31.4
32.5
33.5
34.6
273.1
30.344 19 23.40
19 30.33
19 32.13
− 1.80
~~− 1.91~~
− 1.93
+ 2.03 −.02
− .10 −.10
− 1.69 +1.07
+ 0.242
19 30.33
19 30.57
19 30.55 19 33.31
+ 0.89
5
2 28.3
28.3
56.6
2 28.30
+ 6.94
0.84136
0.94334n
−878
7 28.30
7 19.52
+14° 15′ 28.83″
+28° 2′ 34″ 1.48660
−2453
1.46207
x − 28.98
− .01
− .03
− 29.02
+14 14 59.81 14 59.56
19 48.3
+4 48.5 48.3
−7.6 +4 46.9 46.7
−8.94
−0.40 − .40
+4 45.70 −.25 45.65
+4 45.50 +4 45.21
+14 19 45.31 − .41
+4 44.40
19 43.96
19 35.42

July 3 1872 − .32 −.349

19 21.9 19 19.6
24.0 20.4
26.2 21.3
30.5
32.6
34.7
36.8
38.9
43.1
45.2
47.3
381.2
34.655 19 20.43
19 34.64
32.12
+ 2.52
~~+ 2.41~~
+ 2.39
− 2.35 +.03
− .08
− 1.68 −.09 + 1.08
− 4.44 .09
19 34.64
30.53
19 30.55 33.31
+ 0.87
8 35.2
35.1
70.3
8 35.15
+ 14.22
1.15290
1.25488n
−17.98
7 35.15
7 17.17
15 31.18
−2073
1.46587
x − 29.23
− .03
+ .29
− 28.97
15 2.21 15 1.95
19 48.6
+4 46.4 46.1
+4 44.8 44.5
−9.24
−0.70 − .70
+4 45.23 −.26 44.97
+4 44.53 + 44.84
19 46.44 − .40
+4 43.74
19 45.69
37.15

July 15 1872 − .33 −.336

19 32.9 19 32.3
34.0
35.0
36.1
37.2
38.2
39.3
40.4
41.4
334.5
37.167 19 32.30
19 37.15
32.06
+ 5.09
~~+ 4.98~~
+ 4.96
− 4.92 +.00
− .09 −.09
− 1.62 + 1.14
− 6.63
19 37.15
30.52
19 30.52 33.28
+ 0.72
2 22.0
21.8
43.8
2 21.90
+ 4.87
0.68753
0.78951n
−616
7 21.90
7 15.74
15 32.61
−2248
1.46412
x − 29.12
− .00
+ .24
− 28.88
15 3.73 15 3.49
19 50.2
+4 46.5 46.3
+4 44.9 44.7
−10.84
− 2.30 − 2.30
+4 44.61 −.24 ~~44.37~~
+4 42.31 + 44.16
19 46.04 − .33
+4 41.52
19 45.01
36.47

July 22 1872 − .28 −.285

19 (23.3) 19 50.4
26.4 51.5
27.6 52.6
31.9
34.0
36.2
38.3
40.3
44.7
46.8
49.0
36.136 19 51.50
19 36.12
32.01
+ 4.11
~~+ 4.00~~
+ 3.98
− 3.97 +.00
− .07 −.07
− 1.57 + 1.19
− 5.61
19 36.12
30.51
19 30.51 33.27
+ 0.68
1 52.9
53.2
105.4
1 52.70
− 15.36
1.18639n
1.28837
+1943
6 52.70
7 12.13
15 36.22
−918
1.47742
x − 30.02
− .03
+ .04
30.01
15 6.21 6.02
19 50.9
+4 44.7 44.5
+4 43.1 42.9
− 11.54
− 3.00 − 3.00
+4 43.31 −.19 ~~43.12~~
+4 40.31 + 42.99
19 46.52 − .31
+4 39.68
19 45.70
37.16

July 24 1872 − .27 −.260

19 35.6 5
36.7 6
5 37.8 7
red 38.8 8
39.9 9
188.8
37.760 35.64
19 ~~37.74~~ 35.62
31.99
~~+ 5.75~~ 3.63
~~+ 5.64~~
+ 3.60
− 3.48 −.02
− .07 −.07
− 1.55 + 1.21
− 5.102
19 35.62
30.52
19 30.50 33.26
5
1 53.1
53.9
107.0
53.50
+ 2.12
0.32634
0.42832n
−268
6 53.50
6 50.82
15 57.53
−1561
1.47099
x − 29.58
.50
+ .04
− 29.54
15 ~~7.99~~ ~~27.99~~
19 51.1
+4 43.1
−

