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KG
11 866
v.828

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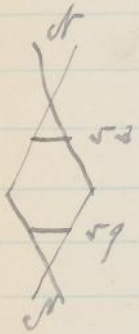
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2

Dec. +53°.53 and 59. (R. 45m. 96)



	+53°.53	+53°.59	9 − 3
3h	1h 21.2m	1h 47.9m	52 58 − 8
	19 23.3m	19 50.5m	
	37 44.5m	38 38.4m	+0 53.9m
	20 35.1m	21 2.0m	
	36 37.9m	22 4.5m	
	42 13.0m	43 6.5m	+0 53.5m
	22 50.3m	23 17.5m	
	23 52.9m	24 19.8m	
	46 43.2m	47 37.3m	+0 54.1m
	25 12.3m	25 39.2m	
	26 14.5m	26 41.7m	
	51 26.8m	52 80.9m	+0 54.1m
	29 43.2m	30 9.0m	
	30 44.1m	31 12.2m	
	60 27.3m	61 21.2m	+0 53.9m
			269.5m
			0 53.9m
			+0 96.95m

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Desig	R.A. (Dm)	Dec. (Dm.)	Mag	Letter
+50° 3572	22h. 2 17.2	+50° 15.0	9.5	
+50° 3575	22h. 2 30.3	+50° 54.8	8.5	A
+51° 574	2h. 16 44.4	+51° 2.9	8.4	B
+50° 553	2h. 18 3.8	+50° 47.6	9.0	
+50° 3171	20h. 38 22.7	+50° 30.3	7.9	B
+50° 3174	20h. 38 47.7	+50° 37.3	8.0	B
+49° 4141	23h. 24 26.7	+49° 59.1	8.6	A
+53° 895	5h. 11 35.1	+53° 50.6	9.0	A
+53° 896	5h. 11 39.0	+53° 56.5	9.0	A
+53° 942 ×	5h. 84 37.6	+53° 43.7	9.4	B
+51° 999	4h. 42 54.3	+51° 51.5	8.2	B
+50° 1571	8h. 32 40.1	+50° 31.2	8.4	A
+51° 1863	5h. 11 14.2	+51° 4.5	8.0	A
+50° 1165	5h. 13 22.5	+50° 57.6	9.1	
+52° 946	5¼h. 10 29.0	+52° 0.6	9.1	A
+52° 955	5¼h. 12 58.2	+52° 5.1	7.8	A.
+51° 1111	5h. 35 33.0	+51° 26.2	6.4	G.
+50° 1763	10h. 8 5 51.2	+50° 12.1	7.8	A
+50° 1826	11h. 21 22.0	+50° 1.6	9.0	A.
+55° 1345	9h. 83 4.3	+55° 1.8	6.7	A.
+49° 1698	7h. 48 10.0	+49° 53.7	8.0	A.
+54° 1238	8h. 20 42.3	+54° 2.5	8.5	A.
+54° 1514	12h. 13 6.9	+54° 23.8	8.5	A

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III

Design.	R. A. (Dnv.)	Dec. (Dnv.)	Mag.	Letter.
+54° 1832	16h. ~~46 41 33.1~~ 46.1	+58° ~~30.0~~ 28.0	~~9.5~~ 8.8	B
+50° 2420 · v	17h. 28 4.2	+50° 48.4	7.5	A
+50° 2426 · v	17h. 29 14.3	+50° 55.8	9.1	A
+53° 2041 · v	18h. 7 38.2	+53° 15.3	8.8	
+53° 2089 · v	18h. 24 38.4	+53° 51.0	7.0	A.
+55° 2081 · v	18h. 26 26.2	+55° 5.3	9.1	A.
+54° 1998 · v	18h. 25 9.7	+54° 57.2	9.2	A.
+53° 2219 · v	19h. ~~18 37.2~~ 14 58.0	+53° ~~36.6~~ 12.3	8.1	A.
+53° 2224 · v	19h. 15 28.4	+53° 3.0	8.7	A.
+54° 2193 · v	19h. 35 27.0	+54° 37.8	5.8	A.
+54 2202 · v	19h. 37 38.6	+54° 47.9	9.1	B
53° 2481 · v	20h. 40 44.6	+53° 58.7	8.6	A.
+54° 2405 · v	20h. 39 4.2	+54° 2.0	8.9	A
+53° 2737 · v	21h. 49 57.8	+53° 1.8	8.4	A.
+50° 2415 · v	17h. 25 56.4	+50° 23.6	9.0	A.
+51° 1774 · v	12h. 32 58.5	+51° 47.3	9.2	A
+54° 1550 · v	12h. 43 1.2	+54° 46.5	9.0	A
+50° 1962 · v	12h. 49 56.0	+50° 7.3	9.4	A
+50° 1969 · v	12h. 52 6.3	+50 3.2	9.3	B
+53° 1657 · v	13h. 42 37.6	+53 3.7	8.8	A
+53° 1699 · v	14h. 10 11.8	+53 12.3	7.0	L.
+				

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~~1826~~

2056 + 1826

~~diag + a = x~~

~~diag - x = a~~

~~diag x~~

~~diag + a = x~~

~~x = diag~~

x = a

~~a =~~

diag + x

" + a

" + a - x = a -

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Desig.	Δ α	Δ δ	
+53° 79 - 53	+0^s 26.9^s	−5′ 33.3″	
+50° 155 - 159	−0 34.77	−6 30.9	(1
+50° 155 - 15K	+0 1.24	+3 36.6	(2
+50° 155 - 160	−0 39.3K	−9 K2.K	(3
+50° 155 - 15K	+0 1.60	+3 34.5	(2
+50° 155 - 159	−0 34.60	−6 24.9	(1
+50° 155 - 160	−0 39.26	−9 39.1	(3
+5K° 295 - 297	−0 15.79	−5 54.2	
+53° 3K5 - 351	−0 50.69	+3 3K.2	(1
+53° 3K5 - 355	−1 K9.19	−1 27.4	(2
3K5 - 351	−0 50.7K	+3 3K.7	(1
3K5 - 351	−1 K9.21	−1 24.7	(2
+55° 375 - 3KK	−0 13.0K	+4 K3.6	
+52° 546 - 542	+0 K7.93	−10 34.7	(1
546 - 544	−0 17.37	−2 0.5	(2
546 - 541	+1 6.46	−6 K4.1	(3
546 - 542	+0 K4.K3	−10 K3.5	(1
546 - 544	−0 17.21	−2 1.1	(2
+K9° 620 - 625	−1 17.3K	+3 25.1	
620 - 629	−1 36.14	+0 4.5	

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Desig.	R. A. (D. M.).	Dec. (D m s)	Mag.	Letter
+53° 53	0h. 15m 0.0	+53° 50.2	7.1	G
+53° 2548	21h. 1m 37.9	+53° 52.1	8.5	A
+53° 2549	21h. 1m 40.0	+53° 47.0	8.6	A
+55° 704	2h. 36m 15.4	+55° 15.9	7.5	B
+55° 706	2h 37m 48.1	+55° 9.0	7.5	A
+52° 643	2h 44m 33.4	+52° 55.5	8.8	
+52° 639	2h 42 15.2	+52° 47.6	8.2	A
+50° 3502	21h. 52 13.5	+50° 9.0	8.7	A.
+50° 3503	21h. 52 26.5	+50° 9.0	8.6	A.
+54° 297	1h. 19 48.1	+54° 31.0	8.0	L.
+53° 351	1h. 29 17.6	+53° 18.5	9.0	
+53° 355	1h. 30 15.2	+53° 23.9	8.0	B.
+54° 344	1h. 30 37.3	+54° 53.7	8.3	R.
+52° 541	2h. 3 53.0	+52° 22.2	6.7	A.
+52° 542	2h. 4 11.3	+52° 26.4	9.0	A.
+52° 548	2h. 5 15.7	+52° 17.4	9.4	A.
+54° 2822	22h. 31 35.8	+54° 22.8	9.1	A.
+54° 2825	22h. 32 29.5	+54° 14.4	9.4	B.
+49° 625	2h. 9m 22.5	+49° 50.3	9.2	A
+49° 629	2h. 9m 41.6	+49° 50.8	8.1	A.
+52° 564	2h. 9 30.0	+52° 58.0	8.7	A.
+53° 505	2h. 10 38.0	+53° 2.1	9.2	A.

