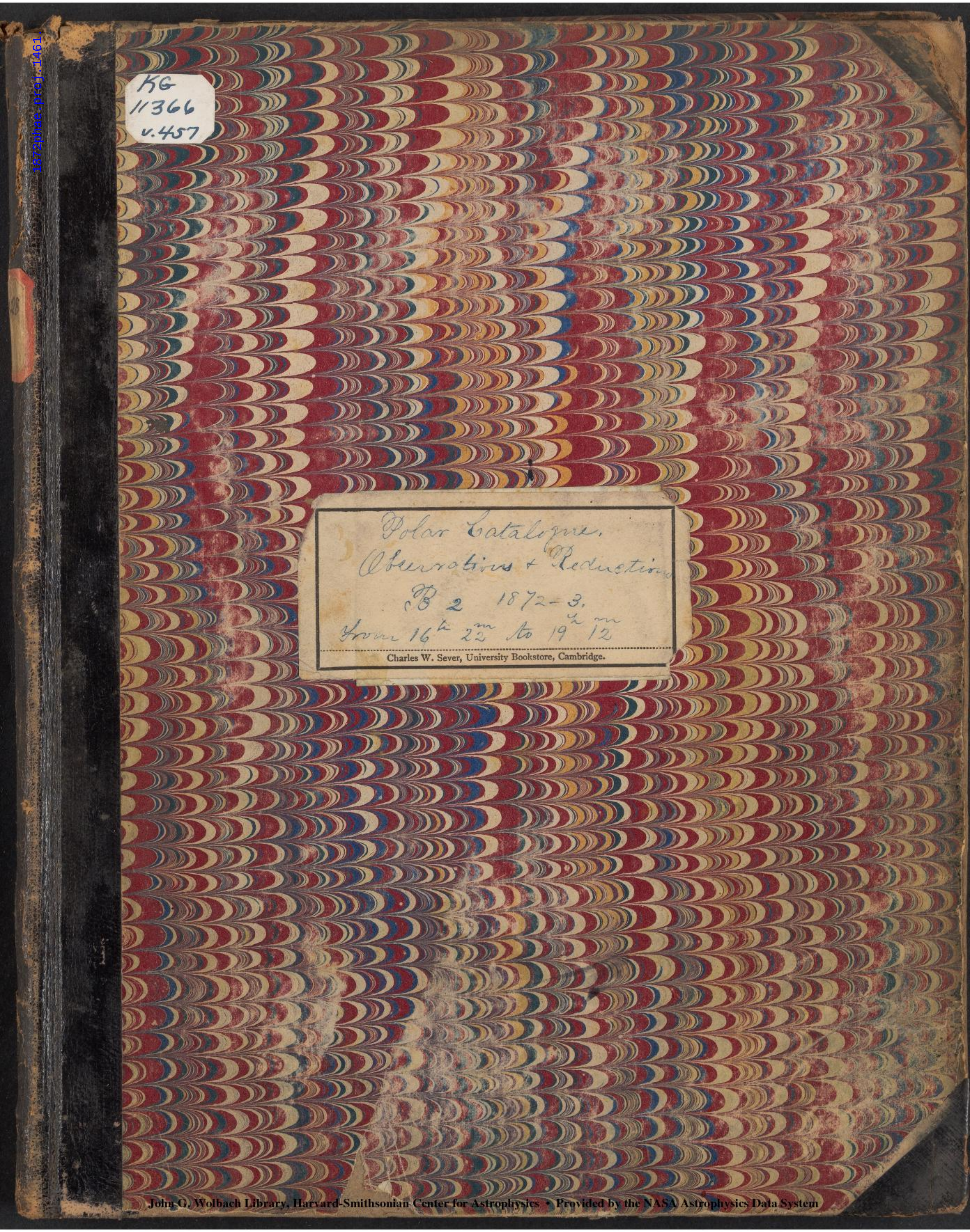
1872phmc.proj.1461

KG
11366
v.457



Polar Catalogue.
Observations + Reductions
B 2 1872-3.
from 16^h 22^m to 19^h 12^m

Charles W. Sever, University Bookstore, Cambridge.

Polar Stars.

Observations & Reductions

A2

1872-3

Approximate values of R_{eq}..

1872	As far as Sept. 28	R_{eq} =	+ 4′ 45″
1872	From Sept 28 to Oct 29	" =	+ 7 43
1872	From Oct 30 to Dec 17	" =	+ 4 48
1873	As far as Oct 17	" =	− 1 8
1873	After Oct 17	" =	− 2 21
1872	From Dec 17 to Dec 31	" =	− 2 31
1873	From Jan 1 to May 15	=	− 2 23
1873	From May 15 to Oct 17	=	− 1 8
1873	From Oct 17 to Dec 31	=	− 2 21

η [2] Draco

h	m	s
16	22	16
16	22	17
+	61°	48
+	61	48 08

δ = −19° 25′ 20″

sin z −.33

tang δ = +1.89
x = −.033
cos x = −.18 δ =
″ α 1872 15.814 δ = 48 16.03
α 1873 16.620 δ = 48 7.83
dα = +0.806
dδ = −8.20

1872		m s		1873	m s	
June 29	22	18.54		June 29	22 19.53	
July 4		18.43	.11	July 4	42	11
9		18.30	13	9	29	13
14		18.16	14	14	15	14
19		18.01	15	19	19.00	15
24		17.84	17	24	84	16
29		17.67	17	29	.66	18
Aug. 3		17.48	19	Aug. 3	47	.19
8		17.28	.20	8	18.27	.20

1872.0

α	δ
15.61	16.00
.62	17.70
.63	15.92
.59	15.87
.61	15.84
.58	
.65	8133
.71	16.266
15.625	16.03
15.814	
−.189	+.24

α
16.75
.50
.45
.37
.31
.46
16.50
16.62
−.118

1872
July 3 −.349 −.32

16 22 12.6 22 8.2
14.7 9.2
17.0
19.1
21.2
23.5
25.6
27.8
29.9
191.4
2
21.267 22 8.70

22 21.23
22 18.45
+2.78
+2.96
−2.36 +.03
−5.98 .60 −.65
−2.64 −1.83
−5.602
22 21.23
22 15.63

22 15.61 22 16.42
+0.87

35
4 42.9
33.8
75 8
39 37.90
+12.57
1.09934
0.88950n
−7.74
39 37.90
39 30.16
+61° 43 18.19
−19 25 15 u + tg n = 1.30750n
−2062
1.28688n
+ 19.36
.03
+ .37
+ 19.70
+61 43 37.89 43 37.43
48 23.5
+4 45.6 45.1
−15.70
−7.50
+4 45.23 −.46 ~~44.77~~
+4 37.73 − 7.50
+61 48 15.62 +4 44.84
+.38 + .28
16.00 +4 37.62
+48 15.05
48 6.85

1872
July 15 −.336 −.33

22 14.7 22 9.5
17.0 12.5
19.2
21.3
23.5
25.7
27.9
30.0
32.3
211.6
23.511 22 11.00

22 23.48
22 18.12
+5.36
+5.54
−4.92 +.00
−6.17 .62 −.63
−2.31 −1.50
7.856
23.48
15.63

22 15.62 16.43
+0.72

4 37.2
29.0
66 2
39 33.10
+12.51
1.09726
0.88742n
−7.72
39 33.10
39 25.38
43 22.97
−2173
1.28577n
+ 19.31
.03
+ .46
+ 19.74
43 42.71 42.25
48 26.0
+4 43.3 42.8
−18.20
−10.00
+4 44.61 −.46 ~~44.15~~
+4 34.61 − 10.00
48 17.32 +4 44.15
+.38 + .23
17.70 +4 34.38
48 16.63
8.43

1872
July 16 −.308 −.31

22 14.2 22 28.6
16.5
18.6
20.9
23.1
25.3
27.5
29.4
31.7
207.2
23.022 22 28.60

22 22.99
22 18.09
+4.90
+5.08
−4.50 −.01
−5.80 .58 −.57
−2.28 −1.47
7.36
22.99
15.63

22 15.63 16.44
+0.72

4 26.8
18.9
45 7
39 22.85
−5.58
0.74663n
0.53699
+3.44
39 22.85
39 26.29
43 22.06
−2079
1.28671n
+ 19.35
.02
+ .44
+ 19.77
43 41.83 41.39
48 26.2
+4 44.4 44.0
−18.40
−10.20
+4 43.91 −.44 ~~43.47~~
+4 33.71 − 10.20
48 15.54 + 43.28
+.38 + .23
15.92 +4 33.31
48 14.70
6.50

1872
July 25 −.266 −.26

22.—1 22 8.3
12.7 9.9
15.0 11.4
17.2
19.5
21.5
23.7
25.9
28.1
30.3
193.9
21.544 22 9.87

22 21.51
22 17.80
+3.71
+3.89
−3.42 −.01
−4.86 .49 −.50
−1.99 −1.18
5.902
21.51
15.61

22 15.59 16.40
+0.65

35
4 38.1
29.0
67 1
39 33.55
+11.67
1.06707
0.85723n
−7.20
39 33.55
39 26.35
43 22.00
−1119
1.29631n
+ 19.78
.03
+ .09
+ 19.84
43 41.84 41.39
48 27.7
+4 45.9 45.5
19.90
−11.70
+4 45.35 −.45 ~~44.90~~
+4 33.65 − 11.70
48 15.49 + 45.12
+.38 + .21
15.87 +4 33.63
48 15.02
6.82

1872
July 27 −.233 −.23

22 12. ~~22~~ 10.7² .22
12.5
14.9
17.0
19.1
21.3
23.5
25.7
27.8
29.9
189.7
191.7
21.300 ~~22 +0.7²~~

22 21.27
22 17.73
+3.54
+3.72
−3.30 −.01
−4.30 .43 −.43
−1.92 −1.11
5.656
21.27
16.62

22 15.61 16.42
+0.64

35 Ky
4 36.8
27.8
64 6
39 32.30
−0.83
9.91908
+0.77
39 32.30
39 33.07

1872
July 28 −.2 −.23

22 24
16.4
18.7
20.9
23.0
25.3
27.4
29.6
(20.87/3) 20.30

22 20.84
22 17.70
+3.14
+3.32
−2.93 +.00
−4.30 .43 −.4
−1.89 −1.08
5.256
20.84
15.59

22 15.58 16.34
+0.63

35
4 31.0
20.3
51 3
39 25.65
+0.57
9.75587
−0.53
39 25.65
39 25.12
43 23.23
~~48~~ 28.2
50
−1125
+19.77
−.03
+.09
+19.83
43 43.06 42.6
48 28.1
+4 45.0 44.6
20.30
−12.10
+4 44.50 −.44 44.06
+4 32.40 − 12.10
48 15.46 44.36
+.38 .20
15.84 43.24
15.0
6.8

1873.0

α	δ		
16.75	8.21	Sin δ	9.94513
.50	8.56	Cos δ	9.67445
.45	7.63		11.571n
.54	7.61		9.79016n
.31	6.55		
.46			
16.502	7.712		
16.620	7.83		
-.118	?-.12		

1872		° ′	″	
June	29	61 48	22.4	
July	4		22.7	+1.3
	9		24.8	1.1
	14		25.8	10
	19		26.7	.9
	24		27.5	.8
	29		28.2	.7
Aug	3		28.8	.6
	8		29.2	.4

1873

July 24	22	16.52	48	6.73
30		16.31		6.75
Aug 4		16.43		5.72

1873.			″	
June	29	47	71.2	
July	4		72.5	+1.3
	9		73.6	1.1
	14		74.6	1.0
	19		75.5	.9
	24		76.3	.8
	29		77.0	.7
Aug.	3		77.6	.6
	8		78.1	+.5

July 29 1872 -.211 -.20

22
12.4
14.5
16.8
18.8
21.1
23.3
25.4
27.6
29.8
1897

21.078

22 21.05
22 17.66
+3.39
+3.57

-3.17 +01
~~-3.74~~ .37 -.39
-1.85 -1.04
5.39 40
21.05
16.66

22 15.65 16.46

+0.62
A.R

Aug 4 1872 -.161 -.15

22
23.5
25.8
27.9
30.4
32.6
34.8
37.1
39.1
41.3
29.2.5

32.500

22 32.47
22 17.43
+15.04
+15.22

-14.84 +01
~~-2.81~~ .28 -.31
-1.62 -0.81
16.74 76
32.47
15.73

22 15.71 16.51

+0.57
A.R.

δ 42 July 12 1873 -.408 -.40

21 22.3 21 12.2
26.0 13.5
29.5 15.2
36.7
40.6
44.1
47.9
51.3
58.6
22 2.4
6.0
365.4
485.4
44.127 21 13.63

21 44.09
22 19.26
+24.89 -35.11

-2.45 +00
~~-7.48~~ -.75 -.76
-2.58
5.789
44.09
21 18.31

~~21? 18.30~~

~~16~~ 56

30
3 36.0
49.9
85.9
33 42.95

+30.50
1.48430
1.27446n
-1881
33 42.95
33 24.14

49 24.21

-553
1.30187n

+ 20.04
- .22
+ .04

+ 19.86
49 4.07
48 14.2
-1 29.7

(July 15 1873 ? -.517 -.53

22
11.4
13.4
15.6
19.9
22.2
24.4
26.5
28.5
32.8
35.0
37.1
266.8
24.255

22 24.22
22 19.11
+5.11
+5.29

-3.98 -.03
~~-9.91~~ .99 -.97
-2.49
7.467
24.22
22 16.76

22 16.75

+1.56
A.R

July 20 1873 -.354 -.38

22
– 22 36.2
– 38.4
– 40.4
24.7 26.9
26.9 26.9
29.1 27.1
31.3 26.9
33.5 27.0
35.8 27.1

21.983 22 38.33

22 26.95
22 18.96
+7.99
+8.17

-7.44 -.01
~~-7.10~~ .71 -.66
-2.34
10.495
26.95
16.46

22 16.50

+1.56

30
3 34.9
48.4
83.3
33 41.65

11.35
1.05500n
0.84516
+7.00
33 41.65
33 48.65

48 59.70

-19° 25′ ″ 1.30740

-1328
1.29412n

+ 19.68
- .03
+ .18

+ 19.83
49 19.53 49 19.23
48 15.8
-1 .38 41

-7.90
-1 4.15 -30 4.45
-1 12.05 7.90
48 7.18 -1 4.86
+.73 + .57
8.21 12.25
~~50~~ 48 6.98

July 23 1873 -.504 -.48

22 19.8
22.2 22 2.4
24.3 3.7
26.4 5.3
28.6
30.8
32.9
35.2
37.3
257.5

28.611 22 3.80

22 28.58
22 18.86
+9.72
+9.90

-8.94 -.01
~~-8.98~~ 90 -.94
-2.24
12.0813
28.58
16.50

22 16.45

+1.60

30
3 56.8
12.9
129.7
34 4.85

+24.81
1.89463
1.18479n
-15.30
34 4.85
33 49.55

48 59.80

-1853
1.28887n

+ 19.45
- .15
+ .20

+ 19.50
49 19.30 16.97
48 16.2
-1 .31 3.4

-8.40
-1 3.07 -33 ~~3.40~~
-1 11.47 8.40
48 7.83 -1 3.14
+.73 + .53
8.56 11.61
~~60~~ 48 7.96

42.62

44.06
-12.10
14.36
.20
43.246
15.08
1.88

β

β Herculis

h	m	s
16	24	41
16	24	46
+	21°	46′
+	21	46 05″

z = + 20° 36′ 43″

sin. z = +.35

tang δ +.40

x = −.017

corr =

α1872 43.088 δ = 46 13.19″

α1873 45.665 δ = 46 5.16

dα = +2.577
dδ = − 8.03

1872	m s		1873	m s	
June 29	24 44.83		June 29	24 47.58	2
July 4	.81	2	July 4	.56	2
9	.78	3	9	.54	3
14	.75	3	14	.51	9
19	44.71	4	19	47.47	4
24	.66	5	24	.42	5
29	.60	6	29	.36	6
Aug. 3	.53	7	Aug. 3	.29	7
8	44.46	7	8	47.22	7

	July 1 1872 −.397 −.40		July 3 1872 .349 −.32		July 15 1872 −.336 −.33		July 22 1872 −.285 −.28		July 24 1872 −.260 −.27		July 25 1872 −.266 −.26	
16	24 29.6	24 25.0	24 33.9	24 26.4	24 36.6	24 31.3	24 35.4	24 31.0	24 34.9	24 26.0	24 34.9	24 21.5
	31.9		36.2	27.7	38.7	32.6	37.7	32.1	37.1	27.5	37.1	22.7
	34.1		38.4	28.8	41.0	33.5	39.9	32.9	39.4	28.9	39.3	23.7
	38.6		40.8		45.3		44.3		43.8		43.7	
	40.8		45.0		47.6		46.6		46.1		45.9	
	43.0		47.2		49.8		48.8		48.3		48.3	
	45.3		49.5		52.0		51.0		50.4		50.4	
	47.4		51.8		64.3		53.2		52.7		52.6	
	51.9		56.2		58.7		57.6		57.0		57.1	
	54.1		58.4		0.9		59.8		59.2		59.2	
	56.4		0.6		3.1		2.2		1.4		25 1.4	
	471.1		460.0		428.0		476.5		470.3		469.9	
			520.0		548.0		536.5		530.3		529.9	
	43.009	24 25.00	47.273	24 27.63	49.818	24 32.47	48.773	~~24 31.67~~ 24 32.00	48.209	24 27.47	48.173	24 22.63
	24 42.99		24 47.26		24 49.80		24 48.76		24 48.19		24 48.16	
	24 44.82		24 44.82		24 44.74		24 44.68		24 44.66		24 44.65	
	− 1.83		+ 2.44		+ 5.06		+ 4.08		+ 3.53		+ 3.51	
	+ 2.02 −.02		− 2.36 +.03		− 4.92 +.00		− 3.97 +.00		− 3.48 −.02		− 3.42 −.01	
	− .16	− .15	− .13	− .14	− .13	− .13	− .11	− .11	− .11	− .10	− .10	− .10
	− 1.73	+ 0.85	− 1.73	+ 0.85	− 1.65	+ 0.93	− 1.59	+ 0.99	− − 1.57	+ 1.01	− 1.56	+ 1.02
	+ .13 .02		− 4.22 0		− 6.70		− 5.67		− 5.16 7		− 5.08	
	24 42.99		47.26		48.80		48.76		48.19		48.16	
	24 43.12		43.04		43.10		43.09		43.03		43.08	
	24 43.11	24 45.69	24 43.06	45.64	24 43.10	45.68	24 43.09	45.67	24 43.02	45.60	24 43.08	45.66
	+ 0.89		+ 0.87		+ 0.72		+ 0.68		+ 0.66		+ 0.65	
40									40		40	
	1 22.0		1 24.2		1 18.7		1 14.8		1 20.0		1 27.2	
	17.3		19.0		14.4		12.1		15.7		22.0	
	39.3		43.2		33.1		26.9		35.7		49.2	
	41 19.65		41 21.60		41 16.55		41 18.45 13.45		41 17.85		41 24.60	
	+ 18.01		+ 19.64		+ 17.35		+ 16.77		+ 20.74		+ 25.54	
	1.25557		1.29314		1.23930		1.22453		1.31681		1.40722	
	1.33910n		1.37673n		1.32289n		1.30812n		1.40040n		1.49081n	
	− 21.83		− 23.81		− 21.03		− 20.33		− 25.14		− 30.96	
	41 19.65		41 21.60		41 16.55		41 13.45		41 17.85		41 24.60	
	40 57.82		40 57.79		40 55.52		40 53.12		40 52.71		40 53.64	
+21°	41′ 50.53″		41 50.56		41 52.83		41 53.23		41 53.64		41 54.71	
+20	36 13	u + lg n =	1.33540									
	− 2428		− 2062		− 2173		− 941		− 1542		− 1119	
	1.31112		1.31478		1.31367		1.32599		1.31998		1.32421	
	− x 20.47″		− x 20.64		− x 20.59		− x 21.18		− x 20.89		− x 21.10	
	− .06		− .07		− .05		− .05		− .08		.13	
	− .01		+ .11		+ .13		+ .02		+ .03		+ .03	
	− 20.54		− 20.60		− 20.51		− 21.21		− 20.94		− 21.20	
+21	41 29.99	41 29.86	41 29.96	29.86	41 32.32	32.19	41 34.02	33.90	41 34.70	34.57	41 33.51	33.37
	46 14.8		46 15.2		46 17.1		46 18.0		46 18.2		46 18.3	
	+ 4 44.8	44.7	+ 4 45.2	45.1	+ 4 44.8	44.7	+ 4 44.0	43.9	+ 4 43.5	43.4	4 44.8	44.7
	− 9.63		− 10.03		− 11.93		− 12.83		− 13.03		− 13.13	
	− 1.60		− 2.00		− 3.90		− 4.80		− 5.00		− 5.10	
	+ 4 45.90 − .13	~~45.77~~	+ 4 45.23 − .13	~~45.10~~	+ 4 44.61 − .13	~~44.48~~	+ 4 43.31 − .12	~~43.19~~	+ 4 43.88 − .13	~~43.75~~	+ 4 45.35 − .14	45.49
	+ 4 44.30 −	1.60	+ 4 43.23 −	2.00	+ 4 40.71 −	3.90	+ 4 38.51 −	4.80	+ 4 38.88 −	5.00	+ 4 40.25 −	5.10
+21	46 14.29 + 4	45.21	46 13.19 +	44.84	46 13.03 +	44.15	46 12.53 +	42.99	46 13.58 +	43.81	46 13.76 +	45.12
	+ .41 −	.31	+ .41 −	.30	+ .41 −	.25	+ .41 −	.23	+ .41 −	.23	+ .41 −	.22
+21	46 14.70 + 4	43.30	46 13.60 + 4	42.54	46 13.44 + 4	40.00	46 12.94 + 4	37.96	46 13.99 + 4	38.58	46 14.17 + 4	38.80
	+ 46	13.16	46	12.40	46	12.19	46	11.86	46	13.15	46	3.17
	46	5.13		4.37		4.16		3.83		5.12		5.14

α
43.11
.06
.10
.09
.02
.08
.09
.06
.10
.07
43.07
.08
− .0

1872.0

α	δ
43.11	14.70
.06	13.60
.10	13.44
.09	12.94
.02	13.99
.08	14.17
.09	13.69
.06	
.10	
.07	9
43.078	13.78 -82
.088	13.19
-.010	+0.59 60

12.97
13.19
-.22

Sin δ 9.56917
Cos δ 9.96788
1.1571 n
.08359 n

1872

		°	′	″	
June	29	+21	46	14.4	
July	4			15.3	+.9
	9			16.1	.8
	14			16.9	.8
	19		46	17.6	.7
	24			18.2	.6
	29			18.8	.6
Aug.	3			19.3	.5
	8		46	19.7	.4

1873

			″	
June	29	45	63.5	
July	4		64.4	+.9
	9		65.2	.8
	14		66.0	.8
	19		66.7	.7
	24		67.4	.7
	29		68.0	.6
Aug.	3		68.4	.4
	8		68.8	.4

1873.0

α	δ
45.60	4.73
61	5.32
67	4.58
69	4.42
65	4.64
67	6.15
45.648	4.97 -1.54
.665	5.16
-.017	-0.19

2.43
5.16
-1.73

1872 -.233
July 27 -.23

24 34.6 24 42.7
36.9
39.1
43.5
45.9
48.1
50.3
52.6
56.9
59.2
25 1.3
468.4
528.4
48.036

24 48.02
24 44.62
+3.40

-3.30 -.01
-.09 -.09
-1.53 +1.05
-4.92 3
48.02
43.10

24 43.09 45.67

+0.64
40
0 1.9
56.9
118.8
? 39 59.40
+6.584

1872 -.234
July 28 -.23

24 34.4 24 23.4
36.6 24.3
38.7 25.7
43.2
45.4
47.6
49.8
52.0
56.5
58.7
25 0.9
463.8
523.8
47.618 24 24.37

24 47.60
24 44.61
+2.99

-2.93 +.00
-.09 -.09
-1.52 +1.06
-4.54
47.60
43.06

24 43.06 45.64

+0.63
40
1 23.9
18.3
42.2
41 21.10

+23.25
1.36642
1.45601 n
-28.19
41 21.10
40 52.91

41 55.44

-11.25
1.32415

+ 21.09
- .10
+ .03

- 21.16
41 34.28 41 34.18
46 18.7
+4 44.4 44.3
- 13.53
- 5.50
+4 44.50 -.10 ~~44.40~~
+4 39.00 - 5.50
46 13.28 +4 44.36
+41 - 22
46 13.69 +4 38.64
+46 12.82
4.79

1872 -.211
July 29 -.20

24 34.4
36.7
39.0
43.5
45.6
47.8
50.1
52.4
56.8
59.0
25 1.2
466.5
526.5
47.864

24 47.85
24 44.60
+3.25

-3.17 +.01
-.08 -.08
-1.51 +1.07
-4.76 5
47.85
43.09

24 43.10 45.68

A.R.

1872 -.187
Aug 4 -.187

24 46.2
48.3
50.3
55.0
57.2
59.5
25 1.7
3.8
8.2
10.5
12.5
353.4
653.4
59.400

24 59.38
24 44.51
+14.87

-14.84 +.01
-.06 -.06
-1.42 +1.16
-16.32 1
59.38
43.06

24 43.07 45.65

A.R.

1873.408
July 12 -.40

24 36.8
39.0 24 25.1
41.2 26.3
45.7 27.8
47.9
50.1
52.3
54.5
59.0
1.2
3.4
431.1
551.1
50.100 24 26.40

24 50.08
24 47.53
+2.55

-2.45 +.00
-.16 -.16
-1.87
-4.48
50.08
45.60

24 45.60

+1.56
35
0 41.2
52.8
94.0
35 47.00

+23.70
1.37475
1.45834 n
-28.73
35 47.00
35 18.27

47 30.08

+20 36 26 1.33550
-553
1.32997

+ 21.38
- .17
+ .01

- 21.48
47 8.60 47 -8.54
46 5.7
-1 2.9 3.0

-0.50
-1 4.14 -.06 ~~4.20~~
-1 4.64 - .50
46 3.96 -1 4.53
+.77 .54
46 4.73 -1 5.57
46 2.97

1873 (?) -.517
July 15 -.53

25
16.9 25 16.9
18.9 18.9
21.0 21.0
25.3 Nq delta
27.5
29.7
31.8
34.0
38.2
40.3
42.5 Prob. wrong tt Rej
32 0.
29.645

25 29.63
24 47.50

-3.98
-.21 -.20
-1.83
-6.02 1
29.63
(23.61)

24 23.62 δ

1873 A.R.

July	20	24	45.61	46	3.24
	22		45.67		2.87
	23		45.69		2.96
	24		45.65		2.95
Aug	4		45.67		4.56

A Draco

h	m	s	
16	28	20	
16	28	14	
+	69°	03	
+	69	02	34

δ = − 26° 39′ 46″
− .15

tan δ = + 2.61
x = − 0.40
corr α = + .12
α 1872 14.460 δ = 2′ 41.64″
α 1873 14.312 δ = 2 33.85

dα = − 0.149
dδ = − 7.78

1872		m	
June	29	28	17.88
July	4		.71 .17
	9		.53 .18
	14		.33 .20
	19		17.11 .22
	24		16.86 .25
	29		.60 .26
Aug.	3		.34 .26
	8		16.07 .27

1873		m		
June	29	28	17.91	
July	4		17.74	17
	9		17.56	18
	14		17.36	20
	19		17.14	22
	24		16.90	24
	29		16.64	26
Aug.	3		16.37	27
	8		16.10	27

	1872 −.397 July 1 −.40	1872 −.349 July 3 −.32	1872 −.319 July 7 −.31	1872 −.284 July 9 −.29	1872 −.336 July 15 −.33	1872 −.260 July 24 −.27
16	28 5.4 27 41.1	28 9.6 27 34.1	28 15.6 27 40.2	28 16.0 27 38.7	28 11.5 27 32.7	28 9.6 27 40.6
	11.2 43.0	12.3 36.6	18.3 41.5	19.0 40.2	14.5 34.8	12.4 42.9
	13.8 45.7	15.0 40.4	21.3 43.6	21.7 42.4	17.4 36.7	15.5 44.3
	17.0	18.2 ✕	24.2 46.1	24.7	20.1	18.2
	19.8	21.3	26.8 –	27.6	23.2	21.0
	22.8	23.9	29.8	30.4	26.0	24.0
	25.7	26.9	32.8	33.2	29.0	26.9
	28.7	29.6	35.8	36.2	31.9	29.6
	31.0	32.5	38.7	38.9	34.6	32.6
	152.4	189.3	243.2	247.7	208.2	189.8
	16.933 27 43.27	21.033 27 37.03	27.022 27 42.85	27.522 27 40.43	23.133 27 34.73	21.089 27 42.60
	28 16.89	28 20.99	28 26.98	28 27.48	28 23.09	28 21.05
	28 17.80	28 17.79	28 17.60	28 17.52	28 17.28	28 16.85
	− 0.91	+ 3.26	+ 9.38	+ 9.96	+ 5.81	+ 4.20
	~~− 1.03~~	~~+ 3.14~~	~~+ 9.26~~	~~+ 9.84~~	~~+ 5.69~~	~~+ 4.08~~
	+ 2.01 − .02	− 2.37 + .03	− 8.47 + .01	− 9.15 + .00	− 4.92 + .00	− 3.48 − .02
	− 1.04 − 1.04	− .84 − .91	− .81 − .83	− .76 − .74	− .86 − .88	− .70 − .67
	− 3.34 − 3.49	− 3.27 − 3.42	− 3.14 − 3.29	− 3.06 − 3.21	− 2.82 − 2.97	− 2.39 2.34
	− 2.37 39	− 6.48 52	− 12.42 3	− 12.97 5	− 8.60 δ2	− 6.57 86
	28 16.89	20.99	26.98	27.48	23.09	21.05
	28 14.52	14.51	14.56	14.51	14.49	14.48
	28 14.50 28 14.35	28 14.47 14.32	28 14.55 14.40	28 14.53 14.38	28 14.47 14.32	28 14.49 14.34
	+ 0.89	+ 0.87	+ 0.82	+ 0.79	+ 0.72	+ 0.66
25 −	0 32.4	0 37.9	0 35.5	0 26.8	0 35.0	25 0 28.9
	22.8	27.9	20.3	27.1	26.9	21.1
	55.2	65.8	60.8	53.9	61.9	50.0
	25 27.60	25 32.90	~~25 30.90~~ 25 30.40	25 31.95	25 30.95	25 25.00
	+ 33.66	+ 44.00	+ 44.17	+ 47.09	+ 48.40	+ 38.49
	1.52711	1.64345	1.64513	1.67298	1.68485	1.58535
	1.19616n	1.31250n	1.31418n	1.34198n	1.35390n	1.25440n
	− 15.71	− 20.54	− 20.61	− 21.98	− 22.59	− 17.96n
	25 27.60	25 32.90	25 30.40	25 31.95	25 30.95	25 25.00
	25 11.89	25 12.36	25 9.79	25 9.97	25 8.36	25 7.04
+ 68°	57 36.46	57 35.99	57 38.56	57 38.38	57 39.99	57 41.31
− 26	39 33 = 1.46100n					
	− 2405	− 2051	− 1433	− 1363	− 2166	− 1525
	1.43695n	1.44049n	1.44667n	1.44737n	1.43934n	1.44575n
	+ 27.35	+ 27.57	+ 27.97	+ 28.01	+ 27.50	+ 27.91
	− .20	− .36	− .36	− .40	− .42	− .26
	− .01	+ .04	+ .04	+ .03	+ .05	+ .00
	+ 27.14	+ 27.25	+ 27.65	+ 27.64	+ 27.13	+ 27.66
+ 68	58 3.60 + .58 3.56	58 3.24 3.19	58 6.21 6.16	58 ~~11.02~~ 6.02 5.96	58 7.12 7.07	58 8.97 8.93
	+ 2 48.5	2 49.0	2 50.0	2 50.5	2 51.7	2 53.2
	+ 4 44.9 44.9	+ 4 45.8 45.7	+ 4 43.8 43.8	+ 4 44.5 44.4	+ 4 44.6 44.5	+ 4 44.2 44.2
	− 6.40	− 7.40	− 8.40	− 8.90	− 10.10	− 11.60
	+ 4 45.90 − .04 ~~45.86~~	+ 4 45.23 − .05 ~~45.18~~	+ 4 44.75 − .05 ~~44.70~~	+ 4 44.68 − .06 ~~44.62~~	+ 4 44.61 − .05 ~~44.56~~	+ 4 43.88 − .04 ~~43.84~~
	+ 4 39.00 − 6.90	+ 4 37.83 − 7.40	+ 4 36.35 − 8.40	+ 4 35.78 − 8.90	+ 4 34.51 − 10.10	+ 4 32.28 − 11.60
+ 69	2 42.60 + 4 45.21	2 41.07 + 4 44.84	2 42.56 + 44.40	2 41.80 + 44.50	2 41.63 + 44.15	2 41.25 + 43.61
	+ .40	+ .39	+ .36	+ .35	+ .32	+ .29
	+ 4 38.71	+ 4 37.83	+ 4 36.36	+ 4 35.95	+ 4 34.37	+ 4 32.50
+ 69	62 42.27	62 41.02	62 42.52	62 41.91	62 41.44	62 41.43
	2 34.49	33.24	34.74	34.13	33.66	33.65

1872phae.pr0j.1461.

60
7
0.6
2.9
4.3
42.60
67
.34
4.34
8.93
43.54
11.60
43.61
29
32.50
41.43
33.65

		1872								
Sin δ	9.97030	June 29	+69 2 48.0		June 29	2′ 37.3″		1872		
		July 4	49.2	+1.2	July 4	38.5	+1.2	Aug. 1	~~25~~ 1444	2 41.28
		9	50.4	1.2	9	39.7	1.2			
Cos δ	9.55334	14	51.4	1.0	14	40.7	1.0	1873		
	1.1571n	19	52.4	1.0	19	41.7	1.0	July 22	1446	33.64
	9.66905n	24	53.2	.8	24	42.5	.8	23	14.31	33.82
		29	53.9	.7	29	43.3	.8	24	14.34	33.49
		Aug. 3	54.5	.6	Aug. 3	43.9	.6	Aug 4	14.37	33.99
		8	55.0	.5	8	44.4	.5			

1872 −266 July 25 −.26	1872 −233 July 27 −.23	1872 −.234 July 28 −.23	1872 −.211 July 29 −.20 ∧	S. list (Aug 4) −.15 −.167 1872	1873 −.408 July 12 −.40
28 27 36.2 9.7 39.9 12.5 44.2 15.4 18.4 21.1 24.1 26.9 29.8 32.5 190.4	28 27 26.4 9.1 30.9 12.1 35.0 15.1 18.0 20.7 23.4 26.4 29.3 32.0 186.1	28 27 37.7 8.7 40.9 11.7 43.1 14.4 17.6 20.1 23.2 26.3 29.1 31.4 183.0	28 9.0 11.8 14.7 17.6 20.5 23.2 26.2 29.1 32.0 184.1	28 27 34.4 12.8 36.4 15.8 38.4 18.6 21.4 24.2 27.3 30.3 33.2 36.0 21.96 Prob. wrong in Dec.	28 9.1 27 47.1 12.4 49.0 15.1 52.3 18.1 21.0 23.8 26.6 29.4 32.6 188.7
21.155 27 40.10	20.678 27 30.77	20.333 27 40.57	20.455	24.400 27 36.40	20.96 27 49.47
28 21.12 28 16.80 +4.32 ~~+4.20~~	28 20.64 28 16.70 +3.94 ~~+3.82~~	28 20.29 28 16.64 +3.65 ~~+3.53~~	28 20.42 28 16.59 +3.83 ~~+3.71~~	28 24.36 28 16.31	28 20.93 28 17.44 +3.49 ~~+3.37~~
−3.42 −.01 − .68 −.69 −2.34 −2.49 −6.446 21.12 14.68	−3.30 −.01 − .60 −.61 −2.24 −2.39 −6.146 20.64 14.50	−2.93 +.00 − .60 −.61 −2.18 −2.33 −5.712 20.29 14.58	−3.17 +.01 − .52 −.55 −2.13 −2.28 −5.884 20.42 14.60	−14.85 − .39 −.43 −1.85 −17.09	−2.45 +.00 −1.04 −1.06 −3.13 −6.684 20.93 14.31
28 14.66 14.51	28 14.48 14.33	28 14.57 14.42	28 14.58 14.43		28 14.29
+0.65	+0.64	+0.63	+0.62 A.R.		+1.56
25 0 32.0 22.4 54.4 25 27.20	25 0 34.7 25.7 60.4 25 30.20	25 0 30.6 21.2 51.8 25 25.90		25 0 33.1 22.7 55.8 25 27.90	15 4 40.6 54.3 94.9 19 47.45
+41.05 1.61331 1.28236n −1916 25 27.20 25 38.04 57 40.31	+49.91 1.69819 1.36724n −2329 25 30.20 25 6.91 57 41.44	+39.76 1.59945 1.26850n −1856 25 25.90 25 7.34 57 41.01			+31.50 1.49831 1.16736n −1470 19 47.45 19 32.75 03 15.60 −26 39 19 1.46090n −523 1.45567n
−1101 1.44999n	−1287 1.44813n	−1107 1.44993n			
+ 28.18 − .31 + .01	+ 28.06 − 47 + .01	+ 28.18 − 28 + 01			+ 28.55 − .18 + .05
+ 27.88 58 38.19 58 8.15 2 53.4 +4 45.2 45.2	+ 27.60 58 9.04 8.99 2 53.7 4 44.7 44.6	+ 27.91 58 8.92 8.88 2 53.8 4 44.9 44.9			+ 28.42 3 44.02 3 43.64 +12 46.3 −1 3.7 4.1
−11.80 +4 45.35 −.04 ~~45.31~~ +4 33.55 − 11.80 2 41.74 +4 45.12 .29 +4 33.61 62 41.76 33.98	−12.10 +4 43.39 −.05 ~~43.34~~ +4 31.29 − 12.10 2 40.33 + 43.43 .28 +4 31.61 40.60 32.82	−12.20 +4 44.50 −.04 ~~44.46~~ +4 32.30 − 12.20 2 41.22 + 44.36 .28 +4 32.44 41.32 33.54			−6.50 −1 4.14 −.38 ~~4.52~~ −1 10.64 − 6.50 2 33.38 −1 4.53 + .70 −1 10.33 2 33.31

o Herculis

h m s
16 30 00
16 30 01
+ 42° 42′
+ 42 42 00
ζ = − 0° 19 12″
− .01

tang δ = +.92
x = −.021
corr =
α 1872 58.636 δ = 42 ′ ″ 807
α 1873 0.568 δ = 42 0.45

dα = +1.932
dδ = −7.62

1872 m s
June 29 30 0.65
July 4 .60 5
9 .55 5
14 .48 7
19 0.41 7
24 .23 8
29 .23 10
Aug. 3 .13 10
8 0.03 10

1873 m
June 29 30 2.75
July 4 .70 .05
9 .65 .05
14 .59 .06
19 2.52 .07
24 .49 .08
29 .35 .09
Aug. 3 .25 .10
8 2.14 .11

~~July 23~~

July 3 −.349 −.32 | 1872 July 15 −.336 −.33 | 1872 July 25 −.266 −.26 | 1873 July 12 −.408 −.40 | 7 1873 July 15 −.517 −.531 | 1873 July 24 −.498 −.48

16 29 46.5 29 39.9 29 49.0 29 41.5 29 47.2 29 36.8 29 46.7 30 29 55.8
49.3 41.8 51.6 42.7 50.0 34.8 51.4 29 35.7 58.7 29 51.8
52.1 42.6 54.5 43.7 52.9 39.1 54.3 37.0 1.4 53.0
57.7 0.1 58.4 0.0 38.5 21.0 6.9 54.2
30 0.6 2.9 30 1.2 2.7 23.3 9.8
3.2 5.7 4.1 5.6 25.4 12.7
6.2 8.5 6.8 8.3 27.7 15.5
8.9 11.3 9.5 11.0 29.9 18.3
14.7 17.0 15.1 16.7 23.8
17.2 19.8 18.0 19.4 26.7
20.1 22.5 20.9 22.1 29.8
276.5 242.9 284.1 240.2 127.3 259.4
36.5 62.9 44.1 60.2 139.4
3.318 29 41.27 5.718 29 42.63 4.009 29 37.90 5.475 29 37.07 25.460 12.673 29 53.00

30 3.30 30 5.70 30 3.99 30 5.45 30 25.44 30 12.65
30 0.61 30 0.46 30 0.21 30 2.61 30 2.68 30 2.44
+2.69 +5.24 +3.78 +2.84 +22.86 +10.21

− 2.37 +.03 − 4.92 +.00 − 3.42 −.01 − 2.45 +.00 − 3.99 − 9.71 +.00
− .29 −.32 − .30 −.31 − .24 −.24 − .37 −.37 − .49 −.47 − .44 −.46
− 1.97 − 0.04 − 1.82 + 0.11 − 1.57 + 0.36 − 2.04 ~~.11~~ − 2.01 − 1.87
− 4.63 − 7.045 − 5.284 − 4.86 6.497 12.024
30 3.30 5.70 3.99 5.45 25.44 12.65
29 58.67 58.66 58.76 00.59 18.95 + 0.63

29 58.67 30 0.60 29 58.65 0.58 29 58.75 0.68 30 0.59 30 18.97 30 0.61

+0.87 +0.72 +0.65 +1.56 +1.60

45 45 4 40 D. R 35

0 44.9 0 42.3 0 34.5 0 1.7 4 51.6
39.1 37.8 38.9 13.8 5.2
84.0 80.1 83.4 15.5 116.8
45 42.00 45 40.05 45 41.70 40 7.75 39 58.40

+ 22.05 + 23.09 + 26.11 + 28.40 + 19.67
1.34341 1.36342 1.41681 1.45332 1.29380
1.32536ₙ 1.34537ₙ 1.39876ₙ 1.43527ₙ 1.27575ₙ
−2115 −2215 −2505 −2724 −1887
45 42.00 45 40.05 45 41.70 40 7.75 39 58.40
45 20.85 45 17.90 45 21.65 39 40.51 39 39.53
+42° 37′ 7.50″ 37 30.45 37 31.70 43 7.84 43 8.82

− 0 19 24 = 9.51100ₙ − 0 19 12 = 9.50700ₙ

−2051 −2166 −1101 −493 −1966
9.49049ₙ 9.48934 9.49999 9.50207ₙ 9.48734ₙ

+ 0.31 + 0.31 + 0.32 + 0.32 + 0.31
− .13 − .14 − .18 − .21 − .11
+ .06 + .07 + .02 + .00 + .25

+ 0.24 + 0.24 + 0.16 + 0.11 + 0.45
+42 37 27.74 + 37 27.67 37 30.69 30.62 37 31.86 31.79 43 7.95 43 7.94 43 9.27 43 8.87
+ 42 13.1 42 15.6 42 17.3 42 4.6 42 6.6
+ 4 45.4 45.3 4 45.0 44.9 4 45.4 45.3 −1 3.3 3.3 −1 2.7 3.1
− 12.62 − 15.12 − 16.82
− 5.00 − 7.50 − 9.20 − 4.20 − 6.10
+ 4 45.23 −.07 ~~45.16~~ + 4 44.61 −.07 ~~44.54~~ + 4 45.35 −.07 ~~45.28~~ − 1 4.14 −.01 ~~4.15~~ − 1 3.54 −.40 3.94
+ 4 40.23 − 5.00 + 4 37.11 − 7.50 + 4 36.15 − 9.20 − 1 8.34 − 4.20 − 1 9.64 − 6.10
+ 42 42 7.97 + 4 44.84 42 7.80 + 44.15 42 8.01 + 45.12 41 59.61 − 1 4.53 41 59.63 − 1 3.68
+ .01 + .01 + .01 + .02 + .02
+ 4 39.85 + 4 36.56 + 4 35.93 − 1 8.71 − 1 9.76
42 7.52 42 7.18 42 7.72 41 59.23 41 59.11
41 59.90 35.36 42 0.10

		1872		°	'	"		1873		"	
Sin δ	9.83133	June	29	+ 42	42	12.2		June 29	41	61.6	
Cos δ	9.86624	July	4			13.3	+ 1.1	July 4		62.8	+ 1.2
	.11571n		9			14.4	1.1	9		63.9	1.1
	9.98195n		14			15.4	1.0	14		64.9	1.0
			19			16.3	.9	19		65.8	.9
			24			17.1	.8	24		66.6	.8
			29			17.9	.8	29		67.3	.7
		Aug.	3			18.5	.6	Aug. 3		67.9	.6
			8			19.1	.6	8		68.5	.6

1873 5.49
Aug. 4 - .55
30

4.6 29 51.4
7.3 52.8
10.2 54.3
15.7
18.6
21.4
24.1
27.0
32.6
35.3
38.2
234.9
21.355 29 52.83
~~21.33~~
30 21.33
30 2.23
+19.10

1873
July 23
Chf.

-18.62 +.00
- .51 -.50
-1.66
20.778
21.33
0.54

30 0.55

39 +1.69
~~40~~
0 56.4 40 0 58.0
10.2 12.9
126.6 130.9
40 3.30 41 5.45

+2852
1.45515
1.43710n
-2736
40 3.30 4
39 35.94

43 12.41

-1278
9.49422n

+ 0.31
- .22
+ .04

+ 0.13
43 12.54 + 43 12.53
42 8.1
-1 4.4 4.4

-7.70
-1 4.35 -.01 4.36
-1 12.05 7.70
42 0.49 -1 4.52
+ .02
-1 12.20
42 0.33

1872phae.proj.1461.

Gr, 848

h	m	s
16	31	38
4	31	47

10° 4 4 18"
+ 75 42 18
104 17 42
ζ = −61° 54' 54"
−.88

tang δ = −.393
x = +.061
corr = +.14 + 0.2"
α1872 38.955 δ = 42 10.54
α1873 45.899 δ = 42 17.95
dα = +7.943
dδ = +7.41

1872	m	s	
Jan 29 δ	31	35.41	
July 4		35.78	.37
9		36.18	.40
14		36.60	.42
19		37.05	.45
24		37.51	.46
29		38.00	.49
Aug. 3		38.49	.48
8		39.01	.52

1873	m	s	
July 19	31	45.17	47
24		45.64	49
29		46.13	50
Aug. 3		46.63	52
8		47.15	53
13		47.68	53
18		48.21	53

δ 1872 = 42 10.54 = 17 49.46
δ 1873 = 42 17.95 = 17 42.05

July 3 1872 −.349 −.32	July 15 1872 −.336 −.33	July 27 1872 −.233 −.23	July 28 1872 −.234 −.23	Aug 1 1872 −.268 −.27	July 20 1873 −.354 −.38
16 31 19.9 31 3.6 24.2 5.4 28.1 7.8 32.6 36.7 40.8 45.1 48.7 63.4 3294 36600 31 5.60	31 23.3 31 0.6 27.6 7.2 31.7 11.8 36.2 40.1 44.7 48.3 52.3 57.0 3616 40,178 31 6.53	31 31 32.5 23.5 27.8 31.8 36.2 40.3 44.7 48.8 52.9 57.1 3631 40344 31 32.50	31 31 3.4 23.1 27.6 31.7 35.8 40.3 44.3 48.4 52.4 56.4 3600 40.000 31 3.40	31 32 3.2 3.9 40.5 44.5 48.9 53.0 57.2 32 1.6 31 44.65 ~~32.0~~ ~~3.37~~ 32 3.55	31 34.8 31 21.8 38.6 24.0 42.8 26.0 46.9 51.2 55.2 59.4 3.7 7.9 3407 46017 51,189 31 23.93
31 ~~36.54~~ 36.66 31 35.69 +0.97 +0.83	31 ~~40.12~~ 40.24 31 36.66 +3.58 +3.44	31 ~~40.28~~ 40.40 31 37.77 +2.63 +2.49	31 ~~39.94~~ 40.06 31 37.87 +2.19 +2.05	31 ~~44.59~~ 44.71 31 38.26 +6.45 +6.31	31 ~~51.13~~ 51.25 31 45.25 +6.00 +5.86
−2.37 +.03 +1.26 +137 +3.26 +11.20 +2.45 29 31 36.66 31 38.81 −2.15 31 38.95 31 46.69 +0.87	−4.91 +.00 +1.30 +132 +2.30 +10.24 −1.34 29 40.24 38.93 31 38.95 46.89 +0.72	−3.29 −.01 + .90 +.91 +1.18 +9.12 −1.21 40.40 39.19 31 39.~~20~~19 47.13 +0.64	−2.93 +.00 + .90 +.92 +1.09 +9.03 −0.94 2 40.06 39.12 31 39.14 47.08 +0.63	−7.28 +.01 +1.06 +1.05 +0.69 +8.63 −5.53 44.71 39.18 31 39.18 47.12 +0.59	−7.44 −.01 +1.49 +139 +1.65 +9.59 −4.30 41 51.25 46.95 31 46.84 7.7 +1.56
10 1 16.7 x x 5.9 22.6 11 11.30 +31.00 1.49136 0.99977n +9.99 11 11.30 11 21.29 104° 11' 27.06" −61 53 24 = 2.03087n	1 12.0 81.1 13.1 11 6.55 +33.65 1.52699 1.03540n +10.85 11 6.55 11 17.40 11 30.95	10 1 19.9 9.1 29.0 11 14.50 +7.84 0.89432 0.40273 +2.53 11 14.50 11 17.03 11 31.32	10 1 12.8 1.1 13.9 11 6.95 +36.60 1.56348 1.07189n +11.80 11 6.95 11 18.75 11 29.60	10 1 30.0 17.7 47.7 11 23.85 −18.92 δ 1.27646n 0.78487 −6.09 11 23.85 11 17.76 11 30.59	5 0 23.9 40.0 63.9 5 31.95 +27.26 1.43553 0.94394n +8.79 5 31.95 5 40.74 17 7.61 −61 53 11 = 2.03081
−2051 2.01036n + 1 .02 + 1 42.42 4 13 + .10	−2166 2.00921n + .03 + 1 42.14 4 .15 + .11	−1287 2.01800n + .02 + 1 44.23 4 .01 + ~~.03~~ .02	−1107 2.01980n + .02 + 1 44.66 4 .17 + .02	−974 2.02113n + .01 + 1 44.98 4 .47 + .03	−1305 2.01776n + .01 + 1 44.17 4 .10 + .03
+ 1 42.67 104 13 9.73 +13 9.61 17 56.1 " + 4 46.4 46.3 +0.2" ~~+4 46.6~~ 46.1 +4 46.2 −14.01 −6.60 6.60 +4 45.23 −12 ~~45.11~~ +4 38.63 44.84 .76 +104 17 48.36 +4 39.00 17 48.61 17 41.20	+ 1 42.43 13 13.38 13 13.27 17 57.9 4 44.5 44.4 ~~+4 44.7~~ 44.2 +4 44.3 −15.81 −8.40 8.40 +4 44.61 −11 ~~44.50~~ +4 36.21 44.15 .63 17 49.59 +4 36.38 17 49.65 42.24	+ 1 44.33 13 ~~15.65~~ 13 ~~15.60~~ 15.65 15.53 17 59.2 4 43.6 43.5 ~~+4 43.8~~ 43.3 +4 43.4 −17.11 −9.70 9.70 +4 43.39 −12 ~~43.27~~ +4 33.69 43.43 .56 17 49.34 +4 34.29 17 49.82 42.41	+ 1 44.87 13 14.47 13 14.36 17 59.3 4 44.8 44.7 ~~+4 45.0~~ 44.5 +4 44.6 −17.21 −9.80 9.80 +4 44.50 −11 ~~44.39~~ +4 34.70 44.36 .53 17 49.17 +4 35.11 17 49.47 42.06	+ 1 45.49 13 16.08 13 15.94 17 59.6 4 43.5 43.4 ~~+4 43.7~~ 43.2 +4 43.3 −17.51 −10.10 10.10 +4 43.11 −14 ~~42.97~~ +4 33.01 42.81 .51 17 49.09 +4 33.32 17 49.26 41.83	+ 1 44.31 18 51.92 18 51.88 17 48.2 −1 37 3.7 ~~−1 35~~ 3.9 −1 3.9 −6.20 6.20 −1 4.15 −.04 4.19 −1 10.35 +1 4.86 1.39 17 41.57 −1 9.69 17 42.19

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Sin δ 9.98633
Cos δ 9.39270
1.67 n
9.50841 n

1872.		°	′	″	
June	29	75	42	4.6	
July	4			3.7	− .9
	9			2.9	.8
	14			2.2	.7
	19			1.6	.6
	24			1.1	.5
	29			0.6	.5
Aug.	3			0.3	.3
	8			0.1	.2
	13				
	18				

1873		′	″	
July	19	42	11.9	
	24		11.3	− .6
	29		10.9	.4
Aug.	3		10.6	.3
	8		10.4	.2
	13		10.3	.1
	18		10.2	.1

1872? n = −.235

3.354
.38

(n)
~~1873~~ ~~Ch. f.~~
Aug. 5 ~~22~~ −.43
−.439

2.18
4.0
6.0

31 | 31 16.5
39.0 | 20.2
42.9 | 23.3
46.9
51.2
55.0
55.4
32 3.6
7.8
12.4
318.2
498.2
55.333 31 20.00

(cant make this out. Rej.