July 25 1872 − .26 −.266

19 22.9 19 28.3
25.0 29.2
27.2 30.4
31.3
33.4
35.5
37.7
39.9
44.2
46.2
48.4
391.7
35.609 19 29.30
19 35.59
31.98
+ 3.61
~~+ 3.50~~
+ 3.48
− 3.42 −.01
− .07 −.07
− 1.54 + 1.22
− 5.034
19 35.59
30.56
19 30.55 33.31
+ 0.65
5
2 22.9
20.0
42.9
21.45
+ 6.31
0.80003
0.90201n
−798
7 21.45
7 13.47
15 34.88
−1137
1.47523
x − 29.87
− .01
+ .05
− 29.83
15 5.05 4.82
19 51.2
+4 46.2 46.0
+4 49.6 49.4
− 11.84
− 3.30 − 3.30
+4 45.35 −23 45.12
+4 42.05 45.12
19 47.10 − .37
+4 41.52
19 46.31
37.80

Sin δ 9.39369
Cos δ 9.98627
.1157 n
.1019 n

1872				
June	29	19	47.9	
July	4		48.7	+.8
	9		49.4	.7
	14		50.0	.6
	19		50.6	.6
	24		51.1	.5
	29		51.6	.5
Aug	3		52.0	.4
	8		52.3	.3

1873				
June	29	19	36.4	
July	4		37.2	+.8
	9		37.9	.7
	14		38.5	.6
	19		39.1	.6
	24		39.6	.5
	29		40.1	.5
Aug.	3		40.5	.4
	8		40.9	.4

> 1873
July 6 19 33.34 37.00
30 33.26 38.81

July 28 1872 −.234 −.23
19 22.3 19 25.5
24.5
26.5
30.9
33.0
35.1
37.3
39.3
43.6
45.7
47.9
386.1
35.100 19 25.50
19 35.08
31.95
+3.13
~~+3.02~~
+3.09
−2.93 +.00
−.06 −.06
−1.51 +1.25
−4.50
19 35.08
30.58
19 30.58 33.34
+0.63
5
2 25.0
25.0
50.0
2 25.00
+9.60
0.98227
1.08423n
−1214
7 25.00
7 12.86
15 35.49
15 35.49
−1143
1.47517
*− 29.87
− .01
+ .05
− 29.83
15 5.66 15 5.42
19 51.5
+4 45.8 45.6
+4 47.2 44.0
−12.14
−3.60 − 3.60
+4 44.50 −.24 ~~44.26~~
+4 40.90 +4 44.36
19 96.56 − .29
+4 40.47
19 45.89
37.35

July 12 1873 .408 −.40
19 (24.9)
27.0 19 32.6
29.1
33.4
35.6
37.7
39.8
42.0
46.2
48.3
50.4
37.672 19 32.60
19 37.66
35.02
+2.64
~~+2.59~~
+2.57
−2.45 +.00
−.10 −.11
−1.81
−4.367
19 37.66
33.30
19 33.29
+1.56
0
1 38.0
47.1
85.1
1 42.55
+5.07
0.70501
0.80699n
−641
1 42.55
1 36.14
21 12.21
+28° 2′ 43″ 1.48670
−583
1.48087
*− 30.26
− .01
+ .02
− 30.25
20 41.96 20 41.82
19 38.3
−1 ~~6.3~~ 3.7 3.8
−1 5.3 5.4
+1.00 + 1.00
−1 4.14 −.14 ~~4.28~~
−1 3.14 −1 4.53
19 38.82 − .73
−1 4.26
19 37.56

July 15 1873 .517 −.53
19 26.6
28.7 29. 29.0
30.8
35.0
37.0
39.3
41.4
43.5
47.7
49.9
52.0
431.9
39.264 19 29.00
19 39.25
35.00
+4.25
~~+4.14~~
+4.12
−3.98 −.03
−.14 −.13
−1.79
−5.983
19 39.25
33.34
19 33.32
+1.56
0
1 46.0
56.9
102.9
1 51.45
+10.26
1.01115
1.11313n
−1298
1 51.45
1 38.47
21 9.88
−2131
1.46539
*− 29.20
− .01
+ .09
− 29.12
20 40.76 40.62
19 38.7
−1 2.1 2.2
−1 3.7 3.8
+0.70 + .70
−1 2.75 −.14 ~~2.89~~
−1 2.05 −1 3.14
19 38.71 − .73
−1 3.17
19 37.45