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Descrip.	Δ K	Δ λ	
+52°569−564	+1″ 52.″71	+1′ 5.″2	(1 ✓
569−507	+0 46.23	−3 7.3	(2 ✓
569−564	+1 52.73	+1 6.4	(1 ✓
569−507	+0 45.99	−3 10.9	(2 ✓
+51°520−574	+1 31.46	+1 22.2	✓
+55°701−704	−1 55.35	−2 31.2	(1 ✓
701−704	−1 55.24	−2 32.4	(1 ✓
701−706	−3 25.65	−2 23.3	(2 ✓
+52°642−639	+2 5.91	−0 29.7	(1 ✓
642−643	−0 11.65	−9 27.2	(2 ✓
~~+51°652−649~~	~~+1 57.77~~		
~~652−657~~	~~+0 2.52~~		

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Δ 53	Δ 59	53+59
1m 2.1 ✓	1m 2.6 ✓	2m 4.7
1m 2.8 ✓	1m 2.5 ✓	2m 5.3
1m 2.6 ✓	1m 2.3 ✓	2m 4.9
1m 2.2 ✓	1m 2.5 ✓	2m 4.7
1m 0.9 ✓ 10.6	1m 3.2 ✓ 13.1	2m 4.1
1m 2.12 ✓	1m 2.62 ✓	2m ~~4.74~~
0m ~~31.07~~		2 4.74 ✓

+53° 59
Dec. = 53° 50.2 ✓

Dec = 53° KK2 ✓

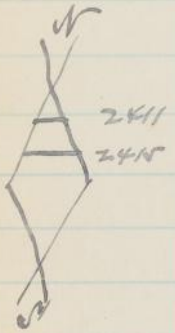
+53° 53

Log. 124.74 ✓ 2.09601 ✓
" 7.5 ✓ = 0.87506 ✓
" cos δ ✓ = 9.77139 ✓
✓✓2.7" ✓ = 2.74246 ✓
δδ 6.0 ✓
333.3" = -5' 33.3" ✓

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Dec. +50° 2411, 2415 (Ref. 165)



+50° 2411		+50° 2415	
14h	53m 32.6s	14h 54m 5.0s	
54	44.0	54	20.0
108	16.6	109	25.0
55	47.2	55	18.2
56	58.7	57	34.1
112	45.9	113	53.3
57	53.5	58	25.3
59	5.0	59	40.2
116	58.5	118	5.5
1	0.0	1	32.5
2	11.7	2	47.6
123	11.7	124	20.1
3	28.0	4	9.8
4	38.5	5	45.5
128	7.5	129	16.3

2413′ − 15

− 1m 8.4′

− 1m 7.4′

− 1m 7.0′

− 1m 8.4′

− 1m 8.8′
− 40.0
− 1.0 8.00′
− .0m 32.00′

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A 2411 A 2415 2415-2411

1m 11.4' 1m 15.0'

1m 11.5' 1m 14.9'
~~0m +4.9~~

1m 11.5' 1m 14.9'

1m 11.7' 1m 15.1'

1m 11.5' 1m 14.7'
57.6' 74.6'

1m 11.52. 1m 14.92. 0m 3.40'

Dec. of.

+50° 24 15 =
+50° 23.6

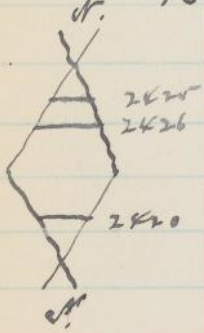
Log. 2.60 = 0.93450'
" cos δ = 9.80449'
" 7.5 = 0.87516'

+50 24 11
= +50° 23.5

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+50° 2K20. 2K25. 2K26. (R 47. 114)



	+50° 2K20	2K25	2K26	$2^{42}5^{5}-5^{0}$	$2^{42}5^{5}-5^{6}$
	13h 53m 42.5s	54m 44.2s	54m 39.0s		
	54 3.0	55 4.5	55 2.35		
	107 45.5	109 52.7	110 2.5	2m 7.2	−0m 9.8
	55 58.4	57 1.7	56 56.1		
	56 20.3	57 24.1	57 39.7		
	112 18.7	114 25.8	114 35.8	2m 7.1	−0m 10.0
	58 12.9	59 16.4	59 10.6		
	58 34.7	59 39.1	59 54.5		
	116 47.6	118 55.5	119 5.1	2m 7.9	−0m 9.6
	0 29.4	1 35.5	1 27.0		
	0 50.8	1 54.6	2 10.8		
	121 20.0	123 30.1	123 37.3	2m ~~7.6~~ 10.1	−0m 7.2
	2 40.6	3 43.8	3 38.6		
	3 2.5	4 6.9	4 22.4		
	125 43.1	127 50.7	128 1.0	2m 7.6	−0m 10.3

39.9 ~~37.4~~
~~2m 7.76~~
~~3.74~~

46.9
−0m 9.38
−0m 4.69

mean = 2m 7.98
half " = 1m 3.99

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A 2420	Δ 2425	A 2426	26+25	26−25
0m 20.5'	0m 24.3'	0m 44.5'		
0m 21.9'	0m 22.4'	0m 43.6'		
0m 21.8'	0m 22.7'	0m 43.9'		
0m 21.2'	0m 19.1'	0m 43.3'		
0m 21.9'	0m 23.1'	0m 43.8'		
107.3'	111.6'	219.1'		
0m 21.46'	0m 22.32'	0m 43.82'	0m 43.78'	0m 21.50'

Dec. of

+50°2420 =
+50° 48.4

+50°2426 =
+50° 55.8

+50°2425 =
+50° 58.1

Log. 43.78 = 1.64128'
" 7.5 = .87506'
" cos δ = 9.79998°

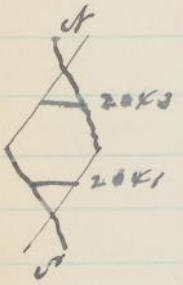
21.50 = 1.33244'
7.5 = .87506'
Cos δ = 9.79994°

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8

2Kl. + 53° 20K1. 20K3. (R 47. 121)



20K1.		20K3.	
13h 42m	16.4s	49m	38.2s
49	7.7	50	20.1
97	26.1	99	54.9
50	50.0	52	6.2
51	39.1	52	51.6
102	29.1	104	57.8
53	18.0	54	34.5
54	7.0	55	19.5
107	25.0	109	54.0
55	45.0	57	1.4
56	34.2	57	46.5
112	19.2	114	47.9
58	12.8	59	28.6
59	2.0	60	14.3
117	14.8	119	42.9

$20\overset{3}{4}X - 20\overset{1}{4}8$

2	28.8
2	28.7
2	29.0
2	28.7
2	28.1
143.3	
25	28.66
1.0	14.33

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1 2041	1 2043	2041+2043
0m 49.3'	0m 45.3'	
0m 49.1'	0m 45.4'	
0m 49.0'	0m 45.0'	
0m 49.2'	0m 45.1'	
0m 49.2'	0m 45.7'	
245.8'	226.5'	
0m 49.16'	0m 45.30'	1m 34.46'

Dec. of

+53°2041 =
+53° 15.'8

+53°2043 =
+53°27.6

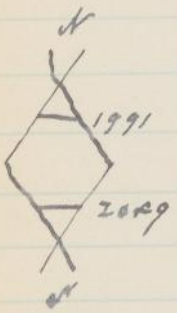
Log 94.46 = 1.97525'
" 7.5 = .87056'
" cos δ = 9.77585'

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10

+53° 2049 and +54° 1991. (Reg. 12K)



1991	2049.	1991 − 2049
14h 12m 24.1s	13h 42m 5s	
12 54.6	14 60	− 2m 27.8s
25 26.7,	27 54.5,	
14 37.0	15 57.5	
15 6.5	16 15.1	− 2m 29.1s
29 43.5,	32 12.6,	
16 51.9	18 12.5	
17 22.5	18 30.1	− 2m 28.2s
34 14.4,	36 42.6,	
19 1.7	20 22.5	
19 822	20 40.0	− 2m 28.6s
38 33.9,	41 02.5,	
21 13.2	22 33.8	
21 43.5	22 51.3	− 2m 28.4s
42 56.7,	45 25.1,	142.1
		− 2m 28.42s
		− 2m 14.21

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Δ 1991 Δ 2089 1991+2089

0m 30.5' 0m 17.5"

0m 29.5' 0m 17.6"

0m 30.6' 0m 17.6"

0m 30.5' 0m 17.5"

0m 30.8' 0m 17.5"
151.4" 87.7"

0m 30.218' 0m 17.54' 0m 47.82'