23.93

31 ~~55.27~~
55.36
31 ~~41.11~~ 38.57
+8.58
+8.44

−~~18.47~~ −17.33
+139
+ 1.69 ~~+1.69~~ +1.72
9.59
+0.09 − .98
− 17.15
(55.39
38.20)

7E

10
1 13.0
1.0
14.0
11 7.00

+ 35.33
1.54814
1.05653 n
+11.39
11 7.00
11 18.39

11 29.96

3081

Rej

+ .08
+ .09

51.88

6.20
4.19
4.86
.37
9.69
1.64
42.19

1873
July 24 −.48 −.498

31
36.7 31 15.5
40.6 19.3
45.1 22.0
49.0
53.4
57.4
1.5
5.9
10.0

299.6
479.6
53.289 31 18.93

31 ~~53.23~~
53.35
31 45.61
+7.74
+7.60

− 9.72 +.00
+ 1.89 +1.96
+ 1.29
− 6.54 47
53.35
46.81

31 46.88
+1.60

5
0 19.9
39.0
58.9
5 29.45

+ 34.36
1.53605
1.04446 n
+11.08
5 29.45
5 40.53

17 7.82

−1966
2.01115 n
+ .02
+ 1 4260
+ .15
+ .03

+ 1 4280
18 50.62 18 50.58
17 48.7
− 1 1.9 1.9
~~− 1 1.7~~ 2.1
− 1 2.1

− 6.60 − 6.60
− 1 3.54 −.04 ~~3.58~~
− 1 10.14 −1 3.68
+ .52
17 40.48 − 1 9.76
17 40.82

1873
Aug. 4 −.55 −.549

31
46.5 31 25.0
50.7 27.0
54.7 30.6
58.8
3.0
7.0
11.7
15.7
20.1

268.2
28.2
3.133 27.53

32 ~~3.07~~
3.19
31 46.71
+16.48
+16.34

−18.62 +.00
+ 2.16 +2.16
+0.19
− 16.27
32 3.19
46.92

31 46.92
+1.69

5
0 20.8
39.4
60.2
5 30.10

+ 35.60
1.55145
1.05986 n
+11.48
5 30.10
5 41.58

17 6.77

−1278
2.01803 n
+ .02
+ 1 4424
+ .16
+ .02

+ 1 4444
18 51.21 18 51.17
17 49.4
− 1 1.8 1.8
~~− 1 1.6~~ 2.0
− 1 2.0

− 7.40 − 7.40
− 1 4.35 −.04 ~~4.39~~
− 1 11.75 + 4.82
4.52
.60
17 39.46 − 1 11.32
17 39.85

Gr. 2372 = 13

h m s
16 32 48
16 32 48

+ 79° 15′ ″
+ 79 13 46
δ = − ~~37~~ 36 50′ 58″
−.060

Tang δ = +5.259
+5.258
K = −.081

Sin δ 9.99078
Cos δ 9.30947
11571n
9.42518n

July 1 1872 −.397
16 32 38.6
44.3
49.5
54.9
0.6
5.8
11.4
16.9
22.8
244.8
~~27.200~~
48
0.533
33 30.9
33.7
37.4
33 34.00
33 0.45
~~+ 2.07~~
− 2.09
− * 5.89
33 ~~6.42~~
32 54.49

July 3 1872 −.349
32 42.2
48.3
53.3
58.9
4.6
10.1
15.6
21.0
26.7
28.07
~~31.119~~
40.7
4.522
32 25.9
29.0
34.4
~~32 30.10~~
32 29.77
33 4.44
− 2.349
− 1.83
− * 5.75
33 ~~5.48~~
54.52

July 7 1872 −.319
32 47.8
54.0
59.5
4.9
10.2
15.8
21.7
27.0
32.2
27.31
~~30.844~~
9.81
10.344
31 48.2
52.8
56.8
31 52.23
33 10.26
− 8.478
− 1.68
− * 5.44
~~33 5.33~~
54.67

July 9 1872 −.284
32 48.8
53.7
59.3
4.9
10.6
15.7
21.2
26.8
32.4
27.33
93.3
10.367
33 10.29
− 9.15
− 1.49
− * 5.27
~~33 5.62~~
54.38

July 15 1872 −.336
32 44.0
49.3
55.0
0.6
6.0
11.5
17.2
22.8
28.2
33.46
5.46
6.067
32 16.9
20.5
25.3
32 20.90
33 5.99
− 4.921
− 1.77
− * 4.74
~~July 20~~
33 5.44
54.57

July 25 1872 −.266
32 41.3
47.1
52.3
58.0
33 3.9
9.0
14.3
20.0
25.4
27.12
31.3
3.428
(33 35.6)
33 35.60
33 3.40
− 3.42
− 1.10
− * 3.76
33 5.18
54.82

+0.89
10
4 00
47.7
107.7
13 53.85
− 33.47
1.52466n
0.94984
+ 8.91
13 53.85
14 2.76
79°
~~+78~~ 8 45.59
− ~~35~~ 36 50 42 = ~~1.61880~~ 1.61888n
1.63470n
− 2405
~~1.59575m~~ 4
1.61065n
Ep.
+ ~~39.42~~ .23
+40.80
− .14
− .04
+ ~~39.15~~ +40.62
+78 9 ~~24.74~~ + 9 25.81
+79 9 26.21 + ~~45.21~~
− 6.92
+4 45.90 −.39 ~~45.57~~
+4 38.98
+79 14 5.19 − 6.92
+4 45.21
+ .53
+4 38.82
+14 4.63

h m s m s
33 0 32 54
° ′ ″ ′ ″
+79 14 11 14 3

+0.87
4 16.1
4.7
20.8
14 10.40
+ 34.75
1.54095
0.96613n
− 9.25
14 10.40
14 1.15
8 47.20
− 2051
~~1.59929m~~ 8
1.61419n
+ ~~39.78~~ .65
+41.13
− .13
+ .34
+ ~~39.86~~ + 41.34
9 ~~27.06~~ 28.12
9 28.54 ~~44.84~~
− 7.39
+4 45.23 −.42 44.81
+ 4 37.84
14 6.38 − 7.39
+ 44.84
+ .52
+4 37.97
14 6.09

+0.82
4 26.1
13.6
39.7
14 19.85
+ 18.11 78.11
1.25792 1.89271
0.68310n 1.31789
− 4.82 20.79
14 19.85 19.85
143 15.03 59.06
8 ~~33.32~~ 49.29
− 1433
~~1.60847m~~ 4
1.62037n
+ ~~40.32~~ .22
+41.72
− .03
+ .34
+ ~~40.53~~ + 42.03
9 ~~13.85~~ 40.58
9 ~~15.35~~ 31.01 ~~44.10~~
− 8.30
+4 44.75 −.43 44.32
+4 36.45 ~~7.46~~
13 ~~51.80~~ − 8.30
7.46 + 44.40
+ .49
+4 36.59
14 7.17

+0.79
4 41.0
29.2
70.2
14 35.10

+0.72
4 14.2
3.1
17.3
14 8.65
+ 45.17
1.65485
1.08003n
− 12.03
14 8.65
13 56.62
8 57.73
− 2166
~~1.59814n~~ 7
1.61304n
+ ~~39.64~~ .55
+41.02
− 22
+ .41
+ ~~39.74~~ + 41.21
9 ~~31.47~~ 32.53
9 32954 ~~44.15~~
− 8.73
+4 44.61 −.41 44.20
+4 35.88
14 8.82 − 8.73
+ 44.15
+ 43
+4 35.85
14 8.38

+0.65
10
3 55.3
44.0
99.3
13 49.65
~~−0.81~~ 32.12
9.90849n 1.50678
9.33567 0.93196
+ 0.21 + 8.55
13 49.65 49.65
13 49.86 58.20
8 ~~58.47~~ 50.15
− 1101
1.60879n 7
1.62369n
+ ~~40.63~~ .53
+42.04
− .00
∓ .08
+ ~~40.61~~ + 42.12
9 ~~39.10~~ 31.81
9 ~~40.61~~ 32.19 ~~45.12~~
11.61
+4 45.35 −38 44.97
+4 33.74
14 ~~14.35~~ − 11.61
5.93 + 45.12
+ .39
+4 33.90
14 5.71

α 1872 $32^m\ 54^s.554$ δ ~~14~~ $5''.80$
1873 50.960 13 59.00

July 27 1872 -.233
32 33 28.8 32
40.5
45.8
52.2
56.9
33 3.0
8.4
13.9
19.2
24.7
264.6
24.6
2.733 33 28.80
33 2.65
-3.37
-1.22
-* 3.55
33 ~~5.43~~
54.57

July 28 1872 -.234
32 16.8 32
26.6
30.6
40.2
45.7
50.9
56.4
33 1.7
7.7
13.2
18.7
23.9
258.4
18.4
2.044 32 [24.67]
33 1.96
-2.93
-1.23
-* 3.44
33 ~~5.64~~
54.36

July 29 1872 -.211
39.8
45.7
51.1
56.7
33 2.2
7.5
13.5
18.6
24.5
259.6
19.6
2.178
33 2.10
-3.18
-1.11
-* 3.33
33 ~~5.50~~
54.49

Aug 1 1842 -.268
32 32 35.3 32
44.1
49.3
55.4
33 1.0
6.3
11.6
17.1
22.8
28.6
236.2
56.2
6.244 32 35.30
33 6.16
-7.27
-1.41
-* ~~3.13~~ 3.01
33 ~~5.65~~
~~54.35~~ 54.47

Aug 4 1872 -.167 ×
51.4
56.7
33 1.9
8.1
12.7
18.9
24.2
30.1
35.2
239.2
119.2
13.244
33 13.16
-14.84~~4~~
-.88
-* ~~2.47~~ 2.69
33 ~~5.03~~
~~54.97~~ 54.75

5. list 1873 July 24 -.498
45.4
50.7 32 46.1
56.1
2.0
7.4
13.1
16.9
23.8
29.3
246.7
66.7
7.411 32 46.10
33 7.33
-9.72
-2.62
-* 4.03
33 ~~9.04~~
50.96

+0.64
10
3 56.1
44.1
100.2
13 50.10
-26.07
1.41614 n
0.84132
+6.94
13 50.10
13 57.04
8 51.31
-1287
~~1.60453~~ n 1.62183 n
~~+ 40.45~~ .36 + 41.86
∓ .07 .08
~~+ 40.37~~ + 41.87
~~9 31.68~~ + 9 32.80
9 33.18 ~~40.43~~
− 11.90
+4 43.39 -.38 ~~43.01~~
+4 31.49
14 4.67 − 11.90
+4 43.43
+ .38
+4 31.91
14 4.71

+0.63
10
4 13.1
1.9
15.0
14 7.50
+37.37
1.57252
0.99770 n
-9.95
14 7.50
13 57.55
8 50.80
-1107
~~1.60873~~ n 1.62363 n
~~+ 40.62~~ .53 + 42.04
∓ .15 .08
~~+ 40.46~~ + 41.97
~~9 31.26~~ 32.36
9 32.77 ~~44.35~~
− 12.03
+4 44.50 -.41 ~~44.09~~
+4 32.47
14 5.24 − 12.03
+ 44.36
+ .37
+4 32.70
14 5.06

A. R.

+0.59
10
4 11.1
57.6
128.7
14 4.35
+ 30.94
1.49052
0.91570 n
-8.24
14 4.35
13 56.11
8. 52.24
-974
~~1.61006~~ ~~1.60906~~ n 1.62496 n
~~+ 40.74~~ .65 + 42.17
∓ .10 .08
~~+ 40.63~~ + 42.15
~~9 30.87 9 32.87~~
9 34.39 ~~40.91~~ 33.99
− 12.56
+4 43.11 -.40 ~~42.71~~
+4 30.55
14 4.94 − 12.56
+ 42.91
+ .35
+4 30.70
14 4.69

A. R.

+1.60
5
3 16.3
32.1
48.4
8 24.20
+21.31
1.32838
0.75356 n
-5.67
8 24.20
8 18.53
14 29.82
-35 50 34 = ~~1.61910~~ 1.63470
-1966
~~1.59944~~ n 1.61504 n
~~+ 39.76~~ + 41.21
∓ .05 .17
~~+ 39.88~~ + 41.33
~~15 9.70~~ 15 10.88
15 11.15 ~~3.68~~
− 8.55
−1 3.54 -.27 ~~3.81~~
−1 12.09
13 59.06 − 8.55
−1 3.68
+ .35
−1 11.88
13 59.00

Gr, 2373

h	m	s	″
16	36	14	
16	36	08	
+	77°	42′	
+	77	41	52
z =	−35°	19′	4″
	−.58		

tang δ = +4.59

x = −.072

con x = −.23 δ = −.074″ = −.014

α 1872 = ~~+11.086~~

α 1873 8.412

1872	m	s	
June 29	36	16.48	
July 4		16.18	.30
9		15.84	.34
14		15.47	.37
19		15.06	.41
24		14.63	.43
29		14.18	.45
Aug 3		13.71	.47
8		13.21	.50

dα = −2.675
dδ = −6.89

1873	m	s	
July 19	36	12.54	
24		.11	.43
29		11.66	.45
Aug 3		.18	.47
8		10.69	.50

δ 1872 = 41′ 58.55″

δ 1873 = 41 51.65

1873		α
July 20	35	8.33
23		8.14
24		8.38
30		8.27
Aug 4		8.12
5		8.10
6		8.08
9		8.09
1872 Aug 5		10.61

	July 1 1872 −.397 −.40	July 3 1872 −.349 −.32	July 11 1872 −.349 −.35	July 15 1872 −.336 −.33	July 16 1872 −.308 −.31	July 22 1872 −.285 −.28
16	35 57.0 36 22.8	36 0.7 34 24.7	36 5.3 34 36.5	36 2.5 34 50.0	36 1.8 34 53.5	36 0.6 34 46.3
	1.2	5.3 28.4	10.2 39.6	7.3 55.0	6.6 1.8	5.3 50.3
	6.1	10.2 34.4	15.3 44.2	11.8 59.4	11.4 5.2	10.1 55.4
	11.1	15.3	19.7	16.9	16.3	14.8
	−15.9	20.1	24.6	21.7	21.2	19.7
	20.6	24.8	29.6	26.4	25.9	24.7
	25.4	29.7	34.4	31.0	30.6	29.3
	30.6	34.6	39.1	36.2	35.7	34.4
	35.4	39.3	44.3	41.2	40.5	39.3
	2033 1433	1800.0	222.5	1950	190.3	178.2
	15.922 36 22.80	20.000 34 29.17	24.722 34 40.10	21.667 34 54.80	21.144 35 0.17	19.800 34 50.67
	36 15.85	36 19.93	36 24.65	36 21.60	36 21.07	36 19.73
	36 16.34	36 16.22	36 15.68	36 15.38	36 15.30	36 14.78
	−0.49	+3.71	+8.97	+6.22	+5.77	+4.95
	−0.26	+3.94	+9.20	+6.45	+6.00	+5.18
	2.00 + ~~2.99~~ −.02	−2.38 +.03	−8.51 −.01	−4.91 +.00	−4.49 −.01	−3.96 +.00
	−1.84 −1.82	−1.47 −1.60	−1.65 −1.60	−1.51 −1.54	−1.42 −1.41	−1.29 −1.31
	−5.25 −7.92	−5.13 −7.80	−4.59 −7.26	−4.29 −6.96	−4.21 −6.88	−3.69 −6.36
	−5.09	−~~8.98~~ 9.08	−13.71	−10.71 4	−10.12	−8.94
	36 15.85	19.93	24.65	21.60	21.07	19.73
	36 10.75 6	10.95	10.94	10.89	10.95	10.79
	36 10.76 36 −8.09	36 10.85 8.18	36 10.94 8.27	36 10.86 8.19	36 10.95 8.28	36 10.77 8.70
	+0.89	+0.87	+0.77	+0.72	+0.72	+0.68
45−	1 10.2	1 41.9	1 37.2	1 31.2	1 29.1	1 30.0
	−1.6	30.0	26.8	21.1	19.9	20.2
	86	719	640	523	490	502
	46 4.30	46 35.95	46 32.00	46 26.15	46 24.50	46 25.10
	−6.88	−~~9.17~~	−~~15.38~~	+86.87	+80.97	+89.13
	0.83759n	+11083	+10462	1.93887	1.90832	1.95002
	0.28174	2.04466	2.01962	1.38302n	1.35247n	1.39417n
	+1.981	1.48881n	1.46377n	−2416	−2252	−2478
	46 4.30	−3082	−2909	46 26.15	46 24.50	46 25.10
	46 6.281	46 35.95	46 32.00	46 1.99	46 1.98	46 0.32
		46 5.13	46 2.91			
+77°	36′ 42.14″	36 43.22	36 45.44	36 46.36	36 46.37	36 48.03
−35	18 39 = 1.61030n					
	−2382	−2040	−2106	−2160	−2072	−986
	1.58648n	1.58990n	1.58924n	1.58870n	1.58958n	1.60044n
	+ 38.59″	+ 38.90	+ 38.84	+ 38.79	+ 38.87	+ 39.85
	− .01	1.39	1.24	.86	.74	.90
	− .01	+ .13	+ .12	+ .14	+ .14	+ .03
	+ 38.57	+ 37.64	+ 37.72	+ 38.02	+ 38.27	+ 38.98
+77	37 20.71 37 20.60	37 20.86 20.70	37 23.16 23.01	37 24.38 24.38 ~~24.45~~ 24.24	37 24.64 24.50	37 27.01 26.87
	42 5.3	42 5.8	42 7.7	42 8.5	42 8.7	42 9.7
−0.1″	+ 4 44.6 44.5 ~~45.21~~	4 44.9 44.8 ~~44.84~~	4 44.5 4.44 ~~44.51~~	4 44.1 44.0 ~~44.15~~	4 44.1 44.0 ~~43.28~~	4 42.7 42.6 ~~42.91~~
	+ 4 44.5 44.4	4 44.8 44.7	4 44.4 44.3	4 44.0 43.9	4 44.0 43.9	4 42.6 42.5
	−13.69	−14.09	−16.09	−16.79	−17.09	−17.99
	−6.80 − 6.80	−7.20 − 7.20	−9.20 − 9.20	−9.90 − 9.90	−10.20 − 10.20	−11.10 − 11.10
	+ 4 45.90 −.11 ~~45.79~~	+ 4 45.23 −.16 ~~45.07~~	+ 4 44.89 −.15 ~~44.74~~	+ 4 44.61 −.14 ~~44.47~~	+ 4 43.91 −.14 ~~43.77~~	+ 4 43.31 −.14 ~~43.17~~
	+ 4 39.10 + 45.21 .51	+ 4 38.03 + 44.84 .50	+ 4 35.69 + 44.51 .44	+ 4 34.71 + 44.15 .41	+ 4 33.71 + 43.28 .41	+ 4 32.21 + 42.91 .39
+77	41 59.81 +4 38.92	41 58.89 +4 38.14	41 58.85 +4 35.75	41 59.09 +4 34.66	41 58.35 +4 33.49	41 59.22 +4 32.28
	41 59.52	41 58.84	41 58.76	41 58.90	41 57.99	41 59.15
	41 52.63	51.95	51.87	52.01	51.10	52.26

δ
41 5222
5795
5247
5292
5215
5289
5350

5701

Sin δ 9.98991
Cos δ 9.32844
11571n
9.44415n

	1872		
June	29	77° 42′ 04.8″	
July	4	6.0	+ 1.2
	9	7.2	1.2
	14	8.2	1.0
	19	9.2	1.0
	24	10.0	.8
	29	10.8	.8
Aug.	3	11.4	.6
	8	11.9	.5

	1873			
July	19	41	59.4″	
	24		60.3	+ 9
	29		61.0	.7
Aug.	3		61.6	.6
	8		62.1	.5

1872 July 24 − .27 (260)

35 59.7, 35 17.2
4.8, 21.3
9.2, 24.4
14.2
19.2
23.9
28.8
33.6
38.5

2319
1719
~~22.456~~ 19.140 35 20.97
36 19.03
36 14.61
+4.42
+4.65

−3.48 −.02
−1.24 −119
−3.52 −6.19
−8.24
19.03
10.79

36 1082 8.15

+0.66
45
1 23.1
13.1
36.2
46 18.10

~~−1.87~~
+5813
1.76440
1.20855n
−1616
46 18.10
46 1.94
36 46.41

−1507
1.59523n
± 39.38
.38
+ .03

+ 39.03
37 25.44 25.31
42 10.0
4 44.6 44.5 ~~43.81~~
4 44.5 44.4
−18.39
−11.50 11.50
+4 4388 −13 ~~43.75~~
+4 3238 +4 43.81 38
41 57.82 +4 3169
41 57.00
50.11

1872 July 25 − .26 (266)

36 −(36 9.2)
~~19.4~~
23.4 18.86
28.9 18.23
33.3 18.79
38.3 18.95
1888
1881
1436
~~28.720~~ 18.81 36 9.20
36 ~~28.65~~
36 14.52
(~~+14.13~~)
+4.29
+4.52

−3.42 −.01
−1.19 −1.22
−3.43 −6.10
−8.04 −8.048
(~~28.65~~ 1881
~~3.81~~) 10.79

36 1073 8.06

45
1 29.3
17.8
47.1
46 23.55

+ ~~19.52~~ 961
1.29048 0.58272
0.73463n 42687
−543
46 23.55
46 18.12
36 30.23
3

−1083
1.59947n
± 39.76
.04
+ .03

+ 39.75
37 9.98
42 16.2
5 0.2
5 0.1
−11.60
+4 4535
+4 3375
41 43.73

1872 July 27 − .23 (233)

36 19.7, 36 8.2, 35
35 59.2 22.3, 9.6
40 25.0, 11.4 36
87 30.4, 34 234
140 33.0, 277
182 35.6, 332
229 38.2
282 41.0
330 46.2
380 48.9
51.6
391.9
1846.7 35.627 34 28.10
1839 18.39
36 35.56
36 19.34
(+21.22)
+4.06
+4.28

−3.29 −.01
−1.06 −1.07
−3.25 −5.92
−7.60 −7.62
~~35.56~~ 18.39
(~~17.96~~) 10.79

36 1077 8.10

+0.64
45
1 36.1
24.2
6.03
46 30.15

+110.37
2.04287
1.48702n
−30.69
46 30.15
45 59.46
36 48.89

−1245
1.59785n
± 39.61
1.38
+ .03

+ 38.26
37 27.15 27.00
42 10.5
4 43.4 43.2 43.43
4 43.3 43.1
−18.89
−12.00 12.00
+4 4389 −15 ~~43.24~~
+4 3139 + 13.43 37
41 58.54 +4 3180
41 5880
51.91

1872 July 28 − .23 (234)

35 5 34 43.5 35
58.9, 46.8
36 3.7 ? (15.8) 36
8.3
13.0
17.9
22.9
27.8
32.8
37.6
2229
1629
18.100 δ?
36 18.03
36 14.25
+3.78
+4.01

−2.93 +.00
−1.06 −1.07
−3.16 −5.83
−7.156
18.03
10.88

36 10.87 8.20

+0.63
45
1 32.2
20.8
53.0
46 26.50

1872 July 29 − .20 (211)

59.1
36 3.8
8.4
13.5
18.2
23.0
27.8
32.5
36.5
2228
1628
18.089
36 18.02
36 14.16
+3.86
+4.09

−3.18 +.01
−.92 −.97
−3.07 −5.74
−7.1721
18.02
10.85

36 1081 8.14

A. K

1872 Aug 1 − .27 (268) δ list

36 35 10.9
2.8, 14.7
7.8, 20.4
12.4
17.5
22.3
26.8
32.0
36.8
41.6
200.0
22.222 35 15.33
36 22.15
36 13.88
+8.27
+8.50

−7.30 +.01
−1.24 −123
−2.79 −5.46
−11.331
22.15
10.82

36 10.84 8.17

+0.59
45
1 25.1
12.8
37.9
46 18.95

~~+68.9~~
+66.89
1.82536
1.26957n
−1860
46 18.95
46 0.35
36 48.00

−963
1.60267n
± 39.87
.51
+ .03

+ 39.39
37 27.39 27.26
1/2 11.2
4 43.8 43.7 ~~42.91~~
4 43.7 43.6
−19.49
−12.60 12.60
+4 43.11 −13 ~~42.98~~
+4 30.51 + 42.91 34
41 57.90 +4 30.65
57.91
51.02

η Herculis

	h	m	s
η	16	38	30
	16	38	33
+	39°	10'	"
+	39	09	54
ξ = +	3°	12'	54"
	+.06		

tang δ = +.81

x = −.028

corr = +.04

" α 1872 30.518 δ = 10' 0.94"

α 1873 32.574 9 53.87

dα = +2.056

dδ = −7.06

1872	m	s	
June 29	38	32.49	
July 4		32.46	3
9		32.42	4
14		32.36	6
14		32.30	6
24		32.22	8
29		32.14	8
Aug. 3		32.05	9
8	=	31.95	10

1873	m	s
July 19	38	34.52
24		.49 .08
29		.36 .08
3		.27 .09
Aug. 8		34.18 .09

	July 1 1872 −.397 −.40		July 3 1872 −.349 −.32		July 15 1872 −.336 −.33		July 22 1872 −.285 −.28		July 25 1872 −.266 −.26	
16	38 14.9 17.5 20.2 25.5 28.3 30.9 33.5 36.3 41.5 44.2 46.8	38 6.3 7.4 8.8	38 19.2 21.8 24.4 29.7 32.4 35.1 37.8 40.5 45.7 48.4 51.1	38 8.0 9.1 10.3	38 21.6 24.3 26.9 32.2 34.9 37.5 40.2 42.9 48.1 50.8 53.4	38 11.2 12.9 14.1	38 20.5 23.2 25.7 31.1 33.8 36.4 39.2 41.8 47.0 49.6 52.4	38 12.7 13.7 14.8	38 19.9 22.6 25.2 30.5 33.3 35.9 38.6 41.1 46.5 49.3 51.8	38 8.6 10.2 11.5
	339.6		386.1		412.8		400.7		394.7	
	30.873	38 7.50	35.104	38 9.13	37.527	38 12.73	36.427	38 13.63	35.882	38 10.10
	38 30.85 38 − 32.48 − 1.63 ~~− 1.67~~		38 35.08 38 32.47 +2.61 ~~+2.57~~		38 37.51 38 32.35 +5.16 ~~+5.12~~		38 36.41 38 32.25 +4.16 +4.12		38 35.86 38 32.20 +3.66 ~~+3.62~~	
	+ 2.00 −.02 − .32 −1.96 − 0.28 30 38 30.85 38 30.57	−.32 + 0.10	− 2.38 +.03 − .26 − 1.95 −4.59 8 35.08 30.49	−.28 + 0.11	− 4.91 +.00 − .27 − 1.83 − 7.01 37.51 30.50	−.27 + 0.23	− 3.96 +00 − .23 − 1.73 − 5.92 36.41 30.49	−.23 + 0.33	− 3.42 −.01 − .21 −1.68 − 5.31 2 35.86 30.55	−.21 + 0.38
	38 30.55	38 32.61	38 30.50	32.56	38 30.50	32.56	38 30.49	32.55	38 30.54	32.60
	+0.89		+0.87		+0.72		+0.68		+0.65	
15	2 51.3 47.8 99.1 17 49.55		2 54.1 49.3 103.4 17 51.70		2 49.0 45.9 94.9 17 47.45		2 45.0 40.7 85.7 17 42.85		15 2 49.7 43.9 93.6 17 46.80	
	+23.37 1.36866 1.37385n −2365 17 49.55 17 25.90		+25.97 1.41447 1.41966n −2628 17 51.70 17 25.42		+24.80 1.39445 1.39964n −2510 17 47.45 17 22.35		+22.80 ~~1.35813~~ ~~1.36332n~~ ~~−2309~~ 17 42.85 ~~17 19.76~~	1.35793 1.36312n −2307 17 42.85 17 19.78	+25.78 1.41128 1.41647n −2609 17 46.80 17 20.71	
+39°	5' 22.45"		5 22.93		5 26.00			5 28.57	5 27.64	
+3	12 41 = 0.50930									
	−2382 0.48548 3.06 ~~+~~ ~~30.58~~ − .14 − .03		−2040 0.48890 3.08 ~~+~~ ~~30.83~~ − .18 + .23		−2160 0.48770 3.07 ~~+~~ ~~30.74~~ − .17 + .28		−986 0.49944 3.16 ~~+~~ ~~31.58~~ − .14 + .06 .05		−1083 0.49847 3.15 ~~+~~ ~~31.51~~ − .18 + .06	
+39	− 3.23 5 19.22 10 4.7 + 4 45.5 45.2 − 10.86 − 3.80 +4 45.90 −.28 + 4 42.10 − +39 10 1.32	19.22 +5 ~~19.28~~ 18.94 45.62 3.80 +4 45.21 .05 − +4 41.36 10 0.30 9 53.24	− 3.03 5 19.90 10 5.2 4 45.3 45.0 − 11.36 − 4.30 +4 45.23 −.28 + 4 40.93 − 10 0.83	19.62 44.95 4.30 +4 44.84 .05 − +4 40.49 10 0.11 53.05	− 2.96 5 23.04 10 7.7 4 44.7 44.4 − 13.86 − 6.80 4 44.61 −.28 4 37.81 − 10 0.85	22.76 ~~44.33~~ 6.80 +4 44.15 .04 − +4 37.31 +10 3.07 53.01	− 3.25 5 25.32 10 8.9 4 43.6 43.3 − 15.06 − 8.00 4 43.31 −.27 4 35.31 − 10 0.63	25.05 43.04 8.00 +4 42.99 .04 − +4 34.95 10 0.00 52.94	− 3.03 5 24.61 10 9.4 4 44.8 44.5 − 15.56 − 8.50 4 45.35 −.28 4 36.85 − 10 1.46	24.61 ~~24.37~~ 24.33 45.07 8.50 +4 45.12 .04 − +4 36.68 10 1.01 52.95

Sin δ 9.80043
Cos δ 9.88948
1157 n
.00519 n

1872		°	'	"	
June	29	+39	10	4.2	
July	4			5.4	+1.2
	9			6.5	1.1
	14			7.5	1.0
	19			8.4	.9
	24			9.2	.8
	29			10.0	.8
Aug.	3			10.6	.6
	8			11.2	.6

1872			
Aug	5	30.55	~~59.42~~
	7	30.52	~~0.05~~
	10	30.53	0.11
1873			
July	20	32.55	53.31
	23	32.51	54.51
	24	32.53	53.82
	26	32.60	53.06
Aug	4	32.60	53.48
	9	32.50	52.21

1873		'	"	
July	19	9	58.5	
	24		59.3	+.8
	29		60.0	.7
Aug.	3		60.7	.7
	8		61.4	.7

July 27 1872 −.233 −.23

38 19.7 38 8.2
22.3 9.6
25.0 11.1
30.4
33.0
35.6
38.2
41.0
46.2
48.9
51.6
391.9
35.627 38 9.63

July 28 1872 −.234 −.23

38 19.3 38
21.9
24.8
29.9 29.7
32.8 32.7
35.3 35.5
37.9 38.2
40.7 40.8
45.9
48.4
51.2
388.4 68
35.309 35.36

July 29 1872 −.211 −.20

Aug 1 1872 −.268 −.27

38 23.6 38 15.8
26.3 17.0
29.0 18.3
34.3
36.9
39.4
42.3
45.0
50.2
52.9
55.6
435.8
39.618 38 17.03

Aug 4 1872 −.167 −.15

38 31.0 38 31.8
33.4
36.4
41.7
44.3
46.9
49.7
52.3
57.5
39 0.1
2.7
396.0
516.0
46.909 38 31.80

Sup. c

Aug 6 1872 −.248 −.24

38 36.1 38 34.1
38.7 35.0
41.5 36.4
46.8
49.5
52.2
54.7
57.5
39 2.7
5.5
8.1
393.3
573.3
52.118 38 35.17

38 35.61
38 32.17
+3.44
~~+3.40~~
−3.29 −.01
−.19 −.19
−1.65 +0.41
−5.134
35.61
30.48
38 30.47 32.53
+0.64

38 35.29
38 32.15
+3.14
~~+3.10~~
−2.93 +.00
−.19 −.19
−1.63 +0.43
−4.75
35.29
30.54
38 30.54 32.60

38 35.36
38 32.14
+3.22
~~+3.18~~
−3.18 +.01
−.16 −.17
−1.62 +0.44
−4.96
35.36
30.40
38 30.40 32.46

38 39.60
38 32.08
+7.52
~~+7.48~~
−7.30 +.01
−.22 −.22
−1.56 +0.50
−9.087
39.60
30.52
38 30.53 32.59
+0.59

38 46.89
38 32.03
+14.86
~~+14.82~~
−14.86 +.01
−.12 −.13
−1.51 +0.55
−16.49
46.89
30.40
38 30.40 32.46
+0.57

38 52.10
38 31.99
+20.11
~~+20.07~~
−19.94 +.00
−.19 −.20
−1.47 +0.59
−21.601
52.10
30.50
38 30.49 32.55
+0.57

15
2 48.1
43.0
91.1
17 45.55
+26.00
1.41497
1.42016 n
−2631
17 45.55
17 19.24
5 29.11
−1245
0.49685
3.14
~~+~~ ~~31.29~~
− .18
+ .06
− 3.02 26.09
5 26.09 ~~25.85~~
10 9.7 5 25.81
4 43.6 43.3
−15.86
−8.80
+4 43.39 −.28 ~~43.11~~
+4 34.59 − 8.80
10 0.68 +4 48.43
.04
−
+4 34.59
10 0.40
53.34

15
2 45.2
39.1
84.3
17 42.15

44.36

15
2 27.1
22.3
49.4
17 24.70

15
2 43.6
37.5
81.1
17 40.55
+22.59
1.35392
1.35911 n
−2286
17 40.55
17 17.79
5 30.66
−3.14
−.06
+ .06
−3.14
5 27.52 7.25
10 10.4
+4 42.9 42.6
−16.56
−9.50
+4 43.11 −.27 42.84
+4 33.61 − 9.50
10 1.13 +4 42.91
.63
+4 33.38
10 0.63
53.57

15
2 35.9
29.0
64.9
17 32.45
+15.11
1.17926
1.18445 n
−1529
17 32.45
17 17.16
5 31.19
−428
0.50502
3.20
~~+~~ ~~31.99~~
− .06
+ .20
− 3.06
5 28.13 +5 27.88
10 10.8
4 42.7 42.4
−16.96
−9.90
+4 42.75 −.25 42.50
+4 32.85 − 9.90
10 0.98 + 42.42
.83
+4 33.49
10 1.37
54.34

15
2 38.9
32.1
71.0
17 35.50
+16.96
1.22917
1.23436 n
−1715
17 35.50
17 18.35
5 30.00
−1221
0.49709
3.14
~~+~~ ~~31.41~~
− .08
+ .21
− 3.01
5 26.99 26.73
10 11.0
4 44.0 43.7
−17.16
−10.10
+4 43.45 −.26 43.19
+4 33.35 − 10.10
10 0.34 +4 43.30
.03
+4 33.17
10 59.90
52.84

Gr, 2377 — H

h	m	s		
16	42	51		
16	42	53		
+	57°	01′		
+	57°	00′	34″	
δ =	−14°	37′	46″	
	−.25			

tang δ = +1.54
X = −0.58
Δα = −0.02
Δδ = −0.4″

Sin δ 9.92367
Cos δ 9.73591
11571 n
9.85162 n

α 1872 = 52.292 δ = 0′ 40.19″
α 1873 = 53.425 δ = 0 33.63
dα = +1.133
dδ = −6.57

1872	h	m	s					
June 29	16	42	54.81	8	+57°	0′	45.0″	
July 4			54.73	9			46.3	+1.3
9			54.64	10			47.6	1.2
14			54.54	12			48.7	1.1
19			54.42	13			49.7	1.0
24			54.29	13			50.6	.9
29			54.15	14			56.5	.9
Aug 3			54.00	15			52.2	.7
8			53.84	16			52.8	.6

1872 July 3 −.349

16 41 34.8 42 22.0
38.7 24.7
42.6 26.0
50.0
53.9
57.6
1.3
5.2
12.8
16.6
20.4
333.8
633.8
42.41 57.618 42 24.23
42.24 41 57.560
54.75
+ 2.81
+ 2.83
41 57.56
− 2.36
− .54
− 2.46
42 52.20
~~42 52.20~~

25
2 29.0
21.5
5.95
27 25.25
− 26.61 8661
1.42514 n 1.98459
1.27626 1.78449
+ 1.91 8.64 51.91
27 25.25 25.25 26.25
27 44.16 371 371
+57° 55′ 4.19″
−14 37 1 = 1.17660 n
0.94080
− 2029
1.15631 n
+ 14.33
.18
+ .19
+ 14.34
+56 55 18.53
0 45.6
−0.4″ + 4 27.1
− 5.40
+ 4 45.23
+ 4 39.83
+ 56 59 58.36

1872 July 20 −.312

42 36.6 42 25.1
40.2 26.0
44.2 27.2
51.4
55.4
59.2
3.0
6.7
14.2
18.0
21.7
350.642
650.6
59.145 42 26.10
59.087
54.39
+ 4.70
+ 4.72
41 59.09
− 4.28
− .48
− 2.10
42 52.23

+0.69
2 23.5
15.1
38.6
27 19.30
+ 33.04
1.57904
1.37066 n
− 23.48
27 19.30
26 55.82
55 52.53
− 16.46
1.16014 n
+ 14.46
.25
+ .23
+ 14.44
56 6.97 +56 6.74
0 49.9
+ 4 42.9 42.7
+ 4 42.5 42.3
− 16.27
− 9.70
+ 4 43.65 − 23 − 9.70
+ 4 33.95 + 4 43.92
0 40.92 + .17
+ 4 33.39
60 40.13
33.56

1872 July 28 −.234

42 34.8 42 20.3
38.5 22.5
42.3 24.3
49.9
53.5
57.4
43 1.4
5.1
12.7
16.4
20.2
332.2
632.2
42 57.478 42 22.37
57.415
54.18
+ 3.23
+ 3.25
42 57.41
− 2.93
− .36
− 1.19
42 52.23

25 + 0.63
2 24.2
16.2
40.4
27 20.20
+ 35.10
1.54531
1.39693 n
− 24.94
27 20.20
26 53.26
54.5 53.09
− 10.71
1.16589 n
+ 14.65
.31
+ .05
+ 14.39
55 7.48 7.25
0 51.4
+ 4 43.9 43.7
+ 4 43.5 43.3
− 17.77
− 11.20
+ 4 44.50 − 23 − 11.20
+ 4 33.30 + 4 44.36
0 40.78 + .16
+ 4 33.22
60 40.47
33.90

1872 Aug 1 −.268

42 39.0 42 22.5
42.8 23.9
46.4 26.7
54.3
57.9
43 1.7
5.5
9.1
16.8
20.6
24.4
318.5
18.5
43 1.682 42 24.37
1.624
54.06
+ 7.56
+ 7.58
43 1.62
− 9.29
− .41
− 1.77
42 52.15

25 + 0.59
2 24.7
15.1
39.8
27 19.90
+ 37.31
1.57183
1.42345 n
− 26.51
27 19.90
26 53.39
54.5 54.96
− 9.51
1.16709 n
+ 14.69
.35
+ .05
+ 14.39
55 9.35 14.16 9.12
0 52.0
+ 4 42.7 42.5
+ 4 42.3 42.1
− 18.37
− 11.80 11.80
+ 4 43.11 − 23
+ 4 31.31 + 4 42.91
0 40.66 + .15
+ 4 31.26
− 60 40.38
33.81

1872 Aug 4 −.167

42 46.4 42 36.9
50.1 39.1
53.9 40.6
43 1.4
5.2
9.0
12.9
16.8
24.2
28.0
31.7
279.6
99.6
43 9.055 42 38.87
8.997
53.97
+ 15.03
+ 15.05
43 9.00
− 14.86
− .26
− 1.68 Aug 5
42 52.20 α 52.24
δ 40.44

25 + 0.57
2 18.8
10.0
28.8
27 14.40
+ 30.18
1.47972
1.33134 n
− 21.45
27 14.40
26 52.95
54.5 53.40
− 4.21
1.17239 n
+ 14.87
.22
+ .18
+ 14.83
55 10.23 10.01
0 52.4
+ 4 42.2 42.0
+ 4 41.8 41.6
− 18.77
− 12.20
+ 4 42.75 − 22 − 12.20
+ 4 30.56 + 4 42.42
0 40.78 + .14
+ 4 30.36
60 40.37
33.80

S. list 1872 Aug 6 −.248

42 51.5 42 29.7
55.2 31.7
59.0 33.4
43 6.5
10.4
14.2
17.9
21.6
29.2
32.9
36.9
335.3
155.3
43 14.118 42 31.70
14.060
53.90
+ 20.26
+ 20.28
43 14.06
− 19.96
− .38
− 1.61
42 52.21

25 + 0.57
2 27.2
19.1
46.3
27 23.15
+ 42.42
1.62757
1.47919 n
− 30.14
27 23.15
26 53.01
54.5 55.34
− 12.09
1.16451 n
+ 14.61
.44
+ .19
+ 14.36
55 9.70 9.46
0 52.6
+ 4 42.9 42.7
+ 4 42.5 42.3
− 18.97
− 12.40
+ 4 43.45 − 24 − 12.40
+ 4 31.03 + 4 43.30
0 40.75 + .14
+ 4 31.04
− 60 40.50
33.93

1873

	h	m	s		°	′	″	
July 19	16	42	55.72		+57	0	40.2	
24			55.59	.13			41.1	.9
29			55.46	.14			41.9	.8
Aug. 3			55.30	.15			42.6	.7
8			55.14	.16			43.3	.7
~~13~~								

1872
Aug 7 -.222

42 54.3
58.1 42 46.2
1.7 47.4
9.5 49.0
13.2
16.9
20.8
24.6
32.2
36.0
39.7
307.0
187.0
43 17.000 42 47.53
16.942
53.87
+23.07
+23.09
43 16.94
-22.81
-.34 Aug 9
-1.18

42 52.21

+0.55
25
2 17.7
11.8
29.5
27 14.75

+29.47
1.46938
1.32100n
-20.94
27 14.75
~~27~~6 53.81

5~~4~~5 54.54

-1434
1.16226n

+ 14.53
− .21
+ .18

+ 14.50 9.04
56 9.04 ~~9.06~~
0 52.7 56 8.82
+4 43.7 43.5
+4 43.3 43.1
-19.07
-12.50 − 12.50
+4 44.05 -.22 43.83
+4 31.55 +4 43.64
0 40.59 + .14
+4 31 28
+0 40 10
33 53

1872
Aug. 10 -.266

43 2.2
5.9 42 49.6
9.7 52.0
17.3 53.3
21.0
24.8
28.7
32.6
40.0
43.7
47.6
273.5
43 24.864 42 51.63
24.806
53.78
+31.03
+31.05
43 24.81
-30.66
-.41
-1.49

42 52.25

+0.54
25
2 20.0
13.0
33.0
27 16.50

+33.23
1.52153
1.37315n
-23.61
27 16.50
~~27~~6 52.89

5~~4~~5 53.46

+ 14.58
− .27
+ .18

+14.49
56 9.95 +57°
0 53.1 9.72
+4 43.2 43.0
+4 42.8 42.6
19.47 ~~4.72~~
-12.90 − 12.90
+4 43.83 -.23 43.60
+4 30.93 +4 43.26
0 40.88 + .13
+4 30 49
0 40 21
33 64

1873
July 20 -.354

42 56.0 42 38.0
58.0 39.6
59.9 40.8
1.8
3.7
5.6
7.4
9.3
11.2
1
21.29
32.9
43 3.644 42 39.53
3.586
42 55.69
+7.90
+7.92
43 3.59
-7.46
-.55
-2.27

42 53.31

+1.56
20
1 27.0
40.0
67.0
21 33.50

+24.11
1.38220
1.23382n
-17.13
21 33.50
21 16.37

1 31.98

-14 37 36 = 6.17690n ~~6.44140~~

-12.59
1.16431n

+ 14.60
− .16
+ .08

+ 14.52
1 46.50 +1 46.38
0 40.4
-1 6.1 6.2
-1 6.5 6.6
~~46.38~~
-6.80 − 6.80
-1 4.15 -.12 ~~4.27~~
-1 10.95 -1 4.88
0 35.55 + .39
-1 11.27
0 35 11

1873
July 24 -.498

42 42 32.1
33.6
34.9
58.0
2.1
6.0
9.8
13.6
89.5
29.5
5.900 42 33.53
5.842
53.58
+10.26
+10.28
43 5.84
-9.72
-.77
-2.16

43 53.19

+1.60
20
1 32.8
47.9
80.7
21 40.35

+32.37
1.51014
1.36176n
-23.00
21 40.35
21 17.35

1 31.00

-19.30
1.15760n

+ 14.37
− .25
+ .08

+ 14.20
1 45.20 −1 45.06
0 41.1
-1 4.1 −1 4.2 ~~45.06~~
-1 4.5 4.6
-7.50 − 7.50
-1 3.54 -.11 ~~3.65~~
-1 11.04 −1 3.65
0 34.16 + .40
−1 10.78
0 34 28

1873
July 26 -.485

43
0.2 ~~44.0~~ 42 46.9
2.0 ~~48.1~~ 48.1
3.9 ~~52.5~~ 49.3
5.8 ~~0.1~~
7.8 ~~3.9~~
9.6
11.4
13.4
15.3
69.4
7.711 42 48.10
7.653
55.53
+12.12
+12.14
43 7.65
-11.39
-.75
-2.11

53.40

+1.62
20
1 23.7
39.2
62.9
21 31.45

+19.61
1.29248
1.14410n
-13.94
21 31.45
21 17.51

1 30.84

-19.02
1.15788n

+ 14.38
− .10
+ .06

+ 14.33
1 45.17 1 45.05
0 41.5
-1 3.7 3.8
-1 4.1 4.2
-7.90 − 7.90
-1 3.74 -.12 ~~3.86~~
-1 11.64 −1 4.09
0 33.53 + .40
−1 11.59
0 33 46

1873
Aug 4 -.549

43
7.1 42 33.2
9.1 34.7
10.9 36.6
12.8
14.8
16.7
18.5
20.4
22.3
132.6
43 14.733 42 34.83
14.675
55.26
+19.48
+19.43
43 14.67
-18.62
-.85 9 11
-1.84

53.36 53.29 53.21
33.70 34.63

+1.69
20
1 36.0
52.0
88.0
21 44.00

+39.90
1.60097
1.45259n
-28.35
21 44.00
21 15.65

1 32.70

-13.28
1.16362n

+ 14.58
− .40
+ .07

+ 14.25
1 46.95 ~~46.86~~
0 42.8 46.81
-1 4.1 4.2
-1 4.5 4.6
-9.20 − 9.20
-1 4.35 -.14 ~~4.49~~
-1 13.55 −1 4.52
0 33.90 + .42
−1 13.30
0 33 51

49 Herculis

h	m	s
16	46	12
16	46	18
+	15°	11′ 〃
+	15	11 20

δ = + 27° 11′ 28″
+ .46

Tany δ = +.27
x = .016
cos x = ~~+.04~~ −.02 Δδ = +0.3
α1872 15.215
α1873 17.943

1872	m	s	
June 29	46	16.99	16.99
July 4			99
9			98
14			95
19		16.	92
24			87
29			81
Aug. 3			76
8		16.	71

1873	m	s	
July 19	46	19.82	
24		.78	.04
29		.73	.5
Aug. 3		.68	.5
8		19.62	.6

δ 1872 = 11′ 26.35″ dα = +2.728
δ 1873 = 11 20.01 dδ = −6.33

	1872 July 1 −.377 −.40		1872 July 15 −.336 −.33 ?		1872 July 25 −.266 −.26		1872 July 28 −.234 −.23		1872 Aug 1 −.268 −.27		1872 Aug 6 −.248 −.24	
16	46 2.4		46 9.2	46 5.8	46 7.7	46 10.1	46 7.0	45 58.8	46 11.5	46 2.9	46 23.9	46 17.9
	4.5		11.3	6.7	9.7		9.3	46 0.2	13.6	3.7	26.2	19.1
	6.6		13.4	7.8	11.9		11.5	1.0	15.7	4.6	28.3	20.2
	10.9		17.6		16.1		15.6		19.9		32.6	
	12.9		19.8		18.4		17.7		22.1		34.7	
	15.2		22.0		20.5		19.9		24.2		36.8	
	17.3		24.0		22.6		21.9		26.3		39.0	
	19.3		26.2		24.4		24.2		28.6		41.1	
	23.7		30.6		28.9		28.4		32.7		45.3	
	25.8		32.6		31.2		30.6		34.9		47.4	
	28.0		34.8		33.3		32.8		37.0		49.6	
	166.8		241.5		225.0		218.9		266.5		404.9	
	15.164		21.955	46 6.77	20.455	46 10.10	19.900	46 0.00	24.227	46 3.73	36.809	46 19.07
	46 15.15		46 21.94		46 20.44		46 19.88		46 24.21		46 36.79	
	46 16.99		46 16.94		46 16.86		46 16.82		46 16.78		46 16.73	
	−1.84		+5.00		+3.58		+3.06		+7.43		+20.06	
s +.06	~~−1.88~~		~~+4.96~~		~~+3.54~~		~~+3.02~~		~~+7.39~~		~~+20.02~~	
	−1.82		+5.02		+3.60		+3.08		+7.45		+20.08	
	+1.98 −.02		−4.91 +.00		−3.42 −.01		−2.93 +.00		−7.31 +.01		−19.96 +.00	
	− .11	−.11	− .09	−.09	− .07	−.07	− .06	−.06	− .07	−.07	− .06	−.07
	−1.78	+0.95	−1.72	+1.01	−1.65	+1.08	−1.60	+1.13	−1.57	+0.84	−1.51	+1.22
	+0.087		−6.72		−5.145		−4.59		−8.984		−21.584	
	46 15.15		21.94		20.44		19.88		24.21		36.79	
	46 15.24		15.22		15.30		15.29		15.26		15.26	
	46 15.22	46 17.95	46 15.22	17.95	46 15.29	18.02	46 15.29	18.02	46 15.27	18.00	46 15.25	17.98

		July 15	July 25	July 28	Aug 1	Aug 6
15	A.R	+0.72	+0.65	+0.63	+0.59	+0.57
			15	15	15	15
		0 56.1	0 48.5	0 58.2	0 57.5	0 54.7
		55.0	46.1	57.1	55.9	53.0
		111.1	94.6	115.3	113.4	107.7
		15 55.55	15 47.30	0 57.65	15 56.70	15 53.85
		+15.18	+10.35	+19.90	+20.50	+17.74
		1.18127	1.01494	1.29885	1.31175	1.24895
		1.28155	1.11522n	1.39913n	1.41203n	1.34923n
		−1912	−1304	−2507	−2583	−2235
		15 55.55	15 47.30	15 57.65	15 56.70	15 53.85
		15 36.43	15 34.26	15 32.58	15 30.87	15 31.50
	+15°	7′ 11.92″	7 14.09	7 15.77	7 17.48	7 16.85
	+27	10 51 = 1.47080				
		−2147	−1048	−1053	−940	−1197
		1.44933	1.46032	1.46027	1.46140	1.45883
		+ 28.14	+ 28.86	+ 28.86	+ 28.93	+ 28.76
		− .03	− .01	− .05	− .05	− .04
		+ .09	+ .02	+ .02	+ .02	+ .08
		28.08	28.85	28.79	28.96	28.72
	+15	− 6 43.84 +6 48.75	− 6 ~~45.24~~ 46.224	− 6 46.69 46.88	− 6 48.52 48.43	− 6 48.13 48.04
		11 28.7	11 30.0 45.16	11 30.23 46.88	11 30.7	11 31.2
		+4 44.9 44.8	4 44.8 44.7	4 43.3 43.2	4 42.2 42.1	4 43.1 43.0
	+0.3	+4 45.2 45.1	+4 45.1 45.0	+4 43.6 43.5	+4 42.5 42.4	+4 43.4 43.3
		− 8.73	− 9.93	− 10.33	− 10.63	− 11.23
		− 2.40 − 2.40	− 3.60 − 3.60	− 4.00 − 4.00	− 4.30 − 4.30	− 4.90 − 4.90
		+4 44.61 −.09 ~~44.52~~	+4 45.35 −.08 ~~45.27~~	+4 44.50 −.10 ~~44.40~~	+4 43.11 −.09 ~~43.02~~	+4 43.45 −.09 ~~43.36~~
		+4 42.21 +4 45.25	+4 41.75 + 45.12	+4 40.50 + 44.36	+4 38.81 + 42.91	+4 38.55 + 43.30
	+15	11 26.05 − .33	11 26.99 − .29	11 27.48 − .28	11 27.33 − .27	11 26.68 − .26
		+4 41.42	+4 41.23	+4 40.08	+4 38.34	+4 38.74
		+11 26.17	11 26.39	11 26.96	11 26.77	11 26.18
		18.84	20.06	20.63	20.44	19.85

Sin δ 9.41815
Cos δ 9.98457
11571 n
.10028 n

1872					
June	29	15°	11'	26.2"	
July	4			27.0	+.8
	9			27.8	.8
	14			28.5	.7
	19			29.2	.7
	24			29.8	.6
	29			30.4	.6
Aug.	3			30.9	.5
	8			31.4	.5

1873				
July	19	11'	20.0"	
	24		20.6	+.6
	29		21.1	.5
Aug.	3		21.6	.5
	8		22.1	.5

1872 Aug. 7 −.22 −.222
46 26.8 / 28.9 / 31.1 / 35.4 / 37.5 / 39.7 / 41.8 / 43.9 / 48.1 / 50.3 / 52.5 / 436.0
46 19.1 / 20.1 / 21.0
39.636 46 20.07
46 39.62
46 16.72
+22.90
~~+22.86~~
+22.92
−22.82 +.00
−.06 −.06
−1.51 +1.22
−24.39
39.62
15.23
46 15.23 17.96
+0.59
15
0 56.4
56.4
112.8
15 56.40
+19.57
1.29159
1.39187n
−24.65
15 56.40
15 21.75
7 16.60
−1426
1.45654
+ 28.61
− .05
+ .07
− 28.59
6 48.01 6 47.92
11 31.3
4 43.8 43.2
+4 43.6 43.5
−11.23
−4.90 — 4.90
+4 44.05 −.09 ~~43.96~~
+4 39.15 +4 43.64
11 27.16 — .27
+4 38.47
11 26.39
20.06

1872 Aug 10 −.27 −.266
46 34.7 / 36.7 / 38.9 / 43.1 / 45.3 / 47.4 / 49.6 / 51.8 / 56.0 / 58.1 / 0.2 / 461.8 / 521.8
46 24.4 / 26.2 / 27.1
47.436 46 25.90
46 47.42
46 16.69
+30.73
~~+30.69~~
+30.75
−30.67 +.00
−.07 −.07
−1.47 +1.26
−32.21
47.42
15.21
46 15.21 17.94
+0.54
15
0 58.0
57.1
115.1
15 57.55
+21.54
1.33325
1.43353n
−27.13
15 57.55
15 30.42
7 17.93
− 28.70
− .06
+ .07
− 28.69
6 49.24 6 49.15
11 31.6
+4 42.4 42.3
+4 42.7 42.6
−11.63
−5.30 — 5.30
+4 43.83 −.09 43.74
+4 38.53 +4 43.26
11 27.77 — .24
+4 37.72
11 26.87
20.54

1873 July 20 −.38 −.354 ^
46 14.6 / 16.7 / 18.9 / 23.1 / 25.2 / 27.3 / 29.4 / 31.6 / 36.0 / 38.1 / 40.1 / 301.0
46 8.5 / 10.0 / 11.4
27.364 46 9.97
46 27.35
46 19.81
+7.54
~~+7.50~~
+7.56
−7.44 −.01
−.10 −.10
−1.87
−9.41
27.35
17.94
46 17.93
+1.56
10
0 12.8
20.0
32.8
10 16.40
+17.39
1.24030
1.34058n
−21.91
10 16.40
9 54.49
12 53.86
+27 11 2 = ~~1.47~~080
−1236
1.45844
+ 28.74
− .04
+ .01
− 28.77
12 25.09 12 25.07
11 20.2
−1 4.9 4.9
−1 4.6 4.6
−0.20 — 0.20
−1 4.15 −.02 ~~4.17~~
−1 4.35 −1 4.86
11 20.74 — .71
−1 5.77
11 19.30

July 24 −.48 −.498
46 16.9 / 19.0 / 21.1 / 25.5 / 27.5 / 29.7 / 31.8 / 34.0 / 38.2 / 40.3 / 42.5 / 326.5
46 11.4 / 12.7 / 13.8
29.682 46 12.63
46 29.67
46 19.78
+9.89
~~+9.15~~
+9.91
−9.72 +.00
−.13 −.13
−1.84
−11.69
29.67
17.98
46 17.98
+1.60
10
0 11.8
21.8
33.6
10 16.80
+17.05
1.23172
1.33200n
−21.48
10 16.80
9 53.32
12 53.03
−1912
1.45168
+ 28.29
− .04
+ .01
− 28.32
12 24.71 12 24.69
11 20.6
−1 4.1 4.1
−1 3.8 3.8
−0.60 — 0.60
−1 3.54 −.02 ~~3.56~~
−1 4.14 — 3.68
11 20.57 — .43
−1 5.01
11 19.68

July 26 −.48 −.485
46 18.6 / 20.7 / 22.8 / 27.0 / 29.2 / 31.3 / 33.4 / 35.6 / 39.9 / 42.0 / 44.1 / 344.6
46 9.1 / 10.6 / 11.7
31.327 46 10.47
46 31.31
46 19.76
+11.55
~~+11.67~~
+11.57
−11.40 +.01
−.13 −.13
−1.82
−13.35 4
31.31
17.96
46 17.97
+1.62
10
0 10.3
26.1
36.4
10 18.20
+20.86
1.31931
1.41959n
−26.28
10 18.20
9 51.92
12 56.43
−1891
1.45189
+ 28.31
− .06
+ .01
− 28.36
12 28.07 28.05
11 20.8
−1 7.3 7.3
−1 7.0 7.0
−0.80 — 0.80
−1 3.74 −.02 ~~3.76~~
−1 4.54 4.09
11 23.53 .74
~~2~~ −1 5.63
11 22.42

Aug 4 −.55 −.549
46 25.7 / 27.9 / 29.9 / 34.1 / 36.3 / 38.5 / 40.8 / 42.8 / 47.1 / 49.1 / 51.3 / 423.5
46 14.7 / 15.6 / 16.7
38.500 46 15.67
46 38.48
46 19.67
+18.81
~~+18.77~~
+18.83
−18.63 +.00
−.15 −.15
−1.73
−20.51
38.48
17.97
46 17.97
+1.69
10
0 14.9
25.1
40.0
10 20.00
+22.83
1.35851
1.45879n
−28.76
10 20.00
9 51.24
12 57.11
−1353
1.45727
+ 28.66
− .07
+ .01
− 28.72
12 28.39 28.37
11 21.7
−1 6.7 6.7
−1 6.4 6.4
−1.70 — 1.70
−1 4.35 −.02 4.37
−1 6.05 4.52
11 22.34 — .77
−1 6.99
11 21.38

1873 aug 9	aug 11
17.95	17.91
19.41	20.31

Gr 2391 = 14

Young δ = +4,600

K = −.072

Sin δ 9.98997
Cos δ 9.32728
11571n
9.42299n

h	m	s	
16	48	43	
16	48	42	
+ 77°		44′	″
+	77	43	34
z = −	35°	20′	46″
	−11.58		

	July 3 1872 −.349	July 6 1872 −.357	July 7 1872 −.319	July 9 1872 −.284	July 11 1872 −.349	July 14 1872 −.301
16	48 39.9 ~~47.6~~ 46 41.7	48 44.2 46 55.2	48 45.6 47 52.6	48 45.9 47 22.1	48 44.4 47 31.2	48 42.4 47 20.6
	44.4 48.1	49.2 59.0	50.3 ? 57.6	50.3 25.4	49.2 37.2	47.1 28.6
	49.3 52.6	54.0 3.3	55.2 4.8	55.8 29.0	54.2 40.8	51.9 35.0
	54.1	58.9	59.8	0.2	58.8	56.7
	59.1	3.5	4.6	5.3	3.7	1.4
	3.7	8.2	10.1	9.9	8.8	6.3
	8.7	13.0	14.8	14.8	13.4	17.2
	13.6	18.2	19.3	19.3	18.3	16.1
	18.6	23.0	24.2	24.8	23.2	21.0
	291.4	272.2	283.9	226.5	274.0	254.1
	531.4	32.2	43.1	46.5	34.0	14.1
	59.044 ~~47.6~~ 46 47.47	3.578 46 59.17	4.878 47 ? (55.00)	5.167 47 25.50	3.778 47 36.40	1.567 47 28.07
	48 58.97	49 3.51	49 4.81	49 5.10	49 3.71	49 1.50
	−2.36	−7.21	−8.48	−9.15	−7.52	−5.71
	−1.60	−1.64	−1.46	−1.30	−1.60	−1.38
	−5.28	−5.09	−5.03	−4.89	−4.76	−4.54
	48 49.73	~~49 10.43~~ 48 49.57	~~49 10.06~~ 48 49.84	~~49 10.24~~ 48 49.76	~~49 10.18~~ 48 49.83	~~49 10.13~~ 48 49.87

	+0.87	+0.83		+0.79	+0.77	+0.73
40	4 33.1	4 45.9	4 29.3	4 38.8	4 34.5	4 34.2
	22.4	34.9	19.6	28.1	23.1	23.8
	55.5	80.8	48.9	66.9	57.6	58.0
	44 27.75	44 40.40	44 24.45	44 33.45	44 28.80	44 29.00
	+ 71.57 ~~+71.57~~	+ ~~6~~2 4.41 + 124.41	+ 69.88	+ ~~2~~9 9.67	+ ~~2~~8 7.38	+ ~~3~~9 3.50
	1.85473 ~~2.06936~~	1.80895 2.09486	1.84435	~~1.59846~~ 1.99856	~~1.43743~~ 1.94141	~~1.52504~~ 1.97081
	1.29772n ~~0.36632~~	1.25194n 1.53785n	1.28734n	~~1.04123~~n 1.44155n	~~0.88042~~n 1.38440n	~~0.96803~~n 1.41380n
	−19.85 ~~−3.21~~	−17.86 −34.50	+− 19.38	− ~~11.00~~ −27.64	~~7.59~~ − 24.23	~~9.29~~ −25.93
	44 27.75 ~~27.75~~	44 40.40	44 24.45	44 33.45	44 ~~28.80~~	44 29.00 ~~3.07~~
	44 7.90 ~~24.54~~	44 ~~22.54~~ 5.90	44 5.07	44 22.45 5.81	44 ~~21.21~~ 4.57	44 ~~19.71~~ 3.07
+77°	38 40.45 ~~28.81~~ ~~26.19~~ 40.46	38 ~~28.81~~ 42.45	38 43.28	38 ~~28.70~~ 42.54	38 ~~27.14~~ 43.78	38 ~~28.64~~ 45.28
−35 20 37 = 1.61080n	−2018 1.59062n	−1329 1.59751n	−1382 1.59698	−1300 1.59780n	−2075 1.59005n	−1763 1.59317n
	± 38.96	± 39.58	+ 39.53	± 39.61	± 38.91	± 39.11
	.60	.50 1.80	− .56	~~.18~~ 1.14	~~.09~~ .87	~~.13~~ 1.00
	+ .36	+ .38	+ 36	+ .87	+ .36	∓ .45
	+ 38.72 39 18.73	+ ~~39.46~~ 38.16 39 20.14	+ 39.33	+ ~~39.80~~ 38.84 39 20.92	+ ~~39.18~~ 38.10 39 21.43	+ ~~39.51~~ 38.64 39 23.47
+77	39 19.17 25.37 39 ~~2.04~~	39 5.27 20.61 ~~4.80~~	39 22.61 39 22.17	39 5.70 21.38 ~~5.24~~	39 ~~6.32~~ 21.88 ~~5.87~~	39 7.15 ~~23.72~~ ~~8.10~~ 7.10
	− 6.39 − 6.39	− 7.13 − 7.13	− 7.37	− 7.84 − 7.84	− 8.30 − 8.30	− 8.96 − 8.96
	+ 4 45.23 − 44 ~~44.49~~	+ 4 44.71 − 47 ~~44.24~~	− 44 + 4 44.75	+ 4 44.68 − 46 ~~44.49~~	+ 4 44.89 − 45 ~~44.44~~	+ 4 44.14 − 45 43.69
	+ 4 38.84 + 4 44.84	+ 4 37.58 + 4 44.66	+ 4 37.38	+ 4 36.84 + 4 44.50	+ 4 36.59 + 4 44.51	+ 4 35.18 + 4 43.41
+77	43 ~~38.01~~ + 50	43 42.85 + 18		43 42.54 + 45	43 42.91 + 44	43 43.33 + 42
	41.37 + 4 38.95	+ 4 37.91		+ 4 37.11	+ 4 36.65	+ 4 33.27
	+ 43 47.04	43 42.71		43 42.35	43 42.52	43 42.97

16 48 55
+77° 44′ 4″

α 1872 = 48 49.750
α 1873 = ~~47~~ 47.085 δ = 51.83″

July 15 1872 −.336
48 41.4 47 30.3
46.2 33.8
51.3 38.8
56.0
0.9
5.5
10.5
15.4
20.4

247.6
7.6
49 0.844 47 34.30

49 0.77
−4.91
−1.54
−4.46

49 ~~10.14~~
48 49.88

+0.72
4 33.2
22.9
5 6.1
44 28.05
+86.54
1.93722
1.38021n
−2400
44 2805
44 4.05
38 44.30

−2147
1.58933n

± 3884
~~107~~.86
+ .45

+ 38.22 43
39 22.52 43 + 39
9.17 −
+4 44.61 45
+4 35.44 +4
43 57.96 +4
+43

22.07 28
9.17
~~44.16~~
44.15
.41
35.39
57.46

July 16 1872 −.308
48 40.9 47 49.6
45.7 54.5
51.0 58.6
55.4
0.4
5.2
9.8
14.8
19.7

242.9
2.9
0.322 47 54.20

49 0.25
−4.50
−1.41
−4.39

49 ~~10.05~~
48 49.95

+0.72
4 26.4
16.3
427
44 21.35
+66.12 √
1.82033
1.26332n
−1834
44 2135
44 3.01
38 45.34

−2065
1.59015n

± 3892
.49
+ .44

+ 3887
39 24.21
− 9.37 −
+4 43.91 − 44
+4 34.54 +4
43 58.75 + 4
43

23.77
9.37
~~43.40~~
43.28
.41
34.32
58.09

July 22 1872 −.285
48 39.6 47 40.1
44.3 44.2
49.4 47.8
54.2
58.8
3.7
8.5
13.3
18.3

290.1
530.1
58.908 47 44.03

48 58.83
−3.96
−1.31
−3.90

Gr. mir.