July 20 1873 −.354 −.38 8 dist
19 30.0
32.0 19 27.9
34.1 28.7
38.3 29.4
40.5
42.6
44.8
46.8
51.0
53.2
55.3
468.6
42.600 19 28.67
19 42.58
34.97
+7.61
~~+7.50~~
+7.48
−7.44 −.01
−.10 −.09
−1.76
−9.30
19 42.58
33.28
19 33.28
+1.56
0
1 49.7
58.9
108.6
1 54.30
+13.93
1.14395
1.24593n
−1762
1 54.30
1 36.68
21 11.67
−1351
1.47319
*− 29.73
− .03
+ .09
− 29.67
41.85 20 42.61
19 37.3
−1 2.7 2.8
−1 4.3 4.4
+0.00 + 0.00
−1 4.15 −.15 ~~4.30~~
−1 4.15 − 4.86
19 37.85 − .73
−1 5.59
19 36.26

July 23 1873 .504 −.48
19
19 52.3
54.0
55.7
39.4
42.0
44.3
46.3
48.4
220.4
44.080 19 54.00
19 44.06
34.94
+9.12
~~+9.01~~
+8.99
−8.94 −.01
−.12 −.13
−1.78
−10.81
19 44.06
33.27
19 33.25
+1.60
0
1 19.8
30.3
50.1
1 25.05
−9.92
0.99651n
1.09849
+1233
1 25.05
1 37.60
21 10.75
−1256
1.47414
*− 29.80
− .01
+ .07
− 29.74
40.90 20 41.01
19 39.5
−1 1.5 1.6
−1 3.1 3.2
−0.10 − .10
−1 3.07 −.11 ~~3.18~~
−1 3.17 − 3.14
19 37.84 − .74
−1 3.98
19 36.92

July 24 1873 −.498 −.48
19 32.1
34.3 24 30.4
36.4 19 31.0
40.7 32.2
42.8
45.0
47.0
49.1
53.4
55.6
57.6
494.0
44.909 24 31.20
19
19 44.89
34.93
+9.96
~~+9.85~~
+9.83
−9.71 +.00
−.12 −.13
−1.72
−11.56
19 44.89
33.34
19 33.33
+1.60
0
1 49.2
0.9
110.1
1 55.05
1 +13.71
1.13704
1.23902
−1734
1 55.05
1 37.71
10.64
−2002
1.46668
*− 29.29
− .03
+ .09
− 29.23
41.41 41.26
19 39.6
1.8 2.0 3.6
−0.30 − .30
−1 3.54 −.15 ~~3.69~~
−1 3.84 − 3.68
19 37.87 − .74
−1 4.82
19 36.44

Gr 2348

h	m	s
16	21	40
16	21	39
+ 55°	30'	
+ 55	29	39

δ = − 13° 6' 51"
− .23

tan γ δ = +1.46
x = −.927
cos x = −.21 +.1

" α 1872 37.585 δ = 29' 47.78"
α 1873 38.893 δ = 29 39.42

dα = +1.308
dδ = −8.36

1872		m s	
June 29	21	39.96	.9
July 4		.87	.9
9		.77	.10
14		.66	.11
19		39.55	.11

1873		m s	
June 29	21	41.45	−.08
July 4		.37	.08
9		.27	10
14		.16	11
19		41.05	11
24		.92	13
29		.78	14
Aug. 3		.63	15
8		40.47	−.16