Dec. of

+53°2089=

+53° 51.0

Log 47.82 = 1.67961

" 7.5 = .87506

cos. δ = 9.76974

+54°1991=

+54° 3.1

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+55 2081, 2083 and +54° 1998 (R. 47 130)

	1998		2081		2083		−1998+2083	2083−81
13h.	48m	15.0s r	49	48.5 r	49	53.1 r		
	49	17.2 r	50	14.5 r	50	53.0 r		
	97	32.2	100	3.0	100	46.1	3m 13.9	0m 43.1
	51m	24.8	52	57.5	53	2.0		
	52	26.0	53	24.1	54	2.5		
	103	50.8	106	21.6	107	4.5	3m 13.7	0m 42.9
	54	36.5	56	8.7	56	13.5		
	55	38.0	56	35.4	57	14.0		
	110	14.5	112	44.1	113	27.5	3m 13.0	0m 43.4
	57	55.1	59	27.1	59	32.0		
	58	56.1	59	54.3	60	32.9		
	116	51.2	119	21.4	119 120	4.9	3m 13.7	0m 43.5
14h.	8	10.0	9	41.1	9	46.0		
	9	10.5	10	8.5	10	48.0		
	137	20.5	139	50.6	140	34.0	3m 13.5	0m 43.4
	11	24.5	12	55.7	13	0.8		
	12	24.6	13	24.3	14	2.1		
	123	49.1	126	20.0	147	2.9	3m 13.8	0m 42.0
							3m 81.6	258.3
							3m 13.6	43.05
								0m 51.66
								25.83
								0m 21.52
							1m 36.8	

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1888phae.proj.1832.

A 1998 A 2081 A 2083 1998+2083 2083−2081

1m 2.2' 0m 26.0' 0m 59.9'

1m 1.2' 0m 26.6' 1m 0.5'

1m 1.5' 0m 26.7' 1m 0.5'

1m 1.0' 0m 27.2' 1m 0.9'

1m 0.5' 0m 28.4' 1m 2.0'

Dec. of

1m 0.1'	0m 28.6'	1m 1.8'	
6.5.	163.5.	5.1'	
1m 1.08	0m 27.25'	1m .85'	2m 1.93 / 2 1.28 / m 0 33.60'

+55°2081 = +55° 5.3

+54°1998 = +54° 57.2

+55°2083 = +55° 3.2

Logs 121.93 = 2,08611'

" 7.5 = .87506'

" cos δ = 9.75852'

33.60 = 1.52634'

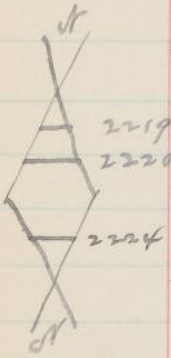
7.5 = 0.87506'

cos. δ = 9.75785

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1888phae.proj.1832.

+53° 2219, 2220 and 2224 (R.47 141)



	2220	2219	2224	20 19	20 24
15h.	3m 52.7s ✓	4m 12.3s ✓	4 30.4 ✓		
	5 11.2 ✓	4 39.4 ✓	5 25.5 ✓		
	9 3.9	8 51.7	9 55.9	0m 12.2'	-0m 52.0'
	5 58.0	6 17.1	6 36.6		
	7 16.8	6 45.5	7 31.0		
	13 14.8'	13 2.6	14 7.6	0m 12.2'	-0m 52.8'
	7 57.4	8 16.5	8 35.0		
	9 16.3	8 44.5	9 30.5		
	17 13.7	17 1.0	18 5.5	0m 12.7'	-0m 51.8'
	10 6.5	10 25.6	10 44.4		
	11 25.5	10 53.5	11 39.6		
	21 32.0	21 19.1	22 24.0	0m 12.9'	-0m 52.0'
	12 7.8	12 27.1	12 46.1		
	13 27.3	12 55.1	13 40.9		
	25 35.1	25 22.2	26 27.0	0m 12.9'	-0m 51.9'
				0 62.9'	260.5
				0m 12.58'	-0m 52.10'
				0m 6.29'	-0m 26.05'

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~~A 2220~~ ~~A 2219~~ ~~A 2224~~

A 2220 A 2219 A 2224 2220-2219 2220+2224

~~t^m 18.5~~

$1^m\ 18.5'$ $0^m\ 27.1'$ $0^m\ 55.1'$

$1^m\ 18.8'$ $0^m\ 28.4'$ $0^m\ 54.4'$

$1^m\ 18.9'$ $0^m\ 28.0'$ $0^m\ 55.5'$

$1^m\ 19.0'$ $0^m\ 27.9'$ $0^m\ 55.2'$

$\frac{1^m\ 19.5'}{94.7'}$ $\frac{0^m\ 28.0'}{139.4'}$ $\frac{0^m\ 54.8'}{275.0'}$

$1^m\ 18.94'$ $0^m\ 27.88'$ $0^m\ 55.00'$ $.0^m\ 51.06'$ $2^m\ 13.94'$

Dec. of.

+53° 2219 =
+53° 12.8

+53° 2224 =
+53° 3.0

+53° 2220
= +53° 8.1

(2)

Log 133.94 = 2.12691'
" 7.5 = .87506'
" cos. δ = 9.77775'

(1)

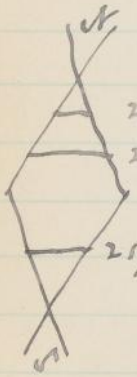
51.06 = 1.70808'
7.5 = .87506'
cos. δ = 9.77852'

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1888phae.proj.1832.

+54° 2193, 2202 and 2205 (R. 47 144)

	2193	2202	2205	−2193+2205	2205 − 2202
15h46m	58 84.0	60 31.9	61 0.3		
	58 54.0	61 22.9	62 4.2	5m 36.5'	1m 9.7'
	117 28.0'	121 54.8'	123 4.5'		
16h	3 1.2	4 58.0	5 26.4		
	3 19.8	5 48.5	6 30.6		
	126 21.0'	130 46.5'	131 57.0'	5m 36.0'	1m 10.5'
	8 9.8	10 5.2	10 34.1		
	8 26.6	10 57.1	11 38.8		
	136 36.4'	141 2.3'	142 12.9'	5m 36.5'	1m 10.6'
	14 88.9	16 35.0	17 3.5		
	14 56.9	17 26.6	18 7.7		
	149 35.8'	154 1.6'	155 11.2'	5m 35.4'	1m 9.6'
	18 37.5	20 36.2	21 4.5		
	18 57.5	21 27.5	22 9.0		
	157 37.0'	162 3.7'	163 13.5'	5m 36.5'	1m 9.8'
				180.9'	50.2'
				5.0 36.18'	10.04'
				2m 48.09'	0m 3.502'



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1888phae.proj.1832.

Δ 2193	Δ 2202	Δ 2205	2205−2202	2205+2193
20.0′	51.0′	1m 3.1′		
18.6′	50.5′	1m 4.2′		
16.8′	51.9′	1m 4.7′		
18.0′	51.6′	1m 4.2′		
18.0′	51.3′	1m 4.5′		
91.4′	256.3′	21.5′		
0m 18.28′	0m 51.26′	1m 4.30′	0m 13.04′	1m 22.58′

Dec. of
+54° 2193 =
+54° 37.8

+54° 2202 =
+54° 47.9

+54° 2205
= +54° 46.9

Log 13.04 = 1.11528′
" 7.5 = 0.87506
" cos. δ = 9.76086

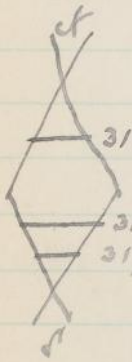
82.58 = 1.91687′
7.5 = 0.87506
cos. δ = 9.76175

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1888phae.proj.1832.

+50° 3171, 3174 and 3176 (R. 45 181)

	3171		3174		3176		3171-6		3174-6	
1h	46	57.2	47	13.2	47	21.0				
	47	36.8	48	10.1	48	18.3				
	94	34.0'	95	23.3'	95	39.3'	-1	5.3'	0	16.0'
	48	52.6	49	9.2	49	16.6				
	49	33.0	50	5.9	50	14.4				
	98	25.6'	99	15.1'	99	31.0'	-1	5.4'	0	15.9'
	~~50~~	39.0	50	55.2	51	2.5				
	51	19.0	51	~~49.0~~ 51.7	52	0.6				
	101	58.0'	102	46.9'	103	3.1'	-1	5.1'	0	16.2'
	52	29.3	52	38.4	52	46.0				
	53	2.5	53	~~2.6~~ 35.4	53	44.0				
	105	24.8'	106	13.8'	106	30.0'	-1	5.2'	0	16.2'
	54	~~21.~~ 4.3	54	37.6	54	45.0				
	55	1.7	55	34.4	55	43.5				
	109	23.0'	110	12.0'	110	28.5'	-1	5.5'	0	16.5'
								26.5'		20.4'
							-1	5.30'	0	16.16'
							-0	32.65'	0	5.04'



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1888phae.proj.1832.