48 49.66

1872 Aug 4 49.51″
6 49.60
5 49.83 57.17″
7 49.79 57.91

+0.68
4 27.0
17.0
440
44 2200
+74.87
+~~13.87~~
1.87431
1.31730n
−2076
44 2200
44 1.24
38 47.11

−1031
1.59949n

39.76
± ~~3886~~
.62
+ .09

+ 39.23
39 26.34
− 10.55 −
+4 43.31 − 44
+4 32.76 +4
43 57.10 + 4
43

25.90
10.55
~~40.84~~
42.99
.39
32.83
58.73

July 25 1872 −.266
48 47 29.4
38.2 30.1
43.4
48.1
53.1
58.2
49 2.7
7.7
12.4
17.5

281.3
521.3
57.922 47 29.75

48 57.85
−3.43
−1.22
−3.65

48 49.55

Aug 20
Aug 24
1873. July 26
Aug 4
9
11

+0.65
40
4 32.9
22.1
550
44 27.50
+88.17
+~~28.17~~
1.94532
1.38831n
−2445
44 27.50
44 3.05
38 45.30

−1048
1.60032n

± 39.84
.88
+ .09

+ 39.05
39 24.35
− 11.08 −
+4 45.35 − 45
+4 34.27 +4
43 58.62 + 4
43

23.90
11.08
~~44.90~~
45.12
.37
34.41
58.31

July 28 1872 −.234
48
37.6
42.7
47.6
52.3
57.1
49 2.0
6.9
11.8
16.6

274.6
514.6
57.178

48 57.11
−2.93
−1.07
−3.38

48 49.73 52.73″
49.08 52.35
47.17
48 47.18 51.42
47.37 51.34
46.84 51.56
46.92 51.61

+0.63
40
4 36.1
24.5
606
44 30.30

Aug 1 1872 −.268
48 47 12.1
41.7 15.7
46.8 20.5
51.5
56.7
49 1.5
5.9
11.3
15.8
20.8

252.0
12.0
1.333 47 δ 24.15
47 16.10

49 1.26
−7.30
−1.23
−3.01

49 ~~10.28~~
48 49.72

+0.59
40
4 36.3
22.8
591
44 29.55
+105.23
+~~97.18~~
2.02215
1.46514n
−~~2.92~~ −29.18
44 29.55 44 29.55
44 ~~26.63~~ 44 0.37
38 47.98

−940
1.60140n

± 39.94
1.25
+ .09

+ 3878
39 26.76
− 12.16 −
+4 43.11 − 45
+4 30.95 +4
43 57.71 + 4
43

26.31
12.16
42.66
42.91
.34
31.09
57.40

K Ophiuchi:

16h 51m 36s
16 51 39
+ 9° 34′
+ 9 34 27
ζ = +32° 48′ 21″
+.54

tan y δ = +.17
x = −.016
anx = +.04

α1872 36.561 δ = 34′ 32.89″
α1873 39.395 δ = 34 27.00
dα = +2.834
dδ = −5.89

1872
July 19 51m 38.27s
24 :23 .04
29 :19 4
Aug. 3 .14 .5
8 38.08 6

1873
July 19 51m 41.28s
.24 4
.20 4
.15 5
41.10 5

July 16 1872 −.31 −.308
16 51 30.4
32.4
34.6
38.7
40.9
42.9
45.0
47.1
51.3
53.3
55.4
472.1
51 24.9
25.8
26.8
42.918 51 25.83
51 42.90
51 38.29
+4.61
~~+4.57~~
−4.49 −.01
−.05
−1.73
−6.278
51 42.90
5 36.63
−.05
+1.10
51 36.62 51 39.45
+0.72
51
2 44.2
44.1
88.3
52 44.15
+17.09
1.23274
1.34237n
−2200
52 44.15
52 22.15
+9° 30′ 26.20″
+32 47 37 = 1.56920
−2065
1.54855
−x 35.36
.03
∓ .27
+9 − 29 35.12
29 51.08
34 34.84
+4 43.33
−7.39
−1.80
43.0
+29 50.81
+4 43.91 −27
+4 42.41 ÷
+9 34 23.49 ∓4
43.64
1.50
43.28
38
∓4 41.40
+34 32.21
34 26.32

July 22 1872 −.285 −.28
51 29.8
31.8
33.9
38.2
40.3
42.4
44.5
46.4
50.7
52.8
54.8
465.6
51 38.6
42.327 51 38.60
51 42.31
51 38.24
+4.07
~~+4.03~~
−3.96 +.00
−.05
−1.68
−5.69
42.31
36.62
−.05
+1.15
51 36.62 39.45
+0.68
50
2 24.8
24.0
48.8
52 24.40
+3.73
0.57171
0.68134n
−1480
52 24.40
52 19.60
30 28.75
−1031
1.55889
−x 36.21
.00
∓ .05
− 36.16
29 52.59
34 34.9
+4 42.3
−7.89
−2.00
42.1
+29 50.81
52.35
+4 43.31 −24
+4 41.31 ÷
34 33.90 ∓4
43.07
2.00
42.99
36
∓4 40.63
34 32.98
27.09

July 25 1872 −.266 −.26
51 29.3
31.3
33.5
37.7
39.7
41.9
43.9
46.0
50.1
52.2
54.3
459.9
51 33.2
24.1
24.9
41.809 51 24.07
51 41.79
51 38.22
+3.57
~~+3.53~~
−3.42 −.01
−.04
−1.66
−5.124
41.79
36.67
−.05
+1.17
51 36.65 39.48
+0.65
50 45.0
2 ~~46.0~~
~~50.0~~
43.0
88.0
52 44.00
+17.74
~~+16.74~~
1.24895
1.35858n
−2283
52 44.00
52 21.17
30 27.18
−1048
1.55872
−x 36.20
.03
∓ .05
− 38.18
29 ~~49.00~~
34 35.1
4900
~~51.00~~
48.73
+4 44.1 46.1
−8.09
−2.20
45.8
+4 45.35 −27
+4 43.15 ÷
34 32.15 ∓4
45.08
2.20
45.12
35
∓4 42.57
34 31.30
25.41

July 27 1872 −.233 −.23
52 29.1
31.1
33.3
37.5
39.7
41.7
43.7
45.8
50.1
52.2
54.2
458.4
52 26.6
27.3
28.0
41.673 52 27.30
52 41.66
51 38.21
+3.45
~~+3.41~~
−3.29 −.01
−.04
−1.65
−4.989
41.66
36.68
−.05
+1.17
51 36.67 39.50
+0.64
50
2 39.9
38.1
78.0
52 39.00
+14.37
1.15746
1.26709n
−1850
52 39.00
52 20.50
30 27.83
−1160
1.55760
−x 34.11
.02
∓ .05
− 36.08
29 51.75
34 35.3
51.48
+4 41.6 43.6
−8.29
−2.40
43.3
+4 43.39 −27
+4 40.99 ÷
34 32.74 ∓4
43.12
2.40
43.43
34
∓4 40.69
34 32.17
26.25

July 28 1872 −.234 −.23
51 28.8
30.8
32.9
37.1
39.2
41.2
43.3
45.4
49.6
51.7
53.7
453.7
51 20.1
21.8
23.0
41.245 51 21.63
51 41.23
51 38.20
+3.03
~~+2.99~~
−2.93 +.00
−.04
−1.64
−4.61
41.23
36.62
−.04
+1.18
51 36.62 39.45
+0.63
50
2 46.0
45.0
91.0
52 45.50
+19.61
1.29248
1.40211n
−2524
52 45.50
52 20.26
30 28.09
−1053
1.55867
−x 36.20
.04
∓ .06
− 36.18
29 51.91
34 35.4
51.63
+4 43.5
−8.39
−2.50
43.2
+4 44.50 −28
+4 42.00 ÷
34 33.91 ∓4
44.22
2.50
44.36
34
∓4 41.52
34 33.15
27.26

Aug 1 1872 −.268 −.27
51 41.4
42.6
43.6
44.7
45.7
46.6
47.7
48.7
49.8
410.8
51 28.4
29.3
30.4
45.644 51 29.37
51 45.63
51 38.16
+7.47
~~+7.43~~
−7.32 +.01
−.05
−1.60
−8.976
45.63
36.66
−.04
+1.19
51 36.67 39.50
+0.59
50
2 40.9
38.8
79.7
52 39.85
+16.27
1.21139
1.32102n
−2094
52 39.85
52 18.91
30 29.44
−940
1.55980
−x 36.29
.02
∓ .05
− 36.26
29 53.18
34 35.8
52.91
+4 42.6 42.3
−8.79
−2.90
+4 43.11 −27
+4 40.21 ÷
34 33.39 ∓4
42.84
2.90
42.91
.31
∓4 39.70
34 32.61
26.72
−.05
+1.23

sin δ 9.22062
cos δ 9.99392n
.11571
.10963n

1872		°	′	″	
July	19	+9	34	34.6	
	24			35.0	+.4
	29			35.5	.5
Aug	3			36.0	.5
	8	9	34	36.5	.5

1873			″	
July	19	34	25.8	
	24		26.3	+.5
	29		26.8	.5
Aug	3		27.3	.5
	8		27.8	.4
	13		28.1	.3

1873	α	δ
July 26	3949	2610
Aug 4	39.59	2698
9	3944	2620
11	3940	25.69
12	39.48	2680

Aug 4 1872 −.167 −.15

51 40.6 51 38.4
42.7 39.3
44.8 40.0
49.0
51.1
53.2
55.2
57.3
52 1.5
3.5
5.7
404.6
584.6
53.145 51 39.23

51 53.13
51 38.13
+15.00
~~+14.96~~

−14.88 +.01
− .03 −.03
−1.57 +1.16
−1648 7
53.13
36.65

51 36.66 39.49

+0.57

50
2 36.0
34.1
70.1
52 35.05

+13.91
1,14333
1.25296n
−1791
52 35.05
52 17.14

30 31.21

−414
1,56506

−★ 36.73
— .02
+ .21

— 36.54
29 54.67 29 54.41
34 36.1
+4 41.1 41.1
−9.09
−3.20
+4 42.75 −.26 ~~42.49~~
+4 39.55 — 3.20
34 34.22 +4 42.42
.30
+4 38.92
+34 33.33
34 27.44

Aug 6 1872 −.248 −.24

51 45.6 57 40.2
47.7 40.9
49.8
54.1
56.1
58.3
52 0.3
2.3
6.6
8.6
10.7
340.1
640.1
58.191 ~~51 40.37~~
51 40.55

51 58.18
51 38.10
+20.08
~~+20.04~~

−19.96 +.00
− .04 −.04
−1.54 +1.19
−2154
58.18
36.64

51 36.64 39.47

+0.57

50
2 42.5
40.8
83.3
52 41.65
+17.64

+~~17.82~~
1,24650
1.35613n
−2271
52 41.65
52 18.94

30 29.41

−1197
1,55723

−★ 36.08
— .03
+ .22

— 35.89
53.25 29 53.52
34 36.3
+4 42.8 42.5
−9.29
−3.40
+4 43.45 −.27 ~~43.18~~
+4 40.05 — 3.40
34 33.57 +4 43.30
.30
+4 37.60
34 32.85
26.96

Aug 7 −.222 −.22

51 48.6
50.6 51 41.1
52.7 42.2
56.9 43.0
58.9
1.0
3.1
5.2
9.3
11.4
13.6
311.3
11.3
1.027 51 42.10

52 1.01
51 38.09
+22.92
~~+22.88~~

−22.82 +.00
− .04 −.04
−1.53 +1.30
−2439
52 1.01
36.62

51 36.62 39.45

+0.55

50
2 44.8
45.0
89.8
52 44.90

+18.93
1,27715
1.38678n
−2437
52 44.90
52 20.53

30 27.82

−1426
1,55494

−★ 35.89
— .03
+ .22

— 35.70
51.85 29 52.12
34 36.4
+4 44.3 44.0
−9.39
−3.50
+4 44.05 −.27 ~~43.78~~
+4 40.55 — 3.50
34 32.67 +4 43.64
.29
+4 39.85
34 31.70
25.81

Aug 10 1872 −.266 −.27

51 56.4
58.4 51 48.5
0.6 49.7
4.6 50.9
6.8
8.8
11.0
13.0
17.1
19.2
21.3
217.2
97.2
8.836 51 49.70

52 8.82
51 38.05
+30.77
~~+30.73~~

−30.67 +.00
− .05 −.05
−1.49 +1.34
−3221
8.82
36.61

51 36.61 39.44

+0.54

50
2 44.8
44.9
89.7
52 44.85

+19.14
1,28194
1.39157n
−2463
52 44.85
52 20.21

30 28.14

+35.80
− .13
+ .22

−35.61
29 52.53 29 52.26
34 36.7
+4 44.2 43.9
−9.69
−3.80
+4 43.83 −.27 ~~43.56~~
+4 40.03 — 3.80
34 32.56 +4 43.26
.29
+4 39.17
34 31.43
25.54

1873 July 23 −.504 −.48

51 37.9
40.0 51 27.0
42.0 28.1
46.2 29.4
48.3
50.5
52.5
54.6
58.8
0.9
3.0
434.9
554.7
50.427 51 28.17

51 50.41
51 41.25
+9.16
~~+9.12~~

−8.96 −.01 −.09
− .08
−1.86
−10.9092
51 50.41
39.51

51 39.49

+1.60

45
2 9.8
16.8
26.6
47 13.30

+22.26
1,34753
1.43716n
−2865
47 13.30
46 40.65

336 3.70

+32 47 52 = 1.56930
−1800
1,55130

−★ 35.59
— .04
+ .11

—5 35.52
52.26 34 28.18 35 27.96
34 26.2
−1 2.0 2.2
+0.80
−1 3.07 −.22 ~~3.29~~
−1 2.27 + 0.80
34 25.91 −1 3.14
.86
−1 3.20
34 24.76

July 24 −.498 −.48

51 38.6
40.7 51 28.1
42.8 29.1
47.0 30.0
49.1
51.1
53.4
55.3
59.5
1.6
3.7
442.8
562.8
51.164 51 29.07

51 51.15
51 41.24
+9.91
~~+9.87~~

−9.73 +.00 −.09
− .08
−1.84
−11.6256
51.15
39.50

51 39.49

+1.60

45
2 5.0
16.7
21.7
47 10.85

+22.09
1.34420
1.45883n
−2843
47 10.85
46 42.42

386 5.93

−1912
1,55018

−★ 35.50
— .04
+ .11

— 35.43
35 30.50 35 30.28
34 26.3
−1 4.2 4.4
+0.70
−1 3.54 −.22 ~~3.76~~
−1 2.84 + 0.70
34 27.66 −1 3.68
.86
−1 3.84
34 26.44

ε Herculis

16 55ᵐ 21ˢ
16 55 26
+ 31° 07′
+ 31 06 53
δ = + 11° 15′ 55″
+ .20

Tang δ = +60
x = -.018
corr x = +~~.05~~

″ α1872 23.576 δ = 6′ 58.39″
α1873 25.870 δ = 6 52.85

1872
June 29 55ᵐ 25.47ˢ
July 4 .45 2
9 .43 2
14 .39 4
19 25.35 4
24 .29 6
29 .23 6
Aug. 3 .16 7
8 25.09 7

1873
July 19 55ᵐ 27.81ˢ
24 .75 6
29 .69 6
Aug. 3 .62 7
8 27.55 7

dα = +2.294
dδ = -5.55

July 1 1872 −.40 −.397
16 55 9.3 55 2.2
11.8 3.1
14.2 4.3
19.0
21.4
23.8
26.3
28.7
33.4
35.8
38.1
261.8
23.800 55 3.20
55 23.78
55 25.46
- 1.68
~~- 1.73~~
+ 1.97 -.02
- .24 -.23
-1.88 +0.41
- 0.156
55 23.78
55 23.63
55 23.62 55 25.91
+0.89
20
0 46.0
41.1
87.1
20 43.55
+20.60
1.31387
1.36211ₙ
-2302
20 43.55
20 20.53
+31° 2 27.82
+11 15 36 = 1.05940
-2312
1.03628
- x 10.87″
- .10
- .01
- 10.98
+31 2 16.84 +2 16.77
7 0.7
+4 43.9 43.8
- 7.85
- 2.30
+4 45.90 -.07 ~~45.83~~
+4 43.60 - 2.30
+31 7 0.44 +4 45.21
.18
+4 42.73
+6 59.50
6 53.95

July 3 1872 −.32 −.349
55 13.7 55 5.9
16.1 7.1
18.5 8.3
23.1
26.7
28.1
30.5
33.0
37.6
40.1
42.5
308.9
28.082 55 7.10
55 28.06
25.46
+2.60
~~+2.55~~
- 2.40 +.03
- .19 -.20
-1.88 +0.41
-4.475
28.06
23.59
55 23.61 25.90
+0.87
0 45.7
41.5
87.2
20 43.60
+20.98
1.32181
1.37005ₙ
-2345
20 43.60
20 20.15
2 28.20
-2007
1.03933
- x 10.95
- .10
+ .06
- 10.99
2 17.21 17.14
7 1.1
+4 43.9 43.8
-8.25
-2.70
+4 45.23 -.07 ~~45.16~~
+4 42.53 - 2.70
6 59.74 +4 44.84
.17
+4 41.97
6 59.11
53.56

July 11 1872 −.35 −.349
55 18.8 55 11.2
21.2 12.1
23.7 13.2
28.4
30.9
33.3
35.7
38.0
42.9
45.2
47.7
365.8
33.255 55 12.17
55 33.24
25.42
+7.82
~~+7.77~~
-8.50 -.01
- .21 -.20
-1.84 +0.45
-10.55
33.24
23.69
55 23.69 25.98
+0.77
0 43.9
39.9
83.8
20 41.90
+21.08
1.32387
1.37211ₙ
-2356
20 41.90
20 18.34
2 30.01
-2060
1.03880
- x 10.94
- .10
+ .06
- 10.98
2 19.03 18.96
7 2.8
+4 43.8 43.7
- 9.95
- 4.40
+4 44.89 -.07 ~~44.82~~
+4 40.49 - 4.40
6 59.52 +4 44.51
.15
+4 39.96
10 58.92
53.37

July 14 1872 −.31 −.301
55 16.7 55 10.9
19.3 11.9
21.7 13.0
26.5
28.9
31.3
33.7
36.1
40.9
43.3
45.8
344.2
31.291 55 11.93
55 31.27
25.39
+5.88
~~+5.83~~
- 5.70 +.00
- .19 -.18
-1.81 +0.48
-7.70 .69
31.27
23.57
55 23.58 25.87
+0.73
0 40.8
36.8
77.6
20 38.80
+19.36
1.28691
1.33515ₙ
-2163
20 38.80
20 17.17
2 31.18
-1748
1.04192
- x 11.01
- .08
+ .06
- 11.03
2 20.15 2 20.09
7 3.4
+4 43.3 43.2
10.55
- 5.00
+4 44.14 -.06 ~~44.08~~
+4 39.14 - 5.00
6 59.29 +4 43.81
.15
+4 38.66
10 58.75
53.20

July 23 1873 −.48 −.504
55 22.7 55 18.0
25.1 19.1
27.5 20.7
32.1
34.7
37.0
39.3
41.7
46.7
49.1
51.5
407.4
37.036 55 19.27
55 37.02
27.76
+9.26
~~+9.21~~
- 8.96 -.01
- .29 -.30
-1.89
-11.146
37.02
25.88
25.87 55 25.86
+1.60
180
4 49.8
3.9
183.7
19 56.85
+17.77
1.24969
1.29793ₙ
-1986
19 56.85
19 36.99
3 11.36
-1787
1.04153
6
- x 11.01
- .08
+ .24
- 10.85
8 0.51 8 0.12 20.09
7 ~~5.0~~ 6 56.6
-1 3.9 4.3
-3.80
-1 3.07 -.39 ~~3.46~~
-1 6.87 - 3.80
6 53.64 ~~+4~~ -1 3.14
.32
-1 7.26
6 52.86
~~7.31~~

July 24 1873 −.48 −.498
55 23.5 55 19.8
25.8 21.0
28.1 22.0
33.0
35.4
37.7
40.1
42.6
47.5
49.8
52.0
415.8
37.859 55 20.93
55 37.78
27.75
+10.03
~~+9.98~~
- 9.73 +.00
- .29 -.23
-1.88 .35
-11.906
37.78
25.88
55 25.82
+1.60
10
4 48.9
4.2
113.1
14 56.55
+16.87
1.22712
1.27536ₙ
-1885
14 56.55
14 37.70
8 10.65
+11 15 45 = 1.05950
-1894
1.04056
- x 10.9
- .07
+ .24
- 10.81
7 59.84 7 59.45
7 5.1 6 56.7
-1 3.1 3.5
-3.80
-1 3.54 -.39 ~~3.93~~
-1 7.34 3.50
6 52.50 -1 3.68
.32
-1 7.80
6 51.65

Sin δ 9.71331
Cos δ 9.93253
1.1571 n
.04824 n

	1872	° ′ ″	
June	29	+31 7 0.2	
July	4	1.3	+1.1
	9	2.4	1.1
	14	3.4	1.0
	19	4.3	.9
	24	5.1	.8
	29	5.9	.8
Aug.	3	6.6	.7
	8	7.2	.6

		″	
July 19	6	55.9	
24		56.7	+.8
29		57.4	.7
Aug. 3		58.1	.7
8		58.8	.7

July 26 – .48 (–.485)

md. 9″

55 34.5
37.0
39.3
41.8
44.2
~~47.0~~
~~51.5~~
~~52.8~~

55 25.0
27.4
29.8

39.360 55 ~~27.07~~
55 27.40

55 39.34
27.72
+11.62
~~+11.57~~

– 11.41 +.01
– .29 ~~–.23~~ .29
– 1.85
–13.55 4
39.34
25.79

55 25.80

15
0 58.9
15.0
13.39
16 6.95
+11.96
+12.29
1.07773
1.12597 n
–1336
16 6.95
15 53.59
7 54.76

–1880
1.04070

–* 10.98
– .03
+ .04

– 10.97
8 4.379
7 5.5 6 57.0
.68

– 4.20
–1 3.74
–1 7.94
5

Aug 4 – .55 (–.549)

55 32.2
34.6
37.0
41.7
44.1
46.7
49.0
51.5
56.3
58.8
5 1.0
512.0

55 17.6
19.6
21.6

46.627 ~~45.~~ 55 19.60

55 46.61
27.60
+19.01
~~+18.46~~

–18.63 +.00
– .33 ~~–.26~~ .32
–1.73
–20.698
46.61
25.92

55 25.93

+1.69

15
0 55.0
11.2
12.62
16 3.10
+27.03
1.43185
1.48009 n
–3020
16 3.10
18 32.90
8 15.45

–1378
1.04572

–* 11.11
– .17
+ .04

– 11.24
7 4.21 8 4.20
7 6.8 6 58.3
–1 5.9 5.9

– 5.40
–1 4.35 –.01 ~~4.36~~
–1 9.75 – 5.40
6 54.46 –1 4.51
– .34
–1 10.25
+6 53.95

Aug. 6 – .44 (–.442)

55 32.6
35.0
37.7
42.4
44.7
47.1
49.6
52.0
56.8
59.1
1.6
458.6
518.6

55 26.0
27.1
28.6

47.145 55 27.23

55 47.13
27.57
+19.56
~~+19.51~~

– 19.25 –.01
– .26 ~~–.20~~ .26
– 1.70
– 21.22 X 2
47.13
25.92

55 25.91

+1.71

10
4 49.0
4.0
113.0
14 56.50
+19.91
1.29907
1.34731 n
–2225
14 56.50
14 34.25
8 14.10

–1550
1.02078

–10.49
– .09
+ .20

– 10.38
8 3.72 8 3.33
+7 7.0 6 58.6
–1 5.1 5.5

– 5.80
–1 4.81 –.39 ~~5.20~~
1 10.61 – 5.80
6 53.11 – 5.11
.34
–1 11.25
6 52.08

Aug. 9 – .49 (–.494)

55 33.7
36.1
38.6
43.5
45.9
48.3
50.7
53.0
57.9
56 0.3
2.6
410.6
580.6

55 32.1
32.8
33.0

48.236 55 32.63

55 48.22
27.53
+20.69
~~+20.64~~

– 20.44 –.03
– .29 ~~–.23~~ .29
– 1.66
– 22.39 .42
48.22
25.83

55 25.80

+1.74

10
4 43.1
58.8
101.9
14 50.95
+15.61
1.19340
1.24164 n
–1744
14 50.95
14 33.57
8 14.84

–1315
1.04635

–* 11.13
– .06
+ .19

– 11.00
8 3.84 8 3.46
7 7.4 6 59.0
–1 4.8 5.2

– 6.10
–1 4.51 –.38
1 10.61 – 6.10
6 53.24 – 4.59
.35
–1 11.04
5242

Aug 11 – .44 (–.438)

No Obs.

10
4 27.2
41.0
68.2
14 34.10

(1872)
(1873) ?

Ch. J.
1873
Aug 12 – .48 (+.504)
~~1872~~ 1872 July 23

55 14.8
17.1
19.5
24.4
26.8
29.2
31.6
33.9
38.7
41.1
43.6
320.7

55 5.4
6.6
7.8

29.154 55 6.60

55 29.14
25.30
+3.84
+3.79

– 21.71
– .29 .30
–1.72
–23.72
29.14
542

10
4 53.3
7.2
120.5
15 0.25
+22.55
1.35315
1.40139 n
–2520
15 0.25
14 35.00
8 13.30

– 13
+ .00

20
0 43.2
36.9
80.1
20 40.05

Ephem. for Wash: M. T. transit

ε Urs, Min.

h	m	s	
16	59	16	
16	59	04	
+	82°	15′	
+	82	14′	33
z =	−39°	51′	45″

sin. z = −.64

tang δ = +7.34
x = −.113
N.A. corr α = −.04
N.A. α 1872 = 10.049
P. α 1872 = 9.925
1.077
N.A. α 1873 = 3.665

1872		m	s		
July 1	June 29	59	18.48		
6	July 4		18.02	.44	5
11	9		17.51	.51	6
16	14		16.94	.57	5
21	19		16.32	.62	5
26	24		15.65	.67	4
	29		14.94	.71	3
	Aug 3		14.20	.74	3
	8		13.41	.79	5

Sin δ 9.99601
Cos δ 9.12985
1.11571n
9.24556n

δ 1872 = 14′ 38.13″ (P) dα = −6.388
dδ = −5.28
δ 1873 = 14 32.84 (P)

	July 1 1872 −.347 −.40	July 3 1872 −.349 −.32	July 6 1872 −.357 −.35	July 7 1872 −.379 −.31	July 9 1872 −.284 −.29	July 11 1872 −.349 −.35
16	58 49.2	58 52.8 58 55.1	58 57.3 58 36.6	58 58.1 58 3.4	58 58.3 58 5.5	58 57.2 59 4.8
	56.8	0.5	4.8 41.5	5.8 10.9	5.6 5.9	5.1 56 40.6
	3.9	7.8	12.4 49.0	13.4 19.5	13.7 6.8	12.7 51.5
	11.5	15.2	20.3	20.7	21.5	20.0 57.7
	19.7	22.1	28.0	28.6	28.8	27.4
	27.4	30.5	35.2	36.3	36.4	35.1
	34.6	38.5	43.5	43.5	43.9	42.4
	42.0	46.1	50.5	51.3	51.4	50.8
	49.9	53.6	58.1	59.3	59.5	58.5
				~~58.~~		
	295.0	267.1	310.1	317.0	318.1	309.2
	175.0	207.1	250.1	257.0	258.1	249.2
	19.444	23.011 58 55.10	27.789 58 42.37	28.556 58 11.27	28.675 58 6.07	27.689 59 4.80 56 49.93
	59 19.33	59 22.90	59 27.68	59 28.44	59 28.56	59 26.98
	59 18.39	59 18.12	59 17.83	59 17.73	59 17.51	59 17.29
	+1.03	+4.78	+9.85	+10.71	+11.05	+9.69
	+1.07	+4.82	+9.89	+10.75	+11.09	+9.73
	+1.96 −.02	−2.41 +.03	−7.23 +.01	−8.49 +.01	−9.15 +.00	−8.50 −.01
	−2.94 −2.91	−2.35 −2.56	−2.57 −2.62	−2.28 −2.34	−2.13 −2.08	−2.57 −2.56
	−8.25 −14.64	−8.07 −14.46	−7.78 −14.17	−7.68 14.07	−7.46 13.85	−7.24 13.63
	−9.232	−~~12.83~~ 13.01	−17.88 .62	−18.45 .50	−18.74 .69	−18.31
	59 19.33	22.90	27.68	28.44	28.56	26.98
	59 10.10	10.07	10.10	9.99	9.82	9.67
	59 10.11 59 3.72	59 9.89 3.30	59 10.06 3.67	59 9.94 3.55	59 9.87 3.48	59 9.67 3.28
		+0.83	+0.87	+0.82	+0.79	+0.77
10						
	4 3.0	3 46.0	3 49.0	3 53.2	3 54.2	4 4.8
	51.3	34.8	38.8	41.9	43.0	52.9
	11 43	808	878	951	972	1177
	13 57.15	13 40.40	13 43.90	13 47.55	13 48.60	13 58.85
		+27.91	+45.42	+77.29	+82.61	+2289 136.14
		1.44576	1.65725	1.88812	1.91703	1.35965 2.13399
		0.69132n	0.90281n	1.13368n	1.16259n	0.60521n 1.37955
		−4.91	−7.99	−13.60	−14.54	−5.03 −23.96
		13 40.40	13 43.90	13 47.55	13 48.60	13 58.85 58.85
		13 35.49	13 35.91	13 33.95	13 34.06	13 53.82 34.89
	+82°	9 12.86	9 12.44	9 14.40	9 14.29	8 9 53.53 13.96
	−39 51	10 = 1.68150n				
		−1996	−1288	−1348	−1264	−2045
		1.66154n	1.66862n	1.66802n	1.66886n	1.66105n
		+ 45.87	+ 46.62	+ 46.56	+ 46.65	+ 45.83
		− .06	− .14	− .42	− .51	− 1.39
		+ .30	+ 30	+ .30	+ .30	+ 32
		+ 46.11	+ 46.78	+ 46.44	+ 46.44	+ ~~46.10~~ +44.79
	+82	9 58.97 +9 58.60	9 59.22 9 58.85	10 0.84 10 0.46	9 10 0.73 10 0.35	9 10 9 39.63 58.28 57.85
		14 44.3	14 ~~45.1~~ 45.1	14 45.3	14 45.8	14 46.3
	+4	4 45.3 44.9	4 45.9 45.5	+4 44.5 44.1	+4 45.1 44.7	+4 4.7 48.0 47.6
		−11.48	−12.28	−12.48	−12.98	−13.48
		−6.20	−7.00	−7.20	−7.70	−8.20
		+4 45.23 −.37 ~~44.86~~	+4 44.71 −.37 ~~44.34~~	+4 44.75 −.38 ~~44.37~~	+4 44.68 −.38 ~~44.30~~	+4 44.89 −.40 ~~44.49~~
		+4 39.03 − 6.20	+4 37.71 − 7.00	+4 37.55 − 7.20	+4 36.98 − 7.70	+4 36.69 − 8.20
	+82	14 38.00 +4 45.21	14 36.93 + 44.84	14 38.39 + 44.40	14 37.71 + 44.50	~~16.32~~ + 44.51
		−.74 + .53	−.74 + .55	−.74 + .52	−.74 + 50	34.94 + 49
	+82	14 37.26 +4 39.54	14 36.19 +4 38.39	14 37.65 +4 37.72	14 36.97 +4 37.30	−.74 +4 36.80
		+14 38.14	14 37.24	14 38.18	14 37.65	14 34.20 14 34.65
		14 32.86	31.96	32.90	32.37	29.37

1872

			"	"
June	29	82° 14'	433	
July	4		44.6	1.3
	9		45.8	1.2
	14		47.0	1.2
	19		48.0	1.0
	24		49.0	1.0
	29		49.8	0.8
Aug.	3		50.6	0.8
	8		51.2	0.6

1872.0

α	δ
10.11	37.26
9.77	36.19
9.89	37.65
10.06	36.97
9.94	34.20
9.87	37.26
9.67	34.63
10.13	36.87
10.04	37.18
9.61	37.22
9.84	37.74
9.92	37.66
9.92	37.71
10.02	37.28
9.88	35.32
9.98	38.06
9.92	37.48
9.87	36.70
10.19	
10.19	
9.944	37.13 +1.48 38.61
.925	38.13 .13
+.019	~~-1.00~~ +48

1873.0

α	δ
3.58	32.49
3.51	32.09
.82	31.22
.37	30.87
.57	31.26
.45	30.56
.63	31.67
.48	31.37
3.551	31.44 +2.82 34.26
.539	32.84 32.84
+.012	~~-1.40~~ +1.42

July 14 1872 -.31 -.301

58 54.3 58 46.2
2.1 49.3
10.1
17.0
25.1
32.7
40.4
47.9
55.8

285.4
225.4
25.044 58 47.75

59 24.93
59 16.94
+7.99
+8.03

-5.70 +.00
-2.28 -2.21
-6.89 -13.28
-14.870
24.93
10.06

59 10.13 3.74

+0.73

3 44.1
33.0
77.1
~~13 38.85~~
13 38.55
+37.29
1.57169
0.81715n
-656
13 38.55
13 31.99

9 16.36

-1733
1.66417n

+ 46.15
- .11
+ .36

+ 46.40
10 2.76 10 2.40
14 47.0
+4 44.2 43.8
-14.18
-8.90
+4 44.14 -.36 ~~43.78~~
+4 35.24 - 8.90
14 .3800 +4 43.81
-.74 + .46
14 37.26 +4 34.37
14 36.74
34.49

July 16 1872 -.31 -.308

58 53.3 ~~59 45.9~~
0.7 56 40.20
8.3
16.4
23.3
30.6
38.5
46.6
54.4

272.1
212.1
23.567 ~~59 45.90~~
56 40.2

59 23.45
59 16.70
+6.75
+6.79

-4.49 -.01
-2.28 -2.26
-6.65 -13.04
-13.421
23.46
10.03

59 10.04 3.65

+0.72

3 3.1
53.1
116.2
58.10
-22.33
~~+37.67~~ +163.4
1.34889n 2.21325
0.59445 1.45881
+3.93 28.76
1 58.10 58.10
14 2.03 26.86

8 46.32 21.49

-2057
1.66093n

+ 45.81
- ~~.03~~ .194
+ .40

+ 46.18 44.27
10 ~~32.50~~ 5.76 5.36
14 47.4
+5 49 41.2
-14.88
-9.30
+4 43.91 -.40 ~~43.51~~
+4 34.61 - 9.30
40.37 + 43.28
-.74 + .46
39.63 +4 34.44
14 39.80
34.52

July 20 1872 -.28 -.312

58 51.8 58 7.2
59.6
7.5
14.7 00 1.2
22.3
30.1
37.6
45.2
53.2

322.0
202.0
22.444 58 7.20
0 1.20

59 22.33
59 16.20
+6.13
+6.17

-4.33 +.05
-2.06 -2.29
-6.15 -12.54
-12.5472
22.33
9.77

59 9.61 3.22

+0.69

3 49.3 3 28.9
38.3 17.8
87.6 46.7
13 43.80 13 23.35
+75.24 -38.76
1.87645 1.58838n
1.12201n 0.83394n
-13.24 +6.82
13 43.80 13 23.35
13 30.56 13 30.17

9 17.99 9 18.18

-1586
1.66564n

+ 46.31
- .41
+ .37

+ 46.27
10 4.06 10 3.69
14 48.2
+4 44.1 43.7
-15.38
-10.10
+4 43.65 -.37 ~~43.28~~
+4 33.55 - 10.10
14 37.61 + 43.92
-.74 + .44
14 36.87 +4 34.26
14 37.95
35.67

July 22 1872 -.28 -.285

58 51.6 57 56.6
58.9 5.9
6.2 16.0
14.2
21.8
29.4
37.5
45.1
52.3

317.0
197.0
21.889 ~~58 6.00~~
58 6.17

59 21.76
59 15.92
+5.84
+5.88

-3.96 +.00
-2.06 -2.09
-5.87 -12.26
-11.8992
21.76
9.87

59 9.84 3.45

+0.68

3 47.0
37.2
84.2
3 42.10
+75.72
~~+15.89~~
1.87921
1.12477n
-13.33
13 42.10
13 28.77

9 19.58

-1074
1.67076n

+ 46.86
- 40
+ 07

+ 46.53
10 6.11 10 5.74
14 48.6
+4 42.5 42.1
-15.48
-10.50
+4 43.31 -.37 ~~42.94~~
+4 32.81 - 10.50
14 38.92 + 43.81
-.74 + .43
14 37.18 +4 33.74
14 39.48
34.20

July 24 1872 -.27 -.260

58 50.6 57 47.9
58.2 0.6
5.7 6.7
13.4
20.7
28.4
36.3
44.4
51.7

309.4
189.4
~~19.433~~ 57 58.40
21.044

59 20.93
59 15.65
+5.28
+5.32

-3.48 -.02
-1.98 -1.98
-5.60 -11.99
-11.081
20.93
9.87

59 9.92 3.53

+0.66

10
3 49.0
38.9
87.9
13 43.95
+82.64
1.91719
1.16245n
-14.55
13 43.95
13 29.40

9 18.95

-1433
1.66717n

+ 46.47
- .51
+ 07

+ 46.03
10 4.98 10 4.61
14 49.0
+4 44.0 43.6
-16.18
-10.90
+4 43.88 -.37 ~~43.51~~
+4 32.98 - 10.90
14 37.96 + 45.12
-.74 + 42
14 37.22
14 34.64
34.25
33.97

July 25 1872 -.26 -.266

58 50.2
58.3
6.2
13.3
20.5
28.5
35.9
43.6
51.4

No. 1

307.9
187.9
20.875

59 20.76
59 15.51
+5.25
+5.29

-3.42 -.01
-1.91 -1.95
-5.46 11.85
-10.7984
20.76
9.97

59 9.92 3.53

+0.65

11
3 53.2
41.5
94.7
13 47.35

1872				
July	27	59	10.02	
	28		9.88	33.09
	29		9.98	32.88
Aug	1		9.98	32.96
	4		9.97	32.41
	6		9.87	32.78
	7		10.19	30.34
	8		10.19	33.39

1873		
July	23	3.58
	24	3.51
	26	3.82
Aug	4	3.37
	6	3.57
	9	3.45
	11	3.63
	12	3.48

19 H. Camelop.

h	m	s
17	01	30
5	01	40
10°	0'	56"
+79	04	21.3
z = 100°	55'	17
z = −58°	32'	29"

−.85

tang δ = −5.18
x = +0.80
corr = +.31 +1.0"
α 1872 30.271
α 1873 40.010

1872

		m	s	
July	9.8	1	26.08	
	14		26.57	.49
	19		27.10	.53
	24		27.66	.56
	29		28.25	.59
Aug.	3		28.86	.61
	8		29.49	.63

1873

		m	s	
July	19	1	37.15	
	24		37.71	.56
	29		38.30	.59
	3		38.91	.61
	8		39.55	.64

δ 1872 = 4' 38.03" = 55 21.97 dα = +9.738
δ 1873 = 4 43.23 = 55 16.77 dδ = +5.21

July 9 1872 −.284 −.29

17 01 12.1 59 (60) 57.2
17.2 59.1
23.2
28.3
33.6
39.3
44.7
50.0
55.7

304.1

1 33.789 59 (60) 58.15

1 ~~33.71~~
33.87
1 26.05
+7.82
+7.51

− 9.15 +.00
+ 1.58 +1.47
+4.22 + 13.96
− 3.436
1 33.87
1 30.44

1 ~~30.44~~ 1 40.15
+0.79

30

3 36.8
24.2
61.0
33 30.50
+35.64
~~+35.64~~
1.~~98064~~ 1.55194
1.3~~7369~~ 0.94499 n
~~+2364~~ + 8.81
33 30.50
33 ~~54.14~~
39.31
100° ~~48~~ 49 ~~54.21~~ 9.04

−58 30 51 = 1.97188 n
−1264
1.95924 n
+ .04
+ 1 31.04
+ .93
+ .28

+1 32.26
+100 50 ~~26.47~~ 41.31 (40) 40.95
55 28.0
+ ~~5~~ 4 ~~7.5~~ 46.7 46.4
~~+4 47.7~~ 45.4
+4 45.7
− 11.21
− 6.00 6.00
+4 44.68 35 ~~44.33~~ 44.50 .67
+4 38.68 7.4
+100 55 19.98 +4 39.17
55 20.12
16.21

July 11 1872 −.349 −.35

01 9.7 00 50.3
15.6
21.1
26.1
32.0
37.2
42.4
48.4
53.9

286.4

31.822 0 50.30

1 ~~31.74~~
31.90
1 26.24
+5.66
+5.35

− 8.50 −.01
+ 1.81 +1.81
+ 4.03 + 13.77
− 1.67
31.90
30.24

1 30.23 39.97
+0.77

3 31.1
18.6
49.7
33 24.85
+41.52
1.61826
1.01131 n
+10.26
33 24.85
33 32.18
49 13.24

−2045
1.95143 n
+ .02
+ 1 29.42
+ .17
+ .27

+1 29.88
50 43.12 42.78
55 28.4
4 45.3 45.0
~~+4 46.3~~ 44.0
+4 44.3
−11.61
−6.40 6.40
+4. 44.89 34 ~~44.53~~ 44.51 .65
+4 38.49 7 +
55 21.61 +4 38.76
55 27.54
16.33

July 14 1872 −.301 −.31

01 8.9 00 47.6
14.2 55.2
19.8 0.8
25.2
30.7
36.1
41.5
47.2
52.4

276.0

30.667 0 54.53

1 ~~30.59~~
30.78
1 26.54
+4.21
+3.90

− 5.70 +.00
+ 1.61 +1.56
+3.73 − 13.47
− 0.41
30.75
30.39

1 30.34 40.08
+0.73

3 31.8
21.8
53.6
33 26.80
+36.14
1.55799
0.95104 n
+8.93
33 26.80
33 35.73
49 12.62

−1733
1.95455 n
+ .02
+ 1 30.06
+ .13
+ .34

+1 30.55
50 43.17 42.83
55 28.9
4 45.7 45.4
~~+4 46.7~~ 44.4
+4 44.7
− 12.11
− 6.90 6.90
+4 44.14 34 ~~42.80~~ 43.81 .62
+ 4 37.24 7 +
55 20.41 +4 36.53
55 19.36
14.15

July 25 1872 −.266 −.26

1 ~~8.7~~ 00 30.7 01
8.3 36.4
13.3 40.0
19.1 45.1
24.3
29.5
34.6
40.5
45.9
51.4

266.9

29.6550 38.05

1 ~~29.58~~
29.73
1 27.74
+1.99
+1.68

− 3.42 −.01
+ 1.35 +1.38
+2.53 − 12.27
+ 0.48
29.73
30.19

1 30.28 39.95
+0.65

30
3 29.9
18.2
48.1
33 24.05
+51.60
1.71265
1.10570 n
+12.76
33 24.05
33 36.81
49 11.54

−1013
1.96175 n
.07
+ 1 31.57
+ .27
+ .07

+1 31.92
42.83 50 43.47 43.46
55 30.57 43.12
4 47.82 46.9
~~+ 4 48.2~~ 45.9
+ 4 46.2
− 13.91
− 8.70 8.70
+ 4 45.35 34 ~~45.01~~ 45.12 .55
+ 4 36.65 7 +
55 21.11 +4 36.97
55 20.09
14.78

July 28 1872 −.234 −.23

00 37.0 01
7.8 43.9
13.3 50.3
19.0
24.9
29.6
35.3
41.1
46.4
52.0

269.4

29.933 0 43.73

1 ~~29.85~~
30.01
1 28.10
+1.91
+1.60

− 2.93 +.00
+ 1.19 +1.21
+2.17 − 11.91
+0.85
30.01
30.44

1 30.46 40.20
+ 0.63

30
3 30.9
18.1
49.0
33 24.50
+ 46.20
1.66464
1.05769 n
+11.42
33 24.50
33 35.92
49 12.43

−1018
1.96170 n
.01
+ 1 31.56
+ .22
+ .07

+1 31.86
43.95 50 44.29
55 31.1
4 46.8 46.5
~~+ 4 47.8~~ 45.5
+ 4 45.8
− 14.31
− 9.10 9.10
+ 4 44.50 34 ~~44.16~~ 44.36 .53
+ 4 35.40 7 +
55 19.69 +4 35.79
55 19.74
14.53

July 29 1872 −.211 −.20

01 00 24.8
8.6 29.0
14.4 34.1
19.8
24.9
31.4
36.5
42.2
47.4
(52.9)

278.1

30.9000 29.30

1 ~~30.82~~
30.98
1 28.22
+2.76
+2.45

− 3.19 +.01
+ 1.04 +1.09
+2.05 11.79
− 0.10 .04
30.98
30.88

1 30.94 40.68
+0.62

30
3 26.0
14.9
40.9
33 20.45
+61.60
~~+1.60~~
1.78958
1.18263 n
+15.23
33 20.45
33 35.68
49 12.67

−1636
1.95552 n
.01
+ 1 30.26
+ .38
+ .07

+1 30.72
50 43.39 43.06
55 31.3
4 47.7 47.6
~~+4 48.9~~ 46.6
+4 46.9
14.51
− 9.30 9.30
+ 4 44.27 33 ~~45.99~~ 44.01 .52
+ 4 34.97 +
55 18.36 +4 35.23
55 18.29
13.08

		1872					1873					
Sin δ	9.99207	July 9	+79° 4′	31.9″						α	δ
		14		31.0	−.9						
cos δ	9.27734n	19		30.1	.9	July 19	4′	38.2″		Aug 1	40.24	13.32
	1.11571n	24		29.4	.7	24		37.5	−.7	11	40.29	14.76
	9.39305n	29		28.7	.7	29		36.8	.7	12	40.48	14.08
		Aug 3		28.1	.6	Aug 3		36.2	.6			
		8		27.6	.5	8		35.7	.5			
						13		35.4	.3			
						18		35.1	.3			

1872 −.222
Aug 7 −.22
01
29.4 01 7.5
35.0 10.6
40.4 15.8
45.8
51.1
56.7
2.1
8.2
13.1
281.8
461.8
51.311 1 11.30
1 ~~51.23~~
51.40
1. 29.33
+22.07
+21.76
−22.84 +.00
+1.14 +1.15
+0.94 +10.68
−20.765
51.40
30.64
1 30.65 40.39
+0.55
30
3 29.1
17.6
1 46.7
33 23.35
+40.01
1.60217
0.99522n
+9.89
33 23.30
33 33.24
49 15.11
−1409
1.95779n
.02
+ 1 30.74
+ .16
+ .27
+1 31.19
50 46.31 50 46.30 45.96
55 32.3
4 46.0 45.7
~~+4 47.0~~ 44.7
+4 45.0
−15.51
−10.30 10.30
+4 44.05 −.34 ~~43.71~~
+4 33.75 +.24 43.64 .46
55 20.05 +4 33.80
55 19.76
14.55

1872 −.257
Aug 8 −.27
01
32.8 01 16.5
38.1 19.4
43.5 22.4
49.0
54.5
59.8
5.3
10.7
15.8
309.5
489.5
54.389 1 19.43
1 ~~54.31~~
54.48
1 29.46
+25.02
+24.91
−25.89 −.01
+1.40 +1.33
+0.81 +10.55
−23.68.76
54.48
30.80
1 30.72 40.46
+0.54
30
3 28.7
16.9
45.6
33 22.80
+34.96
1.54357
0.93662n
+8.64
33 22.80
33 31.44
49 16.91
−1781
1.95407n
.02
+ 1 29.96
+ .12
+ .27
+1 30.37
50 47.28
55 32.4
4 45.1 44.8
~~+4 46.1~~ 43.8
+4 44.1
15.61
−10.40 10.40
+4 43.29 −.34 ~~42.75~~
+4 32.89 +.24 43.16 .45
55 20.17 +4 33.21
55 20.15
14.94

1873 −.498
July 24 −.48
01
23.5 00 31.0
29.0 32.7
34.5 36.3
39.8 42.2
44.8
50.2
56.0
1.5
6.8
286.1
406.1
45.122 0 35.55
1 ~~45.04~~
45.20
1 37.68
+07.52
+7.21
−9.73 +.00
+2.49 +2.58
+2.33
−4.94.82
45.20
40.29
1 40.38 40.46
+1.60
25
2 29.8
46.0
75.8
27 37.90
+69.57
1.84242
1.23547n
+17.20
27 37.60
27 55.10
54 53.25

− 58 30 57 = 1.97191n

−1877
1.95314n
.02
+ 1 29.77
+ .49
+ .13
+1 30.41
46.94 56 23.66 56 23.45
55 22.5
−1 1.2 1.4
~~−1 0.2~~ 2.4
−1 2.2
−5.70 5.70
−1 3.54 −.21 ~~3.45~~
−1 9.24 + 3.66 1.36
55 14.42 −1 8.02
55 13.43

July 26 −.485
−.48
01
25.1 00 23.3
30.8 26.0
36.2 30.2
41.6
47.1
52.5
57.7
3.3
8.7
303.0
423.0
47.000 0 26.50
1 ~~46.92~~
47.08
1 37.91
+9.17
+8.86
−11.41 +.01
+2.49 +2.51
+2.10
−6.82.79
47.08
40.26
1 40.29
+1.62
25
2 25.9
44.0
69.9
~~27 37.95~~
27 34.95
+80.50
1.90580
1.29885n
+19.90
27 34.95
27 54.85
54 53.50
−1868
1.95323n
.02
+ 1 29.79
+ .66
+ .10
+1 30.57
23.86 56 24.07
55 22.7
1 1.2 1.6
~~−1 0.4~~ 2.6
−1 2.4
−5.90 5.90
−1 3.74 −.21 ~~3.95~~
−1 9.64 + 4.02 1.37
55 14.43 −1 8.62
55 15.24

Aug 4 −.549
−.55
01
33.3 00 30.4
38.6
43.8
49.3
54.3
0.6
5.4
11.0
16.1
252.4
492.4
54.711 0 30.40
1 ~~54.63~~
54.79
1. 38.88
+15.91
+15.60
−18.63 +.00
+2.85 +2.84
+1.13
−14.656
54.79
30.14
1 40.13
+1.69
25
2 26.3
45.7
73.0
27 36.00
+84.31
1.92588
1.31893n
+20.84
27 36.00
27 56.84
54 51.57
−1403
1.95788n
.02
+ 1 30.75
+ .72
+ .10
+1 31.49
56 ~~23.00~~ 23.10 22.89
55 23.9
−0 59.2 2.08 ~~59.4~~
~~−0 58.2~~ 1.8 ~~0.4~~ 2.0
−1 0.2
−7.10 7.10
−1 4.35 −.21 ~~4.51~~
−1 11.45 + 4.52 1.43
55 11.65 −1 10.19
55 12.70

1873 .442
Aug. 6 −.44
01
35.1 01 8.0
40.4 9.2
45.9 10.4
51.4
56.5
2.1
8.0
13.1
18.5
271.0
511.0
56.776 1 9.20
1 ~~56.70~~
56.86
1 39.26
+17.60
+17.29
−19.25 −.01
+2.28 +2.29
+0.8175
−16.4.22
56.86
~~40.70~~ 40.64
1 40.64
+1.70
25
2 33.2
50.9
84.1
27 42.05
+47.58
1.67742
1.07047n
+11.76
27 42.05
27 53.81
54 54.54
−1550
1.55638
.02
+ 1 30.44
+ .23
+ .11
28 + 1 30.80
56 25.34 25.12
55 ~~32.4~~ 24.1
−1 1.2 1.4
~~−0 0.2~~ 2.4
−1 2.2
−7.30 7.30
−1 4.81 −.22 ~~5.03~~
−1 12.11 + 5.11 1.45
55 13.23 −1 10.96
55 14.16

Gr. 2415 –

h	m	s	
17	3	37	
17	03	38	
+	40°	41′	
+	40	41	00
z = +	1°	41′	48″
+.03			

tang δ = +.86

x = +.030

" Con α = +.22
+.21 4δ = −.14

α 1872 = 36.058 δ = 41 47.4

α 1873 = 38.007 δ = 40 59.85

1872	m	s	
June 29	3	38.11	
July 4		.08	3
9		.05	3
14		.00	5
19		37.95	5
" 24		88	7
29		.80	8
Aug. 3		.71	9
8		37.62	9

1873	m	s	
Aug. 8	3	39.73	
13		.63	10
18		.52	11
23		.40	12
28		39.28	12
July 19		40.05	
24		40.98	7
29		39.91	7
Aug 3		39.82	9
8		39.73	9

dα = +1.949
dδ = −4.90

	July 6 1872 −.357 −.35		July 11 1872 −.349 −.35		July 14 1872 −.301 −.31		July 20 1872 −.312 −.28		July 20 1872 −.266 −.26	
17	03 40.4	03 22.0	03 29.8	03 21.4	03 28.2	03 15.1	03 37.3	03 56.8	03 25.4	03 17.4
	41.7	28.3	32.5	22.9	30.7	16.3	38.7	57.8	28.1	19.4
	43.1	29.5	35.3	24.0	33.4	17.5	40.0	59.3	30.9	20.5
	44.5		40.8		38.9		41.3		36.4	
	45.8		43.4		41.6		42.6		38.8	
	47.2		46.3		44.4		43.9		41.6	
	48.5		48.9		46.9		45.3		44.4	
	49.9		51.5		49.6		46.8		47.2	
	51.2		56.9		55.2		48.1		52.5	
			59.6		57.8				55.3	
			23		0.6				58.0	
	412.3		447.3		427.3		384.0		458.6	
			507.3		487.3					
	45.811	3 38.27	46.118	3 22.77	44.300	3 16.30	42.667	3 57.97	41.691	3 19.10
	3 45.78		3 46.09		3 44.27		3 42.64		3 41.66	
	3 38.07		3 38.04		3 38.00		3 37.94		3 37.86	
	+7.71		+8.05		+6.27		+4.70		+3.80	
	~~+5.48~~ 7.50		~~+7.84~~ 7.84		~~+6.06~~ 6.08		~~+4.48~~ 4.49		~~+3.58~~ 3.59	
	−7.23 +.01		−7.850 −.01		−5.70 +.00		−4.33 +.05		−3.42 −.01	
	− .30	−.31	− .30	−.30	− .27	−.26	− .24	−.27	− .22	−.23
	−2.01	−0.06	−1.98	−0.03	−1.94	+0.01	−1.88	+0.07	−1.80	+0.15
	−9.54		9.789		−7.910		−6.453		5.446	
	3 45.78		46.09		44.27		42.64		41.66	
	3 36.24		36.31		36.36		36.19		36.22	
	3 36.24	3 38.19	3 36.30	38.25	3 36.37	38.32	3 36.21	38.16	3 36.20	38.15
	+0.83		+0.77		+0.73		+0.69		+0.65	
45 –									45 –	
	1 33.1		1 48.5		1 51.1		1 7.8		1 44.2	
	28.2		42.8		46.7		2.1		39.5	
	61.3		91.3		97.8		9.9		83.7	
	46 30.65		46 45.65		46 48.90		46 4.95		46 41.85	
	+7.54		+23.35		+28.00		−15.30		+22.59	
	0.87737		1.36829		1.44716		1.18469n		1.35392	
	0.87283n		1.36385n		1.44272n		1.18025		1.34948n	
	−7.46		−23.11		−27.72		+15.14		−22.36	
	46 30.65		46 45.65		46 48.90		46 4.95		46 41.85	
	46 23.19		46 22.54		46 21.18		46 20.09		46 19.49	
+40°	36 25.16		36 25.81		36 27.17		36 28.26		36 28.86	
+ F	41 38 = 0.23110									
	−1288		−2045		−1733		−1586		−1013	
	0.21822		0.21065		0.21377		0.21524		0.22097	
	−x 1.65		−x 1.62		−x 1.64		−x 1.64		−x 1.66	
	− .03		− .14		− .21		− .06		− .14	
	+ .12		+ .14		+ .18		+ .11		+ .03	
	− 1.56		− 1.62		− 1.67		− 1.59		− 1.77	
+40	36 23.60	36 23.45	36 24.19	36 24.01	36 25.50	36 25.32	36 26.67	36 26.56	36 27.09	36 26.92
	41 9.0		41 10.2		41 10.9		41 12.1		41 13.0	
	+4 45.4	45.3	+4 46.0	45.8	+4 45.4	45.2	+4 45.4	45.3	+4 45.9	45.7
−1.4	+4 44.0	43.9	+4 44.6	44.4	+4 44.0	43.8	+4 44.0	43.9	+4 44.5	44.3
	−9.20		−10.40		−11.10		−12.30		−13.20	
	−4.30 −	4.30	−5.50 −	5.50	−6.20 −	6.20	−7.40 −	7.40	−8.30 −	8.30
	+4 44.71 −.15	~~44.56~~	+4 44.89 −.18	~~44.71~~	+4 44.14 −.18	~~43.96~~	+4 43.65 −.11	~~43.54~~	+4 45.35 −.17	~~45.18~~
	+4 40.41	+4 44.66	+4 39.39 +	44.51	+4 37.94 +	43.81	+4 36.25 +	43.92	+4 37.05 +	45.12
+40	41 4.01 −	.02	41 3.58 −	.02	41 3.44 −	.02	41 2.92 −	.02	41 4.14 −	.02
		+4 40.34		+4 38.99		+4 37.59		+4 36.50		+4 36.80
		41 3.79		41 3.00		41 2.91		41 3.06		41 3.72
		40 58.89		58.10		58.01		58.16		58.82

Sin δ 9.81417
Cos δ 9.87985
11571 n
9.99556 n

	1872				
June	29	+40°	41'	7.2"	
July	4			8.5	+1.3
	9			9.7	1.2
	14			10.8	1.1
	19			11.8	1.0
	24			12.8	1.0
	29			13.7	.9
Aug	3			14.5	.8
	8			15.2	.7

	1873			
Aug	8	40	67.4	
	13		~~67.9~~	+.5
	18		68.?	.4
	23		68.8	.5
	28		64.2	.4

~~July 19 40 64.1~~
~~24~~
~~29~~
~~Aug. 3~~
~~Aug. 8 69.2~~ 67.4

	1873			
July	19	40	64.1	
	24		65.0	+.9
	29		65.9	.9
Aug	3		66.7	.8
	8		67.4	.7
	13		68.0	.6
	18		68.5	.5
	23		68.9	.4
	28		69.2	.3

1873		α	δ
July	24	38.23	59.14
	26	38.17	57.88
Aug	4	38.20	58.49
	6	38.12	58.57
	9	38.20	58.38
	11	38.23	
	12	38.17	58.35

July 28 1872 −.234 −.23

03 24.9 03 16.1
27.7 17.6
30.4 18.9
35.7
38.5
41.2
43.9
46.6
51.9
54.7
57.4
452.9
41.178 3 17.53
3 41.14
3 37.81
+3.33
~~+3.12~~
3.12
−2.93 +.00
− .20 −.20
−1.75 +0.20
−4.88
3 41.14
36.26
3 36.26 38.21
+0.63
45
1 44.9
39.0
83.9
46 41.95
+23.64
1.37365
1.36921n
−2340
46 41.95
46 18.55
36 29.80
−1018
0.22092
−7 1.66
− .15
+ .03
− 1.78
36 28.02 36 27.85
41 13.6
+4 45.6 45.4
+4 44.2 44.0
−13.80
−8.90 − 8.90
+4 44.50 −.17 ~~44.33~~
+4 35.60 +4 44.36
41 3.62 − .02
+4 35.44
41 3.29
58.39

July 29 1872 −.211 −.20

03 25.1 03 19.4
27.8 20.4
30.5 21.4
36.0
38.7
41.4
44.2
47.0
52.3
55.0
57.8
455.8
41.436 3 20.40
3 41.41
3 37.80
+3.61
~~+3.40~~
3.40
−3.19 +.01
− .17 −.18
−1.74 +0.21
−5.10
41.41
36.31
3 36.31 38.26
+0.62
45
1 31.8
27.6
59.4
46 29.70
3
+21.04
1.32305
1.31861n
−2083
46 29.70
48 58.87
36 49.48
−1636
0.21474
−7 1.64
− .12
+ .03
− 1.73
36 47.75 36 47.60
41 13.7
+4 26.0
−13.90
−9.00 − 9.00
+4 44.27 −.15 ~~44.12~~
+4 35.27 + 44.01
41 √3.02 − .02
+4 34.99
41 22.59
9

Aug 6 1872 −.248 −.24

03 44.7 03 33.2
44.5 34.6
47.2 35.7
52.7
55.4
58.1
04 0.9
3.5
8.9
11.7
15.4
340.0
640.0
58.182 3 34.50
3 58.15
3 37.66
+20.49
~~+20.28~~
20.28
−19.99 +.00
− .21 −.21
−1.60 +0.35
−21.80
58.15
36.35
3 36.35 38.30
+0.57
45
1 41.9
37.0
78.9
46 39.45
+23.68
1.37438
1.36994n
−2344
46 39.45
46 16.01
36 32.34
−1172
0.21938
−7 1.66
− .15
+ .14
− 1.67
36 30.67 36 30.50
41 14.9
+4 44.2 44.0
+4 42.8 42.6
−15.10
−10.20 − 10.20
+4 43.45 −.17 ~~43.28~~
+4 33.25 + 43.30
41 3.92 − .02
+4 33.08
41 3.63
58.73

Aug 7 1872 −.222 −.22

03 44.6
47.4 03 37.8
50.0 38.9
55.5 40.0
58.8
1.0
3.6
6.3
11.7
14.5
17.2
310.1
10.1
0.918 3 38.90
4 0.89
3 37.64
+23.25
~~+23.04~~
23.04
−22.85 +.00
− .19 −.19
−1.58 +0.37
−24.62
4 0.89
36.27
3 36.27 38.22
+0.55
45
1 41.1
37.0
78.1
46 39.05
+22.02
1.34282
1.33838n
−2180
46 39.05
46 17.25
36 31.10
−1409
0.21701
−7 1.65
− .13
+ .14
− 1.64
36 29.46 36 29.24
41 15.1
+4 45.6 45.4
+4 44.2 44.0
−15.30
−10.40 − 10.40
+4 44.05 −.17 ~~43.88~~
+4 33.65 + 43.64
41 3.11 − .02
+4 33.22
41 2.51
57.61

Aug. 8 1872 −.257 −.27

03 47.7
50.5 03 42.9
53.1 44.0
58.6 44.8
1.2
3.9
6.7
9.4
14.8
17.5
20.2
283.6
43.6
3.964 ~~3 45.85~~
3 43.90
4 3.93
3 37.62
+26.31
~~+26.10~~
26.10
−25.90 −.01
− .23 −.22
−1.56 +0.39
−27.69
3.93
36.34
3 36.24 38.19
+0.54
45
1 37.9
32.9
70.8
46 35.40
+20.06
~~+18.11~~
1.30233
1.29789n
−19.86
46 35.40
46 15.64
36 32.71
−1781
0.21329
−7 1.63
− .11
+ .13
− 1.61
36 31.10 36 30.94
41 15.2
+4 44.1 43.9
+4 42.7 42.5
−15.40
−10.50 − 10.50
+4 43.29 −.16 ~~43.13~~
+4 32.79 +4 43.16
41 3.89 − .02
+4 32.64
41 3.58
58.68

Aug. 10 1872 −.266 −.27

03 52.5
55.3 03 45.8
57.9 47.1
3.4 48.2
6.1
8.8
11.4
14.2
19.6
22.4
25.0
276.6
96.6
8.282 3 47.03
4 8.75
3 37.58
+31.17
~~+30.96~~
30.96
−30.70 +.00
− .23 −.23
−1.52 +0.43
32.45
8.75
36.30
3 36.30 38.25
+0.54
45
1 40.2
35.0
75.2
46 37.60
+21.75
1.33746
1.33302n
−21.53
46 37.60
46 16.07
36 ~~47.28~~
32.28
− 1.64
.13
+ .11
− 1.66
36 ~~45.62~~ 30.62 30.46
41 15.5
+4 44.9 44.7
+4 43.5 43.3
−15.70
−10.80 − 10.[illegible]0
+4 43.83 −.16
+4 33.03 + 43.2[illegible]
41 3.65 − .02
+4 32.44
41 2.70
58.00

α Herculis

h	m	s	
17	08	46	
17	08	.51	
+ 14°	32′	″	
+ 14	32	13	
z = + 27°	50′	35″	

sin z = + .47

tang δ = ~~+.026~~ +.26
x = −.016 s
cos α = −.02
α 1872 48.690
α 1873 51.424

1872	m	s	
June 29	8	50.51	0
July 4		.51	0
9		.51	2
14		.49	2
19		50.47	3
24		.44	3
29		.40	4
Aug 3		.35	5
8		50.29	6

1873	m	s	
July 19	8	53.37	4
~~24~~		.33	4
29		29	4
3		24	5
8		53.19	5

δ 1872 = 32 16.94
δ 1873 = 32 12.55
dα = +2.733
dδ = −4.39

1872	α	δ
Aug 6	48.70	10.95
7	48.71	11.92
8	48.72	11.41
10	48.71	11.06
1873		
July 26	57.46	10.67
Aug 4	57.42	10.27
10	57.51	11.59
11	57.44	11.60
12	57.42	11.72

	June 30 1872 −.330 −.33		July 6 1872 −.357 −.35		July 7 1872 −.319 −.31		July 9 1872 −.284 −.29		July 11 1872 −.349 −.351		July 14 1872 −.301 −.31	
17	08 33.3	08 27.1	08 48.2	08 40.3	08 46.3	08 36.5	08 46.9	08 39.0	08 46.4	08 36.4	08 43.5	08 39.4
	35.4	28.0	47.3	(4?1.2)	48.6	37.4	49.1	40.0	47.5	37.4	(45.6)	40.7
	37.5	29.0	49.4	42.2	50.7	38.2	51.2	40.8	49.6	38.4	47.7	42.0
	41.9		53.6		54.9		55.3		54.0		52.1	
	44.0		55.8		56.9		57.6		56.0		54.2	
	46.1		57.9		59.0		59.7		58.2		56.4	
	48.2		0.1		1.2		1.8		0.2		58.5	
	50.3		2.2		3.4		4.0		2.4		0.6	
	54.6		6.4		7.6		8.2		6.6		4.8	
	56.7		8.5		9.7		10.4		8.8		7.0	
	58.8		10.7		11.9		12.5		10.9		9.1	
	506.8		337.1		350.2		356.7		339.6		379.5	
			637.1		650.2		656.7		639.6		619.5	
	46.073	8 28.03	57.918	8 41.23	59.109	8 37.37	59.700	8 39.93	58.145	8 ~~37.13~~ 8 37.40	56.318	8 40.77
	8 46.06		8 57.90		8 59.09		8 59.68		8 58.13		8 56.30	
	8 50.51		8 50.51		8 50.51		8 50.51		8 50.51		8 50.49	
	−+4.45		+7.39		+8.58		+9.17		+7.63		+5.81	
	−~~4.47~~		+~~7.41~~		+~~8.60~~		+~~9.19~~		+~~7.65~~		+~~5.83~~	
	+ 4.64 −.02		−7.24 +.01		− 8.49 +.01		− 9.15 +.00		−8.50 −.01		− 5.70 +.00	
	− .09	−.09	− .09	−.09	− .08	−.08	− .08	−.07	− .09	−.09	− .08	−.08
	− 1.82	+0.91	− 1.82	+0.91	− 1.82	+0.91	− 1.82	+0.91	− 1.81	+0.92	− 1.80	+0.93
	+ 2.79 31		− 9.15 4		− 10.38		− 11.05 4		− 10.42 1		− 7.58	
	8 46.06		57.90		59.09		59.68		58.13		56.30	
	8 48.79		48.75		48.70		48.63		48.73		48.72	
	8 48.77	8 51.50	8 48.76	51.49	8 48.71	51.44	8 48.64	51.37	8 48.72	51.45	8 48.72	51.45
55	+ 0.92		+0.83		+0.82		+0.79		+0.77		+0.73	
	0 12.2		0 7.4		0. 12.9		0 9.2		0 11.7		0 3.0	
	10.0		5.1		13.0		9.2		11.5		3.8	
	22.2		12.5		25.9		18.4		23.2		6.8	
	55 11.10		55 6.25		55 12.95		55 9.20		55 11.60		55 3.40	
									+ 20.74			
	+18.04		+16.69		+ 21.74		+ 19.77		~~+21.01~~		+15.55	
	1.25624		1.22246		1.33726		1.29601		1.31681		1.19173	
	1.35783n		1.32405n		1.43885n		1.39760n		1.41840n		1.29332n	
	−2279		−2109		−2747		−2498		−2621		−1965	
	55 11.10		55 6.25		55 12.95		55 9.20		55 11.60		55. 3.40	
	54 43.31		54 45.16		54 45.48		54 44.22		54 45.39		54 43.75	
+14°	28 0.04		28 3.19		28 2.87		28 4.13		28 2.96		28 4.60	
+27	50 3 = 1.48280											
	−2305		−1268		−1331		−1246		−2030		−1718	
	1.45975		1.47012		1.46949		1.47034		1.46250		1.46562	
	−x 28.82		−x 29.52		−x 29.48		−x 29.54		−x 29.01		−x 29.22	
	− .04		− .04		− .07		− .05		− .06		− .03	
	− .00		+ .05 .01		+ .02		+ .02		+ .02		+ .00	
	− 28.86		− 29.55		− 29.53		− 29.57		− 29.05		− 29.25	
+14	27 31.18	+27 31.16	27 33.54	33.64 33.63	27 33.34	33.32	27 34.56	34.55	27 33.91	33.89	27 35.35	35.34
	32 16.8		32 17.9		32 18.0		32 18.3		32 18.8 7		32 19.1	
	+4 45.6 −.02		+4 44.73 −.01		+4 44.7 −.02		+4 43.7 −.01		+4 44.98 −.02		+4 43.8 −.01	
	− 4.29		− 5.39		− 5.49		− 5.79		− 6.19		− 6.59	
	+ 0.10		− 1.00		− 1.10		− 1.40		− 1.80		− 2.20	
	+4 45.20		+4 44.71		+4 44.75		+4 44.68		+4 44.89		+4 44.14	
	+4 45.30 +	.10	+4 43.71 −	1.00	+4 43.65 −	1.10	+4 43.28 −	1.40	+4 43.09 −	1.80	+4 41.94 −	2.20
+14	32 16.48 +	4 45.04	32 17.35 +	44.66	32 16.99 +	44.40	32 17.84 +	44.50	32 17.00 +	44.51	32 17.29 +	43.81
	+.54 −	.43	+.54 −	.39	+.54 −	.38	+.54 −	.37	+.54 −	.36	+.54 −	.34
+14	32 17.02 +	4 44.71	32 17.89 +	43.27	32 17.43 + 4	42.92	32 18.38 + 1	42.73	32 17.54 + 4	42.35	32 17.83 + 4	41.27
	+ 32	15.87	32	16.90	5 32	16.24	+ 32	17.28	32	16.24	32	16.61
	32	11.48		12.51		12.85		12.89		11.85		12.22

Sin δ 9.39958
Cos δ 9.98588
11571n
.10159n

1872				
June	29	+14° 32′	16.6″	
July	4		17.5	+.9
	9		18.3	.8
	14		19.1	.8
	19		19.8	.7
	24		20.5	.7
	29		21.1	.6
Aug.	3		21.6	.5
	8		22.1	.5

1873				
July	19	31	72.5	
	24		73.1	+.6
	29		73.7	.6
Aug.	3		74.3	.6
	8		74.9	.6

1872.0 α	δ	1873.0 α	δ
48.77	17.02	51.46	13.17
.76	17.89	.42	12.62
.71	17.~~49~~ 53	.51	14.07
.64	18.38	.44	13.93
.72	17.54	.42	13.95
.72	17.83		
.75	17.26		
.68	18.42		
.67	17.78		
.75	17.90		
.68	16.87		
.68	16.81		
.71	16.30		
.70	17.53		
.71	16.73		
.71			
.72			
48.711	17.44 −1.08	51.450	13.55 −2.06
.690	16.94	.424	12.55
+.021	+ ~~0.50~~	+.026	+ ~~1.00~~
	16.35		14.49
	16.94		12.55
	−.59		−1.06

July 20 1872 −.28 ~~−.312~~
08 42.1 08 58.4
44.8
46.3
50.6
53.0
54.9
56.9
59.1
3.4
5.6
7.7
423.9
603.9
54.900 8 58.40
8 54.88
8 50.46
+4.42
+ ~~4.44~~
− 4.33 +.05
− .07 −.08
− 1.77 +0.96
− 6.173
54.88
48.71
8 48.75 51.48
+0.69
50
4 38.9
38.9
77.8
54 38.90
− 3.56
+ 3.50
0.54407n
0.64566
+442
54 38.90
54 34.48
43.37
28 13.87
5.03
−1566
1,46714
− ⋆ 29.32
− .00
+ .46
− 28.86
27 45.01 36.17 35.71
32 20.0
+4 35.0 −.46 43.83 43.4
− 7.49
− 3.10
+4 43.65
+4 40.55 − 3.10
32 ~~25.56~~ +4 43.92
16.72 32
+.54
32 17.26 +4 40.50
32 16.21
11.82

July 22 1872 −.28 −.285
08 50.2
51.3
52.4
53.4
54.5
55.5
56.6
57.7
58.8
490.4
54.489
8 54.47
8 50.45
+4.02
+ ~~4.04~~
− 3.96 +.00
− .07 −.07
− 1.76 +0.97
− 5.79
54.47
48.68
8 48.68 51.41
A. R.