	1872 July 1 −.397 −.40		1872 July 3 −.349 −.32		1872 July 15 −.336 −.33		1872 July 16 −.308 −.31 ∧		1873 July 12 −.408 −.40	
16	21 31.1	21 8.8	21 35.3	21 11.2	21 ~~33.2~~	21 14.8	21 36.9	21 9.0	21	
	33.0	9.7	37.2	13.1	~~26.8~~	16.0	38.9	10.8	22.4	21 12.2
	34.8	11.5	39.0	14.7	~~30.4~~	17.4	40.9	12.7	26.1	13.6
	36.6		40.9		37.7		42.7		29.6	15.2
	38.4		42.6		41.4		44.5		36.7	
	40.2		44.3		45.0		46.3		40.7	
	41.9		46.2		48.6		48.0		44.1	
	43.7		48.1		52.3		49.8		47.9	
	45.6		50.0				51.7		51.3	
									55.6	
									2.3	
	345.3		383.6				399.7		5.9	
									365.6	
	38.367	21 10.00	42.622	21 13.00	45.000	21 16.07	44.411	21 10.83	48.56	~~21 13.00~~
									44.145	21 13.67
	21 38.34		21 42.59		21 44.97		21 44.38		21 44.12	
	21 39.92		21 39.89		39.63		39.61		41.20	
	−1.58		+2.70		+5.34		+4.77		+2.92	
	−1.37		+2.51		+5.55		+4.98		+3.13	
	+2.03 −.02		−2.36 +.03		−4.92 +.00		−4.50 −.01		−2.45 +.00	
	−.58	−.58	−.47	−.51	−.48	−.49	−.45	−.45	−.58	−.59
	−2.34	−1.03	−2.30	−0.99	−2.05	−0.74	−2.02	−0.71	−2.31	
	−0.89 91		−6.184		−7.456		−6.988		−5.345	
	21 38.34		42.59		44.97		44.38		44.12	
	21 37.45		37.46		37.82		37.41		38.78	
	21 37.43	21 38.74	21 37.45	38.76	21 37.51	38.82	21 37.40	38.71	21 38.77	08
	+0.89		+0.87		+0.72		+0.72		+1.56	
55									50	
	15.4		3 15.9		3 12.0		3 14.4		2 26.9	
	8.1		8.6		5.0		7.2		39.9	
	23.5		24.4		17.0		21.6		66.8	
	3 11.75		3 12.20		3 8.50		3 10.80		2 33.40	
	+28.37		+29.62		+28.93		+33.58		+30.47	
	1.45286		1.47159		1.46135		1.52608		1.48387	
	1.32170n		1.34043n		1.33019n		1.39492n		1.35271n	
	3 −20.98		−21.90		−21.89		−24.83		−22.53	
	58 11.75		58 12.20		58 8.50		58 10.80		52 33.40	
	57 50.77		57 50.30		57 47.11		58 45.97		52 10.87	
+55°	24' 57.58"		24 58.05		25 1.24		25 2.38		30 37.48	
−13°	7' 44"	1.12800n							−13° 6' 42"	1.12750n
	−2453		−2073		−2248		−2083		−583	
	1.10347n		1.10727n		1.10552n		1.10717n		1.12167n	
	+ 12.69"		± 12.80		± 12.75		± 12.80		± 13.23	
	− .20		.23		.22		.30		.23	
	− .03		+ .26		+ .31		+ .32		+ .03	
	+ 12.46		+ 12.83		+ 12.84		+ 12.82		+ 12.03	
+55	25 10.04	25 9.72	25 10.88	10.56	25 14.08	13.77	25 15.20	14.88	30 ~~49.51~~	30 49.30
	29 54.1		29 54.5		29 57.1		29 57.3		29 ~~42.8~~	45.3
	+4 44.1	43.8	+4 43.6	43.3	4 43.0	42.7	+4 42.1	41.8	−1 ~~6.7~~	−1 ~~5.2~~ −1 4.2 4.4
	+4 45.2	44.9	+4 44.7	44.4	+4 44.1	43.8	+4 43.2	42.9	−1 3.1	3.5
	−14.66		−15.06		−17.66		−17.86		11.26	
	−6.30	6.30	−6.70	6.70	−9.30	9.30	−9.50	9.50	−5.90	5.90
	+4 45.90 −32	~~45.58~~	+4 45.23 −32	~~44.91~~	+4 44.61 −31	~~44.30~~	+4 43.91 −32	~~43.59~~	−1 4.14 −21	~~4.35~~
	+4 39.60	+4 45.21	+4 38.53	+4 44.84	+4 35.31	+4 44.15	+4 34.41	+4 43.28	−1 10.04	−1 4.53
+55	29 49.64	+ .20	29 49.41	+ .20	29 49.39	+ .16	29 49.61	+ .16	29 39.47	+ .35
		+4 39.11		+4 38.34		+4 35.01		+4 33.94		−1 10.08
		29 48.83		29 48.90		29 48.78		29 48.82		29 39.22
		29 40.47		40.54		40.42		40.46		

Sin δ 9.91599
Cos δ 9.75313
11571n
9.86884n

1872

June	29	29′	53.6″	
July	4		54.7	+11
	9		55.7	1.0
	14		56.8	1.1
	19		57.8	1.0
	24			
	29			
Aug.	3			
	8			

604 Rej.

Wrong # Rej.