Δ 3171	Δ 3174	Δ 3176.	3176−3171	3176+3174
39.6'	56.9'	57.3'		
40.4'	56.7'	57.4'		
40.0'	56.5'	58.1'		
40.2'	57.0'	58.0'		
40.4'	56.8'	58.5'		
0.6'	283.9'	249.7'		
40.12'	56.78'	57.94'	0m 17.82'	1m 54.72'

Dec. of 3171 = +50° 30.8'

+50° 3174 = +50° 37.3

+50° 3176 = +50° 31.6

Log. 17.82 = 1.25066 91

" 7.5 = .87506

" cos. δ = 9.80336

114.72 = 2.05964

7.5 = .87506

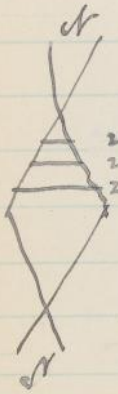
cos. δ = 9.80284

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1888phae.proj.1832.

+54° 2406, 2405 and +53° 2481 (R. 47. 150)

	2405	2406	2481	2406 − 06 5	2481 − 06 81
14h.	30 17.0 ✓	30 26.9 ✓	31 36.5 ✓		
	30 53.0 ✓	30 57.5 ✓	32 57.8 ✓		
	61 10.0'	61 26.4'	64 34.3'	0m 16.4'	−3m 7.9'
	33 30.1	33 40.5	34 49.9		
	34 6.1	34 12.6	36 10.9		
	67 36.2'	67 53.1'	71 0.8'	0m 16.9'	−3m 7.7'
	40 8.3	40 19.3	41 28.0		
	40 45.0	40 51.4	42 50.1		
	80 53.3'	81 10.7'	84 18.1	0m 17.4'	−3m 7.4'
	43 18.2	43 28.3	44 38.3		
	43 55.8	44 2.0	46 0.5		
	87 14.0'	87 30.3'	90 38.8'	0m 16.3'	−3m 8.5'
	46 51.3	47 1.8	48 10.8		
	47 28.5	47 35.0	49 33.5		
	94 19.8'	94 36.8'	97 44.3'	0m 17.0'	−3m 8.5'
				84.0'	39.0'
				0 16.8'	3.0 87.80'
				0m 8.40'	1m 33.90



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1888phae.proj.1832.

Δ 2405	Δ 2406	Δ 2481	2405 - 2406	2481 - 2406
0ᵐ 36.0′	0ᵐ 32.6′	1ᵐ 21.3′		
0ᵐ 36.0′	0ᵐ 32.1′	1ᵐ 21.0′		
0ᵐ 36.7′	0ᵐ 32.1′	1ᵐ 22.1′		
0ᵐ 37.6′	0ᵐ 33.7″	1ᵐ 22.2″		
0ᵐ 37.2′ / 183.5	0ᵐ 33.2′ / 163.7	1ᵐ 22.7′ / 109.3		
0ᵐ 36.70″	0ᵐ 32.74′	1ᵐ 21.86″	.0ᵐ 3.96′	0ᵐ 49.12

Dec. of,

+54°2405 = +54° 2.0

+53°2481 = +58° 58.7

+54°2406 = +54° 2.3

Log. 3.96 = 0.59770′

" 7.5 = 0.87506″

cos. δ = 9.76884′

Log 48.12 = 1.68126′

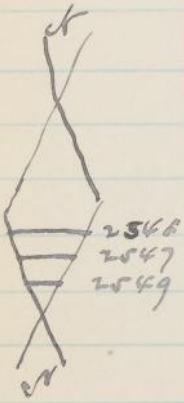
7.5 = 0.87506″

cos. δ = 9.76913′

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1888phae.proj.1832.

+53° 2527, 2548 and 2549 (R. 45 105)



	2548	2547	2549	2547 − 48	2547 − 49
0	31 23.1	31 36.8	32 1.0		
	32 50.9	32 35.1	32 20.0	~~0m 2.1~~	~~0m 9.1~~
	64 14.0	64 11.9	64 21.0	−0m 2.1	−0m 9.1
	33 29.4	33 43.5	34 1.2		
	34 57.3	34 42.0	34 27.0		
	68 26.7	68 25.5	68 34.2	−0m 1.2	−0m 8.7
	36 2.4	36 16.3	36 40.2		
	37 31.0	37 14.8	37 0.1		
	73 33.4	73 31.1	73 40.3	−0m 2.3	0m 9.2
	38 11.4	38 25.5	38 49.5		
	39 38.9	39 23.8	39 8.9		
	77 51.3	77 49.3	77 58.4	−0m 2.0	0m 9.1
	40 20.5	40 ~~20.5~~ 34.6	40 58.1		
	41 48.6	41 33.1	41 17.9		
	82 9.1	82 7.7	82 16.0	−0m 1.4	0m 8.8
				9.0	44.4
				0m 1.80	0m 8.88
				−0m 0.90	−0m 4.44

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1888phae.proj.1832

α 2548	α 2547	α 2549	2548 − 2547	2547 − 2549
1ᵐ 27.8 ✓	58.3 ✓	19.0 ✓		
1ᵐ 27.9 ✓	58.5 ✓	19.8 ✓		
1ᵐ 28.6 ✓	58.5 ✓	19.9 ✓		
1ᵐ 28.5 ✓	58.3 ✓	19.4 ✓		
1ᵐ 28.1 ✓ / 140.9	58.5 ✓ / 292.1 ✓	19.8 ✓ / 97.9		
1ᵐ 28.18 ✓	0ᵐ 58.42 ✓	0ᵐ 19.58 ✓	0ᵐ 29.76 ✓	0ᵐ 38.84 ✓

+53° 2548
Dec = +53° 52.1

+53° 2549
Dec = +53° 47.0

+53° 2547
= +53° 49.7

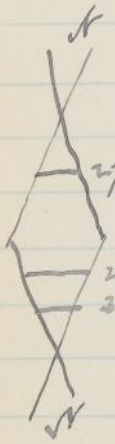
Log. 29.76 ✓ = 1.47363′
" 7.5 = 0.87506
" cos. δ = 9.77080′

38.84 ✓ = 1.58928′
7.5 = 0.87506
cos. δ = 9.77123′

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1888phae.proj.1832.

+52° 3060, +53° 2730, 2737 (R. 47, 158)



	2730	2737	3060	2737 − 2730	2737 − 3060
16h.	0 12.5	1 19.4	1 38.5		
	0 58.4	2 32.2	2 17.5		
	1 10.9	3 51.6	3 56.0	2m 40.7	0m 4.4
	3 2.2	4 9.0	4 28.2		
	3 48.3	5 21.7	5 6.5		
	6 50.5	9 30.7	9 34.7	2m 40.2	0m 4.0
	5 51.0	6 57.6	7 16.5		
	6 36.8	8 10.1	7 55.6		
	12 27.8	15 7.7	15 12.1	2m 39.9	0m 4.4
	8 52.2	9 59.5	10 18.4		
	9 38.7	11 11.5	10 57.1		
	18 30.9	21 11.0	21 15.5	2m 40.1	0m 4.5
	11. 45.0	12 52.5	13 11.5		
	12. 81.5	14 4.6	13 49.5		
	24 16.5	26 57.1	27 1.0	2m 40.6 / 201.5	0m 4.9 / 22.2
				2m 40.30	0m 4.44
				~~0m 50.15~~	0m 2.22
				1m 20.15	

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1888phae.proj.1832

Δ 2730	Δ 2737	Δ 3060	2730+3060	2737−3060
~~45.9~~				
45.9	1m 12.8	49.0		
46.1	1m 12.7	48.3		
45.8	1m 12.5	39.1		
46.5	1m 12.0	38.7		

$$\frac{46.5}{230.8} \quad \frac{1^m\,12.1}{62.1} \quad \frac{38.0}{213.1}$$

$0^m\,46.16'$ $1^m\,12.42'$ $0^m\,42.62'$ $1^m\,28.78'$ $0^m\,29.80'$

Dec. of.