July 25 1872 −.26 −.266
08 41.2 08 31.6
43.2 32.4
45.5 33.2
49.6
51.8
53.9
56.2
58.2
2.4
4.4
6.8
413.2
593.2
53.927 8 32.40
8 53.91
8 50.43
+3.48
+ ~~3.50~~
− 3.42 −.01
− .07 −.07
− 7.74 +0.99
− 5.234
53.91
48.68
8 48.67 51.40
+0.65
55
0 10.3
8.8
19.1
55 9.55
+21.53
1.33304
1.43463n
−2720
55 9.55
54 42.35
28 6.06
−995
1,47285
− ⋆ 29.71
− .07
+ .01
− 29.77
27 36.23 36.22
32 20.6
+4 44.4 −.01 44.4
− 8.09
− 3.70
+4 45.35
+4 41.65 − 3.70
32 17.88 + 45.12
+.54 .30
32 18.42 +4 41.12
32 17.34
12.95

July 28 1872 −.23 −.234
08 40.7 08 33.7
42.8 34.8
45.0 35.9
49.2
51.4
53.5
55.6
57.7
9 1.9
4.1
6.3
408.2
588.2
53.473 8 34.80
8 53.46
8 50.41
+3.05
+ ~~3.07~~
− 2.93 +.00
− .06 −.06
− 1.72 +1.01
− 4.71
53.46
48.75
8 48.75 51.48
+0.63
55
0 5.9
4.8
10.7
55 5.35
+18.67
1.27114
1.37273n
−2359
55 5.35
54 41.76
28 6.59
−1080
1,47280
− ⋆ 29.70
− .05
+ .00
− 29.75
27 36.84 36.83
32 21.0
+4 44.2 −.01 44.2
− 8.49
− 4.10
+4 44.50
+4 40.40 − 4.10
32 17.24 + 44.36
+.54 .29
32 17.78 +4 39.97
32 16.80
12.41

July 29 1872 −.20 −.211
08 40.9 08 32.5
43.0 33.3
45.2 34.4
49.3
51.5
53.6
55.8
57.9
9 2.1
4.3
6.4
410.0
590.0
53.636 8 33.40
8 53.62
8 50.40
+3.22
+ ~~3.24~~
− 3.19 +.01
− .05 −.05
− 1.71 +1.02
− 4.954
53.62
48.67
8 48.68 51.41
+0.62
55
0 7.0
7.8
14.8
55 7.40
+20.24
1.30621
1.40780n
−2557
55 7.40
54 41.83
28 6.52
−1628
1,46652
− ⋆ 29.28
− .05
+ .00
− 29.23
27 ~~37.29~~ 37.29 ~~37.19~~ 37.28
32 21.1
+4 43.8 −.01 43.8
− 8.59
− 4.20
+4 44.27
+4 40.07 − 4.20
32 17.36 + 44.01
+.54 .29
32 17.90 +4 39.52
32 16.80
12.41

Aug 1 1872 −.27 −.268
08 45.0 08 52.6
47.2
49.3
53.4
55.7
57.7
59.9
9 2.0
6.4
8.4
10.5
395.5
635.5
57.773 8 52.60
8 57.76
8 50.37
+7.39
+ ~~7.41~~
− 7.34 +.01
− .07 −.07
− 1.68 +1.05
− 9.078
57.76
48.67
8 48.68 51.41
+0.59
55
0 48.9
46.0
94.9
54 47.45
+5.17
+ ~~5.10~~
0.71349
0.81508n
−653
54 47.45
54 40.92
28 7.43
−905
1,47375
− ⋆ 29.77
− .01
+ .02
− 29.76
27 37.61 37.21
32 21.4
+4 43.7 −.46 43.2
− 8.89
− 4.50
+4 43.11
+4 38.61 − 4.50
32 16.28 + 42.91
+.54 .27
32 16.82 +4 38.14
32 15.35
10.96

π Herculis

h	m	s
17	10	34
17	10	38
+ 36°	57′	
+ 36	57	
δ = + 5°	25′	13″ 35″
+.09		

tang δ = +.75

x = −.020

" cos x = −.04

α 1872 35.429

α 1873 37.517

1872

		m	s	
June	29	10	37.43	
July	4		.41	.2
	9		.38	3
	14		.34	4
	19		37.30	4
	24		.24	6
	29		.18	6
Aug.	3		.10	8
	8		37.02	8

1873

		m	s	
July	19	10	39.55	
	24		.49	6
	29		.43	6
Aug.	3		.35	8
	8		39.27	9

δ 1872 = 57′ 17″.60

δ 1873 = 57 13.33

dα = +2.089

dδ = −4.28

June 30 1872 −.330 −.33

17 10 17.5 10 16.0
20.1 17.0
22.8 18.0
28.0
30.5
33.0
35.7
38.3
43.4
46.0
48.6
363.9
33.082 10 17.00

10 33.06
10 37.43
−4.37
~~−4.33~~

+4.64 −.02
−.25 −.25
−2.00 +0.09
+2.397
10 33.06
10 35.45

10 35.43 10 37.52

+0.92

30
0 29.6
23.2
52.8
30 26.40

+16.08
1.20629
1.22463n
−1677
30 26.40
30 9.63

+36° 52 38.72

+5 25 25 = 0.73770
−2286
0.71484

− x 5.19
− .07
− .01

−5.27
+36 52 33.45 +52 33.41
57 19.8
+4 46.4 −.04 46.4
−6.48
−2.20
+4 45.20
+4 43.00 − 2.20
+36 57 16.45 +4 45.04
− .08
+4 42.76
+57 16.17
57 11.89

July 6 1872 −.357 −.35

18 29.4 18 18.6
31.9 19.6
34.6 20.7
39.7
42.3
44.9
47.5
49.9
55.2
57.7
0.3
433.4
492.4
44.855 10 19.63

10 44.84
10 37.40
+7.44
~~+7.48~~

−7.24 +.01
−.20 −.27
−1.97 +0.12
−9.47
44.84
35.37

10 35.37 37.46

+0.83

0 35.7
29.9
65.6
30 32.80

+25.22
1.40175
1.42009n
−2631
30 32.80
30 6.49

52 41.86

−1248
0.72522

− x 5.31
− .17
+ .04

−5.44
52 36.42 36.37
57 21.3
+4 44.9 −.05 44.8
−7.98
−3.70
+4 44.71
+4 41.01 − 3.70
57 17.43 + 44.66
− .07
+4 40.89
57 17.26
12.98

July 7 1872 −.319 −.31

10 (30.8) 18 33.5
33.3 34.6
35.9 35.8
41.0
43.5
46.2
48.6
51.3
56.4
59.0
1.7
507.7
46.155 ~~10 53.97~~
10 54.63

10 46.14
10 37.39
+8.75
~~+8.79~~

−8.49 +.01
−.23 −.24
−1.96 +0.13
−10.68
46.14
35.46

10 35.46 37.55

+0.82

25
4 62.2
57.0
119.2
~~28 58.60~~
289 59.60 −8.48
~~7.82~~

1.77525 0.92840n
1.79329n 0.94674
~~622~~ 4885
11.92 289 59.60
30 8.45

52 39.90

−1314
0.72456

− x 5.30
− .03
+ .43 40

−4.93
52 34.97 34.47
57 21.6
+4 46.6 −.50 46.1
−8.28
−4.00
+4 44.75
+4 40.75 − 4.00
57 15.72 + 44.40
− .07
+4 40.33
57 14.80
10.52

July 9 1872 −.284 −.29

10 31.1 10 20.4
33.8 21.4
36.4 22.7
41.4
43.9
46.7
49.2
51.7
56.9
59.5
2.1
452.7
512.7
46.609 10 21.50

10 46.59
10 37.38
+9.21
~~+9.25~~

−9.15 +.00
−.22 −.21
−1.95 +0.14
−11.32 1
46.59
35.27

10 35.28 37.37

+0.79

30
0 33.9
29.2
63.1
30 31.55

+25.11
1.39985
1.41819n
−2619
30 31.55
30 5.36

52 42.59

−1228
0.72542

− x 5.31
− .18
+ .04

−5.45
52 37.54 37.49
57 22.1
+4 44.6 −.05 44.6
−8.78
−4.50
+4 44.68
+4 40.18 − 4.50
57 17.72 + 44.50
− .07
+4 39.93
57 17.42
13.14

July 11 1872 −.349 −.35

10 29.7 10 20.3
32.3 21.4
34.7 22.6
40.0
(42.5)
45.1
47.7
50.4
55.4
58.0
0.6
45.127 10 21.43

10 45.11
10 37.37
+7.74
~~+7.78~~

−7.50 −.01
−.26 −.26
−1.94 +0.15
−9.70 1
45.11
35.41

10 35.40 37.49

+0.77

0 33.3
27.9
61.4
30 30.70

+23.70
1.37475
1.39309n
−2472
30 30.70
30 5.98

52 42.37

−2015
0.71755

− x 5.22
− .17
+ .04

−5.35
52 37.02 37.49
57 22.5
+4 45.5 −.05 45.5
−9.18
−4.90
+4 44.89
+4 39.99 − 4.90
57 17.01 + 44.51
− .07
+4 39.54
57 16.51
12.23

July 20 1872 −.282 −.28

10 26.3 10 42.4
28.8
31.4
36.7
39.2
41.7
44.3
46.9
52.1
54.6
57.2
459.2
41.743 10 42.40

10 41.73
10 37.29
+4.44
~~+4.48~~

−4.33 +.05
−.21 −.23
−1.86 +0.23
−6.40 .37
41.73
35.33

35.36 37.45

+0.69

0 5.8
0.9
6.7
30 3.35

−0.66
9.81954n
9.83788n
+0.69
30 3.35
30 45.04

52 44.31

−1546
0.72224

− x 5.27
− .00
+ .03 .01

−5.26
52 ~~39~~37.06 36.97 39.05 39.04
57 24.3
+4 45.2 −.01 45.2
−10.98
−6.70
+4 43.65
+4 36.95 − 6.70
57 16.00 + 43.92
− .06
+4 37.16
57 16.20
11.92

Sin δ 9.77896

Cos δ 9.90263
,11571
.01834n

1872						1873			
June	29	+36	57	19.5	July	19	36	76.9	
July	4			20.8	+1.3	24		77.7	+8
	9			22.0	1.0	29		78.6	9
	14			23.1	1.0 Aug.	4		79.4	8
	19			24.1	1.0	8		80.3	9
	24			25.0	.9				
	29			25.9	.9				
Aug	3			26.7	.8				
	8			27.4	.7				

1872			
Aug	6	35.38	16.30
	8	35.40	16.19
1873			
July	26	37.51	11.76
Aug	4	37.45	11.71
	6	37.44	11.52
	10	37.53	12.23
	12	37.52	11.45

1872 July 25 −.266 −.26

10 25.3 10 15.0
27.9 16.3
30.3 17.3
35.6
38.1
40.8
43.4
46.0
51.1
53.7
56.3
448.5

40.773 10 16.20

10 40.75
10 37.23
+3.52
~~+3.56~~

−3.42 −.01
− .20 −.20
−1.80 +0.29
−5.483
10 40.75
35.33

10 35.32 37.41

+0.65

30
0 31.0
25.8
56.8
30 28.40

+24.57
1.39041
1.40875n
−2563
30 28.40
30 2.77

52 45.58

−977
0.72793

−λ 5.34
− .18
+ .01

− 5.51
52 40.07 52 40.02
57 25.2
+4 45.1 −.05 45.0
− 11.88
− 7.60
+4 45.35
+4 37.75 − 7.60
57 17.82 +4 45.12
.06
+4 37.46
+57 17.48
13.20

1872 July 28 −.234 −.23

10 24.9 10 13.2
27.4 14.5
29.9 15.7
35.1
37.7
40.3
42.7
45.4
50.5
53.1
55.4
442.7

40.245 10 14.47

10 40.23
10 37.19
+3.04
~~+3.08~~

− 2.93 +.00
− .17 −.17
−1.76 +0.33
−4.86
40.23
35.37

10 35.37 37.46

+0.63

30
0 32.1
26.0
58.1
30 29.05

+25.77
1.41111
1.42945n
−2688
30 29.05
30 2.17

52 46.18

−982
0.72788

−λ 5.34
− 18
+ .01

− 5.51
52 40.67 40.62
57 25.8
+4 45.1 −.05 45.1
− 12.48
− 8.20
+4 44.50
+4 36.30 − 8.20
57 16.97 + 44.36
.06
+4 36.10
57 16.72
12.44

1872 July 29 −.211 −.20

10 25.1 10 19.5
27.6 20.7
30.2 21.6
35.3
37.8
40.5
43.1
45.6
50.8
53.4
55.9
445.3

40.482 10 20.60

10 40.46
10 37.18
+3.28
+3.22

− 3.20 +.01
− .15 −.16
−1.75 +0.34
−5.10
40.46
35.36

10 35.36 37.45

+0.62

30
0 25.7
21.1
46.8
~~30 22.25~~
30 23.40

+19.88
1.29842
1.31676n
−20.74
30 23.40
30 2.66

52 45.69

−1620
0.72150

−λ 5.27
− .10
+ .01

− 5.36
52 40.33 40.29
57 25.9
+4 45.6 .04 45.6
− 12.58
− 8.30
+4 44.27
+4 35.97 − 8.30
57 16.30 + 44.01
.05
+4 35.66
57 15.95
11.67

1872 July 30 −.316 −.32

10 10 49.2
50.8
51.8
38.9
40.3
41.6
42.8
44.2
207.8

41.560 10 50.60

10 41.54
10 37.17
+4.37
~~+4.41~~

− 4.22 +.01
− .24 −.24
−1.74 +0.35
− 6.20.19
41.54
35.34

10 35.35 37.44

+0.61

25
4 55.8
49.9
105.7
29 52.85

−9.04
0.95617n
0.97451
+9.43
29 52.85
30 2.28

52 46.07

−0971
0.72799

−λ 5.35
− .03
+ .10

− 5.28
52 40.79 40.30
57 26.0 1
+4 45.2 3 −.49 44.8
−12.78
− 8.50
+4 43.66
+4 35.16 − 8.50
57 15.95 + 43.29
.05
+4 34.74
57 15.04
10.76

Aug 6 Sup. C.

1872 Aug 7 −.222 −.27

10 54.9
57.5 10 45.0
mid 92' 0.0 47.0
2.6 49.7
5.3
~~10.3~~
~~12.7~~
~~15.5~~

0.060 10 47.23

11 0.04
10 37.03
+23.01
~~+23.05~~

−22.86 +.00
− .20 −.17
− 1.60 +0.49
−24.663
11 0.04
35.38

10 35.41 37.50

+0.55

30
0 17.3
15.0
32.3
30 16.15
+12.83
~~−12.83~~
1.10823
1.12657n
−13.38
30 16.15
30 2.77

52 45.58

−1392
0.72378

−λ 5.29
− .05
+ .02

− 5.32
52 40.26 40.23
57 27.3
+4 47.0 −.03 47.0
−13.98
− 9.70
+4 44.05
+4 34.35 − 9.70
57 14.61 + 43.64
.05
+4 33.89
57 14.12
9.84

Gr. 2437. =15

Tang δ = +3.064
K = – .048

Sin δ 9.97800
Cos δ 9.49192
1167′n
9.60763n

h	m	s	
17	18	12	
17	18	09	
+	71°	57′	″
+	71	55	05
ζ = –	29°	32′	17″
	–.049		

1872 June 20 –.316	1872 July 6 –.357	1872 July 7 –.319	1872 July 9 –.284	1872 July 11 –.249	1872 July 16 –.308
17 18 0.1 3.5 7.0 10.2 13.5 16.9 20.2 23.5 26.8	18 11.4 15.0 18.2 21.4 25.0 28.2 31.4 35.0 38.3	18 13.0 16.2 19.6 22.8 26.2 29.5 33.1 36.3 39.6	18 13.2 16.5 19.9 23.3 26.3 29.7 33.2 36.4 39.8	18 11.9 15.3 18.6 21.8 25.1 28.7 31.8 35.1 38.4	18 8.7 11.9 15.3 21.7 28.4 35.2
17 25.8 29.2 32.9	17 27.8 30.8 32.0	17 27.7 29.6 31.8	17 44.8 47.3 51.0	17 22.5 26.9 29.2	17 46.0 49.4 50.9
121.7	223.9	236.3	238.3	226.7	Rej'd [illegible]
13.522 17 29.30	24.878 17 30.20	26.255 17 29.70	26.478 47.70	25.189 17 26.20	17 48.77
18 13.47 +4.61 –.97 –4.05	18 24.83 –7.24 –1.09 –3.87	18 26.281 –8.49 –.98 –3.84	18 26.43 –9.15 –.87 –3.77	18 25.14 –7.50 –1.07 –3.770	–.94
18 ~~12.96~~ 13.06	18 12.63	18 12.8990	18 12.64	18 12.847	

30

June 20	July 6	July 7	July 9	July 11	July 16
+0.92	+0.83	+0.82	+0.79	+0.77	
2 55.2 45.2 100.4 32 50.20	2 58.5 48.0 106.5 32 53.25	2 58.5 48.3 106.8 32 53.40	2 50.0 41.0 91.0 32 45.50	2 57.8 47.9 105.7 32 52.85	2 44.0 35.1 79.1 32 39.55
+44.22 1.64562 1.23325n –~~22.55~~ –17.92 32 50.20 32 50.20 32 ~~27.65~~ 32 32.28 +71° 50′ 16.07″	+54.68 1.73783 1.34546n –22.16 32 53.25 32 31.05 50 17.26	+56.55 1.75243 1.36006n –22.91 32 53.40 32 30.49 50 17.86	+38.78 1.58861 1.19624n –15.71 32 45.50 32 29.79 50 18.56	+58.99 1.77078 1.37841n –23.90 32 52.85 32 28.95 50 19.40	
–29 32 13 = 1.51350n –2267 1.49083n	–1228 1.50122n	–1297 1.50053n	–1210 1.50140n	–2000 1.49350n	
+ 30.96″ – .31 – .03 –.28	+ 31.71 – .50 + .23 –.29	+ 31.66 – .53 + .23 –.29	+ 31.72 – .24 + .22 –.28	+ 31.15 – .56 + .23 –.29	
+ 30.62 +71 50 46.69 +50 46.41 – 3.60 – 3.60 +4 45.20 +4 45.04 +4 41.60 + .45 +71 55 28.29 +4 41.89 +55 28.30	+ ~~31.98~~ +31.44 50 49.24 48.78 48.41 – 5.31 – 5.31 +4 44.71 +4 44.66 +4 39.40 + .40 55 28.10 +4 39.75 55 28.16	+ ~~31.96~~ +31.36 50 ~~49.82~~ 49.22 48.93 – 5.59 – 5.59 +4 44.75 + 44.40 +4 39.16 + .40 55 28.38 +4 39.21 55 28.14	+ 31.70 50 50.26 49.98 – 6.14 – 6.14 +4 44.68 + 44.50 +4 38.54 + .38 55 28.80 +4 38.74 55 28.72	+ 31.48 +30.82 50 ~~50.88~~ 50.22 49.93 – 6.66 – 6.66 +4 44.89 44.51 +4 38.23 + .37 55 28.45 +4 38.22 55 28.15	

17	18	17	18	15
+71°	55′	32″		27″

α 1872 = 18 12.828 55′ 28″.19
α 1873 = 18 11.897 55 24.50

2
308
46.0
49.4
0.9
4877

1872 July 24 -.260		1873 ~~Aug~~ July 24 -.498		1873 July 26 -.485		1873 Aug 4 -.549		1873 Aug 6 -.447 Aug 10 & 12	
18 7.0	18 52.8	18		18		18		18	
10.4	56.2	13.0	17 46.1	14.8	17 39.2	21.8	17 28.1	21.6	17 54.6
13.7	59.2	16.4	49.6?	18.0	42.2	25.0	31.6	25.4	56.1
16.9		19.7	52.3	21.2	44.2	28.3	34.8	28.4	59.9
20.3		23.0		24.6		31.5		31.6	
23.4		26.4		27.8		34.5		35.0	
27.1		29.5		31.3		38.0		38.3	
30.4		32.9		34.7		41.4		41.7	
33.7		36.3		37.9		44.6		45.0	
		39.6		41.3		48.0		48.1	
182.9		236.8		251.6		313.1		315.1	
20.322	18 56.07	26.311	17 49.13 ?	27.955	17 41.87	34.789	17 31.50	35.011	17 56.87
18 20.27		18 26.26		18 27.901		18 34.74		18 34.96	
-3.50		-9.74		-11.41		-18.64		-19.26	
-.79		-1.52		-1.48		-1.68		-1.35	
-3.11		-3.17		-3.06		-2.55		-2.43	
18 12.87		18 11.83		18 11.956		18 11.87		18 11.92	11.94 11.86

1873 Aug 10 11.94ˢ 24.16″
12 11.86 24.32

+0.66		+1.60	+1.62	+1.69	+1.71
30	~~25~~	25	25	25	25
2 16.7	× ~~52.2~~	1 53.0	1 55.7	2 0.9	1 50.0
6.8	~~7.2~~	7.0	9.1	14.1	3.4
23.5		12.00	12.48	15.0	11.34
32 11.75		26 ~~55.00~~ 27 0.00	27 2.40	27 7.50	26 56.70
-35.75		+37.18	+46.08	+63.29	+38.14
1.55328n		1.57031	1.66351	1.80134	1.58138
1.16091		1.17794n	1.27114n	1.40897n	1.18901n
+14.49		-15.06	-18.67	-25.64	-15.45
32 11.75		27 0.00	27 2.40	27 7.50	26 56.70
32 26.24		26 44.94	26 43.73	26 41.96	26 41.25
50 22.11		56 3.41	56 4.62	56 6.39	56 7.10
		−29 32.7 = 1.51340n			
-1378		-1823	-1833	-1478	-1172
1.49972n		1.49517n	1.49507n	1.49862n	
± 31.60		± 31.27	± 31.27	± 31.52	+ 31.72
− .21		− .22	− .34	− .64	− .23
+ .04 -.22		+ .10 -.16	+ .08 -.16	+ .08 -.17	+ .08 -.15
+ 31.43		+ 31.15	+ 31.01	+ 30.96	31.57
50 53.54 50 53.32		56 34.56 56 34.40	56 35.63 56 35.47	56 37.35 37.18	38.67 38.52
− 9.77 − 9.71		− 6.97 − 6.97	− 7.37 − 7.37	− 9.04 − 9.04	− 9.38 − 9.38
+4 43.88 +4 43.81		−1 3.54 −1 3.68	−1 3.74 − 4.09	−1 4.35 − 4.52	−1 4.81 − 5.11
+4 34.11 + .32		−1 10.51 + .77	−1 11.11 + .79	−1 13.39 + .82	−1 14.19 + .83
55 27.65 +4 34.36		55 24.05 −1 9.88	55 24.52 −1 10.67	55 23.96 −1 12.74	24.48 −1 13.66
55 27.68		55 24.57	55 24.80	55 24.44	55 24.76

1662 Urs. Min. (P.B.) =

Gr. 966

h	m	s	
17	22	29	
5	22	45	
+	105°	08′	
+	74	57	16″
	105°	2′	44″
δ =	−62°	39′	56″

Ani z −.89

1872

Tang v = −372

x = +.059

cos x = {−.31 (− 89)

α 1872 37.454

α 1873 45.409

δ 1872 = 57′ 12″.61 = 2′ 47″.39

δ 1873 = 57 15.88 = 2 44.12

1872	m	s	
June 29	22	33.82	
July 4		34.11	.29
9		34.43	.32
14		34.78	.35
19		35.15	.37
24		35.54	.39
29		35.96	.42
Aug 3		36.40	.44
8		36.86	.46

1873

	m	s	
July 19	22	43.39	
24		43.79	.40
29		44.21	.42
3		44.65	.44
8		45.11	.46
13		45.59	.48
18		46.08	.49

dα = +7.983
dδ = +3.27

	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	July 16 1872 −.308 −.31
17	22 11.8 15.7 19.5 23.8 27.5 31.6 35.6 39.3 43.6 21 5.5 8.9 11.9	22 24.0 27.8 31.8 35.9 39.7 42.7 47.6 51.5 55.6 21 39.9 41.7 45.8	22 25.2 29.4 33.4 37.4 41.3 45.3 49.4 53.3 57.1 21. 58.7 59.5	22 26.2 30.5 34.4 38.2 42.5 46.2 50.1 54.1 58.2 21 58.9 0.0 3.4	22 24.7 28.7 32.5 36.4 40.5 44.6 48.3 52.1 56.4 21 44.9 47.1 49.5	22 22.1 26.0 29.7 33.6 37.4 42.0 45.7 49.7 54.0 21 47.8 50.9 54.5
	248.4	357.6	371.8	380.4	364.2	340.2
	27.600 21 8.77	39.733 21 41.80	41.311 21 59.10	42.267 21 59.77	40.467 21 47.17	37.800 21 51.07
	22 ~~27.54~~ 27.66 22 33.86 −6.20 − 5.89 88	22 ~~39.67~~ 39.79 22 34.21 +5.58 +5.89 89	22 ~~41.25~~ 41.37 22 39.27 +7.10 +7.41 41	22 ~~42.21~~ 42.33 22 34.41 +7.92 +8.23	22 ~~40.41~~ 40.53 22 34.55 +5.98 +6.29	22 ~~37.74~~ 37.86 22 34.91 +2.95 +3.26
	+ 4.62 −.02 + 1.23 +1.23 +3.59 +11.57 + 9.44 2 22 27.66 22 37.10	− 7.25 +.01 + 1.30 +1.33 +3.24 +11.22 − 2.71 .67 39.79 37.08	− 8.50 +.01 + 1.15 +1.19 +3.18 +11.16 − 4.17 2 41.37 37.26	− 9.15 +.00 + 1.08 +1.06 +3.04 +11.02 − 5.03 5 42.33 37.30	− 8.49 −.01 + 1.30 +1.30 +2.90 +10.88 −4.29 30 40.53 37.24	− 4.49 −.01 +1.15 +1.14 +2.54 +10.52 −0.80 2 37.86 37.06
	22 37.08 +0.92 22 45.06	22 37.12 +0.83 45.10	22 37.25 +0.82 45.23	22 37.28 +0.79 45.26	22 37.23 +0.77 45.31	22 37.04 +0.72 45.02
25	1 10.3 −1.9 8.4 26 4.20	1 16.5 21.8 21.3 26 10.65	1 21.0 8.0 29.0 26 14.50	1 20.7 10.9 31.6 26 ~~10.80~~ 26 15.80	1 14.8 2.8 17.6 26 ~~9.30~~ 26 8.80	1 15.2 5.0 20.2 26 10.10
	+78.83 1.89669 1.42684n +26.72 26 4.20 26 30.92	+57.93 1.76290 1.29302n +19.64 26 10.65 26 30.29	+42.21 1.62644 1.15656n +14.34 26 14.50 26 28.84	+42.50 1.62839 1.15857n +14.41 26 15.80 26 30.21	+53.30 1.72673 1.25685n +18.06 26 8.80 26 26.86	+46.73 1.66960 1.19972n +15.84 26 10.10 26 25.94
104°	56′ 17″.13	56 18.06	56 19.51	56 18.14	56 21.49	56 22.41
− 62 38 14 = ~~2.04148~~ 2.04448n	−22.48 ~~2.01895n~~ 2.02200n .03 ± 1 ~~44.46~~ 45.20 + .85 − .01	−12.08 ~~2.02935n~~ 2.03240n .02 ± 1 ~~46.99~~ 47.74 + .46 + .10	−12.80 ~~2.02863n~~ 2.03168n .02 ± 1 ~~46.82~~ 47.57 + .24 + .10	−11.92 ~~2.02951n~~ 2.03256n .02 ± 1 ~~47.03~~ 47.78 + .25 + .10	−19.85 ~~2.02158n~~ 2.02463n .02 ± 1 ~~45.07~~ 45.83 + .39 + .09	−20.43 ~~2.02100n~~ 2.02405n .02 ± 1 ~~44.95~~ 45.70 + .30 + .12
+104 +105	+1 46.07 58 3.50 2 50.1 +4 46.6 −.11 −5.97 −2.70 +4 45.20 − +4 42.50 +4 2 46.00 + −1.03 +4 2 44.97 2	+1 48.32 58 6.38 2 51.3 +4 44.5 −.12 −7.17 −3.90 +4 44.71 − +4 40.81 + 2 47.19 + −1.03 +4 46.16 2	+1 47.93 58 7.44 2 51.5 +4 44.1 −.12 −7.37 −4.10 +4 44.75 − +4 40.65 + 2 48.09 + −1.03 +4 47.06 2	+1 48.15 58 6.29 2 52.0 +4 45.7 −.13 −7.87 −4.60 +4 44.68 − +4 40.08 + 2 46.37 + −1.03 +4 45.34 2	+1 46.33 58 7.82 2 52.3 4 44.5 −.11 −8.17 −4.90 +4 44.89 − +4 39.99 + 2 47.81 + −1.03 +4 46.78 2	+1 46.14 58 8.55 2 53.2 4 44.7 −.12 −9.07 −5.80 +4 43.91 − +4 38.11 + 2 46.66 + −1.03 +4 45.63 +2
	+58 3.39 46.5 2.70 45.04 .81 43.15 46.54 2 43.26	6.26 44.8 3.90 44.66 .73 41.49 47.75 44.47	7.32 44.0 4.10 44.40 .72 41.02 48.34 45.06	6.16 45.6 4.60 44.50 .70 40.60 46.76 45.48	7.71 44.4 4.90 44.51 .68 40.29 48.00 44.72	8.43 44.6 5.80 43.28 .64 38.12 46.55 43.27

Sin δ 9.98484
Cos δ 9.41441
1157
9.53012n

1872					
June	29	+74	57	10.1	
July	4			9.1	−.10
	9			8.1	.10
	14			7.1	.10
	19			6.2	.9
	24			5.4	.8
	29			4.6	.8
Aug	3			3.9	.7
	8			3.3	.6

1873		′	″	
July	19	57	12.2	
	24		11.3	−.9
	29		10.6	.7
Aug.	3		10.0	.6
	8		9.4	.6
	13		8.9	.5
	18		8.5	.4

1872		α	δ
Aug	4	37.32	46.65
	6	37.50	47.08
	7	37.41	46.15
	8	37.52	47.37
1873			
July	24	45.54	44.92
	26	45.33	42.94
Aug	4	45.03	42.83
	10	45.13	43.89
	12	45.44	43.38

v. Supp. List

98
47.8
50.9
54.5
51.07
+1.14
10.52
45.02
8.48
44.6
5
43.28
.64
38.12
46.55
43.27

July 20 1872 −.28 −.312

22 22.4 21 58.8
26.5
30.2
34.3
38.2
42.1
46.0
49.9
54.1

343.7

38.189 21 58.80

22 ~~38.13~~
38.25
22 35.21
+3.04
+3.35

−4.33 +.05
+1.04 +1.16
+2.24 +10.22
−1.05 .88
38.25
37.20

22 37.37 45.35
+0.69

1 19.8
9.1
28.9
26 14.45

+39.39
1.59539
1.12551n
+1335
26 14.45
26 27.80

56 20.55

−1506
~~2.02637n~~
2.02942n
+1 ~~46.25~~ .02
47.01
+ .21
+ .12
+1 47.36
58 7.91 58 7.79
2 53.9
+4 46.0 −.12 45.9
−9.77
−6.50
+4 43.65 − 6.50
+4 37.15 + 43.92
2 45.66 + .61
−1.03 +4 38.03
44.03 2 45.82
42.54

July 24 1872 −.27 −.260

22 21.8 23
25.6
29.3
33.5
37.4 23 22.6
41.3 25.1
45.4 29.3
49.2
53.4

336.9

37.433 23 25.67

22 ~~37.37~~
37.49
22 35.52
+1.97
+2.28

−3.48 −.02
+1.00 +.97
+1.93 +9.91
−0.55 60
37.49
36.94

22 36.89 44.87
+0.26

25
1 49.0
38.5
87.5
26 43.75

−48.24
1.68341n
1.21353
−1635
26 43.75
26 27.40

56 20.95

−1360
~~2.02783n~~
2.03088n
+1 ~~46.62~~ .01
47.37
+ .32
+ .03
+1 47.73
58 8.68 8.51
2 54.6
+4 45.9 −.17 45.7
−10.47
−7.20
+4 43.88 − 7.20
+4 36.68 + 43.81
2 45.36 + .58
−1.03 +4 37.19
44.23 2 45.70
42.42

July 25 1842 −.26 −266

22 22.2
26.6
29.8
33.8
37.8 no.
42.0
45.9
49.7
53.8

341.6

37.955

22 ~~37.90~~
38.01
22 35.60
+2.41
+2.72

−3.42 −.01
+0.97 +.99
+1.85 +9.83
−0.60 .59
38.01
37.41

22 37.42 45.40
+0.65

25
1 23.2
12.3
35.5
26 17.75

−943
2.03455
+1 48.28
+ .30
+ .03
+1 48.61
2 54.7
− −.13
−7.30
+4 45.35

July 27 1872 −.23 −.233

22 21 57.0
22.2 22 0.9
26.2 4.5
30.1
34.0
38.0
42.0
45.7
50.0
53.6

341.9

37.989 22 0.80

22 ~~37.93~~
38.05
22 35.77
+2.28
+2.59

−3.29 −.01
+0.86 +.87
+1.78 68 +9.66
−0.65 .75
38.05
37.40 .30

22 37.40 .30 45.28
+0.64

25
1 20.0
8.2
28.2
26 14.10

+37.19
1.57043
1.10055n
+1260
26 14.10
26 26.70

56 21.65

−904
~~2.03239n~~
2.03544n
+1 ~~47.74~~ .01
48.50
+ .19
+ .02
+1 48.72
58 10.37 10.25
2 55.0
+4 44.6 −.12 44.5
−10.87
−7.60
+4 43.39 − 7.60
+4 35.79 + 43.43
2 46.16 + .56
−1.03 +4 36.39
45.13 2 46.64
43.36

July 28 1872 −.23 −.234

22 21 33.1
21.9 36.8
25.7 40.8
29.7
33.5
37.7
41.6
45.5
49.3
53.8

338.4

37.600 21 36.90

22 ~~37.54~~
37.66
22 35.85
+1.81
+2.12

−2.93 +.00
+0.86 +.87
+1.60 +9.58
−0.46
37.66
37.19

22 37.20 45.18
+0.63

25
1 12.4
1.9
14.3
26 7.15

+60.70
1.78319
1.31331n
+2058
26 7.15
26 27.73

56 20.62

−946
~~2.03147n~~
2.03502n
+1 ~~47.64~~ .01
48.40
+ .50
+ .02
+1 48.93
58 9.55 9.44
2 55.2
+4 45.7 −.11 45.6
−11.08
−7.80
+4 44.50 − 7.80
+4 36.70 + 44.36
2 46.25 + .56
−1.03 +4 37.12
45.22 2 46.56
43.28

July 29 1872 −.28 −.211

22 21 40.3
22.9 44.3
25.9 47.3
30.3
34.1
38.4
42.2
46.3
50.4
54.7

345.2

38.355 21 43.97

22 ~~38.30~~
38.41
22 35.94
+2.47
+2.78

−3.20 +.01
+0.74 +.78
+1.51 +9.49
−0.95 .80
38.41
37.46

22 37.51 45.49
+0.62

25
1 12.9
1.9
14.8
26 7.40

+34.38
1.73544
1.26556n
+1843
26 7.40
26 25.83

56 22.52

−1603
~~2.02540~~
2.02845n
+1 ~~46.02~~ .02
46.77
+ .51
+ .02
+1 47.32
58 9.84 9.73
2 55.4
+4 45.6 −.11 45.5
−11.28
−8.00
+4 44.27 − 8.00
+4 36.27 + 44.01
2 46.11 + .55
−1.03 +4 36.56
45.08 2 45.29
42.01

1872 1873

β Draco,

	h	m	s	
	17	27	35 –	
	17	27	34	
	+	52°	24′	″
	+	52	23	46
β =	–	10°	0′	58″
		–17		

tan γ δ = +1.30
x = –.025
cos x = ~~+.04~~
α 1872 32.458
α 1873 33.809

1872	m	s	
June 29	27	34.88	3
July 4		.85	5
9		.80	7
14		.73	7
19		34.66	7
24		.57	9
29		.47	10
Aug. 3		.35	12
8		34.23	.12

δ 1872 = 23 48.63
δ 1873 = 23 45.80

1873	m	s	
July 19	27	36.13	.9
24		.04	.10
29		.94	.12
Aug. 3		.82	.12
8		35.70	.12

dα = +1.351
dδ = –2.88

	June 30 1872 –.33 –.330	July 6 1872 –.35 –.357	July 7 1872 –.31 –.319	July 9 1872 –.29 –.284	July 11 1872 –.33 –.339	July 16 1872 –.31 –.308
III	27 23.9 25.7 27.5 29.2 30.9 32.5 34.2 35.9 37.7	27 22.5 25.7 28.1 35.8 39.2 42.6 46.0 49.2 36.1 39.5 2.9	27 23.5 26.9 30.8 37.0 40.4 43.7 47.2 50.6 57.4 0.8 4.0	27 24.1 27.3 30.8 37.5 41.0 44.3 47.8 51.1 37.7 1.2 4.5	27 22.5 25.9 29.2 36.1 39.3 42.8 46.3 49.6 56.4 59.8 3.1	27 32.9 34.5 36.2 37.8 39.0 41.3 42.9 44.6 46.3
	27 2.7 4.3 5.7	27 14.5 19.0	mw. ∫ e.h.f.	27 9.0 10.7 12.5	27 8.4 10.3 11.7	27 6.3 7.8 8.9
	277.5	408.6 468.6	361.8 481.8	367.3 483.3	411.0 471.0	356.0
	30.833 27 4.23	42.600 27 16.75	43.800	44.300 27 10.73	42.818 27 10.13	39.555 27 7.67
	27 30.81 27 34.87 –4.06 –4.10	27 42.58 27 34.83 +7.75 +7.71	27 43.78 27 34.82 +8.96 +8.92	27 44.28 27 34.80 +9.48 +9.44	27 42.79 27 34.77 +8.02 +7.98	27 39.53 27 34.70 +4.83 +4.79
	+ 4.61 –.02 – .43 –.43 – 2.41 –1.06 – 7.45 +17.85 27 30.81 30.81 27 (23.36 32.58	6 – 7.27 +.01 – .46 –.46 – 2.37 –1.02 –10.10 0.98 42.58 32.48 49	– 8.50 +.01 – .40 –.41 – 2.36 –1.01 –11.26 43.78 32.52	– 9.15 +.00 – .38 –.37 – 2.34 –0.99 –11.86 44.28 32.41	– 8.49 –.01 – .46 –.45 – 2.31 –0.96 –11.26 42.79 32.53	– 4.49 –.01 – .40 –.40 – 2.24 –0.89 – 7.14 39.53 32.40
	27 32.56 27 33.91	27 32.50 33.85	27 32.52 33.87	27 32.42 33.77	27 32.53 33.88	27 32.39 33.74
	+0.92	A. K.		+0.79	+0.77	+0.72
D	4 17.1 9.6 26.6 4 13.30		4 11.2 2.3 13.5 4 6.75	4 18.2 11.8 30.0 4 15.00	~~4 17.60~~ 16.3 8.9 25.2 4 12.60	4 14.2 8.8 23.0 4 11.50
	+34.60 1.53908 1.44022n –2756 4 13.30 3 35.74 +52° 19 12.61″	+25.85 1.41246 1.31360n –20.59 Rej		+33.53 1.52543 1.42637n –2670 4 15.00 3 48.30 19 0.05	+32.69 1.51441 1.41755n –2615 4 12.60 3 46.45 19 1.50	+31.88 1.50352 1.40466n –2539 4 11.50 3 48.11 19 0.24
	–10 0 44 = 1.00720n –2248 0.98472n			–1192 0.99528n	–1985 0.98735n	–2043 0.98677n
	+ 9.65 – .82 – .44			+ 9.89 + .29 + .34	+ 9.71 + .28 + .34	+ 9.70 + .27 + .42
	+ 9.29 +52 19 1.91 10.90 23 51.0 ~~56.1~~ +19 11.48 +4 44.5 –.42 44.1 – 10.68 – 7.80 +4 45.20 2.1 +4 37.40 – ~~7.10~~ +52 23 49.30 +4 45.04 + .15 +4 37.09 +52 23 48.57 23 45.69			+ 9.94 19 9.99 9.57 23 ~~55.4~~ 53.6 +4 48.4 –.42 48.0 – 12.68 – 9.80 +4 44.68 5.00 +4 34.88 – ~~4.80~~ 23 44.87 + 44.50 + .13 +4 34.57 23 44.14 41.26	+ 9.77 19 11.67 11.25 23 ~~58.9~~ 54.1 +4 47.2 –.42 46.8 – 13.18 – 10.30 +4 44.89 –5.5 +4 34.59 – ~~10.30~~ 23 46.26 + 44.51 + .13 +4 34.08 23 45.33 42.45	+ 9.85 19 10.09 9.67 23 ~~59.8~~ 55.2 +4 49.7 –.42 49.3 – 14.08 – 11.20 +4 43.91 –6.5 +4 32.71 – ~~11.20~~ 23 42.80 + 43.26 + .12 +4 32.20 23 41.87 38.99

Sin δ 9.87888

Cos δ 9.78543
11571n
9.90114n

1872		°	'	"		
June	29	+52	23	56.1	50.7	
July	4			57.8	52.2	15
	9			58.4	53.6	14
	14			59.4	54.9	13
	19		24	0.2	56.1	12
	24			0.9	57.2	11
	29			1.6	58.3	11
Aug.	3			2.1	59.3	10
	8			2.6	.60.2	9

1873		°	"	
July	19	23	50.4	
	24		51.5	+1.1
	29		52.5	1.0
Aug.	3		53.6	1.1
	8		54.6	1.0

1872		α	δ
Aug	1	3260	
	4	3260	4612
	6	3252	4724
	7	32.59	4673
	8	32.51	4642
	10	32.49	4653

1873		α	δ
July	26	3388	4626
	30	3293	45.36
Aug	4	33.70	46.06
	5	3379	46.11
	6	33.89	4466
	12	33.79	45.01

2
3.08
31

6.3
7.8
8.9

7.67

−.40
0.89

33.74

9.67
49.3

−6.5
~~11.20~~
43.28
.12
32.20
41.87
38.99

July 20 1872 −.362 −.28

27 19.1 27 11.4
22.4 12.4
26.0 13.7
32.8
36.1
39.4
42.7
46.0
52.9
56.2
59.8
433.4

39.400 27 12.50

27 39.38
27 34.64
+4.74
~~+4.70~~

−4.33 +.05
− .36 −.40
−2.18 − 0.83
−6.876
39.38
32.51

27 32.52 33.87

+0.69

4 10.9
2.9
138
4 6.40

+26.90
1.42975
1.33089n
−2142
4 6.90
3 45.38

19 2.97

−1506
0.99214n

+ 9.82
− .20
+ .41

+ 10.03
19 13.00 +19 12.54
24 23 ~~0.4~~ 56.3
+4 47.4 −.41 47.0
14.68
−11.80
+4 43.65 7.7
+4 31.85 − ~~11.80~~
23 44.85 +4 43.92
+ .11
+4 32.23
23 44.82
41.94

July 24 1872 −.260 −.27

27 18.3 27 10.6
21.5 12.2
25.0 13.3
31.7
35.1
38.5
41.8
45.3
52.1
55.3
58.7
423.3

38.482 27 12.03

27 38.46
27 34.57
+3.89
+3.85

−3.48 −.02
− .35 −.34
−2.11 −0.76
−5.945
38.46
32.52

27 32.51 33.86

+0.66

0 0
4 9.5 3 14.3
2.9 8.9
124 232
4 6.20 3 11.60

+26.45
1.42243
1.32357n
−2107
4 6.20
3 45.13

19 3.22

−1360
0.99360n

+ 9.85
− .18
+ .08

+ 9.75
19 12.97 19 12.56
24 23 ~~0.9~~ 57.2
+4 47.9 −.41 47.5
15.18
−12.30
+4 43.88 8.6
+4 31.58 − ~~12.30~~
23 44.55 + 43.81
+ .11
+4 31.62
23 44.18
41.30

July 25 1872 −.266 −.26

0
27 18.0
21.3
24.9
31.86 27 28.3
34.9 29.5
38.3 31.0
41.7
45.1
51.8
55.2
58.6
421.4

38.309 27 29.60

27 38.28
27 34.56
+3.73
+3.69

−3.42 −.01
− .34 −.34
−2.09 −0.74
−5.856
38.28
32.43

27 32.42 33.77

+0.65

0
3 54.2
47.6
1017
3 50.85

+ 8.71
0.94002
0.84116n
−6.94
3 50.85
3 43.91

19 4.44

−942
0.99778n

+ 9.95
− .03
+ .08

+ 10.00
19 14.44 14.06
24 23 ~~1.1~~ 57.4
+4 46.7 −.38 46.3
15.38
−12.50
+4 45.35 −8.7
+4 32.85 − 12.50
23 47.29 + 45.12
+ .11
+4 32.73
23 46.74
43.91

July 27 1872 −.233 −.23

27 17.8 27 7.1
21.3 8.8
24.7 10.1
31.4
34.7
38.1
41.4
44.9
51.6
54.9
58.2
419.0

38.091 27 8.67

27 38.07
27 34.51
+3.56
~~+3.52~~

−3.29 −.01
− .30 −.30
−2.05 −0.70
−5.645
38.07
32.43

27 32.42 33.77

+0.64

0
4 11.4
3.0
144
4 7.20

+29.42
1.46864
1.36978n
−2343
4 7.20
3 43.74

19 4.61

−904
0.99816n

+ 9.96
− .22
+ .08

+ 9.81
19 14.42 14.01
24 23 1.4 57.9
+4 47.0 −.41 46.6
−15.68
−12.80
+4 43.39 9.3
+4 30.59 − ~~12.80~~
23 45.01 + 43.43
+ .10
+4 30.73
23 44.74
41.86

July 28 1872 −.234 −.23

27 17.4 27 15.5
20.4 14.7
24.3
31.0
34.4
37.8
41.1
44.4
51.2
54.7
58.2
415.4

37.764 27 15.10

27 37.74
27 34.48
+3.26
~~+3.22~~

−2.93 +.00
− .30 −.30
−2.02 −0.67
−5.25
37.74
32.49

27 32.49 33.84

+0.63

0
4 5.0
58.0
1230
4 1.50

+22.66
1.35526
1.25640n
−1805
4 1.50
3 43.45

19 4.90

−946
0.99774n

+ 9.95
− .13
+ .08

+ 9.90
19 14.80 14.40
24 23 ~~1.5~~ 58.1
+4 46.7 −.40 46.3
−15.78
−12.90
+4 44.50 9.5
+4 31.60 − ~~12.90~~
23 46.40 + 44.36
+ .10
+4 31.56
23 45.96
43.08

July 29 1872 −.211 −.20

27 14.7 27 6.4
21.1 7.8
24.5 9.2
31.4
34.6
38.2
41.5
44.9
51.5
54.9
58.3
418.6

38.055 27 7.80

27 38.03
27 34.47
+3.56
~~+3.52~~

−3.20 +.01
− .26 −.27
−2.01 −0.66
−5.47
38.03
32.56

27 32.56 33.91

+0.62

0
4 11.1
3.3
144
4 7.20

+30.25
1.48073
1.38187n
−2409
4 7.20
3 43.11

19 5.44

−1603
0.99117n

+ 9.80
− .24
+ .08

+ 9.64
19 15.08 14.67
24 23 1.6 58.3
+4 46.5 −.41 46.1
15.86
−13.00
+4 44.27 9.6
+4 31.27 − ~~13.00~~
23 46.35 + 44.01
+ .10
+4 31.11
23 45.78
42.90

1872phae.proj.1461.

1872 ν₁ 1872 ν₂ 1873 1873

ν₁ Draconis

h m s
17 29 40
~~17 29 41~~
+ 55° 16′ ″
+ 55 16 18

h m s
17 29 46
+ 55° 15′ 36″

η – – 12 52 48

– 221872

Red.	s
1	217
2	181
3	145
4	9.2
5	8.6
6	0.0
7	
8	
9	
10	
11	

long δ = +1.44
x = –.027
corr x =

ν₂ α 1872 44.768 δ = 15 38.50
α 1873 45.948 δ = 15 35.88

ν₁ 16 20.23″

dα = +1.179
dδ = –2.62

1872

	m s		
July 19	29 41.68	47.08	10
24	.58	.98	10
29	47	46.87	11
Aug. 3	35	.75	12
8	41.22	46.61	14

1873

	m s	
July 19	29 48.36	42.96
24	.26	.86
29	15	.75
Aug. 3	.03	.62
8	47.89	42.49

ν₂ ν₁ 1873 the same

ν × Draconis

July 20 1872 –.312 –.28 ν₂
17 29 44.3 30 15.4 / 46.1 17.7 / 48.0 19.1 / 49.7 / 51.6 / 53.4 / 55.2 / 57.0 / 59.0
464.3
51.589 30 17.40
29 51.56
29 ~~47.07~~
+4.49
–4.33 +.05
– .40 –.45
–2.30 –1.12
–7.03
29 51.56
29 44.53
29 44.53 29 45.71
+0.69

July 24 1872 –.266 –.27 ν₁ ν₂
29 – 29 23.5 / – 25.4 / – 26.7
38.3 / 41.9 / 45.5 / 49.0 / 52.8
45.50 29 25.20
29 45.47
29 41.57
+3.90
–3.48 –.02
– .39 –.37
–2.20 –1.02
–6.09
45.47
39.40
29 39.40 40.38
+0.66

July 29 1872 –.211 –.20 ν₂
29 28.9 29 19.7 / 32.4 21.5 / 36.0 23.2 / 43.2 / 46.7 / 50.4 / 54.1 / 57.6 / 30 4.9 / 8.4 / 12.0
374.6
554.6
50.418 29 21.47
29 50.39
29 46.86
+3.53
–3.20 +.01
– .29 –.30
–2.09 –0.91
–5.58
50.39
44.81
29 44.81 45.99

Aug 6 1872 –.248 –.24 ν₂
29 45.3 29 33.8 / 48.9 36.0 / 52.6 37.9 / 59.8 / 30 3.3 / 7.0 / 10.7 / 14.3 / 21.4 / 24.9 / 28.7
316.9
76.9
6.991 29 35.90
30 6.96
29 40.66
+20.30
–20.04 +.00
– .35 –.36
–1.89 –0.71
–22.289
30 6.96
44.68
30 44.67 45.85

Aug 8 –.257 –.27 ν₂
29 14.7 / 16.8 29 No delta / 18.8 / 23.1 / 25.8 / 27.3 / 29.4 / 31.6 / 35.8 / 37.9 / 40.0
300.7
27.336
29 27.31
29 46.60
–25.95
– .39 –.37
–1.83 –0.65
–28.17
29 27.31
~~9.14~~

Cant. makes Rg.

10
1 14.0
351
491
11 24.55
–2581
+~~34.19~~
1.41179 n
1.28319 n
+1919
11 24.55
11 ~~5.36~~ 43.74
–12 53 30
–1486
1.10504 n
+ 1274
– .16
+ .14
+ 1272
+55 11 56.16
15 ~~46.4~~
46.4
+4 43.65

10
1 34.1
26.2
60.3
11 30.15
+20.30
1.30750
1.17890 n
–15.09
11 30.15
11 15.06
1.11990 n
–1342
1.10648 n
+ 12.78
– .10
+ .03
+ 1271
11 27.77
15 ~~47.8~~ 3
16 28.9
+4 43.88

10
2 21.0
13.2
34.2
12 17.10
+28.95
1.46166
1.33305 n
–21.53
12 17.10
11 08.57
–1595
1.10805 n 3
+ 1268
– .22
+ .05
+ 1251
12 ~~18.08~~
15 ~~48.3~~
12 8.08
+4 44.27 +

10
2 ~~39.2~~ 212
~~29.9~~ 13.2
34.4
12 17.20
+31.09
1.49262
1.36402 n
–23.12
12 17.20
11 54.08
–1111
1.10879 n
+ 1285
– .25
+ .18
+ .1278
12 8.86
15 ~~50.0~~
+4 43.45

10
1 ~~21.2~~ 48.2
13.2 41.8
90.0
11 45.00

And more or there [illegible]
Are one inextricably mixed through the interchange of the two stars.