1873,

June	29	29′	42.3″	
July	4		43.5	+1.2
	9		44.6	1.1
	14		45.6	1.0
	19		46.5	.9
	24		47.3	.8
	29		48.0	.7
Aug.	3		48.6	.6
	8		49.2	.6

1872?

July 15 − .517 − .53

18.0
20.1 21 18.0
22.3 ~~22.1~~
26.5 ~~22.3~~
28.7
30.8
33.0
35.2
39.4
41.6
43.9
339.5
~~28.955~~
30.864

21 30.84
41.13
−11.29
−11.08

−3.98 −.03
− .77 −.75
−2.24
−6.98 7.00
30.84
23.85

21 23.84

A. R.

July 20 1873 − .354 − .38

21 27.0
30.8 21 10.0
34.3 11.8
41.6 14.2
45.2
48.8
52.6
56.0
3.4
7.0
10.7
357.4
537.4
48.855 21 12.00

21 48.83
41.02
+7.81
+8.02

−7.44 −.01
− .58 −.52
−2.13
−10.120
48.83
38.71

21 38.73

+1.56

50
2 28.1
41.9
1 70.0
2 35.00″

+36.85
1.56644
1.43528n
−27.24
52 35.00
52 7.76

30 40.59

−1351
1.11399n

+ 1300
− .36
+ .13

+ 1277
30 53.36 30 53.15
29 46.7
−1 6.7 6.9
−1 5.6 5.8

−7.30 − 7.30
−1 4.15 −21 4.3
−1 11.45 −1 4.86
29 41.91 + .35
−1 11.81
29 41.34

July 22 1873 − .413 − .41

26.0
21 36.0 21 44.8
37.8
39.7
41.6
43.4
45.1
47.0
48.6
50.6
389.8
43.311 21 44.80

21 43.28
40.97
+2.31
(+2.52)

−8.43 +.01
− .60 −.60
−2.08
−11.110
43.28
32.17

21 32.18

+1.58

40
3 39.0
52.1
91.1
3 45.55

−1.49
0.17319n
0.04203n
+1.70
43 45.55
43 46.65

39 1.70

−1383
1.11367n

+ 1299
− .01
+ .19

+ 13.17
39 14.87
29 47.0
~~6.9~~

~~Oct. 24~~

22
~~20.6 21 56.4~~
~~22.8~~ ~~0.1~~
~~25.0~~ ~~2.1~~
~~27.1~~
~~29.4~~
~~31.2~~
~~33.5~~
~~36.0~~
~~38.1~~

July 6 1873 − .518 − .51

21 21 11.4
33.0 12.9
35.0 14.5
36.7
38.5
40.2
42.1
43.9
45.7
47.8
362.9
8
40.322 21 12.93

21 40.30
41.33
−1.03
−0.82

+1.51 +.02
− .74 −.76
−2.44
~~40.30~~ 1.67
40.30
38.63

21 38.63

+1.57

50
2 25.0
39.2
64.2
52 32.10

+27.39
1.43759
1.30643n
−20.25
52 32.10
52 11.85

30 36.50

−828
1.11922n

+ 1316
− .19
+ .03

+ 1300
30 49.50 49.30
29 44.0
−1 5.5 5.7
−1 4.4 4.6

−4.60 − 4.60
−1 4.28 −20 ~~4.48~~
−1 8.88 − 4.41
29 40.62 + .36
−1 8.65
29 40.65

July 9 1873 − .476 − .49

21 20.7 21 7.9
24.4 9.4
28.0 10.9
35.3
39.0
42.6
46.0
50.0
57.1
22 0.8
4.5
348.4
468.4
42.582 21 9.40

21 42.56
41.27
+1.29
+1.50

−0.74 +.00
− .72 −.73
−2.38
−3.845
42.56
38.72

21 38.71

+1.56

50
2 28.0
43.0
71.0
2 35.50″

+33.18
1.52088
1.38972n
−24.53
52 35.50
52 10.97

30 37.38

−0701
1.12049n

+ 1320
− .28
+ .03

+ 1295
30 50.33 50.12
29 44.7
−1 5.6 5.8
−1 4.5 4.7

− 5.30 − 5.30
−1 4.70 −21 ~~4.91~~
−1 10.00 − 4.75
29 40.33 + .35
−1 9.70
29 40.42

1872phae.proj.146O

551 Obs.

Secondary stars
100 Obs.