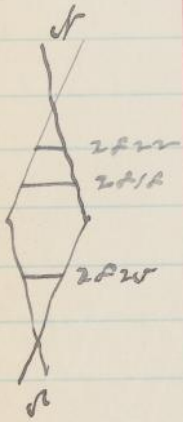
+53°2737 =	log 88.78 = 1.94832	29.80 = 1.47422
+58° 1.8	" 7.5 = 0.87506	7.5 = 0.87506
+52°3060 =	" cos. δ = 9.77893	cos. δ = 9.77940
+52° 59.0		
+53°2730 =		
+53° 7.3		

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1888phae.proj.1832.

+54° 2818, 2822, and 2825 (R. 45, 153)

	2818	2822	2825	2822 − 18	2825 − 18
2h.	57 54.6	59 11.7	59 59.0		
	58 50.6	59 50.5	60 57.9		
	116 45.2	119 2.2	120 51.9	−2 17.0	−4m 6.7
3h.	2 13.4	3 30.7	4 16.9		
	3 8.8	4 8.9	5 11.4		
	5 22.2	7 39.6	9 28.3	−2m 17.4	−4m 6.1
	6 7.0	7 24.0	8 10.0		
	7 1.6	8 2.0	9 5.1		
	13 8.6	15 26.0	17 15.1	−2m 17.4	−4m 6.5
	10 3.6	11 20.9	12 6.4		
	10 58.0	11 58.3	13 1.9		
	21 1.6	23 19.2	25 8.3	−2m 17.6	−4m 6.7
	14 4.6	15 22.1	16 7.3		
	14 59.0	15 59.0	17 3.0		
	29 3.6	31 21.1	33 10.3	−2m 17.5	−4m 6.7
				86.9	32.7
				−2m 17.38s	−4.0 6.54s
				−1m 8.69s	−2m 3.27s



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1888phae.proj.1832.

Δ 2818	Δ 2822	Δ 2825	2818−2822	2818+2825
56.0′	38.8′	53.9′		
55.4′	38.2′	54.5′		
54.6′	38.0′	55.1′		
54.4′	37.4′	55.5′		
54.4′	36.9′	55.7′		
274.8′	~~187.3~~ 183.3′	274.7′		
54.96′	37.~~86~~66′	~~54.94~~ 54.94′	$^m_0$ 17.10′	$^m_1$ 49.90′

Dec. of

+54° 28 22 =

+54° 22.8′

+54° 28 25 =

+54° 14.4′

+54° 28 18

= +54° 21.3′

log. 17.10 = 1.23300′

" 7.5 = 0.87506

" cos. δ = 9.76537′

log. 109.90 = 2.04100′

" 7.5 = 0.87506

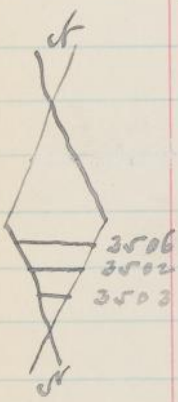
" cos. δ = 9.76611′

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1888phae.proj.1832.

+50° 3502, 3503, 3506 (R. 45 136)

3502	3506	3503	3506 − 3502	3503 − 3506
43 8.4	43 16.2	43 25.3		
43 43.0	44 25.9	43 56.6		
86 51.4	87 42.1	87 21.9	0m 50.7'	0m 20.2'
45 42.5	45 50.7	45 59.3		
46 17.0	47 0.0	46 30.8		
91 59.5	92 50.7	92 30.1	0m 51.2'	0m 20.6'
47 ~~53.9~~ 19.2	47 27.4	47 36.5		
47 ~~19.2~~ 53.9	48 37.5	48 7.9		
95 13.1	96 4.9	95 44.4	0m 51.8'	0m 20.5'
49 32.1	49 40.1	49 48.4		
50 7.1	50 50.2	50 21.0		
99 39.2	100 30.3	100 10.4	0m 51.1'	0m 19.9'
51 16.6	51 24.6	51 33.5		
51 51.2	52 34.5	52 5.5		
103 7.8	103 59.1	103 39.0	0m 51.3'	0m 20.1'
			256.1'	101.3'
			0m 51.22'	0m 20.26'
			0 25.61	0m 10.13



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1888phae.proj.1832

$\Delta 3502$	$\Delta 3506$	$\Delta 3503$	$3506-3502$	$3506-3503$
32.6′	1m 9.7′	31.3′		
34.5′	1m 9.3′	31.5′		
34.7′	1m 10.1′	31.4′		
35.0′	1m 10.1′	31.6′		
34.6′	1m 9.9′	32.0′		
173.4	49.1′	157.8′		
0m 34.68′	1m 9.82′	31.56′	0m 35.14′	0m 38.26′

Dec. of
+50° 3502 =
+50° 9′.0

+50° 3503 =
+50° 9′.0

+50° 3506
= +50° 11′.7

Log. 35.14 = 1.54580′
" 7.5 = 0.87506′
" cos. δ = 9.80650′

Log 38.26 = 1.58274′
" 7.5 = 0.87506′
" cos. δ = 9.80650′

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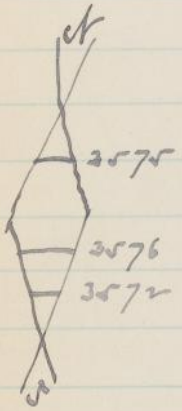
1888phae.proj.1832.

+50° 3572, 3575, 3576 (R. 45 160)

	3576	3572	3575
2h	9 38.5	10 1.0	10 10.2
	10 59.7	10 22.0	10 28.5
	20 39.2	20 23.0	20 38.7

3572 − 76 (6, 2) 3575 − 76 (6, 5)

0m 16.2 +0m 0.5



12 48.4	13 9.1	13 19.1
14 9.0	13 30.9	13 37.5 30.9
26 57.4	26 40.0	26 56.6

0m 17.4 +0m 0.8

14 55.2	15 16.4	15 26.8
16 16.1	15 38.5	15 45.0
31 11.3	30 54.9	31 11.8

0m 17.4 (6) −0m 0.5

17 2.7	17 23.9	17 34.0
18 23.2	17 45.6	17 52.1
35 25.9	35 9.5	35 26.1

0m 16.4 +0m 0.2

18 45.1	19 6.4	19 16.7
20 6.8	19 28.9	19 34.5
38 51.9	38 35.3	38 51.2

0m 16.6 +0m 0.7

8340 2.7

0m 16.6 (6) 0m .54

0m 8.30 0m 0.27

1.3
+.7
+0m 0.26
+0m 0.34

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$\lambda 3576$	$\lambda 3572$	$\lambda 3575$	3576 − 3572	3576 + 3575
~~20.2~~				
1m 20.2	21.0	18.3		
1m 20.6	21.8	18.4		
1m 20.8	22.1	18.2		
1m 20.5	21.7	18.1		
1m 21.7 / 10 43.9	22.5 / 109.1	17.8 / 90.8		
1m 20.76	21.82	18.16	0m 58.96	1m 38.94

+50° 35 72
Dec. = 50° 15.0

+50° 35 75
λ = +50° 17.8

+50° 3576
= +50° 47.7

Log. 58.96 = 1.77056
" 7.5 = 0.47506
" cos δ = 9.80540
242.2 = 2.45102

24' 42.2
+2.4 +47.5
50 15.0
50 17.5

1.77056
0.47506
9.80544
242.5 = 2.45106

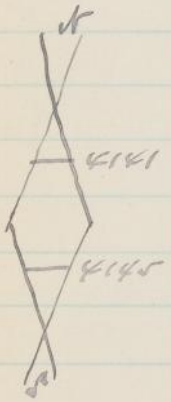
98.84 = 1.99537
7.5 = 0.47506
cos δ = 9.79964
2467.9 = 2.67011
2338.9 = −3' 53.9
50° 15.0

1888phae.proj.1832.

+49° 4141, 4145 (R. 45 184)

4141 4145 $4141^{5} - 4145^{1}$

	4141		4145	
5^h	5	5.4	5	20.0
	5	29.5	6	10.0
	10	54.9	11	30.0
				0m 35.1
	8	58.8	8	13.9
	8	43.4	9	3.5
	16	42.2	17	17.4
				0m 35.2
	10	58.3	11	13.0
	11	42.5	12	2.8
	22	40.8	23	15.8



0m 35.0
105.3
0m 35.10
~~2.0.5~~
~~0m 10.53~~
0s 17.55

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1888phae.proj.1832.