Sin δ

			1872 ′	″ ²		″			1873 ′	″	′	v² ″	
cos δ	July	19	15	46.1		878	July	19	15	82.4	15	40.6	
		24		47.2	+11	889		24		83.6		40.7	+11
		29		48.2	10	900		29		84.7		42.8	11
	Aug.	3		493	11	910	Aug.	3		85.7		43.9	11
		8		50.3	10	920		8		86.6		44.9	10

L. 8 Draco.

Aug 8 −.27 −.257 L7   Aug 10 −.27 −.266 L7

30

5.6 30 24.4   29 49.3
7.4 25.3   50.8
9.2 26.3   52.6
11.0
12.8   29 17.6 17.6
14.6   21.2 17.6
16.5   24.8 17.6
18.3   32.1 17.6
20.1   35.7 17.6
39.3 17.6

115.5

12.833 30 25.33   17.600 29 50.90

30 12.81   29 17.57
29 (41.21)   29 (41.17)

−25.95 −.01   −30.74 +.00
− .39 −.37   − .39 −.38
− 1.84 −0.66   − 1.80 −0.62
−28.187   32.982
30 12.81   29 17.57
44.63   44.64

30 44.64 45.82   30 44.65 45.83

Aug 7

10   10   10
1 37.2   1 48.2   1 31.9
30.3   41.8   25.9
67.5   90.0   57.8
11 33.75   11 45.00   11 28.90

− 12.50   − 33.30
1.09691n   1.52244
0.96831   1.39384
+ 9.30   +24.77
11 33.75   11 45.00
11 43.05   12 9.77

−1717   −902

1.10273n   1.11088n

+ 12.67   + 12.91
− .84   − .28
+ .14   + .14

+ 12.77   + 12.77
11 55.82   12 22.54
15 50.3   15 50.67

+4 43.29   +4 43.83

Creamin sheet, for order of $\mu_1 \times \mu_2$

μ_2^1 Draconis

17 29 40
+ 55 16

μ_1 μ1872 39.367
μ1873 40.547

Sin δ 9.91477
Cos δ 9.75569
11571m
9.87140n

July 20 1872.28

17 28

Aug 4 -.13 -167 1872

33.3 29 35.0 29 23.7
58.3 38.4 25.4
57.4 42.1 26.8
1.6 49.4
3.7 52.8
5.8 56.5
8.0 30 0.1
10.2 3.7
14.4 11.1
16.5 14.8
18.6 18.2
244.8 322.1
64.8 622.1
5.891 56.555 29 25.30

~~29~~ 5.86 29 56.63
5.83 56.50
41.32

Rej Merz

- 4.33 -14.95 +.01
- 4.0 - .22 -.24
-2.31 -1.95 - 0.77
-7.03 -17.12 3
6.83 56.50
58.80 39.38

30 39.37 40.55

10
1 39.2
29.9
6.91
11 34.55

+31.25
1.49485
1.36625n
-2324
11 34.55
11 11.31
- 363

1.11627m

+ 13.07
∓ .25
∓ .13

+ 12.95
11 24.26
15 49.6

Aug 7 -.22 -222

29 42.9
46.5 29 34.1
50.0 35.1
57.3 36.4
0.8
4.6
8.2
11.7
19.0
22.6
26.3
289.9
49.9
4.536 29 35.20

30 4.51
4.49
41.24

-22.90 +.00
- .32 -32
-1.87 - 0.69
-25.09
4.49
39.40

30 39.40 40.58

10
1 37.2
30.3
67.5
11 38.75

+29.34
1.46746
1.33886n
-2182
11 38.75
11 16.93
-1367

1.10623m

+ 12.77
∓ .22
∓ .13

+ 12.68
11 29.61
15 50.1

Aug 10 -.44 -266

28 19.5
21.6 28
23.6
27.8
30.0
32.2
34.2
36.2
40.6
42.7
44.8
353.3
32.118

28 32.09
41.17

-30.74
-.63 -.38
-1.80 - 0.62
-33.17
41.17

10
1 31.9
25.9
57.8
11 28.90

Aug 5 -.43 -439 1873

29 40.5 29 30.3
44.2 32.4
47.8 34.0
53.0
58.7
29 2.1
6.0
9.6
16.8
20.3
23.9
325.0
25.0
2.273

29 2.35
30 2.22

-2.99
- .62 -.63
-2.03
-5.64
2

5
0 42.3
57.0
99.3
5 49.65

Aug 6 -.44 -442

29 46.1
49.8 29 38.4
53.4 39.6
0.6 40.6
4.2
7.8
11.5
15.1
22.1
26.0
29.6
269.2
86.2
7.836

30 7.81

+1.50
-.63 -.64

5
1 24.0
39.1
6.31
6 36.55

Ch. of
Aug 10

Reject
Cont
read Aug 12 1873
477

29 43.0
46.6 29 35.8
50.0 37.2
57.5 38.6
4.3
4.9
8.3
12.1
23.0
26.5
27.3
8
23.8
4.867 29 37.20
30 4.84

− 2.45
−.69

5
0 58.0
8.5
12.65
6 3.25

5
0 41.3
55.8
97.1
5 48.55

f Draco

h	m	s
17	32	29
17	32	28

°	′	″
+ 68	13′	
+ 68	12′	56
− 25°	50′	
	−.44	

tang δ = + 2.50
x = − .039
Con x = + .11 + 0.!
″ α 1872 = 28.669 δ = 12′ 58.45″ dα = − 0.255 dδ = − 1.29
8″ α 1873 = 28.414 δ = 12 56.17

1872		m s	
July	19	32 31.71	.19
	24	.52	.20
	29	.32	.20
Aug.	3	.10	.22
	8	30.87	.23

1873		m s	
July	19	32 31.50	
	24	.32	.18
	29	.11	.21
Aug.	3	.89	.22
	8	30.67	.22
	13	.42	.25
	18	.15	.27
	23	.89	.28
	28	29.58	.29

Aug 5 → sup. l.

	July 20 1872 −.312 −.28	July 29 1872 −.311 −.26	July 30 1872 −.316 −.32	Aug 1 1872 −.268 −.27	Aug 4 1872 −.187 −.15	Aug 6 1872 −.218 −.24
17	32 26.8 · 31 35.7	32 2.1 · 31 28.8	32 · 31 49.2	32 · 32 14.5	32 · 32 2.0	32 · 32 8.6
	28.5 · 37.7 31.1 · 40.4 34.1 36.7 39.5 42.4 45.2 48.0	7.6 · 31.5 13.1 · 33.7 24.4 29.7 35.2 40.8 46.3 57.6 33 3.2 8.6	25.4 · 51.8 28.2 · 53.8 30.8 33.5 36.3 39.0 42.0 44.8 47.7	28.2 · 15.9 31.2 · 19.8 33.8 36.5 39.4 42.4 45.0 47.7 50.5	35.4 · 4.4 38.4 · 7.5 41.0 43.8 46.5 49.5 52.3 55.0 57.6	40.6 · 9.9 46.3 · 11.9 51.8 57.4 33 3.0 13.8 19.6 25.1
	33[illegible].3	268.6 388.6	327.7	354.7	419.5	
	36.811 · 31 37.93	35.327 · 31 31.33	36.411 · 31 51.60	39.411 · 32 16.73	46.611 · 32 4.67	51.820 · 32 10.13
	32 36.77 32 31.66 +5.11 +5.00	32 35.29 32 31.31 +3.98 +3.87	32 36.37 32 31.27 +5.10 +4.99	32 39.37 32 31.18 +8.19 +8.08	32 46.57 32 31.05 +15.52 +15.41	32 51.78 32 30.95 +20.83 +20.72
	− 4.32 +.05 − .70 · −.78 − 2.99 · − 3.24 − 8.0~~1~~4 32 36.77 32 28.76	− 3.21 +.01 − .50 · −.52 − 2.64 · − 2.89 − 6.3~~5~~6 35.29 28.94	− 4.24 +.01 − .80 · −.79 − 2.60 · − 2.83 − 7.6~~4~~2 36.37 28.73	− 7.38 +.01 − .68 · −.67 − 2.51 · − 2.76 − 10.5~~7~~5 39.37 28.80	− 14.95 +.01 − .38 · −.41 − 2.38 · − 2.63 − 17.~~72~~ +.73 46.57 28.86	− 20.04 +.00 − .60 · .62 − 2.28 · − 2.53 − 22.9~~8~~4 51.78 28.86
	32 28.73 · 28.48	32 28.93 · 28.68	32 28.75 · 28.50	32 28.82 · 28.57	32 28.84 · 28.59	32 28.84 · 28.59
	+0.69	+0.62	+0.61	+0.59	+0.57	+0.57
	15 0 24.9 14.7 34.6 15 19.80	15 0 25.8 15.0 40.8 15 20.40	15 0 15.9 6.2 22.1 15 11.05	15 0 6.7 54.9 12.16 ~~15 00.80~~ 15 0.80	15 0 14.0 43.3 1.07 15 8.65	15 0 13.1 3.9 17.0 15 8.50
	+ 58.88 1.76997 1.45517n −2852 15 19.80 14 57.28	+64.00 ~~+4.00~~ 1.80618 1.49138n −3100 15 20.40 14 49.40	+44.81 1.65137 1.33657n −2170 15 11.05 14 49.35	+22.68 1.35564 1.04084n −1099 15 0.80 14 49.81	+41.94 ~~+41.97~~ 1.62263 1.30783n −2032 15 8.35 · 8.65 14 45.03 · 48.33	+41.69 1.62003 1.30523n −2020 15 8.50 14 48.30
+68°	7′ 57.07″	7 58.95	7 59.00	7 58.54	8 ~~3.32~~ 0.02	8 0.05
−25 49 54 = 1.44520	−1486 1.43034n	−1595 1.42925n	−932 1.43588n	−859 1.43661n	−363 1.44157n	−1111 1.43409n
	+ 26.94 .64 + .03	+ 26.87 .77 + .01	+ 27.28 .38 + .00	+ 27.33 .11 + .00	+ 27.64 .33 + .01	+ 27.17 .33 + .01
+68	+ 26.33 8 23.40 · +8 23.37 13 8.8	+ 26.11 8 25.06 · 8 25.03	+ 26.90 8 25.90 · 25.88	+ 27.22 8 25.76 · 25.76	+ 27.32 8 30.64 · 27.34 · 27.33	+ 26.85 8 26.90 · 26.89
+0.″	+4 43.4 −.03 · 43.4 +4 43.5 · 43.5	13 8.7 +4 43.6 −.03 · 43.6 +4 43.7 · 43.7	13 8.9 +4 43.0 −.02 · 43.0 +4 43.1 · 43.1	13 9.3 +4 43.5 .00 · 43.5 +4 43.6 · 43.6	13 9.9 +4 39.3 42.6 −.01 · 42.6 +4 42.7 · 42.7	13 10.4 +4 43.5 −.01 · 43.5 +4 43.6 · 43.6
	− 10.69 − 8.40 +4 43.65 − · 8.40 +4 35.25 + · 43.92	− 12.49 − 10.20 +4 44.27 − · 10.20 +4 34.87 + · 44.01	− 12.79 − 10.50 +4 43.66 − · 10.50 +4 33.16 + · 43.29	− 13.09 − 10.80 +4 43.11 − · 10.80 +4 32.31 + · 42.91	− 13.79 − 11.50 +4 42.75 − · 11.50 +4 31.25 + · 42.42	14.19 − 11.90 +4 43.45 − · 11.90 +4 31.55 + · 43.30
+68	12 58.65 + · .30 +4 35.82 +68 12 59.19 12 56.90	12 59.13 + · .27 +4 34.08 12 59.11 56.82	12 59.06 + · .26 +4 33.05 12 58.93 56.64	12 58.07 + · .25 +4 32.36 58.12 55.83	12 58.59 + · .25 +4 31.17 12 58.50 56.21	12 58.45 + · .25 +4 31.65 12 58.54 56.25

Sin δ 9.96783
Cos δ 9.56949
1.1571 n
9.68520 n

	1872				
July	19	+68°	13	6.5″	
	24			7.6	+1.1
	29			8.6	1.0
Aug.	3			9.7	1.1
	8			10.7	1.0

	1873			
July	19	12	61.4″	
	24		62.6	+1.2
	29		63.7	1.1
Aug.	3		64.7	1.0
	8		65.6	.9
	13		66.4	.8
	18		67.1	.7
	23		67.7	.6
	28		68.2	.5

	α	δ
1872		
Aug 5	28.49	58.11
1873		
Aug 12	28.59	56.54

Sup. 2.

1872
-.18
-.24
8.6
9.9
11.9
10.13
0
.62
2.53
28.59
26.89
1 43.5
43.6
11.90
43.30
.25
1 31.65
58.54
56.25

Aug 7 1872 -.222 -.22

32 21.0
26.6 31 57.0
32.2
43.4
48.8
54.6
0.2
5.7
16.9
22.0
27.7
299.1
599.1
54.464 31 57.00

32 54.43
32 30.91
+23.52
+23.41

-22.91 +.00
-.55 -.55
-2.24 -2.49
-25.70
54.43
28.73

32 28.73 28.48

+0.55

15
0 19.0
10.2
29.2
15 14.60

+57.46
1.75937
1.444157 n
-27.83
15 14.60
14 46.77
8 1.58

-1367
1.43153 n

+ 27.01
− .62
+ .02

+ 26.41
8 27.99 8 27.97
13 10.6
+4 42.6 -.02 42.6
+4 42.7 42.7
-12.49
-12.70
+4 44.05 − 12.20
+4 31.85 +4 43.64
12 59.84 + .24
+4 31.68
12 59.65
57.36

Aug 8 -.257 -.27

32 ?
46.6 32 11.4
49.3 14.3
52.1 17.4
54.9
57.7
0.4
3.3
5.9
8.7
278.9
518.8
57.644 32 14.37

32 57.61
32 30.86
+26.75
+26.64

-25.95 -.01
-.68 -.64
-2.19 -2.44
-28.82 79
57.61
28.79

32 28.82 28.57

+0.54

15
0 13.6
4.0
17.6
15 8.80

+43.27
1.63619
1.32139 n
-20.96
15 8.80
14 47.84
8 0.87

-1717
1.42803 n

+ 26.79
− .35
+ .01

+ 26.45
8 26.96 26.95
13 10.7
+4 43.7 -.01 43.7
+4 43.8 43.8
-14.49
-12.20
+4 43.29 − 12.20
+4 31.09 + 43.16
12 58.05 + .23
+4 31.19
12 58.14
55.85

Aug 4 1873 -.549 -.55

32 39.9
~~17.5~~ 31 55.1
42.4 58.3
45.5 1.0
48.2
51.0
53.9
56.5
59.4
2.3
51.012 31 58.13

32 50.97
32 31.84
+19.13
+19.02

-18.64 +.00
-1.38 -1.37
-2.43
-23.45 54
50.97
28.54

32 28.53

+1.69

5
4 24.9
40.3
65.2
9 32.60

+52.88
1.72329
1.40849 n
-25.61
9 32.60
9 6.99
13 41.36

-25 49 45 = 1.44510
-1528
1.42982 n

+ 26.90
− .53
+ .18

+ 26.55
14 7.91 14 7.55
13 4.9
-1 3.0 -.36 3.4
-1 2.9 3.3
-8.70
-1 4.35 − 8.70
-1 13.05 -1 4.52
12 54.86 + .74
-1 12.48
12 55.07
~~52.78~~

Aug 5 1873 -.439 -.43

32 ~~17.6~~ 32 8.4
~~23.2~~ 10.3
~~29.0~~ 12.6
48.1
45.6
50.7
56.4
33 2.3
51.021 32 10.43

32 50.98
32 30.79
+19.19
+19.08

-18.98 +.02
-1.08 -1.09
-3.38
-23.44 43
50.98
28.54

32 28.55

+1.70

5
4 18.0
32.8
50.8
9 25.40

+40.59
1.60842
1.29362 n
-19.66
9 25.40
9 5.74
13 42.61

-465
1.44045 n

+ 27.57
− .32
+ .18

+ 27.43
14 10.04 14 9.69
13 5.1
-1 4.9 -.35 5.2
-1 4.8 5.1
-8.90
-1 5.98 − 8.90
-1 14.88 -1 6.33
12 55.16 + .75
-1 14.48
12 55.21

Aug 6 1873 -.442 -.44

32
40.0 32 5.6
42.9 7.7
45.7 9.8
48.5
51.1
54.0
56.8
59.6
2.5
401.1
461.1
51.283 32 7.70

32 51.19
32 31.75
+20.44
+20.33

-19.26 -.01
-1.10 -1.10
-2.34
-22.70 1
51.19
28.49

32 28.48

+1.70

5
4 19.8
34.5
54.3
9 27.15

+43.53
1.63879
1.32399 n
-21.09
9 27.15
9 6.06
13 42.29

-1160
1.42885 n

+ 26.83
− .36
+ .18

+ ~~26.83~~
14 +26.65 14 8.58
8.94
13 5.3
-1 2.6 -.36 4.0
-1 3.5 3.9
-9.10
-1 4.81 − 9.10
-1 13.91 − 5.11
12 55.03 + .75
-1 13.46
12 55.12

Aug 10 1873 -.441 -.44

32 32 2.6
41.7 11.8
44.3 14.4
47.3
49.9
~~5~~
55.4
58.0
33 1.0
3.8
421.5
52.687 32 11.93

32 52.65
32 30.57
+22.08
+~~22.19~~ 21.97

-20.90 +.02
-1.10 -1.10
-2.16
-24.18 4
52.65
28.49

32 28.51

+1.75

5
4 17.9
32.9
50.8
9 25.40

+40.76
1.61023
1.29543 n
-19.75
9 25.40
9 5.65
13 42.70

-902
1.43608 n

+ 27.30
− .31
+ .18

+ 27.17
14 9.87 14 9.52
13 6.0
-1 3.9 -.35 4.3
-1 3.8 4.2
-9.80
-1 4.02 − 9.80
-1 13.82 − 4.30
12 56.05 + .77
-1 13.33
12 56.19

i Herculis

h m s
17 35 51
17 35 53
+ 46° 04'
+ 46 04 29
z = − 3° 41' 41"
sin z = −.06

tang δ = +1.04
x = −.022
cos α = (~~+~~.20.)
" α 1872 51.373 δ = 4' 30.83" dα = +1.703
dδ = 2.12
α 1873 53.076 δ = 4 28.71

1872 m s
July 19 35 53.47 .07
24 40 7
29 .33 9
3 24
8 53.14 .10

1873 m s
Aug 8 35 54.97
13 .86 11
18 .74 12
23 .61 13
28 54.48 13

1872 α δ
Aug 5 51.13 31.08
1873
Aug 10 52.77 28.32
12 52.80 28.30
Sept 9 52.82

1872 Aug 15 − Sup.

	July 20 1872 −.312 −.28		July 24 1872 −.260 −.27		July 29 1872 −.211 −.20		July 30 1872 −.316 −.32		Aug 1 1872 −.268 −.27		∧ Aug 6 1872 −.248 −.24	
17-	35 46.0	35 32.5	35 39.2	35 23.7	35 38.7	35 28.7	35 39.9	35 31.9	35 42.8	35 28.2	35 55.3	35 48.4
	43.0	33.4	42.2	25.4	41.7	30.3	42.9	33.1	45.8	30.7	58.4	49.7
	45.9		45.2	26.8	44.6	31.5	45.8	34.5	48.7	31.9	36 1.4	51.2
	52.0		51.1		50.6		51.8		54.8		7.2	
	54.9		54.0		53.6		54.7		57.6		10.3	
	57.8		57.0	36 18.6	56.6		57.7		36 0.6		13.3	
	0.7		59.8	20.0	59.5		36 0.6		3.6		16.2	
	3.8		2.9	21.3	36 2.5		3.5		6.6		19.2	
	9.6		8.9		8.5		9.6		12.7		25.2	
	12.5		11.8		11.4		12.4		15.5		28.1	
	15.7		14.8		14.4		15.4		18.4		31.0	
	335.9		386.9		382.1		334.3		307.1		265.6	
	635.9		626.9		622.1		634.3		7.1		145.6	
	57.809	35 32.95	56.991	35 25.30 36 19.97	56.545	35 30.17	57.664	35 33.17	0.646	35 30.27	13.236	35 49.77
	35 57.79		35 56.97		35 56.52		35 57.64		36 0.62		36 13.21	
	35 53.45		35 53.40		35 53.33		35 53.31		35 53.27		35 53.18	
	+4.34		+3.57		+3.19		+4.33		+7.35		+20.03	
	+4.54		+3.77		+3.39		+4.53		+7.55		+20.23	
	− 4.32 +.05		− 3.47 −.02		− 3.21 +.01		− 4.24 +.01		− 7.38 +.01		−20.05 +.00	
	− .29	−.32	− .28	−.27	− .21	−.22	− .33	−.33	− .28	−.28	− .25	−.26
	−2.08	− 0.38	−2.03	− 0.33	−1.96	− 0.26	−1.94	− 0.24	−1.90	− 0.20	−1.81	− 0.11
	− 6.697		− 5.789		− 5.38		− 6.510		− 9.565		−22.12	
	35 57.79		56.97		56.52		57.64		36 0.62		13.21	
	35 51.10		51.19		51.14		51.13		51.06		51.10	
	35 51.12	52.82	35 51.18	52.88	35 51.14	52.84	35 51.14	52.84	35 51.07	52.77	35 51.09	52.79
	+0.69		+0.66		+0.62		+0.61		+0.59		+0.57	
	20		20		20		20		20		20	
	3 22.0		3 28.9	2 38.9	3 23.1		3 21.2		3 25.4		3 18.6	
	16.6		23.1	34.0	15.5		13.9		14.8		12.9	
	386		520	729	386		351		432		315	
	23 19.30		23 26.00	2 36.45	23 ~~16.80~~ 19.30		23 17.55		23 21.60		23 15.75	
			+31.69									
	+24.86		~~+21.69~~		+26.37		+24.49		+30.37		+23.47	
	1.39560		1.50092		1.42111		1.38899		1.48244		1.37051	
	1.35246n		1.45788n		1.37807n		1.34595n		1.48940n		1.32747n	
	−2252		−2870		−2388		−2218		−2750		−2125	
	23 19.30		23 26.00		23 16.80		23 17.55		23 21.60		23 15.75	
	22 56.78		22 57.30		22 52.92		22 53.37		22 54.10		22 54.50	
+115°	59' 51.57"		59 51.05		59 ~~55.43~~ 52.93		59 52.98		59 54.25		59 53.85	
−3	41 48 = 0.57060n											
	−1466		−1324		−1587		−919		−848		−1099	
	0.55594n		0.55736n		0.55473n		0.56141n		0.56212n		0.55961n	
	+ 3.60		+ 3.61		+ 3.59		+ 3.64		+ 3.65		+ 3.63	
	− .17		− .28		− .18		− .16		− .25		− .14	
	+ .33		+ .07		+ .07		+ .07		+ .07		+ .26	
	+ 3.76		+ 3.40		+ 3.48		+ 3.55		+ 3.47		+ 3.75	
+45	59 55.33	+59 55.00	59 54.45	54.11	59 58.91	58.58	59 56.53	56.20	59 57.72	57.39	59 57.60	57.27
	4 37.9		4 38.8		4 39.8		4 40.0		4 40.4		4 41.4	
	+4 42.6 −.33	42.3	+4 44.4 −.34	44.1	+4 40.9 −.33	40.6	+4 43.5 −.33	43.2	+4 42.7 −.33	42.4	+4 43.8 −.33	43.5
	− 9.22		−10.12		−11.12		−11.32		−11.72		−12.72	
	− 7.10		− 8.00		− 9.00		− 9.20		− 9.60		−10.60	
	+4 43.65		+4 43.88		+4 44.27		+4 43.66		+4 43.11		+4 43.45	
	+4 36.55 −	7.10	+4 35.88 −	8.00	+4 35.27 −	9.00	+4 34.46 −	9.20	+4 33.51 −	9.60	+4 32.85 −	10.60
+46	4 31.88 +	4 43.92	4 30.33 +	43.81	4 ~~34.18~~ 31.68 +	44.01	4 30.99 +	43.29	4 31.23 +	42.91	4 30.45 +	43.30
	−.07 +	.04	−.07 +	.04	−.07 +	.04	−.07 +	.04	−.07 +	.03	−.07 +	.03
+46	4 31.81 +4	4 36.86	4 30.26 +4	35.85	4 31.61 +4	35.05	4 30.92 +4	34.13	4 31.16 +4	33.34	4 30.38 +4	32.73
	+46	4 31.86	4	29.96	4	33.63	4	30.33	4	30.73	4	30.00
		4 29.74		27.84		31.71		28.21		28.61		27.88

8.
108
8.32
8.30
1872
–.248
–.24
48.4
49.7
51.2
5 49.77
–.26
0.11
52.79
57.27
43.0
10.68
43.30
.03
3273
3000
27.88

Sin δ 9.85742
Cos δ 9.84125
1157'n
9.95696n

1872		°	'	"	
July	19	+46	4	37.6	
	24			38.7	+1.1
	29			39.7	1.0
Aug	3			40.7	1.0
	8			41.7	1.0

1873			"	
Aug.	8	4	36.8	
	13		37.5	+.7
	18		38.1	.6
	23		38.8	.7
	28		39.4	.6

1872.0 α	δ		1873.0 α	δ	
51.12	31.81		52.81	28.67	
18	30.26		79	28.79	
14	31.61		86	28.64	
14	30.92		77	28.55	
07	31.16		80	28.30	
09	30.38		82		
14	32.18				
18	32.56 30.51				
16	31.50				
13					
51.130	31.29	+.14 31.43	52.808 –	28.59	+.26 .85
.373	30.83	3083	53.076	28.71	.71
–.246	+ 0.46	+60	– .268	–0.12	+.14

Ch. f

Aug 7 1872 –.222 –.22

35 56.2
1.2 35 55.0
4.3
10.2
13.1
16.1
19.2
22.0
27.9
30.9
33.9
237.0
177.0
16.091 35 55.00

36 16.07
35 53.16
+22.91
+23.11

–22.91 ±00
– .23 –.23
–1.79 – 0.09
–24.93
36 16.07
51.14

35 51.14

+0.55
20
3 15.2
9.2
24.4
23 12.20

+21.09
1.32408
1.28104n
–19.10
23 12.20
22 53.10

59 55.25

–1359
0.55701n

+ 3.61
– .12
+ .26

+ 3.75
59 59.00 58.68
4 41.6
+4 42.6 –.32 42.3
–12.92
–10.80
+4 44.05
+4 33.25 – 10.80
4 32.25 +4 43.64
–.07 + .03
4 32.18 +4 32.87
4 31.55
29.43

Aug. 8 –.257 –.27

36 1.3
4.3 35 54.7
7.3 55.7
13.3 56.9
16.2
19.2
22.2
25.2
31.0
34.0
36.6
210.8
19.164 35 55.77

36 19.14
35 53.14
+26.00
+26.20

–25.96 –.01
– .28 –.27
–1.77 – 0.07
–28.01
19.14
51.13

52.84 35 51.13

+0.54
20
3 17.5
12.4
29.9
23 14.95

+23.39
1.36903
1.32599n
–21.19
23 14.95
22 53.76

59 54.59

–1704
0.55356n

+ 3.58
– .14
+ .26

+ 3.70
59 58.29 57.97
4 41.8
+4 43.5 –.32 43.2
–13.12
–11.00
+4 43.29
+4 32.29 – 11.00
4 30.58 + 43.16
–.07 + .03
4 30.51 +4 32.19
4 30.16
28.64

Aug. 10 –.266 –.27

35 6.2
9.1 34 54.5
12.1 55.8
18.0 57.2
21.0
24.0
26.8
29.9
35.9
38.7
41.7
263.4
23.945 34 55.83

36 23.92
35 53.10
+30.82
+31.02

–30.75 ±00
– .28 –.28
–1.73 – 0.03
–32.76
23.92
51.16

52.83 35 51.16

+0.54
20
3 21.2
15.2
36.4
23 18.20

+28.11
1.44886
1.40582n
–25.46
23 18.20
22 52.74

59 55.61

+3.58
– .21
+ .26

+3.53
59 59.14 58.81
4 42.2
+4 43.1 –.33 42.8
– 13.52
– 11.40
+4 43.83
+4 32.43 – 11.40
4 31.57 + 43.26
–.07 + .03
4 31.50 +4 31.89
4 30.70
28.58

Aug 4 1873 –.549 –.55

35 56.2
59.2 35 40.7
36 2.0 42.0
8.0 43.3
11.0
14.0
17.0
20.0
25.9
28.9
31.8
274.0
154.0
14.000 35 42.00

36 13.98
35 53.04
+18.94
+19.14

–18.64 ±00
– .57 –.57
–1.96 – ~~0.26~~
–21.17
13.98
52.81

52.86 35 52.81

+1.69
15
2 32.8
47.2
80.0
17 40.00

+32.00
1.50515
1.46211n
–28.98
17 40.00
17 11.02

5 37.33

– 3 41 41 = 0.57040
–1553
0.55487n

+ 3.59
– .28
+ .11

+ 3.42
5 40.75 5 40.53
4 36.3
– 1 4.4 –.22 4.6
–7.60
– 1 4.35
– 1 11.95 – 7.60
4 28.80 – 1 4.52
–.13 + .10
4 28.67 – 1 12.02
4 28.51

Aug 5 –.439 –.43

35 56.3 35
59.4 43.5
36 2.5 45.2
8.1 46.7
11.2
14.1
17.1
20.1
26.0
29.0
32.1
275.9
155.9
14.173 35 45.13

36 14.15
35 55.02
+19.13
+19.33

–18.98 +.02
– .45 –.46
–1.94 – ~~0.27~~
–21.376
14.15
52.78

35 52.79

+1.70
15
2 28.7
42.5
71.2
17 35.60

+29.04
1.46300
1.41996n
–26.30
17 35.60
17 9.30

5 39.05

–447
0.56593n

+ 3.68
– .23
+ .10

+ 3.55
5 42.60 5 42.39
4 36.4
– 1 6.2 –.21 6.4
–7.70
– 1 5.98
– 1 13.68 – 7.70
4 28.92 – 6.83
–.13 + .10
4 28.79 – 1 13.93
4 28.46

Aug 6 –.442 –.44

35 56.7
59.7 35 52.7
2.7 53.8
8.5 55.3
11.5
14.5
17.6
20.5
26.4
29.4
32.4
279.9
159.9
14.536 35 53.93

36 14.51
35 53.00
+19.51
+19.71

–19.26 –.01
– .46 –.46
–1.92 – ~~0.22~~
–21.645
14.51
52.87

35 52.86

+1.71
15
2 21.7
36.9
58.6
17 29.30

+20.61
1.31408
1.27104n
–18.67
17 29.30
17 10.63

5 37.72

+3.68
– .12
+ .05 .10

+3.66
5 41.38 5 41.18
4 36.5
– 1 4.9 –.20 5.1
–7.80
– 1 4.81
– 1 12.61 – 7.80
4 28.77 – 1 5.11
–.13 + .10
4 28.64 – 1 12.81
4 28.37

ω Draco
h m s
17 37 42
17 37 42
+ 68° 49′ ″
+ 68 48 58
δ = − 26° 26′ 10″
− 44

Red. s
1 .114
2 8.5
3 5.7
4
5 2.9

Tany ρ′ = +2.58
x = −.040
Corr x = −.01 + .04
α1872 42.111 δ = 48′ 59.92″ dα = −0.358
α1873 41.753 δ = 48 58.27 dδ = −1.64

1872 m s
July 19 37 45.25
24 .05 .90
29 .85 .20
Aug. 3 .63 .22
8 44.40 .23

1873 m s
Aug 8 37 44.07
13 43.81 .26
18 43.54 27
23 43.26 28
28 42.96 30

July 20 1872 −.312 −.28
17 37 39.1 36 52.5
42.2 55.6
44.6 57.6
47.6
50.5
53.3
56.0
58.9
1.9
394.1
454.1
50.455 36 55.23
37 50.42
37 45.20
+5.22
+5.23
−4.32 +.05
− .72 −.80
−3.09 −3.45
−8.136
37 50.42
37 42.29
37 42.26 37 41.90
+0.69
35
4 23.0
14.1
37.1
39 18.55
+55.22
1.74210
1.41574n
−2605
39 18.55
38 52.50
+68° 43′ 55.85″
−26 25 53 = 1.45670n
−1466
1.44204n
+ 27.67
− .56
+ .43
+ 27.54
+68 44 23.39 +44 22.96
49 8.0
+4 44.6 −.43 44.2
+0.4 +4 45.0 44.6
−9.74
−8.10
+4 43.65 − 8.10
+4 35.55 +4 43.92
+68 48 58.94 + .30
+4 36.12
+68 48 59.08
48 57.44

July 22 1872 −.285 −.28
37 15.6 36 57.3
21.4 0.0
27.0 3.4
38.6
44.1
49.7
55.6
1.3
12.7
18.2
23.9
308.1
548.1
49.827 37 0.23
37 49.79
37 45.12
+4.67
+4.68
−3.95 +.00
− .72 −.73
−3.01 −3.37
−7.689
49.79
42.11
37 42.10 41.74
+0.68
A.R.
+49.60
1.69548
1.36912n
−23.39
− 46
49 8.4
−10.14
−8.50
+4 43.31 − 8.50
+4 34.81 + 42.99
+ .28
+4 34.77

July 27 1872 −.233 −.23
37 36 33.1
37.5 35.3
40.5 36.9
43.4
46.3
48.9
51.5
54.5
57.3
38 0.2
380.1
440.1
48.900 36 35.10
37 48.86
37 44.92
+3.94
+4.65
−3.28 −.01
− .59 −.60
−2.81 −3.17
−6.68 .70
48.86
42.18
37 42.16 41.80
+0.64
35
4 30.0
20.1
50.1
39 25.05
+73.80
1.86806
1.54170n
−34.81
39 25.05
38 50.24
43 58.11
−819
1.44851n
+ 28.09
− 1.00
+ .09
+ 27.18
44 25.29 24.85
49 9.5
+4 44.2 −.44 43.8
+4 44.6 44.2
−11.24
−9.60
+4 43.39 − 9.60
+4 33.79 + 43.43
48 59.08 + .28
+4 34.11
48 58.96
57.32

July 29 1872 −.211 −.20
37 37 6.8
37.4 8.3
40.2 9.9
43.1
46.0
48.9
51.6
54.4
57.3
38 0.2
379.1
439.1
48.789 37 8.67
37 48.75
37 44.84
+3.91
+3.92
−3.21 +.01
− .52 −.54
−2.73 −3.09
−6.467
48.75
42.29
37 42.28 41.92
+0.62
35
4 13.9
4.1
18.0
39 9.00
+40.12
1.60336
1.27700n
−18.93
39 9.00
38 50.07
43 58.28
−1587
1.44083n
+ 27.60
− .29
+ .08
+ 27.39
44 25.67 25.25
49 10.0
+4 44.3 −.42 43.9
+4 44.7 44.3
−11.74
−10.10
+4 44.27 − 10.10
+4 34.17 + 44.01
48 59.84 + .27
+4 34.18
48 59.43
57.79

July 30 1872 −.376 −.132
37 37 5.3
38.6 7.4
41.3 10.1
44.2
46.9
49.9
52.7
55.5
58.4
38 1.3
388.8
448.8
49.867 37 ~~7.27~~
37 7.60
37 49.83
37 44.80
+5.03
+5.04
−4.24 +.01
− .83 −.81
−2.69 −3.05
−7.763
49.83
42.07
37 42.10 41.74
+0.61
35
4 13.2
4.1
17.3
39 8.65
+42.27
~~+42.60~~
1.62603
1.29967n
−19.94
39 8.65
38 48.71
43 59.64
−919
1.44751n
28.02
+ ~~27.78~~
− .32
+ .08
+ 27.78
44 27.42 25.25
49 10.2
+4 42.8 −.41 43.9
+4 43.2 44.3
−11.94
−10.30
+4 43.66 − 10.10
+4 33.36 + 44.01
49 0.78 + .27
+4 34.18
48 59.43
57.79

Aug 1 1872 −.268 −.27
37 36 46.1
41.2 50.2
44.2 53.2
46.7
49.7
52.9
55.5
58.3
38 1.2
4.1
353.8
473.4
52.644 36 49.83
37 52.60
37 44.71
+7.89
+7.90
−7.38 +.01
− .70 −.69
−2.60 −2.96
−10.686
52.60
41.92
37 41.94 41.58
+0.59
35
4 23.0
13.1
36.1
39 18.05
+62.81
1.79810
1.47174n
−29.63
39 18.05
38 48.42
43 59.93
−848
1.44822n
+ 28.07
− .13
+ .09
+ 27.43
44 27.36 27.01 26.93
49 10.6
+4 43.2 −.43 42.4 42.8
+4 43.6 42.8 43.2
12.34
−10.70
+4 43.11 − 10.30 10.7
+4 32.41 + 43.29 42.9
48 59.77 + .26 .2
+4 33.25 +4 32.4
49 0.26 48 59.3
58.62 57.7

			1872					1873					1872		
Sin δ	9.96962	July	19	+68° 49′	7.7″		Aug.	8	48′	67.7″			aug 5	40.22	58.86
Cos δ	9.55793		24		8.8	+1.1		13		68.4	+.7		1873		
	11571′ n		29		9.9	1.1		18		69.1	.7		aug 4	41.67	58.02
	9.67364 n	Aug.	3		11.0	1.1		23		69.8	.7		5	41.69	58.31
			8		12.1	1.1		~~28~~		70.5	.7		6	41.83	58.62
													12	41.92	58.64
													Sept 9	41.76	

Aug 4 1872 −.157 | Aug 4 1872 −.187 −.157 | Aug 6 1872 −.248 −.24 | Aug 7 −.222 −.22 | Aug. 8 −.257 −.27

(37
12.9
13.9
14.9
15.9
16.9
18.0)

37 | 37 3.6 | 37 | 36 57.2 | 37 | 37 59.7 | 37 18.4 | 37
48.5 | 4.4 | 53.7 | 57.8 | 37 10.9 | 2.6 | 20.0
51.4 | 9.0 | 56.8 | | 38 10.9 | 5.4 | 22.6
54.4 | | 59.5 | | 56.8 | 8.3
57.1 | | 38 2.4 | | 59.3 | 11.2
38 0.1 | | 5.1 | | 2.4 | 13.9
? 2.8 | | 8.1 | | 4.9 | 16.8
5.7 | | 10.9 | | 8.0 | 19.9
8.4 | | 13.6 | | 10.9 | 22.6
11.3 | | 16.5 | | 13.7
| | | | 16.7
239.8 | 226.6 | (219.5) | 160.4
| 46.6 | 8.022 | ? | 100.4
59.967 37 5.67 | 5.178 36 57.50 | 8.022 37 10.90 | 11.155 37 2033
| | 38 10.90

37 59.93 | 38 5.14 | 38 7.98 | 38 11.12
37 44.58 | 37 44.49 | 37 44.44 | 37 44.39
+15.35 | +20.65 | +23.54 | +26.73
+15.36 | +20.66 | +23.55 | +26.74

−14.96 +.01 | −20.05 +.00 | −22.91 +.00 | −25.96 −.01
− .37 −.43 | − .62 −.64 | − .57 −.57 | − .70 −.66
−2.47 −2.83 | −2.38 −2.74 | −2.33 −2.69 | −2.28 −2.64
−17.825 | 23.057 | −25.81 | −28.941
37 59.93 | 38 5.14 | 7.98 | 11.12
42.11 | 42.09 | 42.17 | 42.18

37 42.08 41.72 | 37 42.07 41.71 | 37 42.17 41.81 | 37 42.21 41.85

+0.57 | +0.55 | +0.54

35 | 35 | 35 | 35
4 17.3 | 4 23.9 | 4 18.9 | 4 15.1
8.5 | 14.1 | 10.1 | 7.0
25.8 | 38.0 | 29.0 | 22.1
39 12.90 | 39 19.00 | 39 14.50 | 39 11.05

| +67.68 | |
+54.30 | ~~+54.28~~ | +57.12 | +50.82
1.73480 | 1.83046 | 1.75679 | 1.70603
1.40844 n | 1.50410 n | 1.43043 n | 1.37967 n
−25.61 | −31.92 | −26.94 | −23.97
| 39 19.00 | 39 14.50 | 39 11.05
| 38 47.08 | 38 47.56 | 38 47.08

| 44 1.27 | 44 0.79 | 44 1.27

| −10.99 | −13.59 | −17.04
| 1.44571 n | 1.44311 n | 1.43966 n

| + 27.91 | + 27.74 | + 27.52
− .53 | − .82 | − .59 | − .47
| + .34 | + .34 | + .34

| + 27.48 | + 27.49 | + 27.39
| 44 28.75 28.75 ~~28.70~~ | 44 28.29 28.28 | 44 28.66 28.24
49 11.3 | 49 11.7 44 28.32 | 49 11.9 27.86 | 49 12.2
| +4 43.0 −.43 42.6 | +4 43.6 −.42 43.2 | +4 43.5 −.42 43.1
| +4 43.4 43.0 | +4 44.0 43.6 | +4 43.9 43.5
| − 13.44 | − 13.64 | −13.94
−11.40 | − 11.60 | − 12.80 | −12.30
| +4 43.45 − 11.80 | +4 44.05 − 12.00 | +4 43.29 − 12.30
| +4 31.65 +4 43.30 | +4 32.05 + 43.64 | +4 30.99 + 43.16
| 49 0.40 + .25 | 49 0.33 + .24 | 48 59.65 + .23
| +4 31.75 | +4 31.88 | +4 31.09
| 49 0.07 | 48 59.74 | 59.33
| 58.43 | 58.10 | 57.69

ψ Herculis

h	m	s		
17	41	25		
17	41	29		
+ 27°	48′			
+ 27	47	47	1″	

z = + 14° 35′
+ .25

tang δ = +.53
x = −.018
cos x = −.03

1872	m	s	
July 19	41	28.86	
24		.82	4
29		.78	4
Aug 3		.83	5
8		28.67	6

1873	m	s	
Aug 8	41	31.18	8
13		.10	8
18		.62	8
23		.94	8
28		30.85	9

α 1872 26.975 δ = 47 49.48 dα = +2.345
dδ −2.35

α 1873 29.320 δ = 47 47.13

	July 20 1872 −.28 −.312		July 22 1872 −.28 −.285		July 27 1872 −.23 −.233		July 29 1872 −.20 −.211		July 30 1872 −.32 −.316		Aug 1 1872 −.27 −.268	
17	41 19.3	41 13.0	41 19.0		41 18.3	41 11.1	41 18.2	41 8.7	41 19.3	41 9.3	41 22.4	41 13.1
	21.7	14.0	21.3		20.5	12.2	20.5	9.7	21.5	10.4	24.8	14.1
	24.1	15.2	23.6		22.9	13.3	22.8	10.7	23.9	11.6	27.0	15.2
	28.7		28.2		27.6		27.3		28.6		31.6	
	31.1		30.6		30.0		29.8		30.9		34.0	
	33.2		32.9		32.3		32.2		33.3		36.3	
	35.5		35.3		34.7		34.5		35.5		38.6	
	37.9		37.5		36.9		36.8		37.9		40.9	
	42.4		42.2		41.5		41.4		42.4		45.5	
	45.0		44.6		43.8		43.8		44.9		48.0	
	47.8		46.9		46.1		46.1		47.2		50.2	
	366.2		362.1		354.6		353.4		365.4		399.3	
	33.291	41 14.07	32.918		32.236	41 12.20	32.127	41 9.70	33.218	41 10.43	36.300	41 14.13
	41 33.27		41 32.90		41 32.22		41 32.11		41 33.20		41 36.28	
	41 28.85		41 28.83		41 28.90		41 28.78		41 28.77		41 28.75	
	+4.42		+4.07		+3.43		+3.33		+4.43		+7.53	
	~~+4.45~~		+4.10		~~+3.46~~		~~+3.36~~		~~+4.46~~		~~+7.56~~	
	−4.32 +.05		−3.95 +.00		−3.28 −.01		−3.21 +.01		−4.24 +.01		−7.38 +.01	
	− .15	−.16	− .15	−.15	− .12	−.12	− .11	−.11	− .17	−.17	− .14	−.13
	−1.88	+0.46	−1.86	+0.48	−1.82	+0.52	−1.81	+0.53	−1.80	+0.54	−1.78	+0.56
	−6.351		−5.96		−5.273		−5.132		−6.210		−9.3028	
	41 33.27		32.90		32.22		32.11		33.20		36.28	
	41 26.92		26.94		27.00		26.98		26.99		26.98	
	41 26.96	41 29.30	41 26.94	29.28	41 26.99	29.33	41 26.99	29.33	41 27.00	29.34	41 27.00	29.34
	+0.69		+0.68 A.R.		+0.64		+0.62		+0.61		+0.59	
	35				35		35		35		35	
	4 49.5				4 47.1		4 51.2		4 49.8		4 50.3	
	43.2				42.5		44.9		45.4		43.3	
	92.7				89.6		96.1		95.2		93.6	
	39 46.35				39 44.80		39 48.05		39 47.60		39 46.80	
	+19.22				+20.04		+22.43		+22.79		+22.17	
	1.28375				1.30190		1.35083		1.35774		1.34577	
	1.34620n				1.36435n		1.41328n		1.42019n		1.40822n	
	−2219				−2314		−2590		−2681		−2560	
	39 46.35				39 44.80		39 48.05		39 47.60		39 46.80	
	39 24.16				39 21.66		39 22.15		39 21.29		39 21.~~14~~20	
+27	43 24.19				43 26.69		43 26.20		43 27.06		43 ~~28~~27.15	
+14	34 39 = 1.17540											
	−1446				−777		−1579		−906		−836	
	1.16094				1.16763		1.15961		1.16634		1.16704	
	− + 14.49				− + 14.71		− + 14.41		− + 14.67		− + 14.69	
	− .08				− .09		− .10		− .12		− .21	
	+ .48				+ .09		+ .10		+ .10		+ .10	
	− 14.09				− 14.71		− 14.40		− 14.69		− 14.70	
+27	43 10.10	43 9.62			43 11.98	43 11.51	43 11.80	−11.80 11.32	43 12.37	43 11.89	43 12.45	11.97
	47 53.9				47 55.2		47 55.5		47 55.7		47 56.1	
	+4 43.8 −48	43.3			+4 43.2 −47	42.7	+4 43.7 −48	43.2	+4 43.3 −48	42.8	+4 43.7 −48	43.2
	−6.75				−8.05		−8.35		−8.55		−8.95	
	−4.40				−5.70		−6.00		−6.20		−6.60	
	+4 43.65				+4 43.39		+4 44.27		+4 43.66		+4 43.11	
	+4 39.25 −	4.40			+4 37.69 −	5.70	+4 38.27 −	6.00	+4 37.46 −	6.20	+4 36.51 −	6.6
+ 27	47 49.35 +4	43.92			47 49.67 +	43.43	− 47 50.07 +	44.01	47 49.83 +	43.29	47 48.96 +	42.9
		.17				.16		.15		.15		.15
+27	∓4	39.35			∓4	37.57	∓4	37.86	∓4	36.94	∓4	36.1
	47	48.97			47	49.08	47	49.18	47	48.83	47	48.1
	47	46.62				46.73		46.83		46.48		45.78

Sin δ 9.66875 July 19 1872 27 47 53.7 Aug. 8 1873 47 52.1
24 54.6 +9 13 52.7 +.6
Cos δ 9.94674 29 55.5 .9 18 53.2 .5
11 571n Aug. 3 56.4 .9 23 53.8 .6
.06245n 8 57.2 .8 28 54.3 .5

1872 Aug 5 α 26.99 δ 48.84
1873 Aug 6 29.35 46.02
17 29.34 46.78
Sept 9 29.32

1872
Aug 4 − .15 −.161
41 29.7 41 24.4
32.2 25.2
34.5 26.2
39.1
41.4
43.8
46.2
48.5
53.1
55.3
57.8
481.6
43.782 41 25.27
41 43.76
41 28.72
+15.04
~~+15.07~~
−14.97 +.01
− .08
−1.75 −.09 +0.59
−16.80
41 43.76
26.96
41 26.96 29.30
+0.57
35
4 44.0
38.6
826
39 41.30
+18.51
1.26741
1.32986n
−2137
39 41.30
39 19.93
43 28.42
−348
1.17192
− ~~+~~ 14.86
− .08
+ .38
− 14.56
43 13.86 43 13.39
47 56.6
+4 42.7 −.47 42.2
−9.45
−7.10
+4 42.75
+4 35.65 − 7.10
47 49.51 +4 42.42
.14
− +4 35.18
47 48.57
47 46.22

1872
Aug 6 − .24 −.248
41 35.0 41 27.0
34.2 27.9
39.6 28.8
44.2
46.6
48.9
51.1
53.6
58.1
42 0.6
2.8
417.7
537.7
48.882 41 27.90
41 48.86
41 28.69
+20.17
~~+20.20~~
−20.06 +.00
− .13
−1.72 −.13 +0.62
−21.91
48.86
26.95
41 26.95 29.29
+0.57
35
4 47.0
42.6
896
39 44.80
+20.98
1.32181
1.38426n
−2422
39 44.80
39 20.68
43 27.65
−1087
1.16453
− ~~+~~ 14.61
− .10
+ .38
− 14.33
43 13.32 43 12.85
47 56.9
+4 43.6 −.47 43.1
−9.75
−7.40
+4 43.45
+4 36.05 − 7.40
47 49.37 + 43.30
.14
− +4 35.76
47 48.61
46.26

Aug. 8 − .27 −.257
41 46.8
43.1 41 36.1
45.5 37.1
50.1 38.8
52.6
54.8
57.0
59.4
4.0
6.3
8.8
422.4
602.4
54.764 41 37.33
41 54.75
41 28.67
+26.08
~~+26.11~~
−25.97 −.01
− .14
−1.70 −.14 +0.64
−27.812
54.75
26.94
41 26.93 29.27
+0.54
35
4 43.1
38.1
812
39 40.60
+17.43
1.24130
1.30375n
−2012
39 40.60
39 26.48
43 27.87
−1691
1.15849
− ~~+~~ 14.40
− .07
+ .38
− 14.09
43 13.78 43 13.31
47 57.2
+4 43.4 −.47 42.9
−10.05
−7.70
+4 43.29
+4 35.59 − 7.70
47 49.37 + 42.16
.13
− +4 35.33
47 48.64
46.29

Aug. 10 − .27 −.266
41 45.6
48.0 42 21.7
~~45.7~~
~~22.7~~
~~48.0~~
~~22.8~~
~~50.3~~
50.3
55.0
57.3
59.7
2.0
4.3
8.9
11.3
13.6
356.0
656.0
59.636 42 22.73
41 59.62
41 28.64
+30.98
~~+31.01~~
−30.76 +.00
− .14
−1.67 −.14 +0.67
−32.57
59.62
27.05
41 27.05 29.39
+0.54
35
~~3~~ 4 56.9
51.4
1083
~~38~~ 9 54.15
+36.91
1.66714
1.62939n
−4259 62
39 54.15
39 ~~14.56~~
11.53
43 36.52
−14.43
.30
+ 31
− 14.42
12.15
47 57.6
−.39
−10.45
−8.10
+4 43.83
+4 35.73 + 8.10
43.26
.14
+4 35.02

1873
Aug 4 − .55 −.549
41 36.3
38.4 41 21.5
40.8 22.7
45.7 24.0
47.9
50.3
52.7
54.8
59.6
42 1.9
4.3
432.7
552.7
50.245 41 22.73
41 50.23
41 31.24
+18.99
~~+19.02~~
−18.64 +.00
− .29
−1.92 −.29 ~~+0.47~~
−20.85
50.23
29.38
41 29.38
+1.69
30
4 1.0
16.6
176
34 8.80
+27.51
1.43949
1.50194n
−3177
34 8.80
33 37.03
49 11.32
+14 34 45 = 1.17540
−1578
1.15962
− ~~+~~ 14.44
− .17
+ .16
− 14.45
48 56.87 48 56.54
47 51.6
−1 5.3 −.33 5.6
−4.50
−1 4.35
−1 8.85 − 4.50
47 48.02 ~~+~~ − 4.52
.42
−1 9.44
47 47.10

1873
Aug 5 − .43 −.439
41 36.6 41 24.7
38.9 25.8
41.1 27.0
45.8
48.1
50.5
52.7
55.0
59.6
42 1.9
4.3
434.5
554.5
50.409 41 25.83
41 50.39
41 31.23
+19.16
~~+19.19~~
−18.98 +.02
− .23
−1.91 −.23 ~~+0.43~~
−21.120
50.39
29.27
41 29.29
+1.70
30
3 56.7
10.8
1275
34 3.75
+24.58
1.39058
1.45303n
−2838
34 3.75
33 35.37
41 13.98
−1128
1.17112
− ~~+~~ 14.83
− .14
+ .16
− 14.81
48 58.17 48 57.85
47 51.7
−1 6.5 −.32 6.8
−4.60
−1 5.98
−1 10.58 − 4.60
47 47.59 −1 6.33
.42
−1 11.35
47 46.50

ψ¹ Draco

h	m	s
17	44	14
17	44	12
+ 72°	13′	″
+ 72	12	37

ζ = −29° 49′ 49″
− .50

tang δ = +3.17
x = −.049
cos α = +.03 +0.2

α 1872 13.061 δ = 12′ 39.09″ dα = −1.087
α 1873 11.974 δ = 12 37.45 dδ = −1.65

1872	m	s	
July 19	44	16.65	
24		16.43	.22
29		16.19	.24
3		15.92	.27
8		15.63	.29

1873	m	s	
Aug 8	44	14.52	
13		14.21	.31
18		13.89	.32
23		13.55	.34
28		13.19	.36
Sept. 2		12.82	.37
7		12.45	.37

July 22 1872 −.28 −.285	July 25 1872 −.26 −.266	July 27 1872 −.23 −.233	July 29 1872 −.20 −.211	July 30 1872 −.32 −.316	Aug 1 1872 −.27 −.268
17 43 40.9	44	44 43 27.7	44 43 18.4	44 43 25.9	44 43 13.4
47.6	7.3	7.2 31.2	6.8 23.4	8.1 27.9	10.7 15.2
54.2	10.5	10.3 ~~57~~	10.2 26.9	11.4 30.7	14.2 19.0
7.8	13.6	13.8	13.4	14.8	17.6
14.6	17.1	17.1	17.1	18.1	21.0
21.4	20.8	20.4	20.4	21.4	24.1
28.0	23.9	23.8	23.7	24.7	27.6
35.0	27.4	27.1	27.0	28.2	31.1
48.5	30.7	30.8	30.4	31.4	34.3
55.0	34.0	33.9	33.7	34.7	37.7
2.0					
355.0	185.3	184.4	181.7	192.8	218.3
235.0					
21.364	20.589	20.489 43 29.45	20.189 43 22.90	21.422 43 28.17	24.255 43 15.87
44 21.32	44 20.54	44 20.44	44 20.14	44 21.37	44 24.21
44 16.51	44 16.37	44 16.28	44 16.18	44 16.13	44 16.02
+ 4.81	+4.17	+4.16	+3.96	+5.24	+8.19
+4.78	+4.14	+4.13	+3.93	+5.21	+8.16
− 3.95 +.00	− 3.42 −.01	− 3.28 −.01	− 3.21 +.01	− 4.25 +.01	− 7.39 +.01
− .87 −.89	− .81 −.83	− .72 −.73	− .62 −.66	−1.00 −.99	− .84 −.84
−3.45 − 4.54	−3.31 − 4.40	−3.22 − 4.31	−3.12 − 4.21	− 3.07 − 4.16	−2.96 − 4.05
− 8.279	− 7.547	− 7.284	− 6.958	− 8.320	11.198
44 21.32	20.54	20.44	20.14	21.37	24.21
44 13.05	13.00	13.22	13.19	13.05	13.02
44 13.03 44 11.94	44 12.97 44 11.88	44 13.20 12.11	44 13.16 12.07	44 13.07 11.88	44 13.03 11.94

A.R AR.

July 27	July 29	July 30	Aug 1
+0.64	+0.62	+0.61	+0.59
15 0 41.5	15 0 42.2	15 0 42.5	15 0 46.8
30.9	32.9	31.4	35.2
72.4	75.1	73.9	82.0
15 36.20	15 37.55	15 36.95	15 41.00
+51.04	+57.29	+ 53.25	+68.39
1.70791	1.75808	1.72632	1.83499
1.30852n	1.35869n	1.32693n	1.43560n
−2035	−2284	−2123	−2726
15 36.20	15 37.55	15 36.95	15 41.00
15 15.85	15 14.71	15 15.72	15 13.74
+72° 7′ 32.50″	7 33.64	7 32.63	7 34.61

− 29 49 29 = 1.51860

July 27	July 29	July 30	Aug 1
−777	−1579	−906	−836
1.51083n	1.50281n	1.50954n	1.51024n
32.42″	31.83	32.32	32.28
− .42	− .51	− .45	− .75
+ .01	+ .01	+ .01	+ .01
+ 32.01	+ 31.33	+ 31.88	+ 31.64
+72 8 4.51 +8	4.45 8 4.97	4.91 8 4.51	4.45 8 6.25 6.18
12 48.42	12 48.97	12 49.9	12 49.5
+4 43.9 −.06	43.6 +4 44.0 −.06	43.6 +4 44.4 −.06	44.3 +4 45.3 −.07 45.0
+0.2 +4 43.79	43.8 +4 43.9	43.8 +4 44.6	44.5 +4 45.3 45.2
−10.75	−11.25	−11.45	−11.85
− 9.10	− 9.60	−9.80	−10.20
+4 43.39 −	9.10 +4 44.27 −	9.60 +4 43.66 −	9.80 +4 43.11 − 10.20
+4 34.29 +	4 43.43 +4 34.67 +	44.01 +4 33.86 +	43.29 +4 32.91 + 42.9
+72 12 38.80 +	.32 12 39.64 +	.31 12 38.37 +	.30 12 39.16 + .30
+4 34.65	+4 34.72	+4 33.79	+4 33.6
+72 12 39.10	12 39.63	12 38.14	12 39.1
37.45	37.98	36.49	37.5

Sin δ 9.97874
Cos δ 9.48490
11 57′ n
9.60061 n

1872				
July 19	+72°	12′	46.4″	
24			47.6	+1.2
29			48.8	1.2
Aug. 3			49.9	1.1
8			50.9	1.0

1873			
Aug. 8	12′	46.3″	
13		47.2	+.9
18		48.0	.8
23		48.7	.7
28		49.2	.5
Sept. 2		49.6	.4
7		50.0	.4

1872
Aug 5 13.15 37.53
1873
Sept 6 11.89
9 11.98

Add $\frac{s}{2}$

872
.268
.27
13.4
15.2
14.0
15.87
−.84
4.05
11.94
6.18
45.0
45.2
10.20
42.9
30
33.0
34.1
37.5

1873
Aug 6 — .24 ~~.248~~
+.25
44 21.3 43 28.3
24.4 31.9
28.0 35.0
31.2
34.8
37.9
41.4
44.8
48.1
311.9
34.655 43 34.73
3
44 ~~34~~36.61
44 15.74
+18.87
+18.84
−20.06 +.00
− .75 −.77
−2.68 −3.77
−~~23.59~~ 51
36.61
13.12 13.12
44 ~~13.10~~ 13.10 12.01
+0.57
15
0 43.1
32.9
76.0
15 38.00
+62.93
+2.93
1.79886
1.39947n
−2509
15 38.00
15 12.91
7 35.44
−1087
1.50773n
+ 32.19
− .64
+ .05
+ 31.60
8 7.04 +8 6.98
12 50.64
+4 43.64 −.06 43.3
+4 43.6 43.5
−12.95
−11.30
+4 43.45 − 11.30
+4 32.15 +4 43.30
12 39.19 + 28
+4 32.28
12 39.26
37.61

Aug 7 — .22 −.222
44 26.1 43 30.2
29.2 33.0
33.0 36.0
36.1
39.5
42.7
46.2
49.6
53.0
355.4
39.489 43 33.07
44 39.44
44 15.68
+23.76
+23.73
−22.93 +.00
− .69 −.69
−2.62 −3.71
26.24
39.44
13.20
44 13.20 12.11
+0.55
15
0 45.0
34.5
79.5
15 39.75
+66.42
1.82230
1.42291n
−2648
15 39.75
15 13.27
7 35.08
−1359
1.50501n
+ 31.99
− .71
+ .05
+ 31.36
8 6.41 6.34
12 50.86
+4 44.42 −.07 44.1
+4 44.4 44.3
−13.15
−11.50
+4 44.05 − 11.50
+4 32.55 + 43.64
12 38.96 + 27
+4 32.41
12 38.75
37.10

Aug 8 — .27 −.257
44 29.3 43 45.8
32.4 48.9
35.9 52.1
39.1
42.7
46.0
49.5
52.7
56.0
383.6
42.622 43 48.93
44 42.57
44 15.62
+26.95
+26.92
−25.97 −.01
− .84 −.80
−2.56 −3.65
−29.37 4
42.57
13.20
44 13.23 12.14
+0.54
15
0 38.7
28.2
66.9
15 33.45
+53.69
1.72989
1.33050n
−2140
15 33.45
15 12.05
7 36.30
−1691
1.50169n
+ 31.74
− .46
+ .05
+ 31.33
8 7.63 7.57
12 50.8
+4 43.42 −.06 43.1
+4 43.4 43.3
−13.35
−11.70
+4 43.29 − 11.70
+4 31.59 + 43.16
12 39.22 + 27
+4 31.73
12 39.30
37.65

Aug. 10 — .27 −.266
44 6.7
33.7 ~~18.3~~ 43 26.5
37.1 ~~20.2~~ 30.1
40.5 ~~23.7~~ 33.9
43.8 ~~37.1~~
47.1 ~~40.5~~
50.7 ~~43.8~~
54.0 ~~47.1~~
57.3 ~~50.7~~
0.7 ~~54.0~~
~~57.3~~
424.9
47.217 43 30.17
44 47.16
44 15.51
+31.65
+31.62
−30.76 +.00
− .84 −.83
−2.45 −3.54
−34.08 4
47.16
13.11
44 13.12 12.03
+0.54
15
0 47.7
38.4
86.1
15 43.05
+77.04
1.88672
1.48733n
−3071
15 43.05
15 12.34
7 36.01
+ 31.80
− .95
+ .06
+ 30.91
8 6.92 6.85
12 51.42
+4 44.3 −.07 44.2
+4 44.5 44.4
−13.75
−12.10
+4 43.83 − 12.10
+4 31.73 + 43.26
12 38.65 + 27
+4 31.43
38.28
36.63

1873
Aug 4 — .35 .349
44 21.7 43 52.0
25.1 55.0
28.7 0.2
31.9
35.0
38.7
41.9
45.0
48.6
316.6
35.178 43 55.73
44 35.13
44 14.74
+20.39
+20.36
−18.65 +.00
−1.72 −1.71
−~~1.68~~ 2.77
−~~17.05~~ 23.143
35.23
~~13.08~~ 11.99
44 12.00 ~~11.71~~
+1.69
5
4 41.1
53.9
95.0
~~9 47.00~~
9 47.50
+39.45
1.59605
1.19666n
−1573
9 47.50
9 31.77
13 16.58
−29 49 20 = 1.51850
−1578
1.50272n
+ 31.82
− .28
+ .19
+ 31.73
13 48.31 12 47.93
12 45.53
−1 2.8 −.38 3.4
−1 7.8 3.2
−7.90
−1 11.35 − 7.90
−1 12.25 −1 4.52
12 36.06 + 84
−1 11.58
12 36.35

1873
Aug 5 — .43 .437
44 21.6 43 47.1
24.7 48.9
28.5 51.3
32.0
35.1
38.5
42.0
45.2
48.7
316.3
35.144 43 49.10
44 35.10
44 14.68
+20.42
+20.39
−18.98 +.02
−1.34 −1.37
−~~1.62~~ 2.71
~~21.94~~ 23.084
35.10
~~13.16~~ 12.07
44 12.06
+1.70
5
4 42.9
55.9
98.8
9 49.40
+46.04
1.66314
1.26375n
−1835
9 49.40
9 31.05
13 17.30
−428
1.51422n
+ 32.67
− .34
+ .19
+ 32.52
13 49.82 49.44
12 45.75
−1 4.3 −.38 4.7
−1 4.1 4.5
−8.00
−1 5.98 − 8.00
−1 13.98 −1 6.33
12 35.84 + .85
−1 13.48
12 35.96

ξ Draco

h	m	s	
17	51	19	
17	51	20	
+	56°	53′	″
+	56	53	35

ζ = −14° 30′ 47″
− .25

tang δ = +1.53
x = −.027
cos α =

α 1872 19.006 δ = 53′ 36.″18 dα = +1.036
dδ = −0.69
α 1873 20.042 δ = 53 35.49

1872

	m	s	
July 19	51	21.45	
24		.35	.10
29		.25	.10
3		.13	.12
8		21.00	.13

1873

	m	s	
Aug 8	51	22.11	
13		21.96	15
18		21.80	16
23		21.63	17
28		21.46	17
Sept. 2		21.28	18
7		21.09	19
12		20.89	20
17		20.69	20

Sin δ 9.92310
Cos δ 9.73727
1.11571n
9.85298n

1872
Aug 5

star not found

July 25 1842 −.266 −.26

51 2.8
6.4
10.4
17.6
21.4
25.1
28.9
32.7
40.3
44.1
47.7
277.4

25.218

51 25.19
51 21.33
+3.86

−3.42 −.01
− .40 −.41
−2.32 −1.28
−6.146
51 25.19
19.00

51 19.03 51 20.07

A.R.

July 27 1872 −.233 −.23

51 2.3 50 56.7
6.0 57.8
9.8
17.4
21.0
25.0
28.7
32.6
39.9
43.7
47.4
273.8

24.891 ~~50 54.83~~
50 57.25

51 24.86
51 21.29
+3.57

−3.28 −.01
− .35 −.36
−2.28 −1.24
−~~6.11~~ 5.9×3
24.86
18.95

51 18.93 19.97

+0.64
30
4 25.2
16.4
4.16
34 20.80
+27.64
~~+30.06~~
1.44154
1.29452n
−19.70
34 20.80
34 1.10

+56° 48′ 47.25″

−14 30 44 = 1.17330n
−734
1.16596n

+ 14.65
− .19
+ .09

+ 14.55
+56 49 1.80 49 1.37
53 44.9
+4 43.1 −.43 42.7
−9.39
−8.70
+4 43.39
+4 34.69 − 8.70
+56 53 36.49 +4 43.43
+ .16
+4 34.89
+56 53 36.26
35.57

July 29 1872 −.211 −.20

51 2.3 50 49.3
5.9 50.8
9.6 52.7
17.2
21.0
24.9
28.6
32.4
39.9
42.4
47.4
271.9

24.718 50 50.93

51 24.69
51 21.24
+3.45

−3.22 +.01
− .31 −.32
−2.23 −1.19
−5.76
24.69
18.93

51 18.93 19.97

+0.62
30
4 29.3
21.1
5.04
34 25.20

+33.79
1.52879
1.38177n
−24.09
34 25.20
34 1.11

48 47.24

−1571
1.15759n

+ 14.37
− .29
+ .09

+ 14.17
49 1.41 0.97
53 45.4
+4 44.0 −.44 43.6
−9.89
−9.20
+4 44.27
+4 35.07 − 9.20
53 36.48 + 44.01
+ .15
+4 34.96
53 35.93
35.24

July 30 1872 −.316 −.32

35
1 15.1
6.0
2.11
36 10.55

Aug 1 1872 −.268 −.27

51 6.2 50 51.7
10.1 52.7
13.9 54.4
21.2
25.1
29.0
32.9
36.4
43.8
47.7
51.4
317.7

28.882 50 52.93

51 28.86
51 21.17
+7.69

−7.39 +.01
− .41 −.41
−2.16 −1.12
−9.965
28.86
18.90

51 18.91 19.95

+0.59
30
4 30.1
21.0
5.11
34 25.55

+35.95
1.55570
1.40868n
−25.63
34 25.55
33 59.92

48 48.43

−825
1.16505n

+ 14.62
− .33
+ .09

+ 14.36 2.79 ~~2.18~~ 2.35
49 ~~2.79~~
53 46.1
+4 43.3 −.44 42.9
−10.59
−9.90
+4 43.11
+4 33.21 − 9.90
53 36.00 + 42.91
+ .15
+4 33.16
53 33.51
34.82

Aug 7 −.222 −.22

51 21.7
25.3 51 11.0
29.1 12.5
36.7 14.6
40.6
44.2
48.1
51.8
59.4
3.1
7.0
367.0
487.0

44.273 51 12.70

51 44.25
51 21.02
+23.23

−22.94 +.00
− .34 −.34
−2.01 −0.97
−25.29
44.25
18.96

51 18.96 20.00

+0.55
30
4 25.7
17.5
4.32
34 21.60

+31.57
1.49924
1.35225n
−22.50
34 21.60
33 59.10

48 49.25

−1342
1.15988n

+ 14.45
− .25
+ .35

+ 14.55
49 3.80 3.37
53 47.4
+4 43.6 −.43 43.2
11.89
−11.20
+4 44.05
+4 32.85 − 11.20
53 36.65 + 43.64
+ .14
+4 32.58
53 35.95
35.26

1872					1873			
July 19	+56°	53′	43.0″		Aug. 8	53′	44.2″	
24			442	+1.2	13		45.2	+1.0
29			45.3	1.1	18		46.0	.8
Aug 3			46.5	1.2	23		46.7	.7
8			47.6	1.1	28		47.3	.6
					Sept. 2		47.8	.5
					7		48.1	.3
					12		48.3	.2
					17		48.5	.2

Ch. f.

-.222
-.22

Aug. 8 -.27 -.257 | Aug. 10 -.27 -.266 | Aug 5 1873 -.43 -.437 | Ch. f. Aug 12 | Aug 28 -.41 -.401 | Sept 2 1873

51 24.9 | 51 29.5 | 51 19.1 | 51 1.9 | 51 26.5
11.0 | 28.6 50 39.5 | 33.2 51 14.3 | 23.0 | 3.1 | 30.4 ~~50~~
12.5 | 32.3 42.0 | 37.0 16.0 | 26.8 | 5.9 | 34.1
14.6 | 39.8 43.5 | 44.5 18.4 | 34.1 | 41.6
43.6 | 48.8 | 38.0 | 45.4
47.4 | 52.1 | 41.8 | 49.2
51.0 | 56.0 | 45.5 | 52.9
54.8 | 59.7 | 49.5 | 56.7
2.4 | 7.1 | 56.9 | 4.3
6.2 | 11.0 | 52 0.6 | 8.1
9.9 | 14.7 | 4.5 | 11.8
340.9 | 393.0 | 339.8 | 361.0
520.9 | 573.0 | 459.8 | 541.0
12.70 | 47.355 50 41.67 | 52.091 51 16.23 | 41.800 51 3.63 | 49.182

51 47.33 | 51 52.06 | 51 41.77 | 51 49.16
51 20.99 | 51 20.94 | 51 22.18 | 51 21.45
+26.34 | +31.12 | +19.59 | +27.71

-25.98 -.01 | -30.77 +.00 | -18.98 +.02 | -27.18 -.01
-.34 | - .41 -.39 | - .41 -.41 | - .66 -.67 | - .63 -.61
0.97 | -1.98 -0.94 | -1.93 -0.89 | -2.14 | -1.41
-28.36 | -33.11 | -21.787 | -29.221
47.33 | 52.06 | 41.77 | 49.16 1872
18.96 | 18.95 | 19.99 | -19.94 Aug 5 18.92 22.39

20.00 | 51 18.97 20.01 | 51 18.95 19.99 | 51 20.00 | 51 19.95 1873 Sept 6 20.03
9 19.97

+0.54 | +0.54 | +1.70

A. R | A. R

30 | 30 | 25 | 25
3 23.1 | 4 27.7 | 3 33.7 | 3 33.0
14.8 | 19.9 | 49.0 | 48.3
379 | 476 | 827 | 813
33 18.95 | 34 23.80 | 28 41.35 | 28 40.65

+65.69 | +35.86 | +38.17
1.81750 | 1.55461 | 1.58172
1.67048n | 1.40759n | 1.43470n
-4682 | -2556 | -2721
33? 18.95 | 34 23.80 | 28 41.35
33 32.13 | 33 58.24 | 28 14.14

49 16.22 | 48 50.11 | 54 34.21

-14 30 38 = 1.17330n
-1678 | -410
1.15652n | 1.16920n

+ 14.34 | +14.59 | + 14.76
- 1.08 | - .33 | - .35 -
+ .26 | + .35 | + .15

+ 13.52 | +14.52 | + 14.56
3.37 | 49 29.74 +49 29.31 | 49 4.63 4.19 | 54 48.77 +54 48.47
53 1.77 | 53 48.1 | 53 ~~44.0~~ 41.6
4.32 | 0 -.43 | +4 43.8 -.44 43.1 | -1 4.7 7.2 -.30 7.5

-11.50 | -11.90 | - ~~5.60~~ 6.10
× | +4 43.29 | +4 43.83 - | -1 5.98
11.20 | +4 31.49 - 11.50 | +4 31.93 - 11.90 | -1 12.08 - 6.10
43.64 | 1.53 +4 43.16 | 53 36.56 + 43.26 | 53 36.69 -1 6.33
.14 | + .13 | + .13 | + .42
32.58 | +4 31.79 | +4 31.49 | -1 12.01
35.95 | 54 1.10 | 53 35.68 | 53 36.46
35.26 | 34.99

1872 1873

γ Draconis tang δ = +1.26 x = -.024 cos α = ~~+.02~~

h	m	s	
17	53	30	
17	53	39	
+	51′	30′	″
+	51	30	16

z = −9° 7′ 28″

sin. z = −.16

α 1872 38.094 δ = 30′ 16.68″ dα = +1.394
dδ = −0.59

α 1873 39.488 δ = 30 16.09

1872	m	s	
July 19	53	40.36	
24		.28	.08
29		.20	.08
Aug. 3		40.10	.10
8		39.99	.11

1873	m	s	
Aug 8	53	41.48	
13		41.35	13
18		41.22	13
23		41.08	14
28		40.94	14
Sept. 2		40.78	16
7		40.62	16
12		40.45	17
17		40.28	17

Sin δ 9.89354
Cos δ 9.79415
11.571n
9.90986n

July 20 1872 −.312 −.28		July 22 1872 −.285 −.28	July 25 1872 −.266 −.26	July 27 1872 −.233 −.23		July 29 1872 −.211 −.20		July 30 1872 −.316 −.32	
17 53 25.2	53 16.0	53 24.8	53 24.2	53 23.8	53 18.2	53 23.9	53 14.3	53 25.0	53 16.5
28.4	17.0	28.2	27.6	27.4	19.3	27.2	15.9	28.2	18.5
31.6	18.2	31.4	30.7	30.6	20.8	30.6	17.0	31.6	20.0
38.4		38.0	37.4	37.1		37.1		38.3	
41.7		41.3	40.8	40.4		40.5		41.4	
45.0		44.6	44.2	43.8		43.8		44.8	
48.3		48.0	47.3	47.3		47.0		48.2	
51.8		51.3	50.7	50.5		50.4		51.4	
58.1		57.7	57.4	57.0		57.0		58.2	
1.6		1.2	54 0.5	54 0.5		54 0.3		54 1.3	
4.8		4.5	3.9	3.6		3.4		4.6	
374.5		371.0	364.7	362.0		361.8		373.3	
494.5		491.0	484.7	482.0		481.5		493.3	
44.955	53 17.07	44.636	44.064	43.818	53 19.43	43.773	53 15.73	44.845	53 18.33
53 44.93		53 44.61	53 44.04	53 43.79		53 43.75		53 44.82	
53 40.34		53 40.31	53 40.26	53 40.23		53 40.20		53 40.18	
+4.59		+4.30	+3.78	+3.56		+3.55		+4.64	
−4.32 +.05		−3.95 +.00	−3.42 −.01	−3.28 −.01		−3.22 +.01		−4.25 +.01	
− .35	−.39	− .35 −.36	− .33 −.33	− .29	−.29	− .25	−.26	− .40	−.40
−2.25	−0.86	−2.22 −0.83	−2.17 −0.78	−2.14	−0.75	−2.11	−0.72	−2.09	−0.79
−6.92 1		−6.52 3	−6.92 3	−5.71 2		−5.58		−6.74 3	
53 44.93		44.61	44.04	43.79		43.75		44.82	
53 38.01		38.09	38.12	+38.08		38.17		38.08	
53 38.02	53 39.41	53 38.08 39.47	53 38.11 39.50	53 38.07	39.46	53 38.17	39.56	53 38.09	39.48
+0.69		A.R.	A.R.	+0.64		+0.62		+0.61	
55				55		55		55	
2 43.5				2 40.0		2 43.1		2 40.1	
35.0				31.4		34.2		31.1	
785				714		773		71.2	
57 39.25				57 35.70		57 23.65 38		57 35.60	
+27.88				+24.39		+28.04		+26.51	
1.44529				1.38721		1.44778		1.42341	
1.35575n				1.29707n		1.35764n		1.33327n	
−2265				−1982		−2279		−21.54	
57 39.25				57 35.70		57 23.65		57 35.60	
57 16.60				57 15.88		57 0.86 38 15		57 14.06	
+51° 25′ 31.75″				25 32.47		25 47.49 32		25 34.29	
−9 7 28 = 0.96610n									
−1406				−692		−1563		−880	
0.95204n				0.95918n		0.95047n		0.95730n	
+ 8.95″				+ 9.10		+ 8.92		+ 9.06	
− .21				− .15		− .21		− .19	
+ .27				+ .05		+ .05		+ .05	
+ 9.01				+ 9.00		+ 8.76		+ 8.92	
+51 25 40.76	+25 40.49			25 40.47	25 41.21	25 56.25 41	41.09	25 43.21	42.95
30 23.4				30 25.0		30 25.5		30 25.7	
+4 42.6 −.27	42.3			+4 43.5 −.26	43.2	+4 44.3 −.26	44.0	+4 42.5 −.26	42.2
−7.29				−8.89		−9.39		−9.59	
−6.70				−8.30		−8.80		−9.00	
+4 43.65				+4 43.39		+4 44.27		+4 43.66	
+4 36.95 —	6.70			+4 35.09 —	8.30	+4 35.47 —	8.80	+4 34.66 —	9.00
+51 30 17.71 +4	43.92			30 16.56 +	43.43	30 16.72 +	44.01	30 17.87 +	43.29
−18 +	.11			−.18 +	.10	−.18 +	.09	−.18 +	.09
+51 30 17.53 +4	36.33			30 16.38 +4	35.23	30 16.54 +4	35.30	30 17.69 +4	34.28
+51 30 16.82					30 16.94		30 16.39		30 17.23
30 16.23					15.85		15.80		16.64

1872		
aug 5	38.14	16.76
1873		
aug 5	39.45	16.06
28	39.35	
Sept 6	39.50	
9	39.52	

1872				
July 19	51°	30′	23.1″	
24			24.3	+1.2
29			25.4	1.1
Aug. 3			26.6	1.2
8			27.7	1.1

1873			
Aug. 8	29′	84.4″	
13		85.4	+1.0
18		86.2	.8
23		86.9	.7
28		87.5	.6
Sept 2		88.0	.5
7		88.4	.4
12		88.6	.2
17		88.8	.2

1872.0 α	1872.0 δ	1873.0 α	1873.0 δ
38.02	17.53	39.39	16.21
38.09	16.38	.45	15.94
.11	16.54	.35	
.07	17.69	.58	
.17	17.11	.52	
38.09	17.09		
37.94	17.27		
38.10	18.81		
15	16.88		
14			
08			
14			
38.091	17.26 +.36 17.62	39.442	16.07 +.70 16.77
.094	16.68 16.68	.488	16.09 .09
−.003	+0.58 +.94	−.046	−0.02 +.68

1872
−.316
−.32
16.5
18.5
20.0
18.33
−.40
0.79
39.48
42.95
42.2
9.20
43.29
.09
34.28
17.23
16.64

Aug 1 −.27 (1872 −.268)

53 27.7 | 53 23.3
31.2
34.5
41.1
44.5
47.7
51.1
54.4
54 0.9
4.4
7.7
845.2
525.2
47.745 | 53 23.30

53 47.72
53 40.14
+7.58

−7.40 +.01
− .34 | −.34
−2.05 | −0.06
−9.78
47.72
37.93

39.48 53 37.94

+0.59

55
2 38.1
28.9
67.0
57 33.50

+24.44
1.38810
1.29796n
−19.86
57 33.50
57 13.64

25 34.71

−813
0.95797n

+ 9.07
.15
+ .05

+ 8.97
25 43.68 | 25 43.42
30 28.2
+4 42.5 −.26 | 42.2
−10.09
−9.50
+4 43.11
+4 33.61 − | 9.50
30 17.29 +4 | 42.91
−.18 + | .09
30 17.11 +4 | 33.50
30 16.92
16.33

Aug 6 −.24 (1872 −.248)

53 40.7
44.0
47.2
53.8
57.2
54 0.6
3.7
7.0
13.6
17.0
20.3
305.1
5.1
0.464

54 0.44
53 40.04
+20.40

−20.08 +.00
− .30 | −.31
−1.95 | −0.56
−22.34
54 0.44
38.11

39.33 53 38.10

A.R.

Aug 7 −.22 (−.222)

53 43.4 | 53 39.0
46.8 | 40.3
50.1 | 41.6
56.7
0.1
3.3
6.5
9.9
16.5
19.8
23.2
276.3
36.3
3.300 | 53 40.30

54 3.28
53 40.00
+23.28

−22.94 +.00
− .28 | −.28
−1.91 | −0.52
−25.13
3.28
38.15

39.49 53 38.15

+0.55

55
2 36.0
28.1
64.1
57 32.05

+23.00
1.36173
1.27159n
−18.69
57 32.05
57 13.36

25 34.99

−1334
0.95276n

+ 8.97
.14
+ .20

+ 9.03
25 44.02 | 43.77
30 27.5
+4 43.5 −.25 | 43.2
−11.39
−10.80
+4 44.05
+4 33.25 − | 10.80
30 17.27 +4 | 43.64
−.18 + | .08
30 17.09 +4 | 32.82
30 16.59
16.00

Aug 8 −.27 (−.257)

53 46.5
50.0 | 53 35.9
52.9 | 37.5
59.7 | 39.0
3.1
6.3
9.7
13.0
19.7
22.9
26.3
310.1
240
701 | 53 37.47
6.365

54 ~~6.58~~ 6.335
53 39.98
+26.55

−25.99 −.01
− .34 | −.32
−1.89 | −0.50
−28.21
6.35
38.13

39.54 53 38.14

+0.54

55
2 38.9
32.0
70.9
57 35.45

+28.89
1.46075
1.37061n
~~−18.69~~ | −23.48
57 35.45 | 57 35.46
~~57 16.76~~ | 57 11.97

25 36.38

−1665
0.94945n

+ 8.90
.23
+ .21

+ 8.88
~~57 26.85~~ | 25 45.26
45.00
30 27.8
+4 42.5 −.26 | 42.2
−11.69
−11.10
+4 43.29
+4 32.19 − | 11.10
30 17.45 +4 | 43.16
−.18 + | .08
30 17.27 +4 | 32.14
30 17.14
16.55

Aug. 10 −.27 (−.266)

53 51.3
54.5 | 53 42.1
57.8 | 43.4
4.5 | 45.3
7.7
11.0
14.4
17.7
24.3
27.7
30.9
301.8
121.8
11.073 | 53 43.60

54 11.05
53 39.94
+31.11

−30.78 +.00
− .34 | −.34
−1.85 | −0.46
−32.97
11.05
38.08

39.53 53 38.08

+0.54

55
2 35.9
29.9
65.8
57 32.90

+27.47
1.43886
1.34872n
−22.31
57 32.90
57 10.59

25 37.76

+ 8.90
.20
+ .20

+ 8.90
25 46.66 | 46.41
30 28.7
+ 4 41.5 −.25 | 41.3
−11.50
+4 43.83
+ 4 32.33 − | 11.50
30 18.99 +4 | 43.26
−.18 + | .08
30 18.81 +4 | 31.74
30 18.15
17.56

Aug 4 −.55 (1873 −.549)

53 40.9
44.2 | 53 30.2
47.5 | 31.7
54.0 | 34.0
57.7
0.8
4.1
7.3
14.0
17.2
21.5
309.2
10.2
0.836 | 53 31.97

54 0.81
53 41.57
+19.24

−18.65 +.00
− .69 | −.69
−2.08
−21.42
0.81
39.39

39.47 53 39.39

+1.69

50
1 43.0
60.9
103.9
51 51.95

+28.87
1.46045
1.37031n
−23.46
51 57.95
51 28.49

31 19.86

−9 7 24 = 0.96600n
−1628
0.94972n

+ 8.91
.23
+ .07

+ 8.75
~~51 37.24~~ | 31 28.61 | 28.31
.46
30 ~~24.2~~ 23.8
−1 4.48 −.15 | 5.0
−7.70
−1 4.35
−1 12.05 − | 7.70
30 16.56 −1 | 4.52
−.35 + | .27
30 16.21 −1 | 11.95
30 16.36

35 Draco

h m s
17 55 14
17 55 08
76° 59'
+ 76 58 40
ʒ = −34° 35' 52"
− .57

tan δ = +4.32
x = −.069
corr x = +.15 +0.3

1872
July 19 58m 15.34s
24 15.04 .39
29 14.70 .34
Aug. 3 14.33 .37
8 13.93 .40

" α 1872 10.681 δ = 58' 40.44" dα = −2.697
dδ = −0.19
52" α 1873 7.984 δ = 58 40.25

1873
Aug 8 58m 11.12s
13 10.70 .42
18 10.25 .45
23 9.78 .47
28 9.29 .51
Sep: 2 8.78 .51
7 8.26 .52

Sin δ 9.98869
Cos δ 9.35263
11571n
9.46834n

1872 Aug 5

July 27 1872 −.233 −.23
55 54 39.5
1.1 42.7
5.4 49.4
10.1
14.8
19.5
23.8
28.6
33.0
37.7
174.0
10
19.333 54 43.87
55 19.26
55 14.83
+1.43
+4.28
−3.28 −.01
−.99 −1.01
−4.15 −6.85
−8.485
55 19.26
55 10.84
55 10.81 55 8.11
+0.64
25
4 37.1
26.9
6.40
29 32.00
+35.46
1.54974
1.01808n
−10.43
29 32.00
29 21.57
+76° 53' 26.78"
− 34 35 23 = 1.59870
−692
1.59178n
+ 39.06
− .15
+ .09
+ 39.00
+76 54 5.78 +54 5.33
58 49.2+1
" +4 43.45 −.45 43.1
+0.3 +4 43.8 43.4
−8.99
−8.80 9 − 8.90
+4 43.39 +4 43.43
+4 34.49
+76 58 40.27 + .36
+4 34.89
58 40.22
58 40.03

July 30 1872 −.316 −.32
55 54 33.0
2.4 35.6
7.0 39.2
11.6
15.9
20.4
25.2
29.7
34.3
38.6
185.1
20.867 54 35.93
55 20.50
55 14.62
+5.88
+5.73
−4.26 +.01
−1.38 −1.37
−3.94 −6.64
−9.586
20.50
10.92
55 10.94 8.24
+0.61
25
4 39.7
29.1
6.88
29 34.40
+44.64
1.64972
1.11806n
−18.12
29 34.40
29 21.28
53 27.07
−880
1.58990n
+ 38.90
− .24
+ .09
+ 38.75
54 5.82 54 5.36
58 49.9+1
+4 44.2 −.46 43.7
+4 44.5 44.0
−9.79
−9.50 6 − 9.60
+4 43.66 + 43.29
+4 34.06
58 39.88 + .34
+4 34.03
58 39.39
58 39.20

Aug 6 1872 −.248 −.24
55
17.2
21.5
26.3
30.7
35.2
40.0
44.8
49.1
53.6
318.4
35.378
55 35.31
55 14.07
+21.24
+21.09
−20.08 +.00
−1.04 −1.07
−3.39 −6.09
−24.514
35.31
10.80
55 10.77 8.07
A.R.

Aug. 8 −.257 −.27
55
22.9 54 56.7
27.6
32.2
36.6
41.2
45.8
50.3
55.1
59.7
37.14
41.267 54 56.70
55 41.20
55 13.91
+27.29
+27.14
−25.99 −.01
−1.17 −1.11
−3.23 −5.93
−30.384
41.20
10.81
55 10.86 8.16
+0.54
25
4 36.0
25.9
6.19
29 30.95
+44.57
1.64904
1.11738n
−13.10
29 30.95
29 17.85
53 30.50
−1665
1.58205n
+ 38.20
− .24
+ .36
+ 38.32
54 8.82 54 8.37
58 51.9+1
+4 43.7 −.45 42.7
+4 43.5 43.0
−11.79
−11.50 6 − 11.60
+4 43.29 + 43.16
+4 31.69
58 40.51 + 30
+4 31.86
58 40.23
40.04

Aug. 10 −.266 −.27
55
27.7 55 9.4
32.1 18.1
36.5 16.5
41.4
45.8
50.3
55.2
59.7
4.6
41.33
45.92 55 13.00
55 45.85
55 13.74
+32.11
+31.96
−30.78 +.00
−1.17 −1.15
−3.06 −5.76
~~−35.01~~ 34.99
45.85
10.84
55 10.86 8.16
+0.54
25
4 32.8
22.1
5.49
~~29 27.95~~
29 27.45
+32.92
1.51746
0.98580n
−9.68
29 27.45
29 17.77
53 30.58
+38.60
− .08
+ .35
+ 38.87
54 9.45 9.01
58 52.3+1
+4 42.9 −.44 42.5
+4 43.2 42.8
−12.19
−11.90 12.00 − 12.00
+4 43.83 + 43.26
+4 31.83
58 41.28 + 30
+4 31.56
58 40.57
40.38

Aug 5 1873 −.433 −.43
55 54
13.9 48.2
18.4 50.0
23.1 52.8
27.5
32.4
36.9
41.7
46.1
50.9
290.9
32.322 54 50.33
55 32.25
55 11.34
+20.91
+20.76
−18.98 +.02
−1.86 −1.94
−3.36 −6.[illegible]
−24.202
32.25
8.05
55 8.03
+1.70
20
3 41.0
54.0
9.50
23 47.50
+41.99
~~+31.99~~
1.71592
1.18926n
−15.29
23 47.50
23 32.21
59 16.14
− 34 35 20 = 1.59870
−391
1.59479n
+ 39.34
− .21
+ .15
+ 39.28
59 55.42 59 55.12
58 48.8+1 48.4
−1 ~~6.6~~ 7.0 −.30
−1 6.7
− ~~8.31~~
−8.20 8 − 8.[illegible]
−1 5.98 −1 6.33
−1 14.18
58 41.14 + 9[illegible]
−1 13.57
58 41.55

1872

		°	′	″	
July	19	76	58	47.1	
	24			48.4	+1.3
	29			49.6	1.2
Aug.	3			50.7	1.1
	8			51.8	1.1

1873

		′	″	
Aug.	8	58	49.0	
	13		50.0	+1.0
	18		50.9	.9
	23		51.6	.7
	28		52.2	.6
Sept.	2		52.7	.5
	7		53.1	.4

Ch. f
Aug 12

Aug 28 −.41 −.491
55
20.0 S
24.5
29.1
33.6
38.4
42.7
47.4
51.9
56.9
344.5
38.278
55 38.21
55 9.26
+28.95
+28.80
−27.18 −.01
−1.77 −1.73
−1.28
−30.280
55 38.21
7.98
55 8.01
A.R.

Ch. f.
Sept 2
A.R.

Sept 6 −.41 −.420
54
52.9
56.7
1.5
5.9
10.8
15.9
19.6
25.0
29.3
217.6
9.76
10.844
54? 10.78
55 8.34
+2.44
+2.29
− 0.46 −1.04
− 1.77 −1.81
− 0.36
− 2.59
55 10.78
8.19
55 8.19
A.R.

Sept 9 −.32 −.325 1873
54
49.0
8.8
26.4
43.6
2.1
20.4
39.3
57.9
15.7
363.2
23.2
2.578
55 2.51
55 8.02
− 5.51
− 5.66
− 0.76
− 1.38 −1.40
−0.04
−9.18
2.51
23
Wrong star.
A.R.

1872 ♌
Aug 5 10.80

20
3 36.7
49.8
86.5
23 43.25

7.8
7.0

ψ Draco

17 44 14

+ 72 13

ε Draco

17 51 19
+ 56 53

1879 Urs Min = 16

~~g Draco~~

17 55 35
~~+7 53 38~~
93 14
~~+ 51 30~~

h m s
5 56 01

+ 86° 45' 45"
93° 14' 15"
z = −50° 51' 27"
−77

Red. 1m 13s.0
54.8
36.6
18.3
0.0

Sin δ 9.99931
Cos δ 8.75130
1157n
8.86701n

Tang δ = −17.674
K = +.891

1873

Aug 4 −.549

54
49.9
55 6.6
26.8
44.8
56 3.2
20.5
38.2
55.7
57 13.2

260.9
20.9

56 2.322

56 2.41
−18.65
+9.70
+7.90

56 ~~11.36~~
1.36

54 51.1

54 51.10

Aug 5 −.439

~~56~~ 28.9
55

56 24.3 64
43.0 64
58.6 38
57 17.1 41

56 5.075

56 5.1617
−18.96
+7.76
+7.56

56 ~~11.52~~
1.523

~~56~~ 28.90
55

Ch. f.
Aug 12

Aug 28 −.401

01

~~56 42.6~~
~~0.7~~
~~17.9~~
~~57 36.9~~

56 42.7 244
57 0.7 241
17.9 231
36.9 239

56 23.875

56 23.967
−27.19
+7.09
−1.59

56 2.278

Ch. f
Sept 2

Sept 6
−.420

56

18.4 601
36.1 595
54.4 596
57 12.8 598

55 59.750

55 59.84
−0.42
+7.40
−5.60

56 ~~2.22~~
1.26

+1.69

5
3 19.2
35.8
55.0
8 27.50
+71.22
~~+11.22~~
1.85260
0.71961n
+524
8 27.50
8 32.74
93° 14' 15.61"

− 50 50 20 = 1.84870n
−1628
1.83242n
+1 .01
+1 7.99
+ .16
+ .14 −.28

+1 8 30
+93 15 23.91 +15 23.63
+ 6.60
−1 4.35
−0 57.75
+93 14 26.16

Eq.
~~+~~ − 6.60
−1 4.52
+ 1.30
− ~~0 56.62~~ −1.982
+93 ~~14 27.01~~ 13.81

h m s
5 56 5.2
° ' "
+86 45 44

+1.70

5
3 26.0
41.5
67.5
8 33.75
− ~~23.83~~ + 36.17
~~1.37712n~~ 1.55835
0. ~~54413~~ 0.42536
~~−7554~~ + 266
8 33.75 ~~41~~
8 ~~16.20~~ 36.41
14 ~~32.14~~ 11.94

−391
1.84479n
+ .00
+1 9.95
+ .17
+ .14 −.29

+2 10.26
15 ~~42.40~~ 22.20 21.91 ~~42.11~~
+ 6.79
−1 5.98
−0 59.19
14 43.21

Eq.
~~+~~ − 6.79
−1 6.33
+ 1.31
− ~~0 58.23~~ −1 11.81
~~14 43.88~~ 30.30

5
3 29.8
45.8
75.6
8 37.80

A.R.

A.R.

α 1873 = $56^m\ 1^s.607$

δ =

Sept 9 1873 −.325

55 37.2
40.2
43.1
49.0
51.9
55.0
58.0
56 1.0
6.7
9.8
12.8
564.7
604.7
54.973

55 55.06
− 0.74
+ 5.74
~~− 7.12~~ 6.97

~~56 294~~
{55 53.09}

A.R.

Lal. X67

17 55 08
+ 93 12

Sin δ 9.99932
Cos δ 8.74680n
1157n
8.86251

Aug 1 1872

54
~~29.8~~
51.7 37.8
55 9.9
25.5
46.2
56 3.8
21.6
39.9

10
4 21.1
9.0
' 3.01
14 15.05

35 Draco

17 55 14
+ 76 59

1872 1873

72 Ophiuchi

	h	m	s
	18	01	15
	18	01	20
	+ 9°	33'	"
	+ 9	32	51
z =	+ 32°	49'	57"
	+ .54		

Aug δ = +.17
x = −.016
Ann α =
α1872 16.885 δ = 32' 50".38
α1873 19.728 δ = 32 50.55

dα = +2.843
dδ = +0.17

1872				1873			
Aug 8	1m	18.73		Aug 8	1m	21.74	
13		.68	5	13		21.69	5
18		.62	6	18		21.64	5
23		.56	6	23		21.58	6
28		18.49	7	28		21.51	7
2				Sept. 2		21.43	8
7				7		21.35	8
				12		21.27	8
				17		21.18	9

Sin δ 9.21987
Cos δ 9.99394
1.157n
.10965n

1872

Aug 6 −.24 (−.248)
01 26.4 01 16.5 − 01
28.6 17.4
30.7 18.4
34.8
36.8
39.0
41.0
43.1
47.2
49.3
51.4
428.8
38.936 1 17.43
1 38.89
1 18.75
+19.77
−20.09 +.00
− .04 −.04
−1.87 +0.97
−22.00
1 38.92
1 16.92
1 16.92 1 19.76
+0.57
50
4 29.5
26.3
55.8
54 27.90
+21.51
1.33264
1.44229n
−27.69
54 27.90
54 0.21
+9° 28' 48".14
+32 49 15 = 1.56970
−1050
1.55920
− 36.24
− .04
+ .35
− 35.93
+9 28 12.21 +28 11.77
32 55.1
+4 42.9 −.44 42.5
− 4.53
− 4.70
+4 43.45
+4 38.75 − 4.70
+9 32 50.96 +4 43.30
− .30
+4 38.36
32 50.07
32 50.24

Aug 7 −.22 (−.222)
01 29.3
31.4 01 22.5
33.5 23.5
37.6 24.4
39.7
41.8
43.9
46.0
50.1
52.2
54.4
459.9
41.809 1 23.47
1 41.79
1 18.74
+23.05
−22.96 +.00
− .04 −.04
−1.85 +0.99
−24.85
41.79
16.94
1 16.94 19.78
+0.55
50
4 23.7
23.2
46.9
54 23.45
+18.34
1.26340
1.37305n
−23.61
54 23.45
53 59.84
28 48.57
−1324
1.55646
− 36.01
− .03
+ .35
− 35.69
28 12.82 12.38
32 55.1
+4 42.3 −.44 41.9
− 4.53
− 4.70
+4 44.05
+4 39.35 − 4.70
32 52.17 + 43.64
− .29
+4 38.65
32 51.03
51.20

Aug 8 −.27 (−.257)
01 32.2
34.3 01 28.3
36.4
40.7
42.8
44.9
46.9
49.0
53.1
55.3
57.3
492.9
44.809 1 28.30
1 44.79
1 18.73
+26.06
−26.00 −.01
− .05 −.04
−1.85 +0.99
−27.90
44.79
16.89
1 16.89 19.73
+0.54
50
4 22.3
20.3
42.6
54 21.30
+16.51
1.21775
1.32740n
−21.25
54 21.30
54 0.05
28 48.30
−1653
1.55317
− 35.74
− .03
+ .35
− 35.42
28 12.88 12.44
32 55.2
+4 42.4 −.44 42.0
− 4.63
− 4.80
+4 43.29
+4 38.49 − 4.80
32 51.37 + 43.16
− .29
+4 38.07
32 50.51
50.68

Aug 10 −.27 (−.266)
01 37.0
39.0 01 27.1
41.2 28.1
45.4 29.0
47.5
49.5
51.6
53.7
57.9
59.9
2.1
484.8
544.8
49.527 1 28.03
1 49.51
1 18.71
+30.80
−30.79 +.00
− .05 −.05
−1.82 +1.02
−32.66
49.51
16.85
1 16.85 19.69
+0.54
50
4 27.9
27.1
55.0
54 27.50
+21.50
1.33244
1.44209n
−27.69
54 27.50
53 59.81
28 48.54
− 36.00
− .04
+ .35
− 35.69
28 12.85 12.41
32 55.3
+4 42.4 −.44 42.0
− 4.73
− 4.90
+4 43.83
+4 38.93 − 4.90
32 51.76 + 43.26
− .29
+4 38.07
32 50.48
50.63

1873

Aug 5 −.43 (−.439)
1 28.4 1
30.5 18.3
32.5 19.6
36.7 20.7
38.7
40.8
42.9
45.0
49.2
51.2
53.4
449.3
40.845 1 19.53
1 40.83
1 21.77
+19.06
−18.98 +.02
− .07 −.07
−2.04 +0.80
−21.087
40.83
19.74
1 19.76 60
+1.69
45
3 34.1
44.1
78.2
48 39.10
+21.31
1.32858
1.43823n
−27.43
48 39.10
48 11.67
34 36.68
+32 49 20 = 1.56970
−373
1.56597
− 36.81
− .04
+ .14
− 36.71
33 59.97 33 59.67
32 52.4
−1 7.6 −.30 7.9
− 1.90
−1 5.98
−1 7.88 − 1.90
32 52.09 −1 6.38
− .91
−1 9.14
32 50.53

Aug 9 −.49 (−.484)
1 29.8
31.8 1 20.8
34.0 22.4
38.1 23.6
40.2
42.4
44.5
46.5
50.6
52.8
54.9
465.6
42.327 1 22.27
1 42.31
1 21.73
+20.58
−20.45 −.03
− .08 −.08
−2.00 + 0.84
−22.586
42.31
19.78
1 19.75
+1.74
45
3 30.8
43.9
74.7
48 37.35
+20.06
1.30233
1.41198n
−25.82
48 37.35
48 11.53
34 36.82
−1370
1.55600
− 35.97
− .04
+ .14
− 35.87
34 0.95 34 0.66
32 52.8
−1 8.1 −.29 8.4
− 2.30
−1 4.51
−1 6.81 − 2.30
32 54.14 − 4.59
− .93
−1 7.82
32 52.84

1872

Aug 8	+9° 32′ 55.2″		
13	55.6	+4	
18	56.0	4	
23	56.4	4	
28	56.8	4	
Sept. 2			
7			

Aug. 8	32′	52.7″	
13		53.2	+.5
18		53.6	.4
23		54.0	.4
28		54.3	.3
Sept. 2		54.6	.3
7		54.8	.2
12		54.9 50	.1
17		55.5	.1

1872.0

α
16.92
94
86
87
86
16.900

1873.0

α
19.76
78
69
80
19.750

Ch. f.
Sept-2

1873
Aug. 28 −.41 .401

Sept. 9 −.32 −.325

01	36.3			01	9.7
	38.3	01	31.7		11.7
	40.4		32.8		13.8
	44.6		33.9		18.0
	46.6				20.1
	48.8				22.3
	50.9				24.4
	52.9				26.4
	57.0				30.5
	59.1				32.6
	1.3				34.7
	476.2				244.2
	536.2				
	48.745	1	3280		22.200

1	48.73	1	22.18
1	21.51	1	21.32
	+27.22		+0.86

−27.18 −.01		−0.76 +.02	
−.07	−.07	−.05	−.05
−1.78		−1.59	
−29.03 4		−2.40 .38	
48.73		22.18	
19.70		19.78	
1 19.69		1 19.80	

AR.

45
3 30.8
43.9
74.7
48 37.35

+15.94
1.202 49
1.312 14n
− 20.52
48 37.35
48 16.83

34 31.52

−360
1.56610

− * 36.82
− .02
+ .22

− 36.62
33 54.90
32 54.3
−1 0.6

−3.80
−1 6.41
−1 10.21
32 44.69

o Herculis

tang ψ = +.55
x = −.018
cos x = +.03

18h 02m 32s
18 02 35
+ 28° 45′ 8″
+ 28 44 47
z = +13° 38′ 1″
sin z = +.23

α 1872 32.970 δ = 44′ 46.89″ dα = +2.339
α 1873 35.309 δ = 44 47.12 dδ = +0.23

1872
July 19 2m 34.94s
24 .51 3
29 .88 3
Aug. 3 .83 5
8 34.78 5

1873
Aug 8 2m 37.26
13 .19 7
18 .12 7
23 .04 8
28 36.95 9
Sept 2 .85 10
7 .75 10
12 .65 10
17 36.55 10

Sin δ 9.68213
Cos δ 9.94286
11571n
.05857n

July 27 1872 ~~−.233~~ −.23
2 24.3 2 12.0
26.6 13.2
28.9 14.2
33.6
36.0
38.3
40.6
43.0
47.6
50.1
52.5
421.5
38.318 2 13.13
2 38.30
2 34.89
+3.41
~~+3.38~~
−3.28 −.01
− .13 −.13
−1.92 +0.42
−5.334
2 38.30
2 32.97
2 32.96 2 35.30
+0.64
40
2 56.8
49.9
106.7
42 53.35
+25.19
1.40123
1.45980n
−2883
42 53.35
42 24.52
+28° 40′ 23.83″
+13 37 40 = 1.14490
−650
1.13840
−1 13.75
− .14
+ .06
− 13.83
+28 40 10.00 +40 9.71
44 53.0
+4 43.0 −.29 42.7
− 5.87
− 6.10
+4 43.39
+4 37.29 − 6.10
+28 44 47.29 +4 43.43
+.27 − .14
+28 44 47.56 +4 37.19
+28 44 46.90
44 47.13

July 30 1872 ~~−.316~~ −.32
2 2 40.0
34.7
35.8
36.9
38.2
39.5
40.5
41.7
42.8
44.1
354.2
39.355 2 40.00
2 39.34
2 34.87
+4.47
~~+4.44~~
−4.26 +.01
− .18 ~~−.18~~ .17
−1.90 +0.44
−6.342
39.34
33.00
2 33.02 35.36
+0.61
40
2 27.0
20.9
47.9
42 23.95
−0.65
9.81291n
9.87148
+0.74
42 23.95
42 24.69
40 23.66
−866
1.13624
−1 13.68
− .00
+ .05
− 13.63
40 10.03 9.79
44 53.5
+4 43.5 −.24 43.3
− 6.37
− 6.60
+4 43.66
+4 37.06 − 6.60
44 47.09 + 43.29
+.27 − .14
44 47.36 +4 36.55
44 46.34
46.57

Aug 7 ~~−.222~~ −.22
02 43.8
46.3 02 36.0
48.6 37.0
53.2 38.2
55.5
58.0
0.2
2.7
7.3
9.7
12.0
337.3
637.1
57.937 2 37.07
2 57.92
2 34.79
+23.13
~~+23.10~~
−22.96 +.00
− .12 −.12
−1.82 +0.52
−24.90
57.92
33.02
2 33.02 35.36
+0.55
40
2 50.0
44.9
94.9
42 47.45
+20.87
1.31952
1.37809n
−2388
42 47.45
42 23.57
40 24.78
−1324
1.13166
−1 13.54
− .10
+ .22
− 13.42
40 11.36 11.08
44 55.1
+4 43.7 −.28 43.4
− 7.97
− 8.20
+4 44.05
+4 35.85 − 8.20
44 47.21 + 43.64
+.27 − .12
44 47.48 +4 35.32
44 46.40
46.63

Aug. 10 ~~−.266~~ −.27
02 51.6
54.0 02 42.7
56.3 43.7
1.0 44.8
3.3
5.8
8.1
10.4
15.1
17.4
19.8
242.8
62.8
5.709 2 43.73
3 5.69
2 34.76
+30.93
~~+30.90~~
−30.79 +.00
− .15 −.15
−1.78 +0.56
−32.72
3 5.69
32.97
3 32.97 35.31
+0.54
40
2 50.1
45.9
96.0
42 48.00
+21.98
1.34208
1.40060n
−2515
42 48.00
42 22.85
40 25.30
− 13.44
− .10
+ .22
− 13.48
40 12.02 11.74
44 55.16
+4 43.6 −.28 43.3
− 8.47
− 8.70
+4 43.83
+4 35.13 − 8.70
44 47.15 + 43.26
+.27 − .12
44 47.42 +4 34.44
44 46.18
46.41

Aug 5 1873 ~~−.439~~ −.43
2 42.6
44.9 2 37.1
47.2 38.5
51.9 39.7
54.2
56.6
58.9
3 1.3
5.9
8.2
10.5
382.2
622.2
56.564 2 38.43
2 56.55
2 37.30
+19.25
~~+19.22~~
−18.98 +.02
− .24 −.24
−1.99
−21.21 .19
2 56.55
35.34
2 35.36
+1.70
35
1 49.2
3.9
113.1
36 56.55
+18.13
1.25840
1.31697n
−2075
36 56.55
36 35.80
46 12.55
+13 37 44 = 1.14490
−373
1.14117
−1 13.84
− .08
+ .08
− 13.84
45 58.71 45 58.56
44 52.4
−1 6.3 −.15 6.4
− 5.30
−1 5.98
−1 11.28 − 5.30
44 47.43 −1 6.33
+.51 − .38
44 47.94 −1 12.01
44 46.55
~~78~~

Aug 9 1873 ~~−.494~~ −.49
2 —
— 2 38.9
— 41.9
53.3 43.5
55.7
58.0 A
3 0.4
2.8
~~7.5~~
~~9.8~~
~~12.2~~
58.040 2 41.77
2 58.02
2 37.24
+20.78
~~+20.75~~
−20.45 −.03
− .27 −.28
−1.93
−22.65 9
58.02
35.37
2 35.33
+1.74
35
1 47.4
2.0
109.4
36 54.70
+16.27
1.21189
1.26996n
−1862
36 54.70
36 36.08
46 12.27
−1370
1.13120
−1 13.54 .53
− .06
+ .08
− 13.51
45 58.76 58.61
44 53.0
−1 5.8 −.15 6.0
− 5.90
−1 4.51
−1 10.41 − 5.90
44 48.35 −1 4.59
+.51 − .40
44 48.86 −1 10.89
44 47.72

1872					1873			
July 19	+28°	44′	51″.4		Aug. 8	44′	52″.8	
24			52.4	+1.0	13		53.6	+.8
29			53.3	.9	18		54.3	.7
Aug. 3			54.3	1.0	23		54.9	.6
8			55.2	.9	28		55.4	.5
					Sept. 2		55.8	.4
					7		56.2	.4
					12		56.4	.2
					17		56.6	.2

1872.0 α	δ		1873.0 α	δ	
32.96	47.56		35.36	47.94	
33.02	47.36		.33	48.56	
33.02	47.48		.23	48.41	
32.97	47.42		.31		
32.992	47.45	−.54 46.91	35.307	48.40	−1.02 47.38
.970	46.89	.89	.309	47.12	.12
+.022	~~+0.56~~	+.02	−.002	+1.28	+.26

+

Chf.

1873 Aug 28 −.41 −.49

1873 Sept 2

Sept. 9 −.325 −.32

1873
−.49

38.9
41.9
43.5

02 58.2
52.5 02 41.8
54.9 43.0
59.7 44.0
2.0
4.3
6.7
8.9
13.7
16.0
18.4
287.3
47.8
4.301 2 42.93

41.77

3 4.28
2 36.95
+27.33
~~+27.30~~

−27.18 −.01
− .23 −.22
−1.64
−29.05
3 4.28
35.23

3 35.23

+1.92

35
1 50.9
1.8
11.27
36 56.35

+21.37
1.32980
1.38837n
−24.45
36 56.35
36 31.90

46 16.45

−360
1.14130

− + 13.85
− .10
+ .11

− 13.84
46 2.61 +46 2.46
44 55.4
−1 7.2 −15 7.3

− 8.30
−1 6.41
−1 14.71 − 8.30
44 47.90 1 6.70
+.51 − .44
44 48.41 −1 15.44
44 47.02

58.61
60

5.90
4.59
.40
10.89
47.72

02 27.6
26.0
28.2
32.9
35.3
37.6
40.0
42.3
47.0
49.4
51.8
414.1
37.645

2 37.63
2 37.71
+.92
−0.41

−0.76 +.02
− .18 −.18
−1.40
−2.342
2 37.63
35.29

2 35.31

3
−.28

A.R. A.R.

22 Camel = Fi

Sin δ 9.97121
Cos δ 9.54702n
1157n
9.66278n

This star does not seem to be 22 Camel. Examine
ε+ red. to app. pl.

18h 04m 37s
6 04 51
+ 110° 38'
+ 69° 21' 36"
~~−26° 58 48"~~
+ 110 38 24
z = − 68 15 36
emiz −.93

Δα = +.04s
Δδ = −.03"
Tang. δ = −1.653
R = −.023

α 1872 = 4 44.180 δ = 21 36.79   dα = +6.620
α 1873 = 4 50.800 δ = 21 36.27   dδ = −0.52

1872 July 27 −.233		1872 July 30 −.316		1873 Aug 5 −.439		Aug 9 −.494		Aug 28 −.401	Ch. f Sept 2
4	4 24.4	04	04 2.2	4	4 20.1	4	4 9.3	05	
33.6	4 25.1	35.0	3.4	56.6	21.6	58.1	14.0	6.8	04 46.0
36.7	25.9	37.9		58.6	24.0	5 1.0	17.5	9.5	48.3
39.9		40.9		5 2.4		4.0		12.4	52.6
42.7		43.8		5.2		6.8		15.1	
45.7		46.7		7.8		9.7		17.8	
48.4		49.4		10.8		12.9		21.0	
51.3		52.4		14.0		15.8		24.0	
54.4		55.4		16.7		18.6		27.1	
57.3		58.6		18.7		21.6		29.9	
410.0		420.41		192.8 72.8		148.5 88.5		163.6	
4 45.55	4 25.13	4 46.711	4 2.80	5 8.089	4 21.90	5 9.833	4 13.60	5 18.177	4 48.97
4 45.53		4 46.69		5 8.07		5 9.81		5 18.165	
−3.29		−4.26		−18.96		−20.48		−27.19	
∓0.38		∓.52		∓.72		∓.81		∓.66	
+1.36		+1.20		+0.453		+0.18		−1.17	
4 43.978		4 44.15		4 50.286		4 50.32		4 50.465	

A.R.

+0.64	+0.61	+1.70	+1.74	+1.92
50	50	45	45	45
1 24.3	1 12.0	0 8.8	0 4.3	0 14.7
10.4	58.5	27.9	23.0	31.2
34.7	13.05	36.7	27.3	45.9
51 17.35	51 5.25	45 18.35	45 13.65	45 22.95
+20.42	+43.90	+46.19	+56.23	+29.21
1.31006	1.64246	1.66455	1.74997	1.46553
0.97279n	1.30519n	1.32728n	1.41270n	1.12826n
+9.39	+20.19	+21.24	+25.86	+13.44
51 17.35	51 5.25	45 18.35	45 13.65	45 22.95
51 26.74	51 25.44	45 39.59	45 38.57	45 36.39
+69 31 21.61	31 22.81	37 8.76	37 9.84	37 11.96

−68 13 18 = 2.15565n   −68 13 12 = 2.15561n

−608	−853	−354	−1375	−350
2.14957n	2.14712n	2.15211n	2.14190n	2.15215n
+ .03	+ .04	+ .04	+ 18.64 +.05	+ .04
+2 21.11	+2 20.32	+2 21.94	+2 ~~21.81~~	+2 21.95
+ .07	+ .35	+ .38	+ .57	+ .15
+ .03 −.13	+ .02 −.11	+ .01 −.02	+ .01 −.02	+ .02 −.03

+2 21.24   +2 20.73   +2 22.37   +2 19.27   +2 22.16
+69 33 42.85 +33 42.72   33 43.54   43.43 39 31.13   39 31.11 39 29.11   29.09 39 34.12   34.09
+ 5.16   + 5.68   + 4.04   + 4.66   + 6.92
+4 43.39   +4 43.66   −1 5.98   −1 4.51   −1 6.41
+4 48.55   +4 49.34   −1 1.94   −0 59.85   −0 59.49
+69 38 31.40   38 32.89   38 29.19   38 29.26   38 34.63

−.03

± 1.88   5.16   ± 1.08   5.68   + 2.05 −   4.04   + 2.05 −   4.66   Sne. − 6.92
38 30.52 ∓   ~~1.08~~   ~~31.81~~ ∓   ~~1.08~~   ~~27.14~~ ∓   ~~2.05~~   ~~27.21~~ ∓   ~~2.05~~
32.48 +4   43.43   33.97 +   43.29   31.24 −1   6.33   31.31 −   4.59   − 6.70
+   59   +   56   +   1.58   +   7.61   + 1.78
+4   ~~45.10~~ 38.86   +4   ~~44.93~~ 38.17   −1   ~~2.70~~ 8.79   −1   ~~6.93~~ 7.64   −1 11.84
+69 38 ~~27.82~~ 21.58   38 ~~28.36~~ 21.60   38 ~~28.41~~ 22.32   38 28.16 22.45   22.25
27.30   27.84

Sept 6 1873 – .420

04
40.4 04 20.6
43.3 23.7
46.0 27.8
48.9
51.8
54.9
58.0
0.6
3.6

347.5
467.5
4 51.944 4 25.03

4 51.92
– 0.42
+ 0.69
– 1.85

4 50.34

+1.70
45
0 14.0
32.0
46.0
45 23.10

+27.91
1.44376
1.10849n
+1284
45 23.00
45 35.84

37 12.57

+16
2.15577n
+ .02
+2 23.14
+ .14
+ .02 – .03

+2 23.32
39 35.83 +39 8.80
+ 7.60
–1 6.09
–0 58.49
38 37.34

Gr – 7.60
– 6.17
+ 1.59
–1 12.18
23.62

1873

Gr 2533 =

h	m	s
18	11	39
18	11	42

+ 42° 07' "

+ 42 07 01

z = +0° 15' 47"

+.01

Aug δ = +.90

x = −.021

cos α = +.18 ~~+.02~~ +0.0

α 1872 39.678 δ = 7' 0.22"

α 1873 41.536 δ = 7 1.24

Aug		
8	11m 43.53s	
13	.45	8
18	.36	9
23	.25	11
28	−43.14	11

dα = +1.857

dδ = +1.02

Sin δ 9.82649

Cos δ 9.87028

11571n

9.98599n

	Aug 5 1873 −.439 −.43		Aug 9 −.494 −.49		Aug 28 1873 −.401 −.41	
	11 46.5		11 (48.0)		11 54.4	
	49.3	11 33.6	50.8	11 36.6	57.0	11 48.0
	52.1	35.0	53.7	37.9	59.9	49.2
	57.7	36.5	59.0	39.0	5.3	50.6
	12 0.5		12 2.0		8.0	
	3.3		4.8		10.9	
	6.1		7.5		13.7	
	9.0		10.3		16.4	
	14.3		15.9		22.0	
	17.1		18.6		24.7	
	19.9		21.3		27.6	
	275.8				299.9	
	35.8				11 9.9	
	12 3.256	11 35.03	12 4.118	11 37.83	12 10.900	11 49.27
	12 3.24		12 4.70		12 10.88	
	11 43.57		11 43.51		11 43.13	
	+19.67		+21.19		27.75	
	+19.49		+21.01		+27.57	
	−18.98 +.02		−20.45 −.03		−27.18 −.01	
	− .39	−.39	− .44	−.44	− .37	−.36
	−2.03		−1.97		−1.59	
	−21.40 38		−22.86 9		−29.14	
	12 3.24		4.70		10.88	
	11 41.84		41.84		41.74	
	11 41.86		11 41.81		11 41.74	
	+1.70		+1.74		+1.92	
	10		10		10	
	4 55.0		4 54.5		4 44.8	
	8.3		7.4		57.0	
	12 33		12 19		10 18	
	18 5 1.65		15 0.95		14 50.90	
	+28.23		+26.89		+21.63	
	1.45071		1.42959		1.33506	
	1.43670n		1.41558n		1.32108n	
	−27.33		−26.03		−20.94	
	16 7.65		15 0.95		14 50.90	
	15 4 34.32		14 34.92		14 29.96	
+42°	8' 14.03"		8 13.43		8 18.39	
			+0 15 43 = 9.42000			
	−336		−1380		−340	
	9.41664		9.40620		9.41660	
	− 0.26		− 0.25		− 0.26	
	− .21		− .20		− .13	
	+ .04		.00		+ .29	
	− 0.43		− 0.45		− 0.10	
+42	7 13.60 +8	13.28	8 12.98	12.66	8 18.29	17.91
	7 8.42		7 8.8		7 11.8	
	−1 5.24 −.32	5.8	−1 4.2 −.32	4.5	−1 6.5 −.38	6.9
+0.0						
	− 7.00		− 7.60		− 10.60	
	−1 5.98		−1 4.57		−1 6.41	
	−1 12.98 −	7.00	−1 12.11 −	7.60	−1 17.01 −	10.60
+42	7 0.62 −1	6.33	7 0.87 −	4.59	7 1.28 −	6.70
	−	.02	−	.02	−	.02
	−1	13.35	−1	12.21	−1	17.32
	+42 6	59.93	7	0.45	7	0.59

1873

		'	"	
Aug.	8	6	68.6	
	13		69.4	+.8
	18		70.2	.8
	23		71.0	.8
	28		71.8	.8

δ Urs Min

h m s
18 14 50
18 13 18
+ 86° 36′
+ 86 36 23″
z = −44° 13′ 37″ 1
sin. z = −.70

Red. s
1 69.5
2 52.1
3 34.7
4 17.4
5 0.0

x = −.259
Corr = −.06
A.R. 1872 = 37.558 (15m)
P α 1872 = 37.537 43
δ 1872 = 36′ 23.″42 (P) dα = −19.405
dδ = +1.21
δ 1873 = 36 24.61 (P)

Sin δ 9.99923
Cos δ 8.77310
11.571n
8.88881n

1873	86	36	25.05″	Corr = +0.3″
NA	86	36	24.61	25.31
P			+.70	

16.87

July 20 1872 −.312 −.28

18 12 53.9 12 23.5 10
13 11.7 47.2
13 27.2
13 44.9
14 0.7
20.0
38.9
54.3
11.6
26.32
23.2
14 2.578
2.32 12 41.35

14 2.32
13 53.14
+9.18
+9.24

−4.32 +05
−4.72
−15.58
−24.62
14 2.32
13 37.70

13 37.75
+0.69

50
2 10.9
57.2
12.81
52 4.05″

+81.23
1.90972
0.79853n
−6.29
52 4.05
51 57.76
+86° 30′ 50.59″

−44 12 47 = 1.74790n
−1344
1.73446n

+ 54.28
.25
+ .21

+ 54.24
+86 31 44.83 31 44.62
36 29.4
+0.3 +4 44.6 −.21 44.4
+4 44.9 44.7

−6.00
+4 43.65 − 6.00
+4. 37.65 +4 43.92
+86 36 22.48 + .05
−.81 +4 37.97
+86 36 22.67 36 22.59
21.67 23.80

July 22 1872 −.285 −.28

23.25 52.8
9.1
26.3
44.7
2.0
18.8
36.7
53.8
12.1
25.63
16.3
1.811

14 17.85 1.55
13 52.68 52.68
+25.17 +8.87
+8.98

−3.95
−4.72
−15.10
−23.79
1.55
37.78

A.R.

1873		
Aug 5	18.76	23.03
9	18.21	22.85
28	18.40	24.02
Sept 3	17.43	20.55
6	18.54	22.99

July 24 1872 −.260 −.27

12 49.7
7.9
24.3
42.9
59.7
17.9
34.6
51.1
9.5
29.78
53.78
59.755

13 59.50
13 52.25
+7.25
+7.31

−3.47
−4.55
−14.69
−22.71
59.50
36.79 2

A.R.

July 27 1872 −.233 −.23

12
50.1
13 7.3
24.4
42.6
59.0
14 16.9
33.5
51.6
15 7.9
29.33
533.3
59.255

13 59.00
13 51.57
+7.43
+7.49

−3.28
−3.88
−14.01
−21.17
59.00
37.83

50
2 23.0
10.4
33.4
52 16.70

July 30 1872 −.316 −.32

11 ~~7.0~~ 11 7.0 12
40.3
12 51.3
14 33.8
16 53.8
17 29.3

Rej.

11 7.00

−4.37
−
−12.51

50
2 24.9
12.3
37.2
52 18.60

Aug 1 1872 −.288 −.29

53.0
13 10.6
26.8
45.9
14 4.3
20.2
37.5
54.8
15 12.5
26.56
2.56
2.844

14 2.55
13 50.07
+12.48
+12.54

−7.43
−4.55
−12.51
−24.49
2.55
38.06

A.R.