Δ 4141 Δ 4145 4145 + 4141

~~44.1~~

44.1' 50.8"

44.6' 49.6"

44.2' 49.8'

132.9' 149.4'

0m 44.30' 0m 4.98' 0m 49.28'

Dec. of

+49°4141 =

+49° 59.1

+49°4145

= +49° 52.3

Log. 49.28 = 1.69267

7.5 = 0,87506

cos. δ = 9.80872

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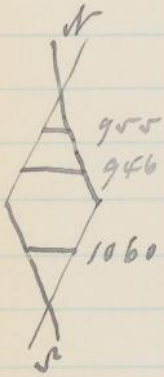
1888phae.proj.1832.

+52° 946, 955 and +51° 1060 (R. 47 50)

	946	955	1060
12h 29	57.0	32 53.0	30 31.9
31	1.5	33 0.8	30 51.0
60	58.5	65 53.8	61 22.9

1060 − 946 1060 − 955

0m 24.4 − 4m 30.9



33	59.4	36 56.0 34 33.9
35	3.9	37 3.2 34 53.7
69	3.3	73 59.2 69 27.6

0m 24.3 − 4m 31.6

41	46.5	44 42.9 42 19.4
42	49.5	44 48.8 42 40.5
84	36.0	89 31.7 84 59.9

0m 23.9 − 4m 31.8

46	3.0	48 59.6 46 43.0
47	13.0	49 12.3 46 57.6
93	16.0	98 11.9 93 40.6

0m 24.6 − 4m 31.3

49	42.0	52 38.6 50 21.2
50	51.9	52 50.5 50 36.5
100	33.9	105 29.1 100 57.7

0m 23.8	− 4m	31.4
1.0		157.0
0m 23.20	− 4	31.4.0
0m 1.10	− 2m	15.70

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1888phae.proj.1832

A 946 A 955 A 1060 1060+946 1060+955

1m 4.5' 7.8' 19.1'

1m 4.5' 7.2' 19.8'

1m 3.0' 5.9' 21.1'

1m 10.0' 12.7' 14.6'

1m 9.9' 11.9' 15.3'
22.9' 45.5' 89.9'

1m 2.5,8' 0m 9.10' 0m 17.78' 1m 20.56' 0m 27.08'

Dec. of

+52°946 =
+52° 0.6

+52°955 =
+52° 5.1

+51°1060 =
+51°51.4

log. 80.56 = 1.90612'
" 7.5 = 0.87506'
" cos. δ = 9.78999'

27.08 = 1.43265'
7.5 = 0.87506'
cos. δ = 9.78964'

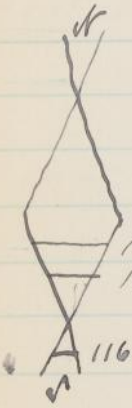
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1888phae.proj.1832.

+51°, 1063, 1065 and +50° 1165 (R. 47 48)

	1063	1065	1165	1063 5 − 1063 3	1065 − 1165
11h.	49 17.4	50 56.3	51 57.0		
	50 38.4 ,	51 21.0 ,	52 11.5 ,		
	99 55.8 ,	102 17.3 ,	104 8.5 ,		2m 21.5 − 1m 51.2
	52 51.9	54 30.8	55 32.2		
	54 13.0 ,	54 56.2 ,	55 45.9 ,		
	107 4.9 ,	109 27.0 ,	111 18.1 ,		2m 22.1 − 1m 51.1
	56 43.0	58 22.0	59 24.0		
	58 5.1 ,	58 48.1 ,	59 37.2 ,		
	114 48.1 ,	117 10.1 ,	119 1.2 ,		2m 22.0 − 1m 51.1
12h.	0 13.0	1 52.0	2 55.0		
	1 35.9 ,	2 18.8 ,	3 7.3 ,		~~1m 51.5~~
	121 48.9 ,	124 10.8 ,	126 2.3 ,		2m 21.9 − 1m 51.5
	3 56.0	5 35.3	6 38.5		
	5 19.5 ,	6 2.5 ,	6 50.5 ,		
	129 15.5 ,	131 37.8 ,	133 29.0 ,		

2m 22.3	− 1m 51.2
109.8	256.1
2 21.96	− 1 51.22
1m 10.98	− 0m 55.61



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1888phae.proj.1832

	Δ 1063	Δ 1065	Δ 1165	1065+1165	1063 − 1065
+	1m 21.0′	+24.7′	+14.5′		
	1m 21.1′	25.4′	13.7′		
	1m 22.1′	26.1′	13.2′		
	1m 22.9′	26.8′	12.3′		
	1m 23.5′	27.2′	12.0′		
	110.6′	130.2′	65.7′		
	1m 22.12′	0m 26.04′	0m 13.14′	0m 39.18	1m 8.98

Dec. of
+51°1063 =
+51° 4.5

+50° 1165 =
+50° 57.6

+58° 1065
= +51° 0.1

log 39.18 = 1.59306
" 7.5 = 0.87506
" cos. δ = 9.79906

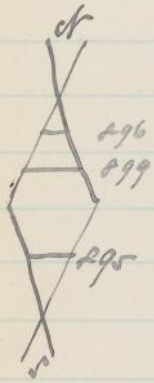
68.98 = 1.83872
7.5 = 0.87506
cos. δ = 9.79851

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1888phae.proj.1832.

+53° 895, 896, and 899 (R. 46 131)

	895	896	899	895 − 899	896 − 899
11h	4 3.0′	4 23.7′	4 58.6′		
	5 27.0′	5 16.0′	5 54.0′	1m 22.6″	1m 12.9′
	9 30.0′	9 39.7′	10 52.6′		
	6 59.1	7 20.0	7 56.0		
	8 23.7′	8 13.1′	8 50.3′	1m 23.5′	1m 13.2′
	18 22.8′	15 33.1′	16 46.3′		
	5				
	9 26.8	9 48.0	10 24.1		
	10 52.1′	10 41.0′	11 18.2′	1m 23.4′	1m 13.3′
	20 18.9′	20 29.0′	21 42.3′		
	11 59.8	12 21.0	12 57.5		
	13 25.2′	13 14.2′	13 51.6′	1m 24.1′	1m 13.9′
	25 25.0′	25 35.2′	26 49.1′		
	15 29.4	15 51.0	16 27.0		
	16 55.0′	16 44.0′	17 21.0′	1m 23.6′	1m 13.0′
	32 24.4′	32 35.0′	33 48.0′	117.2′	66.3′
				1m 23.44′	1m 13.26′
				0m 41.72′	0m 36.63′



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1888phae.proj.1832.

$\Delta 895$	$\Delta 896$	$\Delta 899$	$899-896$	$899+895$
1^m 25.0′	52.3′	55.4′		
1^m 24.6′	53.1′	54.3′		
1^m 25.3′	53.0′	54.1′		
1^m 25.4′	53.2′	54.1′		
1^m 25.6′	53.0′	54.0′		
125.9′	264.5′	271.9′		

Dec. of
53°895 =
+53° 50.6

1^m 25.18′ 0^m 52.92′ 0^m 54.38′ 0^m 1.46′ | 2^m 19.56′

1.46 = 0.16435′
7.5 = 0.87506′
cos δ = 9.76993′

139.56 = 2.14414′
7.5 = 0.87506′
cos δ = 9.77043′

+53°898 =
+53°56.5 "

+53°899
= +53°55.3

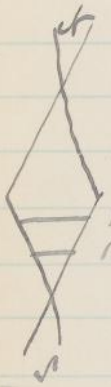
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1888phae.proj.1832.

+51 1110 and 1111 (R. 47 52)

~~+53° 929 and 942~~ (~~R. 46 149~~)

	1111	1110	1111° − 1110′
13h.	28 13.1′	29 37.5′	
	29 23.0′.	29 55.4′.	
	57 36.1′	59 32.9′	1m 56.8′
	30 36.0	32 0.5	
	31 47.0′.	32 19.0′.	
	62 23.0′	64 19.5′	1m 56.5′
	32 48.8	34 13.0	
	34 0.0′.	34 32.0′.	
	66 48.8′	68 45.0′	1m 56.2′
	35 34.5	36 58.9	
	36 46.9′.	37 18.4′.	
	72 21.4′	74 17.3′	1m 55.9′
	37 53.4	39 17.8	
	39 6.4′.	39 38.4′.	
	76 59.8′	78 56.2′	1m 56.4′
			281.8′.
			1m 56.36.
			0m 2X8.18.