α 1872.0
37.75
37.78
36.79 ~~37.79~~
37.83
38.06
37.80
37.71
37.34
37.65
38.31
39.30
847
37.9~~38~~
.537
+.401
.310

1876
18.21
18.40
17.43
18.54
268
18.~~468~~
.130
+.338
1

1872.0
α
37.75
78
79
37.83
38.06
37.80
71
34
37.65
38.31
39.30
37.938
.537
+.401

δ
27.67
23.29
23.42
−.13
27.67 +.162
23.42
~~−4.75~~

1873.0
α
18.76
21
40
43
54
18.468
.130
+.338

δ
20.75
21.27
21.52
18.48
20.21
20.45 +3.08 23.53
24.61 24.61
−4.16 − 1.08

16.87
1872
Aug 6 −.248
−.24

13
4.1
20.8
38.5
55.1
14 13.4
30.7
44.7
15 5.5
23.2
2 39.0
11.90
13.222

14 12.96
13 48.56
+24.40
+24.46

−20.11
−4.05
−11.00
−35.16
12.96
37.80

50
2 25.0
13.4
384
52 19.20

Aug. 7 −.222
−.22

13
5.7 13 6.2
22.3
40.8
58.3
14 15.4
32.1
50.4
15 7.7
25.8
2585
1385
15.389 13 6.20

14 15.13
13 48.28
+26.85
+26.91

−22.99
− 3.71
−10.72
−37.42
15.13
37.71

+0.55
50
2 19.9
8.8
287
52 14.35

+ 69.19
1.84004
0.72885n
−5.36
52 14.35
52 8.99
30 39.36

−1307
1.73483n

+ 54.30
− .16
+ .18

+ 54.32
31 33.68 31 33.46
36 33.6.
−.22

− 10.20
+4 44.05 10.20
+4 33.85 +4 43.64
36 7.53 + .04
−.81 +4 33.48
36 6.72 36 6.94
8.15

Aug. 8 −.257
−.27

18
9.5 No delta
26.1
42.9
1.3
18.6
36.8
53.2
11.0
28.1
2275
1675
18.611

14 18.35
18 48.00
+30.35
+30.41

−26.02
−4.55
−10.44
−41.01
18.35
37.34

50
2 20.9
11.0
319
52 15.95

16.88 −.266
Aug. 10 −.27

13
14.2 No delta
30.5
47.7
6.1
23.2
41.4
57.4
15.6
31.8
267.9
307.9
23.100

14 22.84
13 47.39
+ 35.45
+ 35.51

−30.81
−4.55
−9.13
−45.19
22.84
37.65

50
2 23.8
13.0
368
52 18.40

Oct. 2 −.041
−.05

13 37.0 1.96
54.5 1.98
10.9 1.88
30.3 2.08
13 19.750

14 19.49
13 26.10
+ 53.39
+ 53.45
+6.55

+ 8.21
− .84
~~+8.54~~ 11.45
~~−1.17~~ +8.82
14 19.49
~~8.32~~ 38.31
~~35.40~~

50
4 40.1
25.5
656
54 32.80

16.88 −.115
Oct. 9 −.11

12
14 9.6 11 49.1
24.7 50.4
42.2
59.8
13 17.2
34.5
51.1
9.4
27.2
2757
1557
13 17.300 11 49.75

14 17.04
13 22.99
+54.05
+54.11
+5.89
+ 7.88
− .19
+5.43 +4.57
~~+2.25~~ 12.26
17.04
29.30

+1.13
50
4 51.4
36.2
876
54 43.80

+ 87.55
1.94226
0.83907n
−6.78
54 43.80
54 37.02
28 11.33
− 44 13.6 = 1.74790n

+54.30
.32
+ .14

+ 54.32
29 56.5 29 51.8
36 38.9
−.47

− 15.50
+7 45.16 − 15.50
+7 29.66 44.84
36 35.57 + .08
− .81 +7 29.42
36 34.70 36 34.60
35.81

1872 1873 Sin δ 9.56822

109 Herculis tang δ = +.40 July 19 18m 16.60s 1 Aug 8 18m 19.19s 5 Cos δ 9.96803

24 .59 1 13 .14 5 .11571n

x = -.017 29 .57 2 18 .08 6 .08374n

h m s

18 18 12 Aug. 3 .53 4 23 .01 7

18 18 17 con α = .00 1 8 16.49 4 28. 18.94 7

+ 21 43 '

+ 21 42 48 " α1872 14.609 δ = 42 47.08 dα = +2.554

z = + 20° 40' 00" dδ = +1.32

α1873 17.164 δ = 42 48.40

sin. z = +.35

1872 July 27 -.233 -.23 | 1872 Aug 1 -.268 -.27 | 1873 Aug 5 -.439 -.43 | Aug 9 -.494 -.49 | Aug 28 -.401 -.41 | Ch f. Sept-2

July 27			Aug 1	Aug 5		Aug 9		Aug 28	
18 6.6	17	59.3	18 16.9	18 25.1	18 17.1	18 26.6	18 27.8	18 33.0	
8.9	18	0.3	13.0	27.3	18.4	28.8		35.3	18 25.4
11.1		1.3	15.3	29.6	19.5	31.0		37.5	26.6
15.6			19.6	34.0		35.5		41.8	27.6
17.8			22.0	36.2		37.6		44.1	
20.0			24.2	38.4		39.9		46.3	
22.2			26.3	40.5		42.0		48.6	
24.5			28.5	42.9		44.2		50.7	
28.8			33.0	47.2		48.8		55.1	
31.0			35.2	49.5		50.8		57.4	
33.3			37.4	51.8		53.0		59.7	
219.8			265.4	422.5		438.2		509.5	

18 19.982 18 0.30 18 24.127 18 38.409 18 18.33 18 39.836 18 27.80 18 46.318 18 26.53

18 19.97 18 24.11 18 38.39 18 39.82 18 46.30

18 16.58 18 16.54 18 19.22 18 19.18 18 18.94

+3.39 +7.57 +19.17 +20.64 27.36

-3.28 -.01 -7.43 +.01 ~~-18.98~~ +02 -20.45 -.03 -27.19 -.01

- .09 -.09 - .11 -.10 -18.98 - .17 -.17 - .20 -.19 - .16 -.16

-1.97 +0.58 -1.93 0.63 - 2.06 + ~~.49~~ -2.02 -1.78

- 5.345 -9.475 -21.21.19 -22.679 29.134

18 19.97 24.11 38.39 39.82 46.30

18 14.63 14.64 17.18 17.15 17.17

18 14.62 18 17.17 18 14.66 17.21 18 17.20 18 17.13 18 17.16

+0.64 A.R. +1.70 +1.74 +1.92

40	35	35	35	35
4 43.2	3 46.0	3 37.1	3 43.1	3 36.2
38.0	59.8	50.3	53.5	48.1
81.2	105.8	87.4	96.6	84.3
44 40.60	38 52.90	38 43.70	38 48.30	38 42.15

+19.68	+20.08	+12.04	+19.79
1.29403	1.30276	1.08063	1.29646
1.37777n	1.38650n	1.16437n	1.38019n
-2386	-2435	-1460	-2400
44 40.60	38 52.90	38 43.70	38 48.30
44 16.74	38 28.55	38 29.10	38 24.30
+21° 38' 31.61"	44 19.80	44 19.25	44 24.05

+20 39 32 = 1.33660 +20 39 37 = 1.33660

-523 -317 -1385 -330

1.33137 1.33343 1.32275 1.33330

-A 21.45 -A 21.55 -A 21.03 -A 21.54

- .07 - .07 - .02 - .07

+ .09 + .16 + .15 + .23

- 21.43 - 21.46 - 21.13 58.12 - 21.38

+21 38 10.18 +38 9.71 | 43 58.34 43 58.63 | 43 ~~58.12~~ ~~58.35~~ 57.82 | 44 2.67 44 2.37

42 5.21 | 42 5.26 | 42 5.31 | 42 55.3

+41 40.9 -.47 40.4 | -1 5.7 -.31 6.0 | -1 5.0 -.30 5.3 | -1 7.4 -.30 7.7

- 3.68 ~~3.98~~

- 5.00 | - 4.20 | - 4.70 | - 6.90

+4 43.39 | -1 5.98 | -1 4.51 | -1 6.41

+4 38.39 - 5.00 | -1 10.18 - 4.20 | -1 9.21 - 4.70 | -1 13.31 - 6.90

+21 42 48.57 +4 43.43 | 42 48.16 -1 6.33 | 42 48.91 - 4.59 | 42 49.36 - 6.70

+.41 - .22 | +.77 - .59 | +.77 - .60 | +.77 - .67

+21 42 48.98 +4 38.21 | 42 48.97 -1 11.12 | 42 49.68 -1 9.89 | 42 50.13 -1 14.27

+21 42 47.92 | 3 42 46.91 | 42 47.93 | 42 48.10

49.24

1872						1873			
July	19	+21°	42′	50″.6		Aug.	8	42′	52″.9
	24			51.5	+.9		13		53.5 +.6
	29			52.4	.9		18		54.1 .6
Aug.	3			53.3	.9		23		54.7 .6
	8			54.1	.8		28		55.3 .6

1872.0

α	δ			
14.62	48.98			
.66				
14.640	48.98	−.82	48.16	
.609	47.08		47.08	
+.031	~~+1.90~~		+ 1.08	

1873.0

α	δ		
17.20	48.97 3		
17.13	49.68		
17.16	50.13		
17.13	49.81		
17.155	49.65	−1.54	48.10
.164	48.40		.40
−.009	~~+1.25~~		−.30

Sept 1873 3 −.396
−.41

18 36.8
39.0 18 23.2
41.2 24.3
45.4 25.7
47.9
50.0
52.2
54.6
59.0
1.1
3.4
430.6
550.6
18 50.055 18 24.40

18 50.04
18 11.84
18 +31.20

−31.09 +.01
−.16 −.15
−1.58 68
3292.1
50.04
17.11

18 17.13

+1.98

35
3 49.0
0.2
109.2
38 54.60

+25.65
1.40909
1.49283m
−3.11
38 54.60
38 23.49

44 24.86

−902
1.32758

−1 21.26
− .13
+ .23

21.16
44 3.70 44 3.39
42 56.0
−1 7.7 −.31 8.0

7.60
−1 7.06
−1 14.66 − 7.60
42 49.04 −1 7.81
+.77 − .69
42 49.81 −1 16.10
42 47.29

2 d.

Lal. 896 = 17

h	m	s
18	20	42
~~18~~	20	42
+	101°	52′
+	78	08

z = −~~35~~59 ~~45~~29
−0.58
Z = −1.86

Sin δ 9.99062 Tang δ = −4.745
Cos δ 9.31310n
11571n
9.42881n
κ = +0.074

Eq. red. to app. place

α 1872 = 20m 34.140s
α 1873 20 43.747

July 27 1872 −.233

20 19 46.220
13.3 47.3
17.9
23.2
28.4
33.1
38.6
43.3
48.5
53.3
299.6
20 33.289 19 46.752
20 33.36
−3.29
+1.10
+3.02
20 ~~34.22~~ 34.19

Aug 1 1872 −.268

20
17.5
22.3
28.0
32.6
37.4
42.4
47.6
52.8
57.8
338.4
20 37.600
20 37.67
−7.43
+1.27
+2.58
20 34.09

Aug 9 1873 −.494

20
40.7 19 54.1
45.4 58.0
50.5 20 4.0
55.9
21 0.4
5.6
10.3
15.4
20.3
244.5
4.5
21 0.500 19 58.70
21 0.57
−20.49
+2.34
+1.18
20 43.60

Aug 28 −.401 − Ch. f

20
~~39.9~~ 20 3.1
~~59.9~~ 6.9
4.8 9.8
10.1 11.1
15.5
19.9
24.8
30.1
21 ~~15.034~~ 10.08 20 7.72
21 10.16
−27.20
+1.90
−0.95
43.90

Sept 2

Sept 3 1873 −.396

20
54.6 19 36.8
59.6 42.1
4.3 46.6
9.4
14.6
19.6
24.7
29.5
34.6
250.9
180.0
21 14.544 ~~19 42.50~~
19 41.83
21 14.62
−31.08
+1.88
−1.68
20 43.784

A. R.

+0.64
30
4 25.1
11.5
36.6
34 18.30
+46.54
1.66783
1.09664n
+1249
34 18.30 ~~34 30.79~~
34 ~~5.81~~ 34 30.79
+101 ~~48~~ ~~42.54~~ 48 17.56
1.98892
−~~35~~59 30 39 1.61054n
−523
~~1.60527n~~
1.98369
+ ~~40.30~~ 96.31
+ .24
+ .09 −.44
+1 36.20
~~+ 40.63~~
+101 ~~49 23.17~~ ~~+49 22.73~~
4 5.51 ~~50 18.74~~
+4 43.39 49 53.76
+4 48.90
+101 54 12.07
~~×~~ − 5.51
+4 43.43
+ .37
+4 ~~49.31~~ 38.29
+101 54 ~~12.04~~ 1.02
18 20 31 20 42
+78° 5′ 52″ 49″

Line Z taken wrong

+1.74
25
3 17.0
35.2
52.2
28 26.10
+61.80
1.79099
1.82980n
−~~2088~~ +1659
28 26.10
~~28 5.22~~ 42.69
~~28 9.51~~
54 ~~58.84~~ 5.66
30 42
−1385
~~1.59665n~~
1.97507
+ ~~39.50~~ 94.42
+ .43
+ .14 −.26
+1 34.73
~~+ 40.07~~
~~55 18.91~~ ~~55 18.65~~
+ 5.67 ~~56 13.57~~
−1 4.51 55 40.39
−0 58.84
54 20.07
~~×~~ − 5.67
−1 4.59
+ 1.00
−1 ~~57.92~~ 9.26
54 ~~20.73~~ 9.39

+1.92
25
3 12.7
28.0
40.7
28 20.35
+67.31
~~+7.31~~
1.82808
1.25689n
+18.07
28 20.35
28 ~~2.28~~ 38.42
54 ~~46.07~~ .993
−330
~~1.60520n~~
1.98562
+ ~~40.48~~ 96.74
+ .50
+ .20 −.26
+1 37.18
~~+ 41.18~~
~~55 27.25~~ ~~26.99~~
+ 8.71 ~~56 23.25~~
−1 6.41 55 47.11
−0 57.70
54 29.55
~~×~~ − 8.71
−1 6.70
+ 1.11
−1 ~~56.88~~ 14.30
54 ~~30.11~~ 12.69

25
3 9.2
25.1
34.3
28 17.15

+1.98
25
3 1.9
19.5
21.4
28 10.70
+92.71
~~+92.04~~
1.96713
1.39594n
+24.89
28 10.70
~~27~~ 28 ~~40.81~~ 35.59
5~~3~~4 ~~2.51~~ 12.76
−902
~~1.60148~~
1.97990
+ ~~39.95~~ 95.58
+ .94
+ .19 −.24
+1 36.47
~~+ 41.08~~
~~55 43.62~~ ~~48.38~~
+ 9.41 ~~56 34.01~~
−1 7.06 55 49.23
−0 57.65
54 45.97
− 9.41
7.81
+ 1.14
−1 16.18
(27.30)

54	1.02	58.98
54	1.04	48.96

φ Draco.

h m s
18 22 36
18 22 35
+ 71° 16
+ 71 16 11″
z = − 28° 53′ 23″
− .48

Red. s
1 1.28
2 .96
3 .64
4 .32
5 0.0

tan φ δ = +2.95
x = −.045
corr = −.26 +.03″
α 1872 35.658
α 1873 34.809
δ 1872 = 16 8.68
δ 1873 = 16 10.68

1872 m s
July 29 22 38.96
Aug. 3 38.75 .21
8 38.51 .24
~~9 25~~
Sept 27 35.23
Oct 2 34.86 .37
7 34.49 .37
12 34.13 .36
17 33.77 .36

1873 m
Aug. 8 22 37.57
13 37.32 25
18 37.04 28
23 36.74 30
28 36.43 31
2 36.10 33
7 35.75 35

dα = −0.849
dδ = +2.00

July 27 1872 −.2133 −.23		Aug 1 1872 −.268 −.27		Oct. 2 −.041 −.05		Oct. 9 −.115 −.11		Oct. 12 +.047 +.05		Aug 9 1873 −.494 −.49	
22	22 6.5	22		22		22		22			
29.9	8.1	33.9		13.8	21 54.1	13.7		14.2		22 13.7	
33.3	10.3	36.8		16.9	55.1	16.8		17.2		16.3	
36.4		40.3		20.3	56.6	20.3		20.6		18.5	
39.5		43.3		23.3		23.1		23.6			
42.6		47.0		26.5		26.7		27.0		21 58.9	589
45.8		50.2		29.9		29.9		30.1		2.6	594
49.2		53.0		33.0		33.0		33.5		5.4	590
52.4		56.6		36.2		36.6		36.9		8.9	593
55.8		59.5		39.6		39.6		40.0		12.0	592
384.9		420.6		239.5		239.7		243.1			
22 42.767	22 8.30	22 46.733		22 26.611	21 55.27	22 26.633		~~26.400~~ 22 27.01		21 59.160	22 16.17
22 42.72		22 46.69		22 26.57		22 26.58		22 26.86		21 59.12	16.1
22 39.03		22 38.82		22 34.84		22 34.32		22 33.97		22 37.51	
+3.69		+7.87		−8.27		−7.74		−7.11		(+21.61)	
+3.95		+8.13		−8.61		−7.48		−6.85		+21.87	
−3.28 −.01		−7.44 +.01		+8.21 +.00		+7.88 +.00		+6.57 +.01		−20.46	−.03
− .68	−.69	− .80	−.79	− .15	−.12	− .32	−.34	+ .15	+.14	−1.445	−1.16
−3.37	−4.22	−3.16	−4.01	+0.82	−0.03	+1.34	+0.49	+1.69	+0.84	−2.70	
−7.335		−11.40 .38		+8.88 .91		+8.90 .88		+8.41		−24.615	
22 42.72		46.69		36.57		26.58		26.86		59.12	
22 35.39		35.29		35.45		35.48		35.58		34.57	
22 35.37	22 34.52	22 35.31	34.46	22 35.48	34.63	22 35.46	34.61	22 35.38	34.53	22 34.47	
+0.64		A.R.		A.R.		A.R.		A.R.		+1.74	

10
2 7.1
56.5
13.6
12 6.80
+3447
1.53744
1.15988n
−1445
12 1.80
11 52.35
47
+71° 16 56.00
11 1.00
− 28 52 53 = 1.50180n
−481
1.49699n

3140
± .20
+ .04
+ 3124
+71 11 32.24 +11 32.04
16 16.83
+4 49.71 − .20 43.9
+71 +4 49.4 44.2
− 56.40
− 7.60
+4 43.39 − 7.60
+4 35.79 +4 43.43
+71 16 3.03 + .30
8 +4 36.13
+71 16 8.17
16 10.17

+31.34
1.49610
1.11854n
−1314
.521
− .16

5
0 43.4
56.7
10.01
5 50.05
−17.01
1.23070n
0.85314
+7.13
5 50.05
5 57.18
16 51.17
−28 52 55 = 1.50180n
−1390
1.48790n

30.75
∓ .05
.03
+ 30.73
17 21.90 17 21.84
16 19.1
−1 2.8 −.06 2.9
−1 2.5 2.6
− 8.40
−1 4.51 − 8.40
−1 12.91 −1 4.59
16 8.99 + .83
−1 12.16
16 9.68

Sin δ 9.97636
Cos δ 9.50673
11.571n
9.62244n

1872					1873,		"	
July 29	+71°	16'	16.8"	+1.3	Aug. 8	15	78.8	
Aug. 3			18.1	1.2	13		79.9	+1.1
8			19.3		18		81.0	1.1
					23		81.9	.9
Sept. 27			25.7		28		82.8	.9
Oct. 2			25.6	−.1	Sept. 2		83.5	.7
7			25.4	.2	7		84.1	.6
12			25.0	.4				
17			24.6	.4				

Ch. f

Aug 28 −.401 −.41

22
51.7 22 12.6
54.8 14.4
58.1 17.7
1.6
4.6
7.3
10.7
14.3
17.4

220.5
40.5
23 4.550 22 14.87

23 4.46
22 36.41
+28.05
+28.31

−27.19 −.01
−1.21 −1.18
−1.60
−~~30.00~~ 29.98
23 4.46
34.46

22 34.48

+1.92

5
1 5.8
17.0
22.8
6 11.40

+49.63
1.69574
1.31818n
−2081
6 11.40
5 50.59

16 57.76

−320
1.49860n

31.52
− .42
+ .07

+ 31.17
17 28.73 17 28.83
16 22.8
−1 6.1 −.10 62
−1 5.8 59

− 12.10
−1 6.41 − 12.10
−1 18.51 −1 6.70
16 10.42 + .92
−1 18.88
+16 9.95

Sept 2

5
1 2.3
14.1
16.4
6 8.20

Sept 3 −.396 −.41

22
55.3 22 31.8
58.5 33.7
1.6 36.2
4.9
8.0
11.2
14.4
17.7
20.8

192.4
72.4
23 8.044 22 33.90

23 8.00
22 36.02
+31.98
+32.24

−31.00 +.01
−1.21 −1.17
−1.21
−~~33.52~~ 47
8.00
34.98

22 34.53

+1.98

5
0 57.2
9.3
126.5
6 3.25

+34.14
1.53326
1.15570n
−14.31
6 3.25
5 48.94

16 59.41

−887
1.49293n

31.11
− .20
+ .06

+ 30.97
17 30.38 30.30
16 23.6
−1 6.8 −.08 69
−1 6.5 66

− 12.90
−1 7.06 − 12.90
−1 19.96 −1 7.81
16 10.42 + .95
−1 19.76
16 10.54

X Draco

h	m	s	
18	23	23	
18	23	21	
+ 72°	40'		"
+ 72	40	38	
z = −30°	17'	50"	
−,50			

Rd.

	s
1	138
2	19.4
3	5.9
4	3.5
5	0.0

tang δ = +3.21

x = −.651

cos α =

1872		m	s	
Sept 27	23		21.12	
Oct 2			20.72	.40
Oct 7			20.32	.40
12			19.52	.40
17			19.53	.39

α1872 21.599 δ = 40' 36.13" dα = −1.078
dδ = +1.66

α1873 20.521 δ = 40 37.79

1873	m	s	
Aug 8	23	23.46	
13		23.18	.28
18		22.88	.30
23		22.56	.32
~~Sept~~ 28		22.23	.33
Sept 2		21.87	.36
7		21.50	.37

Oct 2, 1872 −.85 −.841	Oct 7 −.11 .115	Oct 12 +.05 +.047	Aug 9 1873 −.49 −.494	Aug 28 −.41 −.401	Sept 3 1873 −.41 −.396
22 22 32.6	22	22 52.8	23 23 22.0	23 23 51.3	23 − 23 46.6?
59.2 2.6 5.8 9.8 12.8 16.3 19.5 23.3 26.8	58.9 2.9 5.9 9.5 12.8 16.2 19.7 23.1 26.7	59.322 3.0 54.1 6.2 54.7 9.6 13.0 16.7 20.2 23.6 27.0	13.4 20.3 27.4	36.8 40.5 44.0 47.5 50.8 54.3 57.8 1.0 4.7	43.9 54.3 47.4 54.3 51.0 54.5 − 57.9 54.4 1.3 54.4 4.7 54.3 8.3 54.5
175.6 115.6	175.1 115.1	178.6 118.6		337.4 457.4	
23 12.844 22 32.60	23 12.789	23 13.178 22 53.87	23 22.00	23 50.822 23 51.30	23 54.386 23 46.60
23 12.79 23 20.70 −7.91	23 12.74 20.14 −7.40	23 13.13 23 19.74 −6.61		23 50.77 23 22.21 +28.56	23 54.34 23 21.78 +32.56
+ 8.21 +.00 − .16 −.13 + 0.90 −0.18 + 8.958 23 12.79 +.192 21.74 50 23 ~~12.82~~ 21.77	+ 7.88 +.00 − .35 −.37 + 1.46 +0.38 + 8.987 12.74 21.73 50 23 ~~12.72~~ 21.71	+ 6.57 +.01 + .16 +.15 + 1.86 +0.78 + 8.759 13.13 +.123 21.71 50 23 ~~13.15~~ 21.72 ~~21.74~~ 40	− 20.46 −.03 +1.58 − 1.57 − 2.88 − 24.91	−27.19 −.01 − 1.32 −1.29 − 1.69 − 30.20 0.18 50.77 +.192 20.57 40 ~~102.9~~ 20.59	−31.10 +.01 − 1.32 −1.27 −1.26 −33.68 2 20.66 54.34 23 20.72 40 +1.98
0 28.7 23 20.69 13.9 42.6 50 21.30	0 36.8 20.63 23.2 60.0 50 30.00	0 18.5 20.641 1.5 20.0 50 10.00	11.7 2.5 14.2 41 7.10	1 20.9 32.6 53.5 41 26.75	1 21.0 34.2 55.2 41 27.60
+40.24 1.60466 1.19408n −15.64 50 21.30 50 5.66 +72° 32 42.69"		+19.31 1.28578 0.87620n −7.50 50 10.00 50 2.50 32 45.85		−0.48 9.68124n 9.27066 +0.19 41 26.75 41 26.94 41 2.41	+7.79 1.89154 1.48096n −30.31 41 27.60 40 ~~57.23~~ 24.57 41 ~~57.02~~ 23.78
−30 17 37 = 1.52670n −267 1.52403n		−190 1.52480n		−30 17 25 = 1.52670n 1390 1.51280n	−887 1.51783n
+ 33.42 − .25 + .03		+ 33.48 − .06 + .01		+ 32.57 − .00 + .08	+ 32.95 − .01 + .08
+ 33.20 +72 33 15.89 + 33 15.86 40 52.7 + 7 36.8 −.03	+72	+ 33.43 33 19.28 33 19.26 40 52.0 + 7 32.7 −.02		+ 32.65 41 54.06 41 53.95 40 49.6 −1 4.5 −.11 4.6	+ 33.02 41 ~~24.04~~ 56.80 56.69 40 50.4 −1 6.4 −.11 6.5
− 16.60 + 7 45.69 + 7 29.09 16.60 +72 40 44.98 + 7 45.53 50 + 7 29.43 +72 40 45.29 40 46.75		− 15.90 + 7 46.92 + 7 31.02 15.90 +72 40 50.36 + 7 46.63 61 + 7 31.34 40 50.60 52.26		− 11.80 −1 6.41 −1 18.21 11.80 40 35.85 −1 6.70 96 + −1 17.54 40 36.41	− 12.60 −1 7.06 −1 19.66 12.60 40 37.14 −1 7.81 99 + −1 19.42 40 37.27

			1872						1873			
Sin δ	9.97986											
Cos δ	9.47371	Sept.	27	+72°	40′	52.8″		Aug.	8	40′	45.6″	
	″ 571n	Oct.	2			52.7	−.1		13		46.7	+1.1
	9.58942n		7			52.5	.2		18		47.8	1.1
			12			52.2	.3		23		48.7	.9
			17			51.8	.4		28		49.6	.9
								Sept.	2		50.3	.7
									7		50.9	.6

23 H Camel

h m s
18 24 16
6 24 31 42
+ 100° 18' ''
+ 79 41 41
= −37 18 53
= + 100 18 19
= − 57 55 31
Corr δ = − 85

Rd.	s
1	23.0
2	17.3
3	11.6
4	5.9
5	0.0

Tang δ = −.550 J

x = +.085

corr = +.11 +1.4''

α 1872 20.671 δ = 41' 44.08''

α 1873 31.032 δ = 41 41.29 =

1872
July 29.8 24 m 17.27 s
Aug. 3 16.79 .32
18 18.34 .35

18 15.92
18' 18.71''

1873
Aug 28 24 m 31.93 s
Sept 2 32.62 .69
7 33.33 .71

dα = +10.361
dδ = −2.78

Ch. f.

Aug 1 1872 −.27 ~~−.268~~

24
0.7
6.6
11.7
17.4
23.3
29.1
34.7
41.2
46.2
210.9
23.433

24 ~~20.35~~
24 23.53
24 17.56
+5.98
+5.87

− 7.44 +.01
+ 1.49 +1.47
+3.12 +13.48
− 2.834
24 23.53
24 20.70
24 20.69 24 31.05

A.R.

Aug 9 1873 −.49 −.494

24
33.0
44.8
53.9

24 6.5

24 6.50

0
4 49.0
6.4
115.4
4' 57.70''

Aug 28 −.41 −.401

24 = 30.6
44.6 .25 .562 32.8
50.7 .566 36.2
57.1 .571
2.1 .562
8.6 .570
14.2 .569
19.7 .567

24 56.671 ~~25 33.27~~
25 33.20

24 ~~56.59~~
24 56.76
24 31.49
+24.87
+24.76

−27.19 −.01
+ 2.26 +2.20
− 0.86
− 25.79 .86
8 56.76
(3) 20.97
24 20.90
~~+1.92~~

0
4 48.0
3.1
111.1
4 55.55
− 36.53
~~+ 36.60~~
1.562265n
0.93073
− 8.53
4 55.55
4 47.02
+ 100° 18' 1.33''

− 57 54 5 = 1.96159n
− 1390
1.94769n
+ 1' .01''
+ 1 28.65
+ .13
+ .29

+ 1 29.08
+100 19 30.41 +19 30.02
18 28.2
− 1 2.2 −.34 26
−1.4'' − 1 0.8 4.0
− 1 3.6

− 9.50 − 9.50
− 1 6.41 − 1 6.70
− 1 15.91 + 1.63
+ 100 18 14.50 − 1 14.57
+100 18 15.45

Sept 2 1873

0
4 17.9
33.1
51.0
4 25.50

		1872					1873	′	″	
Sin δ	9.99294	July 29	+79	41	37.6		Aug 28	41	31.8	
Cos δ	9.25237	Aug. 3			36.6	−10	Sept. 2		31.2	−6
	1157′n	8			35.5	9	7		30.7	.5
	9.36808n									

α Lyrae

h m s
18 32 36
18 32 38
+ 38° 40′ ″
+ 38 40 00
z = + 3° 42′ 48″
sin. z = + .06

Tang δ = +.80
x = −.020
corr = .00
α1872 36.281
α1873 . 38.313
δ1872 = 39 56.86
δ1873 = 40 0.00

1872	m s	
July 19	32 38.41	
24	.38	3
29	.35	3
Aug 3	.30	5
8	38.24	6
~~Sept~~ 17	37.44	
23	.32	.12
28	37.19	.13
Oct 2	.06	.13
7	36.93	.13
12	36.80	.13

1873	m s	
Aug 8	32 40.38	8
13	.30	8
18	40.22	9
23	.13	9
28	40.04	11
Sept. 2	.93	
7	39.82	11

dα = +2.031
dδ = +3.13

Sin δ 9.79573
Cos δ 9.89254
1.1571 n
.00825 n

July 20 1872 −.312 −.28		July 22 1872 −.285 −.28		July 24 1872 −.260 −.27		July 27 1872 −.233 −.23			Aug 1 1872 −.268 −.27		Aug 6 1872 −.248 −.24		
18 32	27.3	32	26.9	32	26.4	32	26.0	32 14.7	32	30.1	32	42.8	32 22.2
	29.9		29.5		28.9		28.7	18.6		32.8		45.4	23.2
	32.4		32.1		31.5		31.4	19.8		35.4		48.1	24.3
	37.8		37.3		36.8		36.5			40.7		53.4	
	40.4		40.0		39.4		39.3			43.3		56.0	
	42.9		42.6		42.1		41.9			45.9		58.7	
	45.7		45.2		44.9		44.5			48.6	33	1.3	
	48.3		48.2		47.4		47.2			51.3		3.9	
	53.3		53.2		52.7		52.5			56.6		8.2	
	56.2		55.8		55.3		55.1			59.1		12.6	
	58.8		58.5		57.9		57.7		33	1.7		14.4	
	473.0		469.3		463.3		460.8			445.5		344.2	
										505.5		644.2	
	43.000		42.664		42.118	32	41.891	32 18.70	32	45.955	32	58.564	32 23.23

32 42.98	32 42.64	32 42.10	32 41.87	32 45.94	32 58.54
32 38.40	32 38.39	32 38.38	32 38.36	32 38.32	32 38.26
+4.58	+4.25	+3.72	+3.51	+7.62	+20.28
−4.31 +.05	−3.94 +.00	−3.47 −.02	−3.27 −.01	−7.45 +.01	−20.15 +.00
−.22 −.25	−.22 −.22	−.22 −.20 .21	−.18 −.18	−.22 −.21	−.19 −.19
−2.12 −0.09	−2.11 −0.08	−2.10 −0.07	−2.08 −0.05	−2.04 −0.01	−1.98 +0.05
−6.65 3	−6.27	−5.79 80	−5.53 4	−9.71 69	−22.32
32 42.98	42.64	42.10	41.87	45.94	58.54
32 36.33	36.37	36.31	36.34	36.23	36.22
32 36.35 32 38.38	32 36.37 38.40	32 36.30 38.33	32 36.33 38.36	32 36.25 38.28	32 36.22 38.23

A.R.   A.R.   A.R.   A.R.

+0.64
45
2 51.7
45.4
97.1
47 48.55
+23.19
1.36530
1.37355 n
−2364
47 48.55
47 24.91
+38° 35′ 23.44″
+3 42 40 = 0.57220
−439
0.56781
− + 36.97
− .14
+ .06
− 37.05 −3.78
+38 34 46.39 35 19.66 35 19.38
40 3.6 40 3.6
17.2 +4 43.9 −.28 43.6
− 3.57
− 6.70
+4 43.39
+4 36.69 − 6.70
+38 39 56.35 +4 43.43
+.07 − .04
+38 39 56.42 +4 36.69
+38 39 55.07
39 58.20

+0.57
45
3 0.6
54.9
115.5
~~48~~ ∫ ~~27.75~~
47 57.75
+35.33
1.54814
1.55639 n
−3601
47 57.75
47 21.74
35 26.61
−989
0.56231
− + 36.50 −
− .32
+ .23
− 36.59 −3.74
34 ~~50.02~~ 22.87 22.57
40 6.0 6.0
+4 43.1 −.30 42.8
− 6.07
− 9.10
+4 43.45
+4 34.35 − 9.10
39 57.22 +4 43.30
+.07 − .03
39 57.29 +4 34.17
39 56.74
59.87

1872phae.proj.1461.

1872 1873

1873 α δ

July 19 38° 40' 1.6″ Aug. 8 39' 67.0″ Aug 9 38.23 For 1872.0 + 1873.0 over

9.89254 24 2.8 +12 13 68.0 +10 28 38.29 59.37
1.09302 29 4.0 12 18 69.0 10 Sept 3 38.32 59.79
9.98556 Aug. 3 5.2 12 23 69.8 .8
8 6.4 12 28 70.6 .8
Sept. 2 71.2 .6
Sept. 17 11.8 +0 7 71.8 .6
23 11.8 0 72.2 .4
28 11.8 0 17 72.6 .4
Oct. 2 11.9 1
7 11.9 0
12

872 .748 .24

1872 Aug. 7 −.222 −.22 Aug 8 −.257 −.27 Aug. 10 −.266 −.27 Oct. 2 −.04 −.05 Oct. 9 −.115 −.11 Oct. 14 +.047 +.05

22.2 32 44.7 32 48.7 32 53.5 32 13.0 3 32 13.2 32 14.2
23.2 48.4 32 32.8 51.4 32 44.0 56.2 32 42.9 15.7 32 56. 15.8 31 51.9 16.9 31 52.9
24.3 51.1 33.9 54.0 58.8 44.2 18.3 18.7 53.0 19.5 54.0
56.3 35.0 59.3 4.1 46.0 23.5 23.9 54.2 24.8 55.8
59.0 1.9 6.8 26.2 26.5 27.3
1.5 4.5 9.4 28.9 29.0 30.1
4.1 7.1 12.0 31.5 31.7 32.8
6.8 9.8 14.7 34.2 34.5 35.4
12.1 15.1 19.9 39.5 39.7 40.7
14.7 17.7 22.6 42.1 42.4 43.3
17.3 20.4 25.1 44.8 44.9 46.0
316.0 289.9 283.1 317.7 320.3 331.0
16.0 49.9 103.1

23.23 33 1.455 32 33.90 33 4.536 32 44.00 33 9.373 32 44.37 32 28.882 32 56.00 32 29.118 31 53.03 32 30.091 31 54.23

33 1.44 33 4.52 33 9.35 32 28.86 32 29.10 32 30.07
32 38.25 32 38.24 32 38.21 32 37.05 32 36.87 32 36.74
+23.19 +26.28 +31.14 −8.19 −7.77 −6.67

−23.02 +.00 .18 −26.06 −.01 −30.84 +.00 + 8.20 +.00 + 7.88 +.00 + 6.57 +.01
−.19 − .18 −.17 − .22 −.20 − .22 −.21 − .04 −.03 − .09 −.09 + .04 +.04
+0.05 −1.97 +0.06 −1.96 +0.07 −1.93 +0.10 −0.77 +1.26 −0.59 +1.44 −0.46 +1.57
−25.17 −28.24 3 −32.99 8 + 7.39 .40 + 7.20 + 6.17 .16
33 1.44 4.52 9.35 28.86 29.10 30.07
36.27 36.28 36.36 36.25 36.30 36.2?

38.23 33 36.27 38.30 33 36.29 38.32 33 36.37 38.40 33 36.26 38.29 33 36.30 38.33 33 36.23 38.26

+0.55 +0.54 +0.54 +0.99 +1.13 +1.23

45 45 45 45 45 45
2 52.1 2 44.7 2 49.2 4 51.8 4 49.2 4 51.8
48.3 40.3 45.8 41.35 38.9 39.0
100.4 85.0 95.0 93.3 88.1 90.8
47 50.20 47 42.50 47 47.50 49 46.65 49 44.05 49 45.40

+27.55 +20.54 +25.00 −27.12 +36.09 +35.86
1.44012 1.31260 1.39794 1.43329n 1.55735 1.55461
1.44837n 1.32085n 1.40619n 1.41885n 1.54295 1.54017
−2808 −2093 −2548 +2623 +3491 +3469
47 50.20 47 42.50 47 47.50 49 46.65 49 44.05 49 45.40
47 22.12 47 21.57 47 22.02 49 ~~20.42~~ 50 18.96 50 20.09
50 12.88
35 26.23 35 26.78 35 26.33 32 35.47 32 29.39 32 28.26

+3 42 30 = 0.57200

−1282 −1589 −245 −180
0.55938 0.55631 0.56955 0.57020n

−1 36.26 −1 36.00 −3.60 −1 37.11 −37.15 −1 37.17
− .23 − .22 − .17 .21 .34 .34
+ .22 + 22 + .22 ∓ .34 ∓ .14 ∓ .14

74 − 36.27 −364 − 36.00 −3.55 − 36.98 −3.58 −3.90 − 37.37 −3.92
.67 22.57 34.5 49.96 22.59 22.31 34.5 50.78 23.18 22.41 35 22.48 22.78 22.50 32 56.49 31.89 32 25.49 32 25.62 32 50.89 24.34 23.87
40 6.2 6.1 40 6.5 40 6.9 40 11.9 40 11.9 11.8
42.8 +4 43.6 −.28 43.3 +4 43.3 −.27 43.0 +4 44.41 −.28 43.8 +7 40.0 7 46.4 −.47 45.9 7 47.5 −.47 47.0
−6.17 −6.47 −6.87 −11.87 −11.77
−9.30 −9.60 −10.00 −15.00 −15.00 −14.98
+4 44.05 +4 43.29 +4 43.83 +7 45.69 +7 45.16 +7 46.92
9.10 +4 34.75 − 9.30 +4 33.69 − 9.60 +4 33.83 − 10.00 +7 30.69 +7 30.16 − 15.00 +7 32.02 − 14.90
43.30 39 57.34 +4 43.64 39 56.87 +4 43.16 39 56.61 +4 43.26 45.53 39 55.65 +7 44.84 39 56.36 +7 46.63
.03 +.07 .04 +.07 .03 +.07 .03 − .06 +.07 .07 +.07 .07
34.17 39 57.41 +4 34.30 39 56.94 +4 33.53 39 56.68 +4 33.03 39 55.72 +7 29.17 39 56.43 +7 31.66
56.74 39 56.61 39 56.44 39 55.53 39 54.79 39 55.53
59.87 59.74 59.57 58.66 57.92 58.66

Lal 785

18 34 41

90 53

1872.0			1873.0		
α	δ		α	δ	
36.35	56.42		38.23	0.05	
.37	57.29		.29	0.94	
.36	57.41		.32		
.33	56.94				
.25	56.68				
.22	55.72				
.27	56.43				
.29					
.37					
26					
30					
23					
36.295	56.70	-.14 56.56	38.280	0.49	-.26 .23
.281	56.86	.86	.313	000	.00
+.014	-0.16	-.30	-.033	+0.49	+.23

Gr 2640 = F.

h m s
18 35 51
18 35 49
+ 65° 22'
+ 65 22 28"
z = − 22° 59' 40"
− 39

x = −.017
Δα = +25
Δδ = +1.9
tan δ = +2.18

Sin δ 9.95856
Cos δ 9.61994 9.61994
1157n .09302
9.73565n 9.71296
α 1872 = 35m 48.752s δ = 22' 24.88"
α 1873 = 35 48.940 δ = 22 28.03
dα = +0.188
dδ = +3.15

1872	h m s			° ' "	
Jul 19	18 35 51.81	10	+65° 27'	29.5	
24	51.71	12		31.0	+1.5
29	51.69	12		32.5	1.5
3	51.49	14		33.8	1.3
Aug. 8	51.29	16		35.1	1.3
13	51.12	17		36.3	1.2
18	50.93	19		37.4	1.1
23	50.71	.22		38.4	1.0
28	50.48	.23		39.4	1.0

Aug 1 1872 −.268
35 50.3
52.3
54.9
57.2
59.5
36 2.2
4.7
7.3
9.4
297.8
537.8
59.755
59.738
51.54
+8.20
+7.95
35 59.74
−7.45
−.58
−2.79 −2.60
35 48.52 35 49.11

Aug 6 1872 −.248
36 —
—
—
9.5 11.0
12.1 12.4
14.9 13.4
17.1 13.2
19.4 13.0
22.3 12.4
35 12.8
13.9
15.3
17.5
36 12.500 35 14.88
12.488
51.37
+21.12
+20.87
36 12.48
−20.16
−.54
−2.62 −2.43
35 49.16 49.35

Aug 7 1872 −.222
36 5.3
7.7
10.2
12.7
15.2
17.6
20.0
22.6
25.1
35 35.8
37.7
39.3
136.4
36 15.155 35 37.60
35 15.138
51.31
+13.88
+13.58
36 15.14
−23.13
−.48
−2.56 −2.37
35 49.07 49.26

Oct 2, 1872 −.041
35 30.8
33.5
35.8
38.3
40.8
43.2
45.6
48.2
50.8
35 18.7
21.0
22.8
367.0
35 40.778 35 20.83
40.761
48.63
−7.87
−8.12
35 40.76
+8.21
−.09
+.12 +0.31
35 49.00 49.19

Oct. 12 +.047
35 31.7
34.0
36.7
39.2
41.5
44.2
46.6
49.1
51.6
34 53.0
54.6
56.7
374.6
35 41.622 34 54.77
41.605
48.17
~~3.43~~
−6.57
−6.82
35 41.60
+6.58
+.10
+.58 +0.77
35 48.86 49.05

Aug 9 1873 −.494
35 3.1
5.8
8.3
10.8
13.0
15.6
18.4
20.8
23.1
34 45.0
46.2
48.9
1189
35 13.211 34 46.70
13.194
51.41
−21.78
35 13.21
−20.49
−1.09
−2.47
35 49.16

A.R.

+0.57
5
0 56.9
44.7
10.16
5' 50.80"
+57.62
1.76057
1.49622n
−3135
5 50.80
5 19.45
+65° 17' 28.90"
− 22 59 26 = 1.38790n
−977
1.37813n
23.89"
.69
+ .06
+ 23.26
+65 17 52.16 +17 52.08
22 34.6
+1.9"
+4 42.4 −.08 42.3
+4 44.3 44.2
−6.55
−9.70
+4 43.45 − 9.70
+4 33.75 +4 43.30
+65 22 25.91 + .22
+4 33.82
+65 22 25.40
29.05

+0.55
5
0 44.9
34.0
7.89
5 39.45
+37.55
1.57461
1.31026n
−2043
5 39.45
5 19.02
17 29.33
−1274
1.37516n
23.72
.29
+ .05
+ 23.48
17 52.81 17 52.74
22 34.9
+4 42.1 −.07 42.0
+4 44.0 43.9
−6.85
−10.00
+4 44.05 − 10.00
+4 34.05 +4 43.64
22 26.86 + .21
+4 33.85
22 26.59
29.74

+0.99
5
3 12.1
57.3
12.94
8 4.70
+19.95
1.29994
1.01290
+10.30
8 4.70
8 15.00
14 33.35
−22 59 28 = 1.38790n
−223
1.38567n
24.30
.08
+ .22
+ 24.44
14 57.79 14 57.48
22 42.2
+7 44.4 −.31 44.1
+7 46.3 46.0
−14.15
−17.30
+7 45.69 − 17.30
+7 28.39 +7 45.53
22 26.18 + .04
+7 28.27
22 25.75
28.90

+1.23
5
2 59.9
42.7
10.26
7 51.30
+46.85
1.67071
1.38367
+24.19
7 51.30
8 16.49
14 31.86
−170
1.38620n
24.33
.44
+ .08
+ 23.97
14 55.83 14 55.55
22 42.2
+7 46.4 −.28 46.1
+7 48.3 48.0
−14.15
−17.30
+7 46.92 − 17.30
+7 29.62 +7 46.63
22 25.45 + .47
+7 29.80
22 25.35
28.50

+1.74
55
4 37.9
52.1
9.00
59 45.00
+26.51
1.42341
1.15906n
+1442
59 45.00
59 ~~59.42~~
59 30.58
23 17.77
−22 59 21 = 1.3878
−1400
1.37380n
23.65
.14
+ .19
+ 23.70
23 41.47 23 41.09
22 ~~40.4~~ 36.2
−1 11 −.38 1.5
−0 59.27 59.6
−[illegible]
−12.40
−1 4.51 − 8.2
−1 16.91 −1 4.59
22 24.56 + .67
−1 16.32
22 [illegible]

1872

	h	m	s	°	′	″	
~~Oct~~ Sept. 17	18	35	49.48	+65	22	41.9	
22			49.20			42.0	+.1
27			48.92			42.1	.1
Oct. 2			48.64			42.2	.1
7			48.37			42.3	.1

1873

	h	m	s		°	′	″	″		
Aug 8	18	35	51.45		+65	22	35.9	40.2		
13			51.27	.18			37.2	41.0	+13.8	
18			51.07	.20			38.3	41.7	11	.4
23			50.87	.20			39.3	42.3	10	.6
28			50.64	.23			40.2	42.7	.9	.1
2			50.40	.24			41.0	43.0	8	.8
7			50.16	.24			41.7	43.2	.7	.0
12			49.90	.26			42.3	43.2	6	.0
Sept. 17			49.63	.27			42.7	43.2	4	.0

Aug 28 - 401

Ch. f
Sept 2

Sept 3 - 396 1873

36
9.0 35 40.2
11.6 42.1
14.1 45.6
16.5
18.8
21.4
24.0
26.4
28.8

170.6

36 18.955 ~~35 43.63~~
18.938 35 42.63
35 50.63
+28.31
+28.06

36 18.94
− 27.20
− .87
− 1.69

35 49.18

+1.92
55
4 38.2
50.7
88.9
59 44.45
+ 36.32
+ ~~35.32~~
1.56015
1.29580 m
− 19.76
59 44.45
59 24.69

23 23.66

− 308
1.38480 m

~~+~~ 24.25
− .27
+ .28

+ 24.26
23 47.92 23 47.54
22 ~~42.7~~ 40.2
− 1 5.2 − .38 5.6
− 1 3.3 3.7

~~− 14.70~~ 12.2
− 1 6.41 − ~~14.70~~
− 1 21.11 − 1 6.70
22 26.81 + .74
− 1 19.66
+22 27.88

55
4 41.2
53.9
95.1
59 47.55

36
12.8 35 42.7
15.2 44.4
17.7 47.6
20.1
22.8
25.1
27.8
30.0
32.5

204.0

36 22.667 35. 44.90
22.650
35 50.38
+32.07
+31.82

36 22.65
− 31.10
− .86
− 1.44

35 49.25

+1.98
55
4 35.6
49.5
85.1
59 42.55
+ 37.77
1.57715
1.31280 m
− 20.55
59 42.55
59 22.00

23 26.35

− 857
1.37923 m

~~+~~ 23.95
− .29
+ .28

+ 23.94
23 50.29 23 49.91
22 ~~42.0~~ 41.1
− 1 7.3 − .38 7.7
− 1 5.4 5.8

~~− 15.00~~ − 13.1
− 1 7.06 − ~~15.00~~
− 1 22.06 − 1 7.81
22 28.23 + .77
− 1 22.04
22 27.87

51 Cephei

h	m	s		
18	39			
6	40	15.		
+	87°	15′	″	
.+	87	14	11	
	~~9102°~~ 92°	45′	49″	
z =	−5~~2~~0°	23′	1″	

sin z = −.77

2072

Red.

	m	s
1	1	25.9
2	1	4.4
3		42.9
4		21.5
5		0.0

tang δ = −20.71

x = +.318

Cor x = +1.03

.39

(N.A.) α 1872 = 43.629

(α·P) α 1873 = 44.742

N.A. 1873 = ~~33.064~~ 13.916

Sin δ 9.99949

Cos δ 8.68367n 8.68367n

1157/n .09312

8.79938n 8.77669n

+06

δ 1872 = 14′ 14.24″ (P) = 45° 45.76″ dα = +30.326

δ 1873 = 14 10.67 (P) 45 48.33 dδ = −3.54

9

July 20 1872 −.312 −.28

18 39 38.3 36 16.4

19.4

39.7

24.3 3.0

43.7

5.4

26.2

48.8

268.8

208.8

39 23.200 36 16.40

39 23.52

39 25.57

−1.97

−3.02

+ ~~5.80~~

− 4.31 +.05

+ 5.80

+18.12

+19.6716

39 23.52

39 43.128

+0.69

40

2 49.0

37.2

86.2

42 43.10

+186.80

2.27138

1.07076n

+14.77

42 43.10

42 31.33

42 54.87

92° 39′ 53.48″

−50 21 50 = 1.84140n

−1263

1.82877n

+ .01

+1 7.43

+ .92

+ .27

+1 8.62

+92 41 2.10 + 41 1.83 3

+06 45 48.3

−06 +4 46.2 −.27 45.9 July 20

+4 46.8 45.3

45.6

− 3.40

43.92 45 2.50 −3.40 +4 43.92

+ .53 +4 43.65

+4 44.10 40.25

45 45.25 42.35

−.89

41.46

July 22 1872 −.285 −.28

37 57.8

38 20.2

38 42.7

39 2.3

39 22.4

39 45.8

6.9

27.7

49.8

275.6

215.6

39 23.955

39 24.27

39 26.05

−1.78

−2.81

+ ~~6.80~~

− 3.94 +.00

+ 5.80

+17.58

+19.44

24.27

43.71

A.R.

July 24 1872 −.260 −.27

37 58.2

19.9

(~~39.5~~)

(40.0)

3.5

25.4

45.7

7.3

28.2

50.8

279.0

219.0

39 24.333

39 24.65

39 26.51

−1.89

−2.92

+ ~~5.59~~

− 3.47 −.02

+5.59

+17.09

+19.2119

24.65

43.864

A.R.

July 27 1872 −.233 −.23

38

1.2

21.3

43.1

39 3.2

25.1

47.4

40 9.1

29.3

51.2

230.9

39 25.655

39 25.97

39 27.29

−1.32

−2.35

~~+4.76~~

− 3.27 −.01

+ 4.76

+16.34

+17.832

25.97

43.8079

40

2 45.7

34.2

79.9

42 39.95

Aug 1 1872 −.268 −.27

38

5.4

26.3

47.5

39 10.3

32.5

52.2

40 14.7

34.8

56.4

280.1

39 31.122

39 31.44

39 29.05

+2.39

+1.36

+ 6.59

− 7.47 +.01

+ 5.59

+14.58

+ 12.781

31.44

44.145

A.R.

2.071 Aug 6 1872 −.248 −.24

38 37 43.0

20.8 46.2

42.7 50.2

39 5.5

24.7

47.3

40 4.4

28.7

52.1

41 11.8

241.0

421.0

39 46.778 37 46.47

39 47.10

39 30.82

+16.28

+15.25

+ 4.97

− 20.187 +.00

+ 4.97

+12.81

− 23.89

47.10

44.97

+0.57

40

2 47.0

34.8

81.8

42 40.90

+120.31

2.08031

0.87969

+7.58

42 40.90

42 48.48

39 59.87

−977

1.83163n

+ .01

+1 7.86

+ .38

+ .22

+1 8.47

41 8.34 41 8.07

45 52.8

+4 44.5 −.27 44.2

+4 45.1 43.6

43.9

− 7.9

− 7.00 −7.9 43.80

+4 43.45 + .95

45 44.79 43.874 43.593 +45 4

−.89

43.00

(t)2

1873

Au

1873 | α | δ
Aug 28 | 15.52 | 43.90
Sept 3 | 14.43 | 45.62
6

(1+)2 V A δ = 67 14 15.43 45 44.87
1873 14 11.61 45 48.39

α 1872.0	δ	α 1873.0	δ
43.18	1		
71	41.46	14.73	43.90
84	43.00	15.52	45.62
43.72	43.10	14.43	
44.15	43.35	13.14	
44.71	43.19		
.73	43.87		
44.94			
45.12			
45.23			
44.83			
44.385	42.99 +1.78	14.455	44.76 +3.38
.742	45.76	15.058	49.33
−.357	−2.77	−.603	−4.57

48.14
49.33
−1.19

20.69

1872 Aug 7 −.22 (2.22) | Aug. 8 −.27 (−.257) | Oct 2 −.05 (−.041) | Oct. 9 −.11 (−.115) | 44.77 45.76 −.99 | Oct. 14 +.05 (+.047) | 1873 Aug 9 −.49 (4.84)

9
38 25.0 37 10.6 | 41 27.3 | 38 25.1 37 44.5 | 38 27.0 37 19.1 | 38 34.5 37 20.7 | 37 51.2 36 43.8
46.2 42.7 | 45.2 45.9 | 50.0 42.0 | 56.6 22.2 | 38 10.8 12.4
39 7.9 65.3 | 39 7.4 | 39 11.1 58.1 | 39 16.4 24.6 | 38 33.5 29.1
28.7 | 28.3 | 32.8 5.8 | 38.3 | 38 53.0
51.0 | 50.6 | 51.8 | 59.5 | 39 16.3
40 11.4 | 40 13.8 52.3 | 40 11.5 | 40 13.9 | 40 22.0 | 34.8
32.8 | 36.2 53.3 | 33.4 | 35.8 | 43.3 | 59.0
54.6 | 57.7 53.3 | 53.6 | 58.1 | 4.8 | 19.0
41 15.9 | 18.7 52.8 | 41 15.8 | 18.7 | 41 ~~[illegible]~~ | 40 41.3

273.5 | 270.9 | 299.2 | 318.1 | 318.9
463.5 | 450.9 | 479.2 | 558.1 | 138.9

39 50.89 37 39.53 | 39 52.925 41 27.30 | 39 50.100 37 45.20 | 39 53.244 37 46.25 | 40 0.162 37 23.50 37 22.50 | 39 15.433 37 8.48

39 50.71 | 53.24 | 38 50.12 | 39 53.56 | 40 0.48 | 39 51.575
37 31.13 | 31.45 | 39 55.17 | 40 2.12 | 40 04.82 | 40 4.611
+19.58 | +21.79 | | −8.56 | −4.34 | +11.15
+18.55 | +20.76 | | −9.59 | −8.37 | +10.12
+

− 23.04 +.00 | − 26.06 −.01 | + 8.20 +.00 | + 7.88 +.00 | + 6.57 +.01 | − 20.46 −.03
+ 4.56 | + 5.59 | + 1.04 | + 2.28 | − 1.04 | + 10.15
+ 12.50 | + 12.18 | − 14.59 | − 14.49 | − 21.19 | ~~− 31.54~~ + 9.32
− 5.98 | − 8.29 30 | − 5.30 | − 8.33 | − 15.665 | − ~~62.15~~ 41.85 δ −49.102
50.71 | 53.24 | 50.42 | 53.56 | 0.48 | 15.75 15.75 15.75
44.93 | 44.984 | 45.12 | 45.23 | 44.873 | 3.60 23.90 14.793

+0.55 | +0.54 | +0.99 | +1.13 | +1.23 | +1.74
40 | 40 | 45 | 45 | 45 | 35
2 45.9 | 2 58.0 | 0 58.4 | 0 58.9 | 1 3.5 | 1 44.9
34.4 | 46.9 | 44.0 | 44.0 | 45.2 | 1.7
80.3 | 104.9 | 102.7 | 102.9 | 108.7 | 106.6
42 40.15 | 42 52.45 | 45 51.35 | 45 51.45 | 45 54.35 | 36 53.30
| − 94.38 | | | + 157.66 |
+130.86 | ~~−90.38~~ | +124.90 | +126.99 | +156.66 | +127.00
2.11683 | 1.97488n | 2.09656 | 2.10380 | 2.19776 | 2.10380
0.91621 | 0.77426 | 0.87325 | 0.88049 | 0.97445 | 0.90318n
+8.24 | −5.95 | −+7.47 | −+7.59 | −+9.43 | −8.00
42 40.15 | 42 52.45 | 45 51.35 | 45 51.45 | 46 54.35 | 36 53.30
42 ~~31.91~~ | 42 46.50 | 45 ~~58.82~~ 43.88 | 45 ~~59.04~~ 43.86 | 45 ~~4.78~~ 44.92 | 36 45.30
42 48.39 | | | | 47 ~~3.78~~ |
| 40 1.85 | 38 ~~49.53~~ 4.47 | 38 ~~49.31~~ 4.49 | 38 ~~44.37~~ 3.93 | 46 3.05
39 59.96

− 50 21 44/59 = 1.84130 | − 50 22 7 1.84140

−1274 | −1576 | −223 | | −170 | −1400
1.82866n | 1.82564n | 1.83917n | | 1.83970n | 1.82740n
.01 | .01 | .00 | .00 | .00 | .01
+ 1 7.40 | + 1 6.93 | + 1 9.05 | | + 1 9.13 | + 1 7.20
+ .25 | + .23 | + .41 | | + .65 | + .42
+ .22 | + .23 | + .06 | | + .03 | + .08

+1 8.08 | +1 7.40 | +1 9.52 | | +1 9.81 | +1 7.71
41 8.04 41 7.77 | 41 9.25 41 8.96 | 38 13.99 38 13.91 | | 38 13.24 38 13.15 | 47 10.76
45 53.0 | 45 56.2 | 46 0.5 | | 46 0.3 | 46 54.6
+4 45.0 −.27 44.7 | +4 44.0 −.29 43.7 | +7 46.5 −.08 46.4 | | +7 47.1 −.09 47.0 |
+4 ~~45.6~~ 44.1 | +4 ~~44.6~~ 43.1 | +7 ~~47.1~~ 45.8 | | +7 ~~47.7~~ 46.4 |
44.4 | 43.4 | 45.8 | | 46.5 |

Aug 6

8.07
44.2
43.5

− 7.20 −8.1 8.10 | − 7.40 8.3 8.30 | − 14.70 −15.6 15.60 | | − 14.50 −13.4 15.40 | − 6.30 4.59
+4 44.05 + .42 43.64 | +4 43.29 + .41 42.16 | +7 45.69 + .76 45.53 | | +7 46.92 + .44 46.63 | − 1 4.51 + 1.33
45 44.49 43.99 34.96 | 45 44.14 44.24 35.27 | 45 44.98 44.08 +7 29.69 | | 45 45.66 44.76 32.17 | − 1.69
+ 45 .84 42.73 | 45 − .87 44.23 | − 89 45 43.60 | | 45 − .84 35.32 |
43.10 | 43.35 | 43.19 | | 43.87 |

7.98
43.80
+ .95
44.35 93
+45 44.00

1872 1873

24 H Camel Red. s 1 18.5 2 13.8 A. 3 9.2 4 4.6 5 0.0 — s 1 55.5 2 A₄₁ 46.3 3 37.0

h m s
18 41 13
6 41 8.31
182 5.2′ ″
+ 77 07 54
162° 52′ 1″
−60° 29′ 13″
−.87

tang δ = −.438 July 29 41ᵐ 19.18ˢ Aug 3 19.58 .40 8 20.00 .42
x = +.069
corr x = −.05 +06″

Aug 8 41ᵐ 29.51ˢ 45 13 29.96 47 18 30.44 48 23 30.95 51 28 31.48 53

α1872 21.882 δ = 8′ 3.12″ = 51′ 56.89″ dα = +8.854 dδ = −3.61
α1873 30.735 δ = 7 59.49 = 52 0.51

Aug 1 1872 ~~−.268~~ −.27 | Aug 9 1873 ~~−.494~~ −.49 | Aug 28 1873 ~~−.401~~ −.41

41 — 42
—
— ~~24.8~~ 41 12.2 42 34.2
— ~~74.0~~ 13.8 41.0
— ~~43.5~~

30.4 25.8
34.6 25.4
39.5 25.7
43.9 25.4 24.8 47.8 33.8 56.5
34.0 47.7 42.9 56.6
43.5 48.0 52.0 56.8

25.575 41 47.833 ~~41~~ 42 13.00 42 56.633 ~~42~~ 43 37.60

41 ~~25.51~~ ~~41~~ ~~47.76~~ 42 ~~56.56~~
25.64 41 47.90 56.70
41 19.40 41 29.58 41 81.46
+6.24 +18.32 +25.24
+6.29 +18.37 +25.29

− 7.47 +.01 −20.46 −.03 −27.19 −.01
+ 1.18 +1.17 + 2.15 +2.16 + 1.80 +1.76
+2.48 +11.33 +0.15 + ~~10.00~~ −0.73
− 3.81 − 17.168 −26.147
41 25.64 47.90 56.70
41 21.83 29.74 α 30.58

41 21.835 41 30.68 41 30.72 41 30.53
+1.74 +1.92
A.R.
30 30
1 19.0 1 19.8
37.8 36.0
56.8 55.8
31 28.40 31 27.90

~~+34.83~~ −25.17 ~~+19.03~~ −40.97
~~1.54195~~ 1.40088n ~~1.27944~~ 1.61247n
~~1.00535n~~ 0.86428n ~~0.74284n~~ 1.07587n
~~+10.12~~ − 7.32 ~~+ 5.53~~ − 11.91
31 28.40 31 27.90
31 ~~38.52~~ 21.08 31 ~~33.43~~ 15.99

102° 51′ 9.83″ 27.27 51 ~~14.92~~ 32.36

− 60 27 13 = 2.00529
− 1405 − 290
1.99124n 2.00239n
+ .02 + .01
+ 1 38.80 + 1 40.55
+ 14 + .04
+ .06 + .08

+ 1 38.22 + 1 40.68
+102 ~~52 48.05~~ ~~+ 52 47.90~~ ~~52 55.60~~ 53 ~~55.45~~
52 55 53 15.34 52 9.0 12.89
″ − 42.5 −.15 − 46.0 −.15
~~+06~~

− 5.00 − 8.50
− 1 4.51 − 1 6.41
− 1 9.51 5.00 − 1 14.91 8.50
+ 102 51 38.54 − 1 4.59 − 1 2.70
+ 1.51 + 1.67
− 1 8.08 − 1 13.53
+102 51 39.82 51 41.92

Sin δ	9.98896		1873					1872				
Cos δ	9.34769n	Aug.	8	7′	54″.7	–	July	29	77°	7′	58″.2	
	.11571n		13		53.7	–10	Aug	3			57.0	–1.2
	9.46340n		18		52.7	1.0		8			55.9	.1.1
			23		51.8	.9						
			28		51.0	.8						

β

B. Lyrae

h m s
18 45 20
18 45 23

+ 33° 13'
+ 33 12 59"
z = + 9° 9' 49"
sin. z = +.16

tang δ = +.65
x = −.019
cos α = ~~7.01~~
α 1872 21.212
α 1873 23.423

1872
July 19 45m 23.29s
24 28 1
29 26 2
Aug. 3 23 3
8 23.19 4
Sept. 17 22.51
23 .40 .11
28 .28 .12
Oct. 2 .17 .11
7 22.05 .12

1873
Aug 28 45m 25.23s

δ 1872 = 12' 55.48"
δ 1873 = 12 59.42

dα = +2.211
dδ = +3.93

Sin δ 9.73863
Cos δ 9.92252
.11571n
.03823n

July 20 1872 −.28 −.322

18 45 13.1 45 5.4 45 12.6
15.5 6.7 15.2
18.0 7.8 17.7
22.9 22.3
25.3 25.0
27.9 27.5
30.4 29.9
32.8 32.3
37.7 37.3
40.1 39.8
42.6 42.3
306.3 302.1

45 27.845 45 6.63 45 27.464

45 27.83 45 27.45
45 23.29 45 23.28
+4.54 +4.17
~~+4.53~~ ~~+4.16~~

−4.31 +.05 −3.94 +.00
−.18 −.20 −.18 −.18
−2.08 +0.13 −2.07 +0.14
−6.574 −6.19
45 27.83 27.45
45 21.26 21.26

45 21.29 45 23.50 45 21.26 23.47

+0.69
10
[4] 0 49.7
38.6
8 83
14 10 44.15

+21.21
1.32654
1.36477n
−2316
14 10 44.15
14 10 20.99
+33° 8' 12' 27.36"
+9 9 5 36
−12.63
0.95497
−9.01
.10
+ .07
8 −9.09
33 ~~12~~ 18.32 + ~~8~~ 17.85
12 59.5
+4 41.2 −.47 40.7
−0.07
−4.00
+4 43.65
+4 39.65 − 400
+33 ~~12~~ 8 57.97 +4 43.92
+.19 .11
+33 ~~12~~ 8 58.16 +4 39.81
+33 12 57.66
13 1.59

A.R.

July 22 1872 −.28 −.285

July 24 1872 −.27 −.260

45 12.3
14.8
17.1
22.0
24.5
27.1
29.4
31.9
36.8
39.3
41.8
297.0

45 27.000

45 26.98
45 23.28
+3.70
~~+3.69~~

−3.47 −.02
−.18 −.17
−2.07 +0.14
−5.783
26.98
21.26

45 21.25 23.46

A.R.

July 27 1872 −.23 −.233

45 12.1 45 ~~60.3~~ 45 16.2
14.4 61.0 18.6
16.9 2.1 21.1
21.7 26.0
24.3 28.4
26.6 30.9
29.3 33.4
31.8 35.9
36.5 40.8
39.1 43.2
41.5 45.7
294.2 340.2

45 26.745 46 1.13 45 30.927

45 26.73
45 23.27
+3.46
~~+3.45~~

−3.27 −.01
−.15 −.15
−2.06 +0.15
−5.489
26.73
21.25

45 21.24 23.45

+0.64
10
4 57.2
44.5
101.7
14 50.85

−34.39 +25.61
1.53643n 1.40841
1.57466 1.44664
−37.55 +27.97
14 50.85 14 50.85
14 13.30 22.88
8 ~~35.05~~ 25.47
+9 9 28 = 0.96760
−354
0.96406
−1 9.20
−29
+ .10
− 9.39
+33 8 25.66 16.08 8 15.60
13 1.2
+4 ~~35.5~~ −.48 44.6
45.1
−1.77
−5.70
+4 43.39
+4 37.69 − 5.70
33 ~~13~~ 12 53.7 +4 43.43
+.19 .10
~~13~~ 12 53.96 +4 37.63
12 53.23
57.12

Aug 1 1872 −.27 −.268

45 30.91
45 23.24
+7.67
~~+7.66~~

−7.47 +.01
−.18 −.17
−2.03 +0.18
−9.686
30.91
21.23

45 21.25 23.46

A.R.

Aug 6 1872 −.24 −.248

45 28.9 45 20.0
31.3 21.2
33.8 22.7
38.8
41.2
43.7
46.1
48.5
53.4
56.0
58.4
480.1

45 43.645 45 21.30

45 43.63
45 23.21
+20.42
~~+20.41~~

−20.18 −.00
−.16 −.16
−2.00 +0.21
−22.34
43.63
21.29

45 21.29 23.50

+0.57
10
4 46.4
41.3
87.7
14 43.85

+22.34
1.34908
1.38731n
−2440
14 43.85
14 19.45
8 28.90
−965
0.95795
−1 9.08
−12
+ .38
− 8.82
8 20.08 8 19.61
13 3.5
+4 43.4 −.47 42.7
−4.07
−8.00
+4 43.45
+4 35.15 − 8.00
12 55.53 +4 43.30
+.19 .09
12 55.72 +4 35.21
12 54.82
58.75

	1872					1873	
9.92252	July 19	33	12	59.2		Aug. 28	12′ 69.2″
.09802	24		13	0.4	+1.2		
.01554	29			1.6	12		
	Aug. 3			28	12		
	8		13	3.9	11		
	Sept. 17			4.5			
	23			9.6	+.1		
	28			9.7	.1		
	Oct. 2			9.8	.1		
	7			9.9	.1		

1872.0 α	δ		1873.0 α	δ	
21.29 26 25 24 25 29 34 25 31 24 26 21	58.16 53.96 55.72 55.82 55.12 55.51 55.59 54.93 53.73		23.47	0.93	
21.266	55.39 −.38	55.01	23.470	0.93 −.70	0.23
.212	55.48	55.48	.423	59.42	59.42
+.054	−~~0.09~~	−.47	+.047	+1.51	+.81
				11,+	

1873 aug 28 23.47 59.66

1872
24 48.

	Aug 7 −.222 −.22	Aug 8 −.257 −.27	Aug. 10 −.266 −.27	Oct. 2 −.041 −.05	Oct. 9 −.115 −.11	Oct. 14 +.047 +.05
24.0 21.2 22.7	45 31.7 34.3 36.6 41.6 44.1 46.6 49.0 51.5 56.4 58.9 1.3 45 2.0 512.0	45 34.7 37.2 39.7 44.6 47.0 49.6 52.0 54.5 59.3 1.7 4.3 424.6 5446	45 39.6 42.1 44.5 49.3 51.9 54.3 56.8 59.2 4.2 6.6 9.0 417.5 597.5	44 59.2 1.6 4.2 9.0 11.7 14.1 16.5 19.0 23.9 26.4 28.8 214.4 154.4	44 59.3 2.0 4.3 9.3 11.7 14.3 16.8 19.2 24.1 26.8 29.0 216.8 156.8	45 0.5 3.0 5.5 10.4 12.8 15.2 17.7 20.1 25.1 27.7 30.1 168.1
	45 25.1 26.5 27.7	45 28.0 29.0 30.4	45 31.0 32.1 33.6	44 40.1 41.1 42.3	44 53.6	45 11.0
21.30	45 46.545 45 26.43	45 49.509 45 29.13	45 54.318 45 32.23	45 14.036 44 41.17	45 14.255 44 53.60	45 15.282 45 11.00
	45 46.53 45 23.20 +23.33 +~~23.32~~	45 49.49 45 23.19 +26.30 +~~26.29~~	45 54.30 45 23.17 +31.13 +~~31.12~~	45 14.02 45 22.16 −8.14 −~~8.15~~	45 14.24 45 22.00 −7.76 −~~7.77~~	45 15.26 45 21.87 −6.61 −~~6.62~~
−.16 +0.21	−23.06 +.00 − .14 −1.99 −25.189 46.53 21.34 −.14 +0.22	−26.08 −.01 − .18 −1.98 −28.24 49.49 21.25 −.17 +0.23	−30.86 +.00 − .18 −1.96 −33.00 32.99 54.30 21.30 −.17 +0.25	+8.20 +.00 − .03 −0.95 +7.22 14.02 21.24 −03 +1.26	+7.88 +.00 − .07 −0.79 +7.02 14.24 21.26 −07 +1.42	+6.57 +.01 + .03 −0.66 +5.94 5.95 15.26 21.20 +.03 +1.35
23.50	45 21.34 23.55	45 21.25 23.46	45 21.31 23.52	45 21.24 23.45	45 21.26 23.47	21.21 23.42
	+0.55 10 4 43.7 39.9 83.6 14 41.80	+0.54 10 4 43.8 40.0 83.8 14 41.90	+0.54 10 4 44.9 42.0 86.9 14 43.45	+0.99 15 1 44.7 37.1 81.8 16 40.90	+1.13 15 1 57.6 49.8 107.4 16 53.70	+1.23 15 2 18.8 8.8 27.6 17 13.80
	+20.11 1.30341 1.34164n −21.96 14 41.80 14 19.84 8 28.51	+20.38 1.30920 1.34743n −22.26 14 41.90 14 19.64 8 28.71	+22.09 1.34420 1.38243n −24.13 14 43.45 14 19.32 8 29.03	+32.87 1.51680 1.53234 +34.07 16 40.90 17 14.97 5 33.38	+20.65 1.31492 1.33046 +21.40 16 53.70 17 15.70 5 33.25	+4.28 0.63144 0.64698 +4.44 17 13.80 17 18.24 5 30.11
	−1266 0.95494	−1563 0.95197		+9 9 32 = 0.96770 −201 0.96569		−160 0.96610.
	− × 9.01 − .10 + .38	− × 8.95 − .10 + .38	8.50 − 1.2 + .38	− × 9.24 .25 + .12	−9.23 − .10 + .06	− * 9.25 − .01 + .07
19.61 42.9	8.73 −8 19.78 +8 19.31 13 3.7 +4 43.9 −.47 43.4 − 4.27 − 8.20	8.67 −8 20.04 8 19.57 13 3.9 +4 43.9 −.47 43.4 − 4.47 − 8.40	−8.64 ~~14 10.68~~ 8 20.39 13 4.4 +8 19.92 ~~− 4 6.3~~ −.47 43.5 +4 4.40 − 4.97 − 8.90	9.37 −5 24.01 5 23.84 13 9.8 +7 45.8 −.17 45.6 −10.37 −14.30	−9.27 5 23.98 23.79 13 9.9 +7 45.9 −.19 45.7 −10.47 −14.40	9.19 −5 20.92 20.70 13 9.8 +7 48.9 −.22 48.7 −10.37 −14.30
8.00 43.30 09 35.21 54.82 58.75	+4 44.05 +4 35.85 − 8.20 12 55.63 +4 43.64 +.19 − .08 12 .55.82 +4 35.36 12 54.67 58.60	+4 43.29 +4 34.89 − 8.40 12 54.93 +4 43.16 +.19 .08 12 55.12 +4 34.68 12 54.25 58.18	+4 43.83 +4 34.93 − 8.90 12 55.32 +4 43.26 +.19 .08 12 55.51 +4 34.28 12 54.20 58.13	+7 45.69 +7 31.39 − 14.30 12 55.40 +7 45.53 +.19 .15 12 55.59 +7 31.08 12 54.92 58.85	+7 45.16 +7 30.76 − 14.40 12 54.74 +7 44.84 +.19 .18 12 54.93 +7 30.26 12 53.05 56.98	+7 46.92 +7 32.62 − 14.30 12 53.54 +7 46.63 +.19 .09 12 53.73 +7 32.14 12 52.84 56.77

1872   18   1873

Sin δ 9.93412

$\frac{0}{2}$ Draco

tang δ = +1.68

x = −0.30

cos x =

∠1872 18.587 δ =

∠1873 19.472

h m s

18 49 20

18 49 19

+ 59° 14 ″

+ 59 14 01

z = −16° 51′ 13″

−.29

	m s	
July 19	49 21.29	.6
24	.20	.8
29	.15	.10
Aug 3	.05	.10
Aug 8	20.95	.10
Oct 7	18.72	
12	18.50	.22
17	18.29	.21
22	17.08	.21
27	17.88	.20

Aug 28 49m 21.24s 13° 72.8″ cos δ 9.70888 9.70885

11571n .09302

9.82459n 9.80190

1872	°	′	″	
July 19	59	14	0.5	
24			2.0	+1.5
29			3.4	1.4
Aug 3			4.9	1.5
8			6.3	1.4
Oct 7			14.3	
12			13.9	−.4
17			13.6	.3
22			13.3	.3
27			13.0	.3

δ1872 = 13 56.43   dα = +0.885

dδ = +4.29

δ1873 = 14 0.73

July 24 1872 −2.60 −.27	Aug 1 1872 −2.68 −.27	Oct. 2 −.041 −.05	Oct. 9 −.115 −.11		Oct. 12 +.047 +.05		Aug 28 1873 −.49 −.43	
18 50 22.0	49 20.8	49 2.8	49 2.9	49 21.1	49 6.0	49 29.4	49 = 41.1	49 21.9
26.1	23.0	5.0	5.0	22.7	6.0	30.6	45.1	23.4
30.1	25.2	6.8	7.0	25.1	7.9		11 49.2	25.0
34.5	27.1	8.9	9.0		10.0		2 53.1	
38.4	29.0	10.9	11.0		12.0		57.5	
42.6	31.2	12.9	13.0		13.9		~~5.2~~	
46.5	33.2	14.8	15.0		16.0		~~9.3~~	
50.6	35.3	17.0	17.0		17.9		~~13.1~~	
54.7	37.2	19.0	19.1		20.0			
345.5	262.0	98.1	99.0		107.7			
50 38.389	49 29.111	49 10.900	49 11.000	49 22.97	49 11.967	49 30.00	49 49.204	49 23.43

Rej. wrong

50 38.36	49 29.08	49 10.87	49 10.97	49 11.94	49 49.17
50 21.23	49 21.09	49 18.94	49 18.62	49 18.40	49 21.23
(+17.13)	+7.99	−8.07	−7.66	−6.46	+27.94

−2.64

−3.47	−7.47 +.01	+8.20 +.00	+7.88 +.00	+6.57 +.01	−27.20 −.01
−.45	−.45	−.08	−.18	+.08	−.69
−2.64	−2.50	−0.35	−0.04	+0.19	−1.76
−6.56	−10.421	+7.778	+7.665	+6.845	−29.654
50 38.36	29.08	10.87	10.97	11.94	49.17
50 31.80	18.66	18.64	18.63	18.88	19.525

−.43   −.45 −1.62   −.07 +0.53   −.19 +0.84   +.08 +1.07   −.67

Sept 2

3 0.7

4 13.1

50 31.82   50 18.67 50 19.55   50 18.645 19.53   50 18.62 19.50   50 18.89 19.77   50 19.53

+1.13   +1.23   +1.92

A.R.

15	15	5
1 48.6	1 58.2	2 57.0
38.2	42.8	9.8
86.8	100.7	126.8
16 43.40	16 50.35	8 3.40
−11.97	−18.03	+25.77
1.07809n	1.25573n	1.41111
0.87999n	1.05765n	1.23570n
−7.58	−11.42	−17.21
16 43.40	16 50.35	8 3.40
16 35.82	16 38.93	7 46.19
+59° 6 12.53″	6 9.42	15 2.16

−16 51 7 = 1.24150n   −16 51 6 = 1.24150n

−151   −280

1.23999n   1.23890n

+17.40	+ 17.38	+17.32
.03	− .08	.16
∓ .05	+ .05	∓ .18
	+ 17.35	+17.30
+59 6 +17.42 29.95 6 29.78	6 26.77 6 26.59	15 19.46 15 19.22
14 14.1	14 13.8	14 12.8
+7 44.2 −.17 44.0	+7 47.0 −.18 46.8	−1 6.8 −.24 6.9
−13.41	−13.11	−7.81
−17.70	−17.40	−12.10
+7 45.16	+7 46.92	−1 6.41
+7 27.46 — 17.70	+7 29.52 — 17.40	−1 18.51 — 12.10
+59 13 57.41 +7 44.84	13 56.29 +7 46.63	14 0.95 −1 6.70
+ .32	+ .35	+ .55
+7 27.46	+7 29.58	−1 18.25
+59 13 57.24	13 56.17	14 0.97
14 1.53	0.46	

√

50 Draconis = 18 tang δ = +3.81

x = −.059

con α =

h m s
18 50 31
18 50 27
+ 75° 17′ ″
+ 75 16 58
z = −32° 54′ 10″
−0.54

Sin δ 9.98551
Cos δ 9.40490 9.40490
~~9.40442~~ ~~9.40442~~
11571n .09302
~~9.52013n~~ ~~9.49744~~
9.52061n 9.49792

N.A.
α 1872 h 18 m 50 s 29.318 δ = 75° 16′ 53″.18
α 1873 27.419 16 57.62

α 1872 = 50m 29s.399
α 1873 = 50 27.530 16′ 57″.97

July 27	Aug 1 1872 −.268 −.27	Aug 7 1872 −.222 −.22		Aug 8 −.257 −.27		Oct. 2 −.041 −.05	Oct. 9 −.115 −.11	Oct. 14 +.047 +.05		
	50	50		50		50	50	49		
	25.3	40.8	50 30.6	44.1	49 55.7	4.3	4.2	4.1	4.0	49 56.6
	29.9	45.0	33.0	48.1	60.4	8.4	8.2	8.3	6.0	57.2
	33.9	49.3	35.5	52.0	63.4	12.4	12.2	12.3	8.0	58.4
	38.1	53.2		56.0		16.4	16.2	16.8	10.0	
	41.8	57.0		6.0		20.4	20.7	20.7	12.0	
	46.2	1.1		4.1		24.6	24.2	24.7	13.9	49 ~~29.5~~
	49.9	5.3		8.2		28.5	28.6	28.7	16.0	~~30.5~~
	52.8	9.4		12.2		32.9	32.7	32.6	17.9	
	58.3	13.2		16.3		36.6	36.8	37.0	20.0	
	376.2	274.3 514.3		241.0 1.0		184.5	183.8	185.2		
	50 41.800	50 57.144		51 0.111		50 20.500	50 20.422	49 20.578		
	50 41.74	50 57.09	50 33.03	51 0.05	49 59.83	50 20.44	50 20.36	50? 20.52		49 57.40
	−7.47	−23.06		−26.10		+8.20	+7.88	+6.578		
	−1.02	−.84		−.98		−.16	−.44	+0.18		
	−3.98	−3.64		−3.05		+.92	+1.59	+2.07		
~~50 29.42~~	50 29.29	50 29.55		50 29.39		50 29.40	50 29.39	50 29.35		~~Aug 28 1873~~

1872 s ″
July 27 29.42 54.24
1873 s ″
Aug 28 27.53 57.97

A.R.

+0.55
10
1 25.5
15.2
40.7
11 20.35

+24.11
1.38220
0.90281n
−7.99
11 20.35
11 12.36

11 35.99

+0.54
10
1 29.0
19.8
48.8
11 24.40

+60.28
1.78017
1.30078n
−19.99
11 24.40
11 4.41

11 43.94

not read

A.R.

A.R.

−36.83
1.56620n
1.06412n
−11.59

−32 53 33 = 1.57080

1258
1.55822n

+ 36.16
.08
∓ .10 − .14

+ 36.18
12 12.17 12 12.03
17 24

− 9.20
+4 44.05
+4 34.85 − 9.20
16 47.02 +4 43.64
+ .15
+4 34.59
+16 46.62

−1550
1.55530n

+ 35.92
.47
∓ .11 − .15

+ 35.56
12 19.50 12 19.35
17 27

− 9.70
+4 43.29
+4 33.59 − 9.70
16 53.04 +4 43.16
+ .15
+4 33.61
16. 52.96

− .19

13 R Lyrae

h	m	s	
18	51	26	
18	51	28	
+	43′	47′	
+	43	46	47
g =	−1°	23′	59″
	−.02		

1872

tang δ = +.96
x = −.021
cos x = −.04 −.00

α 1872 26.393
α 1873 28.219
δ 1872 = 46 42.32
δ 1873 = 46 46.86

1872		m	s	
July	19	51	28.62	
	24		.59	3
	29		.56	3
Aug.	3		.51	5
	8		28.46	5
Oct	7	51	27.05	
	12		26.92	13
	17		26.79	.13
	22		26.65	14
	27		26.50	15

1873

		m	s	
Aug.	28	51	30.01	
1872 Oct	7	51	28.96	
	12		28.83	.13
	17		28.69	.14
	22			
	27		28.42	

Sin δ 9.84006
Cos δ 9.85851 9.85851
.11571n .09302
9.97422n 9.95153

dα = +1.826
dδ = +4.54

Aug 1 1872 −.27 −.268	Oct. 2 −.05 −.041	Oct. 9 −.11 −.115	Oct. 10 −.01 −.015	Oct. 14 +.05 +.047	Aug 28 1873 −.41 −.491
51 (~~30.7~~) 32.1 33.5 34.9 36.3 37.7 39.1 40.5 41.9	51 1.7 4.8 51 34.3 7.6 13.4 16.2 19.0 21.9 24.8 30.5 33.4 36.3 209.6	51 2.0 8.0 51 5.6 7.7 13.4 16.3 19.2 22.1 24.9 30.6 32.4 36.4 211.0	51 2.2 4.9 50 55.6 7.9 56.7 13.5 58.3 16.5 19.3 22.0 24.9 30.7 33.7 36.6 212.0	51 3.0 4.1 6.0 ~~8.3~~ 51 0.4 8.9 1.1 14.5 17.4 20.3 23.0 25.9 31.7 34.6 37.4 222.7	51 52 2.2 3.8 51.9 4.7 54.8 57.6 0.4 3.2 16.79 28.79
51 36.300	51 19.065 51 34.30	51 19.182 51 56.0	51 19.273 50 56.87	51 20.245 51 0.75	51 57.580 52 3.57
51 36.28 51 28.53 +7.75 +7.79 −7.48 +.01 −.26 −.26 −2.14 −0.31 −9.887 51 36.28 51 26.40	51 19.03 51 29.17 −10.14 −8.18 +8.20 +.00 −.05 −.04 −0.78 +1.05 +7.378 19.03 26.40	51 19.16 51 26.99 −7.83 −7.80 +7.88 +.00 −.11 −.11 −0.60 +1.23 +7.17 19.16 26.33	51 19.25 51 26.96 −7.71 −7.78 +7.70 +.00 −.01 −.01 −0.57 +1.26 +7.12 19.25 26.37	51 20.22 51 26.86 −6.64 −6.68 +6.57 +.01 +.05 +.04 −0.47 +1.36 +6.15 20.22 26.37	51 57.56 51 30.01 +27.55 +27.59 −27.20 −.01 −.39 −.38 −1.79 −29.38 57.56 28.18
51 26.41 51 28.24	51 26.41 28.21	51 26.33 28.16	51 26.37 28.20	51 26.37 28.20	51 28.18
A.R.	+0.99 40 3 54.6 44.8 99.4 ~~43 54.70~~ 43 49.70 −15.25 1.18327n 1.13480n −1364 43 49.70 43 36.06	+1.13 40 3 29.5 19.4 48.9 43 24.45 +13.58 1.13290 1.08443 +1215 43 24.45 43 36.60	+1.14 40 3 22.3 14.5 36.8 43 18.40 +22.40 1.35025 1.30178 +2003 43 18.40 43 38.43	+1.23 40 3 27.3 14.7 42.0 43 21.00 +19.49 1.28981 1.24134 +1743 43 21.00 43 38.43	+1.92 30 4 34.0 45.2 79.2 34 39.60 −5.99 0.77743n 0.75163 −564 34 39.60 34 33.96
+43°	39′ 12.29″ −1 24 7 = 0.14890n −180 0.14710n	39 11.75	39 9.92 −1187 0.13703n	39 9.92 −151 0.14739n	48 14.39 −1 24 18 −280 0.14710n
+43 +43	+ 1.40 − .06 + .27 + 1.61 39 13.90 39 13.52 46 59.3 +7 45.4 −38 45.0 −12.46 −17.00 +7 45.69 +7 28.69 − 17.00 46 42.59 +7 45.53 + .02 +7 28.55 +43 46 42.07 46 46.61	+ 1.40 − .05 + .10 + 1.40 39 13.20 12.86 46 58.7 +7 45.5 −34 45.2 −11.86 −16.40 +7 45.16 +7 28.46 − 16.40 46 41.96 +7 44.64 + .02 +7 28.46 46 41.32 45.86	+ 1.37 − .13 + .10 + 1.34 39 11.26 39 10.93 46 58.6 +7 47.3 −33 47.0 −11.76 −16.30 +7 46.25 +7 29.93 − 16.30 46 41.21 +7 46.11 + .02 +7 29.83 46 41.76 46.30	+ 1.40 − .10 + .10 + 1.40 39 11.32 10.99 46 58.4 +7 47.1 −33 46.8 −11.56 −16.10 +7 46.92 +7 30.82 − 16.10 46 42.14 +7 46.63 + .02 +7 30.55 46 41.54 46.08	+ 1.40 − .03 + .28 + 1.65 48 16.04 46 58.0 −1 18.0 ~~−11.00~~ −1 −11.10 6.41 −1 17.51 46 58.53

Cant make out

6.70
.04

1872				
July 19	43°	46′	46.4″	
24			47.8	+1.4
29			49.1	1.3
Aug. 3			50.4	1.3
8			51.7	1.3
Oct. 7			58.9	
12			58.5	−.4
17			58.2	.3
22			57.9	.3
27			57.6	.3

1873			
Aug. 28	46′	58.0″	
Oct 7		61.3	
12		60.9	−.4
17		60.6	.3
22		60.3	.3
27		60.0	.3

Ch. f

Sept 2 1873 Oct 9 1873 −.18

51 24.5
27.1 51 19.5
30.0 21.0
35.7 22.9
38.7
41.6
44.6
47.0
52.8
55.9
58.7
456.6

51 41.519 51 21.13

51 41.49
51 28.92
+12.57
+12.61

−12.43 +.00
− .17 −.17
− 0.70
−13.30
41.49
28.19

51 28.19

+2.30

30 30
4 53.0 4 59.3
4.9 62.1
117.9 119.4
34 58.95 34 59.70

+20.38
1.30920
1.28342
−19.20
34 59.70
34 40.50

48 7.85

=0.14990

+698
0.15688

+ 1.44
− .11
+ .30

+ 1.63
48 9.48 48 9.08
47 1.1
− 1 8.4 −.40 8.8

− 14.2
14.20
−1 8.29 − 14.29
−1 22.49 −1 8.41
46 46.99 + .05
−1 22.56
46 46.52

v

δ Draco tang δ = +2.92

x = −.045

corr x = +.08 − .01

h	m	s
18	55	58
18	55	57
+ 71°	07′	
+ 71	07	37″

z = − 28° 44′ 49″
− .48

α1872 57.416 δ = 7 32.28
α1873 56.703 δ = 7 37.16

1872	m	s		1873	m	s	
July 29	55	0.90		Aug 28	55	57.64	
Aug 3		.73	.17	Sept: 2		55.30	.39
8		0.53	.20	7		58.02	.38
Sept. 27	55	57.49		Oct. 7		55.90	
Oct. 2		57.13	.36	12		55.54	.36
7		56.76	.37	17		55.17	.37
12		56.40	.36				
17		56.03	.37				

dα = −0.713
dδ″ = +4.88

Aug 1 1872 −.27 −.28	Oct. 2 −.05 −.041	Oct. 9 −.11 −.115	Oct. 10 −.01 −.015	Oct. 12 +.05 +.047
55 56.5 59.7 56 2.8 6.1 9.2 12.1 15.3 18.6 21.9	55 36.6 55 11.0 39.4 15.0 42.6 18.6 46.0 49.4 52.5 55.5 58.5 2.0	55 36.3 54 39.0 39.6 40.2 42.7 41.3 46.0 48.9 52.4 55.4 58.4 1.7	55 36.3 54 23.3 39.3 26.0 42.7 29.2 45.9 48.9 52.2 55.4 58.5 1.9	55 36.9 40.2 55 20.3 43.1 23.8 46.4 26.6 49.8 53.1 56.0 59.1 2.5
202.2 82.2 56 9.133	382.5 442.5 55 49.167 55 14.87	381.4 441.4 55 49.044 54 40.17	381.1 441.1 55 49.011 54 26.17	387.1 447.1 55 49.678 55 23.57
56 9.09 56 0.79 +8.30 +8.22	55 49.12 55 57.11 −7.99 −8.07	55 49.00 55 56.60 −7.60 −7.68	55 48.97 55 56.53 −7.56 −7.64	55 49.63 55 56.24 −6.61 −6.69
− 7.48 +.01 − .79 −.78 − 3.37 − 4.08 −11.642 56 9.09 55 57.45 55 57.47 55 56.76	+ 8.20 +.00 − .15 −.12 + 0.31 − 0.40 + 8.369 55 49.12 57.48 55 57.51 56.80	+ 7.88 +.00 − .32 −.33 +0.82 +0.11 + 8.387 49.00 57.38 55 57.37 56.66	+ 7.70 +.00 − .03 −.04 + 0.89 +0.18 + 8.565 48.97 57.53 55 57.52 56.81	+ 6.57 +.04 − .15 +.14 +1.18 + 0.47 +7.6090 49.63 57.23 55 57.53 56.82

A.R.

	Oct. 2	Oct. 9	Oct. 10	Oct. 12
20 1 08 50.3 111.1 20 55.55	+0.99 20 3 8.5 55.1 123.6 23 1.80	+1.13 20 2 52.9 39.2 92.1 22 46.05	+1.14 20 2 47.2 34.8 82.0 22 41.00	+1.23 20 2 13.7 57.2 130.9 22 5.45
	+ 34.30 1.53529 1.13801 +13.74 23 1.80 23 15.54	+68.87 1.83803 1.44075 +27.59 22 46.05 23 13.64	+ 82.84 1.91824 1.52096 + 33.19 22 41.00 23 14.19	+26.11 1.41681 1.01953 +10.46 22 5.45 15.91
	+70° 59′ 32.81″	59 34.71	59 34.16	59 32.44

−28 44 28 = 1.49920

	Oct. 2	Oct. 9	Oct. 10	Oct. 12
	−159 1.49761n		−1171 1.48749n	−142 1.49778n
	+ 31.45 − .20 + .21	+ 31.80 − .79 + .08	+ 30.72 − 1.15 + .08	+ 31.46 − .11 + .06
+71 ″ −0.1 +71	+ 31.46 +71 0 4.27 +0 3.97 7 50.6 +7 46.3 −.30 46.0 +7 46.2 45.9 − 13.42 − 18.30 +7 − 45.69 − 18.30 +7 27.39 +7 45.53 7 31.66 + .47 +7 27.10 +71 7 31.67 7 36.55	+ 31.19 0 5.90 5.62 7 50.7 +7 44.8 −.28 44.5 +7 44.7 44.4 − 13.52 − 18.40 18.40 +7 45.16 − 18.40 +7 26.76 +7 44.84 7 32.66 + .54 +7 26.98 7 32.60 37.48	+ 29.65 0 3.81 3.54 7 50.7 +7 46.9 −.27 46.6 +7 46.8 46.5 13.52 − 18.40 +7 46.25 − 18.40 +7 27.85 +7 46.11 7 31.66 + .54 +7 28.25 7 31.79 36.67	+ 31.41 0 3.85 3.65 7 50.5 +7 46.7 −.20 46.5 +7 46.6 46.9 13.32 − 18.20 +7 46.92 − 18.20 +7 28.72 +7 46.63 7 32.57 + .57 +7 28.02 7 31.67 36.55

Sin δ 9.97602

Cos δ 9.30970 9.50970
11571n .09302
9.62541n 9.60272

1872

July	29	71 7	38.8	
Aug.	3		40.3	+ 1.5
	8		41.7	1.4
Sept	27		50.4	
Oct.	2		50.6	+ 2
	7		50.7	+ 1
	12		50.6	− 1
	17		50.4	− 2

1873

Aug.	28	7	49.1	
	2		50.0	+ .9
	7		50.9	.9
Oct	7		53.4	
	12		53.3	− .1
	17		53.2	.1

Ch. f.

1873
Aug 28 − .41 −.40¹

56
14.7 55 30.0
17.6 34.2
20.6 36.6
23.9
26.8
30.3
33.3
36.7
40.0

243.9

56 27.150 55 33.60

56 27.06
55 58.62
~~+28.44~~
+28.36

− 27.20 −.01
− 1.20 − .17
− 1.92
−30.370
56 27.06
56.74
55 56.76

+1.92

10
4 41.3
52.8
94.1
14 47.05

+53.50
1.72835
1.35376n
− ~~1046~~ − 22.58
14 47.05 14 47.05
14 ~~37.59~~ 14 24.47
8 33.88 (2)

−28 44 38 = 1.49930 v

−270
1.49660n

± 31.38
.48
+ .29

+ 31.19
8 55.07 9 54.69
7 49.1
+7 ~~44.0~~ −1 60 −.38 6.4
+7 ~~43.9~~ −1 6.1 6.5

− 11.90
−1 6.41 − 11.90
−1 18.31 −1 6.70
7 36.76 + .92
−1 17.68
7 37.01

Sept 2

10
4 38.9
50.0
88.9
14 44.45

Sept 3 −.41 −.396

56
17.9 55 50.7
21.3 53.0
24.3 55.5
27.5
30.7
33.8
36.8
39.9
43.2

275.4

56 30.600 55 53.07

56 30.56
55 58.21
+32.35
+32.27

−31.12 +.01
− 1.20 −.16
− 1.51
−33.83 3.78
30.56
56.73
55 56.78

+1.98

10
4 32.0
44.0
76.0
14 38.00
+37.53
~~+33.63~~
1.57438
1.19979n
−15.84
14 38.00
14 22.16
8 26.19

−813
1.49117n

± 30.99
.24
+ .28

+ 31.03
8 57.22 8 56.86
7 50.2
−1 7.0 −.36 7.4
−1 7.1 7.5

− 13.04
−1 7.06 − 13.04
−1 20.10 −1 7.81
7 37.12 + .95
−1 19.90
~~9~~ 7 36.96

1873
Oct 9 −.18 −.175

56
55 19.0
21.6
23.7
25.6
9.0 90
12.0 88
15.1 88
18.3 88
21.6 89

56 8.860 55 22.47

56 8.82
55 55.74
+13.08
+13.00

− ~~0.76~~ +.00
− 12.43
.33 −.51
+0.96
− ~~12.00~~ −11.98
8.82
56.82
55 56.84

+2.30

10
4 36.6
42.3
78.9
14 39.45
+46.39
1.66642
1.29186n 3
−19.58
14 39.45
14 19.87
8 28.48

+714
1.50644n

± 32.09
.36
+ .28

+ 32.01
9 0.49 9 0.12
7 53.4
−1 7.1 −.37 7.5
−1 7.2 7.6

− 16.20
−1 8.29 − 16.20
−1 24.49 −1 8.41
7 36.00 + 1.10
−1 13.51
7 35.61

1872 1873

λ π Aquilae

tang δ = −.09 ; π = −.016

Conα =

h	m	s	
18	59	26	
18	59	31	
−	5	04′	″
−	5	04	16

z = + 47° 27′ 4″

+ .74

α 1872 27.354 δ = 4′ 20.93″

α 1873 30.540 δ = 4 15.86

1872	m s	
Oct 7	59 28.75	×8 8
12	.63	×9 8
17	.59	14 8
22	.51	15 4
27	28.44	

dα = +3.186

dδ = +5.06

1873

Aug 28 59ᵐ 32.74ˢ

Sin δ 8.94603ₙ

Cos δ 9.99830

.11571ₙ

.11401ₙ

Ch. f

Oct. 10 1872 −.015 −.01		Oct. 14 +.047 +.05			Aug 28 1873 −.41 −.41		Sept 2 1873
59 8.5	59	9.6			59 47.5		
10.6		11.7	59	5.0	49.6	59	42.5
12.7		13.7		6.0	51.6		43.3
16.8		17.9		7.1	55.8		44.5
18.9		20.0			57.8		
21.0		22.1			59.9		
23.0		24.0			4.0 2.0		
25.1		26.1			8.1		
29.3		30.2			10.1		
31.4		32.4			12.3		
33.4		34.6					
230.7		242.8			358.7 65.87		
59 20.973	59	22.027	59	6.03	59 59.882		~~59 43.37~~ 59 43.43

59 20.96 59 22.01 59 59.87

59 28.70 59 28.63 59 32.74

−7.74 −6.62 +27.13

+ 7.70 +.00 +6.57 +.01 −27.20 −.01

+ .00 +.00 +0.00 −.00 + .04 +.04

−1.35 +1.84 −1.28 +1.91 −2.20

+6.35 27.31 +5.29 30 27.30 −29.367 30.51

59 20.96 22.01 +1.23 59.87 +1.92

Key

30 59 27.31 59 30.50 25 59 30.50 25

3 33.0 0 10.0 0 3.0

25.6 17.8 12.1

58.6 27.8 15.1

33 29.30″ 25 13.90 25 7.55

+16.45

+16.00 ~~+16.51~~

1.20412 1.21617

1.29544 1.33018ₙ

+19.74 −21.39

33 29.30 25 13.90

33 49.04 25 52.57

−5° 11′ 0.69″ 2 4.16

+47 26 6 = 1.79660 47 26 1 = 1.79660

−132 −261

1.79528 1.79399

−1′ 2.41″ −1 2.23

+ .01 + .01

+ .10 + .01

~~+1 2.52~~ −1 2.30 ~~+1 2.25~~ −1 2.21

~~−5 9 58.17~~ 12 2.99 ~~1 1.91~~ 3 6.37

− 4 16.7 12 3.34 4 13.9 3 6.39

+7 46.13 −.35 46.0 −1 7.5 −.02 7.5

+0.86

+4.20 +2.00

+7 46.92 −1 6.41

+7 42.72 − 4.20 −1 8.41 − 2.00

−5 4 20.27 +7 46.63 4 14.78 −1 6.70

.91 1.42

+7 41.52 −1 10.12

−5 4 21.82 4 16.51

−5 4 16.76

	1872					1873		
9.99830	Oct. 7	-5°	4'	16.7"		Aug. 28	4'	13.9"
.09302	12			16.8	.1			
.09132	17			17.0	.2			
	22			17.2	.2			
	27			17.4	.2			

Gr 1255 = 19

h	m	s
19	01	06
4	81	18
98°	31′	
81	28′	51″

δ = +98° 31′ 9″
ζ = −56 8 21
−083

Sin δ 9.99518
Cos δ 9.17055n 9.17055n
11571n 09302
9.28626n 9.26357n

1/Aug ρ = −6.850
−6.675

K = +.133
+.130

α 1872 = 0 ~~10.505~~ 58.35
α 1873 = 1 10.025 31 8.17

.51

Aug 1 1872 −.268	Oct. 2 −.041	Oct. 9 −.115	Aug 28 1873 −.401	Sept 3 1873 −.396	Oct 9 1873 −.175
00	00 +7.5	00	01	01	01
(316)	26.9 59 5.7	27.7 00 0.6	7.0 01 32.0	11.2 01 12.1	0.6 00 17.7
38.6	33.7 9.2	34.7 5.0	13.9	17.6	7.5 26.7
46.2	40.7 17.0	41.3 11.2	20.1	24.7	14.6 34.0
52.5	47.9	48.6	27.7	32.5	21.7
0.0	54.9	55.2	34.4	39.7	28.7
6.9	1.7	2.8	41.1	45.9	36.3
13.2	8.6	9.6	47.8	53.4	42.6
20.4	15.8	17.0	55.1	59.8	49.6
27.9	22.9	24.0	2.7	7.2	56.0
	253.1	260.9	249.8	292.0	257.6
	493.1	500.9	309.8	352.0	
0 59.700	0 54.759 59 10.63	0 55.655 0 5.60	1 34.422 1 32.00	1 39.111 1 12.10	1 28.628 0 26.13
0 59.5783	0 54.6692	0 55.5279	1 34.2945	1 ~~38.98~~ 39.24	1 28.4975
−7.48	+8.20	+7.88	−27.21	−31.11	−12.43
+1.83	+0.28	+.79	+2.67	+2.64	+1.17
+4.46	+4.94	+6.21	−0.02	−0.95	−7.23
0 55.55	1 ~~10.08~~ .34	1 ~~10.40~~ .67	1 9.73 9.99	1 9.56 .82	1 ~~10.00~~ 26
	1 58.46	0 58.25			

	Oct. 2	Oct. 9	Aug 28	Sept 3	Oct 9
	+0.99	+1.13	+1.92	+1.98	+2.30
A.R.	0	0	50	50	50
	1 7.8	0 57.0	1 44.7	1 34.9	1 30.9
	53.2	41.3	57.9	50.1	38.4
	121.0	98.3	102.6	85.0	69.3
	1 0.50	0 49.15	51 51.30	51 42.50	51 34.65
	+104.16	+50.05	+2.42	+27.01	+62.49
	2.01771	1.69940	0.38382	1.43152	1.79581
	1.28128	0.96297	9.67008n	0.71778n	1.08207
	∓1911	∓9.18	+~~4.68~~ +0.47	+5.22	+1208
	1 0.50	0 49.15	51 51.30 51 51.30	51 42.50	51 34.65
	α′ ~~41.39~~ 19.61	0 ~~30.97~~ ~~58.33~~ 58.33	51 ~~55.98~~ 51 51.77	51 47.72	51 46.73
98°	22′ 6.96″	α′ ~~17.48~~ ~~50.02~~	30 56.58	31 0.63	31 1.62
	−56 7 2 = 1,93212n		−56 7 0 = 1.93212n		
	−137		−261	−795	+729
	1,93075n		1.92951n	1.92417n	1.93941n
	+ .00	+ .00	+ .01	+ .01	+ .00
	+ 1 25.26	+ 1 25.01	+ 1 25.02	+ 1 23.98	+ 1 26.98
	+ .86	+ .20	+ .00	+ .06	+ .31
	+ .07 −.10	+ .02 −.08	+ .11 −.15	+ .10 −.14	+ .10 −.13
	+1 26.19	+1 25.22	+1 25.14	+1 24.15	+1 27.39
+98	23 33.15 +23 33.05	23 42.70 42.62	32 21.72 32 21.57	32 24.78 24.64	32 29.01 28.8
	∗ −15.50	∗ −15.75	∗ −9.02	∗ −10.09	∗ −13.67
	+7 45.69	+7 45.16	−1 6.41	−1 7.06	−1 8.29
	+8 ~~1.19~~	+8 ~~0.91~~	−0 57.39	−0 56.94	−0 54.62
+98	31 34.34	3 12.11 Exp.	31 24.33 6.29	31 27.81 7.63	31 34.39 7.05
	3.34 Exp.				
	− 15.50	− 15.75	− 9.02	− 10.09	− 13.67
	+7 45.53	+ 44.84	−1 6.70	− 7.81	− 8.41
	+ .82	+ .93	+ 1.59	+ 1.64	+ 2.
	+7 30.85	+7 30.02	−1 14.13	−1 16.26	−1 20.
	+98 31 3.90	31 12.64	31 7.44	31 8.38	31 8.

d	m	s	m	s
7	1	3	1	10
(81°	31′	42″)	28′	46″

.5183

1872 1873

i Lyrae tang δ = +.72 Oct 7 2m 44.96s Aug 28 52 48.09 Sin δ 9.76817

12 .85 11 Sept 2 48.00 9 Cos δ 9.90851

x = −.019 17 .73 12 5 10 .11571n

22 .62 11 7 47.90 .02422n

Cor α = ~~−.02~~ +.18 27 44.50 12 12 47.80 10

17 47.69 11

h m s

19 02 43

19 02 46

~~+ 35 54′~~

+ 35 54 07″ α 1872 41.078 δ = 54 1.97 dα = +2140

z = + 6° 28′ 41″ dδ = +5.41

α 1873 46.218 δ = 54 7.39

sin z = +.11

9.908

.093

.001

Oct 9, 1872 −.11 −.115 Oct. 10 −.015 −.01 Oct. 21 +.089 +.10 Aug 28 1873 −.491 −.41 ch.-f. Sept 1 Sept 3 −.396 −.41

02 02 21.8 02 21.5 03 0.4 03 4.1

50.8 02 42.4 24.4 02 11.0 23.0 02 14.9 2.8 02 51.3 6.8 02 56.0

55.4 43.8 26.9 12.2 25.6 16.6 5.4 52.6 9.3 57.1

59.8 45.5 32.1 13.3 30.7 17.8 10.4 53.9 14.3 58.4

4.4 34.7 33.2 13.0 16.9

8.8 37.2 35.7 15.6 19.8

13.4 39.7 39.4 18.1 22.0

18.1 42.3 40.9 20.8 24.6

22.6 47.4 45.9 25.7 29.6

26.8 50.0 48.6 28.4 32.0

52.6 51.0 30.8 34.7

Rej. Wire # 260.1 409.1 395.5 171.4 213.8

80.1

3 8.900 2 42.83 2 37.191 2 12.17 2 35.956 2 16.43 3 15.582 2 52.60 3 19.436 2 57.17

3 8.88 2 37.17 2 35.94 3 15.56 3 19.42

2 44.91 2 44.89 2 44.64 2 48.09 2 47.98

(+21.97) − 7.72 − 8.70 + 27.47 +31.44

~~− 7.70~~ ~~8.68~~ ~~+ 27.49~~ ~~+31.46~~

+ 7.88 + 7.70 +.00 + 8.70 +.01 −27.20 −.01 −31.12 +.01

− .08 −.08 − .01 −.01 − .07 −.06 − .30 −.29 − .30 −.29

− 0.83 − 0.81 +1.33 −0.56 +1.58 −1.87 − 1.76

+ 6.97 + 6.88 + 8.07 9 −29.37 −33.186

3 8.88 37.17 35.94 15.56 19.42

3 15.85 44.05 44.01 46.19 46.24

2 44.05 2 46.19 2 44.03 46.17 2 46.19 2 46.26

+1.14 AR +1.92 +1.98

35 25 25 25

0 49.9 2 35.2 0 17.6 2 30.9

42.7 47.0 33.8 44.7

92.6 82.2 51.4 75.6

35 46.30 27 41.10 25 25.70 27 37.80

+ 25.07 + 25.02 + 19.52 + 22.98 + 22.27

1.39916 1.39829 1.29048 1.36135 1.34772

1.40068 1.39982 1.29201 1.38559n 1.37194n

+ 2516 + 2571 + 1959 − 2430 − 2335

35 46.30 27 41.10 27 37.80

36 11.41 27 16.80 27 14.25

+35° 46′ 36.94″ 55 31.55 55 34.10

+6 28 28 = 0.81530 +6 28 25 = 0.81520

− 1155 − 261 − 795

0.80375 0.81259 0.80725

− 1 6.36″ − 1 6.49 − 1 6.42

− .16 − 10 − .14 − .12

+ .02 + .16 + .16

− 6.50 − 6.47 − 6.38

+35 46 30.44 46 30.36 55 25.08 55 24.86 55 27.72 27.51

54 17.6 −54 54 17.8 54 18.6

″ +7 47.2 −.08 47.1 −1 7.3 −.22 7.5 −1 9.1 −.21 9.3

+.01 +7 47.3 47.2 −1 7.2 7.4 −1 9.0 9.2

− 10.19

− 15.60 − 10.40 − 11.20

+ 7 46.25 − 15.60 − 1 6.41 − 10.40 − 1 7.06 − 11.20

+ 7 30.63 +7 46.11 − 1 16.81 − 1 6.70 − 1 18.26 − 1 7.81

+35 54 1.09 − .12 54 8.27 − .21 54 9.46 − .21

+.13 +7 30.39 +.24 − 1 17.31 +.24 − 1 19.22

+ 35 54 1.22 54 0.75 54 8.51 54 7.55 54 9.70 54 8.29

54 6.16

9.90851
.09302
.00153

1872					1873				1872.0 α	1872.0 δ	1873.0 α	1873.0 δ
Oct. 7	+35°	54′	17.7″		Aug. 28	53	77.8		44.05	1.22	46.19	8.57
12			17.5	−2	Sept. 2		78.4	+.6	.03		.26	9.70
17			17.2	3	7		79.0	.6			.20	8.55
22			16.9	3	12		79.6	.6	44.040	122 −.26	46.217	.8.92 −.48 8.44
27			16.6	3	17		80.2	.6	.078	1.97	.218	7.39 739
									−.038	−0.75	−.001	~~+1.53~~ +1.05

0.96
1.97
−1.07

Sept-6 1873 −.430 −.41

02 33.3
35.8 02 26.8
38.5 28.0
~~40.3~~ 29.0
43.4
46.1
46.7
51.2
53.8
58.9
1.4
3.9
4150
535.0
2 48.637 2 27.93
2 48.62
2 ~~47.92~~
(+0.70)
~~+0.72~~

−0.46 +04
−.30 −.30
−1.70
−2.46 2
48.62
46.16
2 46.20

+1.99
25
2 30.9
44.9
75.8
27 37.90

+20.71
1.31618
1.32040 n
−21.90
27 37.90
27 16.00

55 32.35

−2.21
0.81299

−4 6.50
− .11
+ .16

− 6.45
55 25.90 25.69
54 18.9
−1 7.0 −.21 7.2
−1 6.9 7.1

−11.50
−1 6.09 − 11.50
−1 17.59 −1 6.17
54 8.31 − .21
+.24 −1 17.88
54 8.55 54 7.81

Gr 2784 = 20 Red.

h m s
19 03 17
19 03 26
+ 76° 53' "
+ 76 52 31
z = − 34° 29' 43"
−0.57

A₋₁ 54.47
45.39
36.31

18.16
13.12
9.08
4.54
.00

Sin δ 9.98852
Cos δ 9.35590 9.35590
.11571n .09302
9.47161n 9.44892

Tang ρ = + 4.271
+4.288

k = +.068

m s
α 1872 = 3 18.260
α 1873 = 3 15.900

Aug 1 1872 −.268
03
13.3
17.5
22.1
26.7
30.8
35.4
40.0
44.7
49.6
280.1
3 31.122
3 31.19
− 7.49
− 1.14
− 4.43
3 18.13

Aug 6 1872 −.248
03
25.3
30.3
34.6
39.2
43.5
48.2
52.6
57.0
4 1.8
332.5
392.5
3 43.611
3 43.68
− 20.22
− 1.06
− 4.15
3 18.25

Oct. 2 −.04
02
50.9 2 42.4
55.5 45.0
59.9 48.3
5.1
9.4
13.7
18.4
23.0
27.5
263.4
83.4
3 9.267 2 45.23
3 9.34
+ 8.20
− .17
+ 0.94
3 18.31

Oct. 14 +.047
02
51.0 03 34.0
55.5 36.3
0.3 40.4
4.8
9.3
13.7
18.5
22.8
27.5
203.4
83.4
3 9.267 3 36.90
3 9.34
+ 6.58
+ 0.20
+ 2.23
3 18.35

Aug 28 1873 −.401
04
23.1 46.8
32.6 47.2
41.0 46.5
3
3 46.833 4 54.90
3 46.90
− 27.21
− 1.72
− 2.20
3 15.77

ch. f.
Sept 1 1873
04 52.4
54.7
57.6

Oct 9 1872
35
3 55.2
40.5

AR

+0.99
35
1 29.3
17.7
47.0
36 23.50
3 55.9
41.8
97.7
38 48.85
+ 24.04
1.38093
0.82985
+ 6.78 6
38 48.85
38 55.63 1
+76° 43' 52.74"
−34 28 47 = 1.59690n
−137
1.59553n
+ 39.40
− .08
+ .27 −.38
+ 39.59
+76 44 32.33 44 31.95
− 18.29
+ 7 45.69
+ 7 27.40
+76 51 59.72
− 18.29
+7 45.53
+ .57
+7 27.81
+76 51 59.76

+1.23
35
4 12.8
56.0
12.88
39 4.40
− 27.63
1.44138n
0.89030n
− 7.77
39 4.40
38 56.63
43 51.72
−132
1.59558n
+ 39.41
− .10
+ .12 −.41
+ 39.43
44 31.15 30.74
− 18.44
+ 7 46.92
+ 7 28.48
51 59.63
− 18.44
+7 46.63
+ .70
+7 28.89
51 59.63

+1.92
25
4 38.6
50.4
89.0
29 44.50
− 68.07
1.83296n
1.30457
+ 20.16
29 44.50
30 4.66
52 43.69
−34 28 47 = 1.59690n
− 251
1.59439n
+ 39.30
− .56
+ .28 −.38
+ 39.02
523 22.71 53 22.33
− 11.57
− 1 6.41
− 1 17.98
52 4.73
− 11.57
− 1 6.70
+ 1.09
− 1 17.18
52 5.15

25
4 37.8
52.1
89.9
29 44.95

h m s m s
19 3 22 3 18
° ' "
+76 49 17 52 15

51 59.69
52 5.10

1873

Sept 3 -.396 Oct 9 1873 -.175 ~~1872 Oct 9~~

03 | 04 26.6 | 03 (9.4) | 03 48.4
27.7 | 13.9 | 50.2
29.5 | 18.2 | 51.5
22.6
50.4 504 | 26.8
54.9 504 | 31.1
59.6 505 | 36.0
3.8 502 | 40.6
8.3 501 | 45.2

3 50.320 4 27.93 3 27.09 3 50.03

3 50.39 | 3 27.16
- 31.11 | - 12.43
- 1.70 | - .75
- 1.67 | + 2.04
3 15.91 | 3 16.02

1-9 1872

55.2
40.5

+1.98 | +2.30
25 | 25 | 35
4 50.9 | 4 50.1 | 3 55.2
3.0 | 55.9 | 40.5
113.9 | 106.0 | 95.7
29 56.95 | 29 53.00 | 38 47.85
+ 37.61
~~11.61~~ | - 22.94
1.57530m | 1.36059m
1.04691 | 0.83220
+11.14 | +6.80
29 56.95 | 29 53.00
30 8.09 | 29 59.80
52 40.26 | 52 48.55

-780 | +713
1.58910m | 1.60403m

+ 38.82 | + 40.18
- 18 | - .07
+ .29 -.39 | + .29 -.39

+ 38.71 18.97 | + 39.96 28.61
53 18.97 ~~19.19~~ | 53 28.51 ~~28.95~~
53 18.58 | 28.56
- 12.76 | - 16.40
-1 7.06 | -1 8.29
-1 19.82 | -1 24.69
51 59.15 | 52 4.26

- 12.76 | - 16.40
-1 7.81 | - 8.41
+ 1.12 | + 1.30
-1 19.45 | -1 23.51
(51 59.13) | 52 5.05

Gr 1259 = 21

h	m	s
19	04	07
7	04	29
	97°	21′
+	82	38	54″

$\mathcal{A}$ = +97° 21′ 6″
g = −54 58 18
−0.82

Red:

	m	s	
A.	1	36.6	32.2
	1	20.5	24.2
	1	4.5	16.1
			8.1
			0.0

Sin δ 9.99642
Cos δ 9.10697n
1157 1n
9.22268n

tang δ = −7.754
−7.746

k = +.174

α 1872 = 4m 0.120s
α 1873 = 4 12.460

ch. f.

Aug 6 1872 −.248

04 04 42.8 06
–
–
–
–
13.4 134
21.3 134
29.8 137
37.7 135
45.9 137
4 13.54 4 42.80
4 13.71
−20.22
+1.92
+4.71
4 0.12

Oct 21 # doubtful

05 28.4
30.0
33.2
10.9
27.2
43.0
59.0
15.4
–
–
165.5
215.5
43.100 5 30.57

Sept 1 1873

Sept 3 1873 −.396

05 –
–
–
–
– very #
–
–
46.1
2.6
06 17.8
05 50.0
52.3
5 51.15
−31.11
+3.07

Sept 6 1873 −.420

03
39.5 03 43.8
46.8
54.0
2.8
10.5
19.0
27.4
34.9
42.5
274
974
4 10.822 3 43.80
4 ~~10.99~~ 11.00
−0.42
+3.25
−1.37
4 12.4546

+0.57
5
2 55.4
43.3
987
7 49.35

0
4 7.7
48.4
1161
3 58.05

0
1 48.9
5.0
113.9
1 56.95

0
1 49.8
4.9
1147
1 57.35

+1.99
0
1 37.9
52.7
906
1 45.30

−29.26
1.46627n
0.68895n
+489
7 49.35
7 54.24
+97° 14 54.11
−54 56 51 = 1.91320n
−916
1.90404n
+ .01
+ 1 20.17
+ .05
+ .22 −.28
+1 20.45
+97 16 14.56 16 14.28
+ 6.32
+4 43.45
+4 49.77
+97 21 4.33

+ 6.32
+4 43.30
+ 46
7 3 50 4 13 +4 50.08
+82° 39′ 00″ 38′ 39″ +97 21 4.36

+27.02
1.43169
0.65437n
−451
1 45.30
1 40.79
21 7.56
−54 57 11 = 1.91330n
−247
1.91083n
.01
+1 21.44
+ .04
+ .11 −.14
+1 21.60
22 29.16 22 29.02
+ 10.80
−1 6.09
−0 55.29
21 33.87

+ − 10.80
−1 6.17
+ 1.63
−0 53.74
21 35.28

21	4,36	38	5564
	35,28	38	2472

1872 1873

ω Aquilae   tang δ = +.20   Oct 7 11^m 49.75^s 8   Aug 28 11^m 53.37 6   Sin δ 9.29466
12 .67 9   Sept. 2 .31 7   Cos δ 9.99140
h m s   x = −.016   17 .58 9   7 .24 7   1.1571 n
19 11 48   22 .49 8   12 .17 7   1.0711 n
19 11 51   cos α = −.09 +0.0"   27 49.41 8   17 53.09 8
4 11° 21'
+ 11 22 .04   α 1872 48.481 δ = 21 58.23"   dα = +2815.   Oct 7 52.74
z = +31° 00' 44"   dδ = +6.19   12 52.66 8
+.51   α 1873 51.296 δ = 22 4.42   17 32.57 9

Ch. f

1872 Oct. 9 −.115 −.11		Oct. 10 −.115 −.01	Oct. 21 +.089 +.10	1873 Aug 28 −.401 −.41		Sept 1 −.443 −.44		Sept 2
11 29.1		11 29.3	11 28.1	12 8.1		11 9.8		
31.3	11 57.2	31.6	30.31	10.1	12 3.4	12 11.9	11 2.0	
33.4		33.7	32.4	12.3	4.6	14.2	12 3.1	
37.7		37.8	36.6	16.6	6.0	18.1	4.1	
39.8		39.9	38.7	18.6		20.3		
41.9		42.0	40.7	20.8		22.3		
44.0		44.1	42.9	22.8		24.4		
46.1		46.2	45.0	25.0		26.6		
50.3		50.4	49.2	29.1		30.7		
52.4		52.6	51.3	31.4		32.8		
54.5		54.7	53.4	33.5		34.8		
460.5		462.3	448.6	228.3		245.9		
11 41.864	11 57.20	11 42.027	11 40.782	12 20.755	12 4.67	12 22.355	12 3.07	

11 41.85	11 42.01	11 40.77	12 20.74	12 22.34	
11 49.712	11 49.69	11 49.51	11 53.37	11 53.32	
−7.87	−7.68	−8.74	+27.37	+29.02	
−7.85	−7.66	−8.72	+27.35	+29.04	
+7.88 +.00	+7.70 +.00	+8.70 +.01	−27.20 −.01	−28.90 −.01	
− .02 −.02	− .00 −.00	−.02 −.02	− .08 −.08	− .09 −.08	
−1.24 +1.57	−1.21 +1.60	−1.03 +1.78	−2.07	−2.02	
+6.62	+6.49	+7.656	−29.356	−31.01	
11 41.85	42.01	40.77	12 20.74	22.34	
11 48.47	48.50	48.42	51.39	51.33	
11 48.47 11 51.28	11 48.50 51.31	11 48.43 51.24	11 51.38	11 51.33	

AR AR

+1.13	+1.92	+1.96	
5	55	55	55
3 11.8	4 12.2	4 13.9	4 4.8
7.2	21.0	26.7	15.0
19.0	33.2	40.6	19.8
8 9.50	59 16.60	59 20.30	59 9.90
−15.34	+16.08	+19.28	
1.18583 n	1.20629	1.28511	
1.27025 n	1.31340 n	1.39222 n	
−1863	−2058	−2468	
8 9.50	59 16.60	59 20.30	
7 50.87	58 56.02	58 55.62	
+11 14 57.48	23 52.33	23 52.72	

+31° 0' 8" = 1.53890   +31° 0' 4" = 1.53890

	−241	−1445
	1.53649	1.52445
− 34.40	−+ 34.39"	−+ 33.45
− .12	− .02	− .03
+ .10	+ .26	+ .26
− 34.32	− 34.15	− 33.22
14 23.16 14 22.84	+11 23 18.18 23 17.84	23 19.50 23 19.16
22 8.3	22 10.8	22 11.0
+7 45.1 −.32 44.8	−1 7.4 −.34 7.7	−1 8.5 −.34 8.8
+.00 −3.91		
−10.10	− 6.40	− 6.60
+7 45.16	−1 6.41	−1 7.81
+7 35.06 − 10.10	−1 12.81 − 6.40	−1 14.41 − 6.60
+11 21 58.22 +7 44.84	22 5.37 −1 6.10	22 5.09 − 8.17
57	.97	.99
+7 34.17	−1 14.07	−1 15.76
+11 21 57.01	22 3.77	22 3.40
22 3.20		

+8

1872

Oct. 7 11 22 8.4
9.99140 12 8.1 -.3
.09302 17 7.9 .2
.08442 22 7.7 .2
27 7.5 .2

1873

Aug 28 20 70.8
Sept. 2 71.1 + .3
7 71.5 .4
12 71.9 .4
17 72.2 .3

Oct. 7 72.5
12 72.3 -.2
17 72.1 .2
71.9 .2
27 71.7 .2

Oct 9 - .18 18 ~~.17~~ .15 3

11 52.7
54.6
56.8
1.0
3.0
5.3
7.3
9.4
13.7
15.7
18.0
23 4.5
54.5
12 5.227

12 5.21
11 5.271
+12.50
+12.52

-12.43 -100
- .04 -.03
-1.41
-13.887
12 5.21
51.33
12 51.34

AR

512 obs.

64 = Polaris