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1888phae.proj.1832.

	Δ 1111	Δ 1110	1111 − 1110
1m	9.9′	17.4′	
1m	11.0′	18.5′	
1m	11.2′	19.0′	
1m	12.4′	19.5′	
1m	13.0′	20.6′	
	57.5′	95.5′	
1m	11.50′	0m 19.10′	0m 52.40′

Dec. of

+51° 1111 =
+51° 26.2

+51° 1110 =
+51° 23.4

Log. 52.40 = 1.71933
7.5 = 0.87506
cos. N = 9.79497

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1888phae.proj.1832.

+49° 1695 and 1693 (R. 47 84)

1693 − 1695

	1693		1695		
12 h.	55	37.5	56	38.8	
	56	17.3	57	10.0	
	111	54.8	113	48.8	1 m 54.0
	57	56.8	58	58.0	
1695	58	36.5	59	29.2	
1693	116	33.3	118	27.2	1 m 53.9
	59	53.4	60	54.5	
13 h.	0	32.7	61	25.4	
	~~60~~ 120	26.1	~~62~~ 122	19.9	1 m 53.8
	2	0.0	3	1.2	
	2	33.3	3	32.0	
	124	33.3	126	33.2	1 m 59.9
	5	46.0	~~6 47~~	47.3	
	6	25.0	7	17.5	
	132	11.0	134	4.8	1 m 53.8
	9	26.2	10	27.6	
	10	5.1	~~10~~	57.6	
	139	31.3	141	25.2	

1 m 53.9

329.3

54.88

1 m ~~6 5.8 6~~

1 m ~~2.9 8~~

27.44

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1888phae.proj.1832.

41693 41695 1693–1695

39.8' 31.2'

39.7' 31.2'

39.3' 30.9'

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33.3' 30.8'

39.0' 30.2'

38.9' 30.0'
230.0' 184.3'

Dre-off.

+49°1693 = +49° 53.7

+49°1695 = +49° 53.7

δ^m 38.33' 0^m30.72' 0^m 7.61'

log 7.61 = 0.88138

" 7.5 = 0.87506

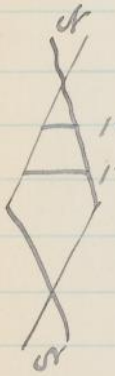
" cos δ = 9.80902

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1888phae.proj.1832.

+54° 1237 and 1238 (R. 47 86)

	1238	1237	1287 − 1238
14h.	14m 19.1s	14 36.5s	
	15 35.6s.	15 15.1s.	~~0m 3.0~~
	29 54.6.	29 51.6.	− 0m 3.0.
	15 56.0	16 13.7	
	17 12.5.	16 52.1	− 0m 2.7.
	33 8.5.	33 5.8.	
	17 30.7	17 48.1	
	18 46.7.	18 26.3.	− 0m 3.0.
	36 17.4.	36 14.4.	
	24 29.5	24 46.7	
	25 44.5.	25 24.2.	− 0m 3.1.
	50 14.0.	50 10.9	
	26 13.6	26 31.0	
	27 29.0.	27 8.4	− 0m 3.2.
	53 42.6.	53 39.4.	
	27 54.1	28 11.4	
	29 8.4.	28 48.8.	− 0m 3.3.
	57 3.5.	57 0.2	18.3.
			~~3.05~~
			− 0m ~~3.6~~
			− 0m ~~.83~~
			1.52.



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1888phae.proj.1832.

α 1238	α 1237	1238 − 1237
$1^m 16.4^s$	38.6^s	
$1^m 16.5^s$	38.4^s	
$1^m 16.0^s$	38.2^s	
$1^m 15.0^s$	37.5^s	
$1^m 15.4^s$	37.4^s	
$1^m 15.3^s$	37.4^s	
94.6″	227.5″	

Dec. of
+54° 1238 = +54° 2.5

+54° 1237
= +54° 5.5

$1^m 15.77^s$ $0^m 37.92^s$ $0^m 37.85^s$

log. 37.85 = 1.57807

" 7.5 = 0.87506

" cos. δ = 9.76852

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1888phae.proj.1832.

+ 50° 1564 and 1571 (R. 46 153)

	1564	1571	64 71
10^h	39 38.6 '	42 27.7 '	
	40 14.5 '	42 54.2 '	
	79 53.1 '	85 21.9 '	-5^m 28.8 '
1571	43 31.5	46 20.1	
	44 6.2	46 47.0 '	
1564	87 37.7 '	93 7.1 '	-5^m 29.4 '
	47 22.5	50 11.7	
	47 58.2	50 3 x 7.7 '	
	95 20.7 '	100 79.4	-5^m 28.7 '
	51 29.2	54 19.0	
	52 5.5	54 44.7 '	
	103 34.7 '	109 3.7 '	-5^m 29.0 '
	55 23.7	58 13.5	
	56 0.0 .	58 39.5 '	
	111 23.7	116 53.0	-5^m 29.3 '
			~~38.2~~ 145.2 '
			$-$ ~~5m 27645m~~ 29.04 '
			~~2m 2m~~ 44.52 '

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1888phae.proj.1832.

Δ1564 Δ1571 1564+1571

35.7' 26.5'

34.7' 26.9'

35.7' 26.0'

36.3' 25.7'

36.3' 26.0'

178.9' 131.1'

Dec. of 0^m35.78' 0^m26.2,2 1^m 2.00'

+50° 1571 =
+50° 31.2

Log. 62.00 = 1.79239'
" 7.5 = 0.87506
" cos. δ = 980415'

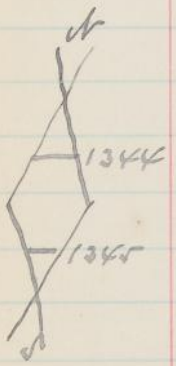
+50° 1564
= +50° 20.4

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1888phae.proj.1832.

+55° 1344 and 1345 (R. 47 74)

	1344	1345	1344 − 1345
13h.	38 58.9 r	40 29.8 r	
	40 6.5 r	41 26.7 r	2m 51.4
	79 5.4 '	81 56.5 '	−2m 51.1 '



	42 44.2	44 15.0
	43 51.8	45 22.4
	86 36.0 '	89 37.4 '
		−3m 1.4 '
	45 59.3	47 29.5
	47 5.8	48 37.3
	93 5.1 '	96 6.8 '
		−3m 1.7 '
	49 37.7	51 7.4
	50 44.0	52 15.5
	100 41.7 '	103 22.9 '
		−3m 1.2 '
	53 9.2	54 9.0
	54 5.5	55 37.4
	107 14.7 '	109 46.4 '
		−2m 31.7 '
		87.1 '
		2.6 17.42 '
		− 1. 26.71 '

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1888phae.proj.1832

$\Delta 1344$	$\Delta 1345$	$1344+1345$
$1^m\ 7.6'$	$56.8'$	
$1^m\ 7.6'$	$1^m 87.4'$	
$1^m\ 6.5'$	$1^m 7.8'$	
$1^m\ 6.8'$	$1^m 8.1'$	

$$\frac{1^m 6.8'}{34.3'} \quad \frac{1^m 28.4'}{108.6'}$$

$1^m 6.88' \quad 1^m 9.72' \quad 2^m 16.58'$

Decr. δ

$+55° 13'45'' =$
$+55° 1'.8$

$+55° 13'44''$
$= +55° 6'.4$

Log. $136.58 = 2).13539$
" $7.5 = 0.87506$
" cos. $\delta = 9.75785$

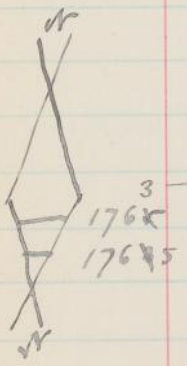
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1888phae.proj.1832.

49 1/4

+50° 1763 and 1765 (R. 47 71)

	1763	1765	$176\frac{5}{8} - 176\frac{3}{4}$
14h.	0 3.1 ✓	1 30.8 ✓	
	0 45.4	2 0.2	
	0 48.5 '	3 31.0 '	2m 45.5'
	2 37.8	4 5.1	
	3 20.5	4 35.0	
3	5 58.3 '	8 40.1 '	2m 41.8'
	5 7.0	6 34.5	
	5 49.5	7 4.5	
	10 56.5'	13 39.0 '	2m 42.5'
	7 49.0	9 16.0	
	8 31.8	9 46.5	
	16 20.8 '	19 2.5 '	2m 41.7'
	19 52.6	21 12.9	
	20 36.0	21 51.0	
	40 28.6 '	43 10.9 '	2m 42.3'
			213.8 '
			2m 42.76'
			1m 21.38'



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1763 1764 1765 3 – 1765 5

42.8' 69.4'

42.7' 29.9'

42.5' 30.0'

42.8' 30.5'

43.4' 31.1'

213.7' 150.9'

0ᵐ 42.74' 0ᵐ 30.18' 0ᵐ 12.56'

Deo. of

+50° 1768 =

+50° 12.1

+50° 1765

= +50° 11.1

Log. 12.56 = 1.09899'

" 7.5 = 0.87506'

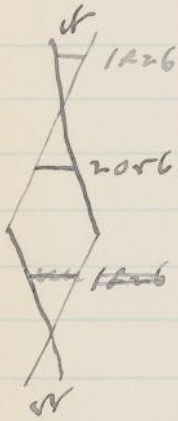
" cos δ = 9.80631'

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+50° 1826 and +49 2056 (R. 47, 72)

	2056	1826	−1826+2056
14h.	39 39.2	40 50.2	
	40 22.2	41 9.7	
	80 1.4	81 59.9	−1m 58.5
	41 35.8	42 46.8	
	42 18.2	43 6.1	
	83 54.0	85 52.9	−1m 58.9
	43 48.1	44 59.0	
	44 31.0	45 18.1	
	88 19.1	90 17.1	−1m 58.0
	46 4.0	47 14.6	
	46 46.2	47 34.2	
	92 50.2	94 48.8	−1m 58.6
	48 4.8	49 15.0	
	48 47.5	49 35.0	
	96 52.3	98 50.0	−1m 58.7
			292.7
			−1m 58.54
			29.17
			30
			−0m 59.17



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1888phae.proj.1832.

A 2056 A 1826 2056+1826

+453.0' +19.5'

+2.4' 19.3'

+2.9' 19.1'

+2.2' 19.6'

42.7' 20.0'
213.2' 97.5'

Dec. of
+50° 1826 = +50° 1.6

δ^m 42.64' 0^m 19.50' 1^m 2.14

+49° 2056
= +49° 57.6

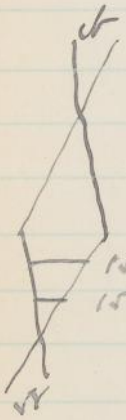
Log 62.14 = 1.79337'
" 7.5 = 0.87506'
" cos. δ = 9.80813'

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1888phae.proj.1832.

+54° 1513 and 1514 (R. 47, 88)

	1513	1514	1513 − 1514
14h.	56 19.0	56 25.4	
	57 1.4	57 29.3	
	113 20.4	113 54.7	−0m 34.3
	57 51.0	57 57.1	
	58 33.4	59 1.1	
	116 24.4	116 58.2	−0m 33.8
	59 28.5	59 34.5	
15h.	0 11.0	0 38.8	
	119 39.5	119 73.3 (120)	−0m 33.8
	1 1.5	1 7.8	
	1 42.6	2 10.2	
	122 44.1	123 18.0	−0m 33.9
	2 35.3	2 41.6	
	3 17.7	3 45.5	
	125 53.0	126 27.1	−0m 34.1
			169.9
			−0m 33.98
			−0m 16.99



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Δ 1513	Δ 1514	1514 − 1513

42.4' 1m 3.9'

42.4' 1m 4.1'

42.5' 1m 4.8'

41.1' 1m 2.4'

$$\frac{42.4' \quad 1^m 3.9'}{210.8 \qquad 18.6'}$$

0^m 42.16 1^m 3.72' 0^m 21.56'

Dec. of S.

+54° 15'14" = Log 21.56 = 1.33365

+54° 23.8 " 7.5 = 0.87506

" cos. δ = 9.76523

+54° 15'13"

= +54° 21.8

1888phae.proj.1832.

+51° 1770 and 1774 (R. 47 172)

	1770	1774	1774° − 1774ʰ
15ʰ	51 50.1	53 7.0	
	52 26.0	53 39.6	
	104 16.1	106 46.6	− 2ᵐ 30.5′
1774	54 13.1	55 30.0	
	54 49.5	56 2.4	
1770	109 2.6	111 32.4	− 2ᵐ 29.8′
	57 54.6	59 2.3	
	58 21.6	59 44.0	
~~16ʰ~~	116 16.2	118 46.3	− 2ᵐ 30.1′
16ʰ	0 19.8	1 28.0	
	0 47.5	2 8.6	
	121 7.3	123 36.6	− 2ᵐ 29.3′
	3 20.2	4 20.2	
	3 39.9	5 10.0	
	127 0.1	129 30.2	− 2ᵐ 30.1′
			149.8′
			− 2ᵐ 29.96
			− 1ᵐ 14.98′

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1888phae.proj.1832.

Δ 1770	Δ 1774	1774+1770
35.8'	32.6'	
36.4'	32.4'	
27.0'	+1.7'	
27.7'	+0.6'	
18.7'	+9.8'	
146.7'	197.1'	
0m 29.34'	0m 39.42'	1m 8.76'

Dec. of.

+51° 1774 =
+51° +7.8

+51° 1770 =
+51° 38.4

Log. 68.76 = 1.83734'
" 7.5 = 0.87506'
" cos. δ = 9.79211'

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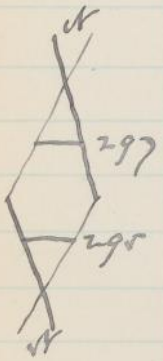
1888phae.proj.1832.

+54° 295, 297. (R. 45 141)

295 – 297

~~297 – 295~~

	295	297	
4h.	16 7.2 ν	16 21.7 ν	
	17 6.2 ν	17 22.9 ν	
	33 13.4	33 44.6	= 0m 31.2.
	17 45.1 ν	18 0.2 ν	
	18 45.1 ν	19 2.0 ν	
	36 30.2	37 2.2	0m 32.0.
	19 37.6 ν	19 53.1 ν	
	20 37.7 ν	20 54.0 ν	
	40 15.3	40 47.1	0m 31.8.
	21 36.8 ν	21 51.9 ν	
	22 36.5 ν	22 53.1 ν	
	44 13.3	44 45.0	0m 31.7.
	23 30.2 ν	23 45.5 ν	
	24 30.7 ν	24 46.6 ν	
	48 0.9	48 32.1	0m 31.2.
			157.9.
			– 0m 31.58
			– 0m 15.79.



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1888phae.proj.1832.

Δ295 Δ297 297+295

59.0' 1m 1.2 2m 0.2

1m 0.0' 1m 1.8 2m 1.8

1m 0.1' 1m 0.9 2m 1.0

59.7' 1m 1.2 2m 0.9

1m 0.5' 1m 1.1 2m 1.6
299.3' 6.2' 5.5
0m 59.86' 1m 1.24' 2m 1.10

Dec. of
+54° 29.7 =
+54° 31.0

+54° 29
Dec. = +54° 25'

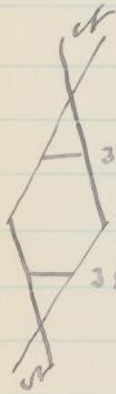
Log. 121.10 ~~2.083~~ ~~2.76767~~ 2.08314
" 7.5 = 0.87506
" cos = 9.76427
527.2 = 2.72247
246.0
354.2 = 5' 54.2

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1888phae.proj.1832.

+55° 375, and +54° 344 R 45. 143

	375	344	375 − 344 / 344 − 375
51.	14 9.3	14 20.2	
	14 49.2	15 4.8	
	28 58.5	29 25.0.	− 0m 26.5.
	16 9.0	16 19.4	
	16 49.0	17 4.0	
	32 58.0	33 23.4.	0m 25.4.
	17 41.2	17 51.9	
	18 21.0	18 35.7	
	38 2.2	36 27.6.	0m 25.4.
	19 7.7	19 18.2	
	19 47.0	20 2.5	
	38 54.7	39 20.7.	0m 26.0.
	21 36.7	21 47.6	
	22 16.5	22 32.1	
	43 53.2	44 19.7.	0m 26.5.
	24 5.5	24 15.8	
	24 44.7	25 1.1	
	48 50.9	49 16.9.	0m 26.7.
			156.5.
			26.08.
			− 0m ~~2.30~~
			− 0m ~~5.65~~
			13.04.



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1888phae.proj.1832.

A 375 A 344 344+375

39.9' 44.6' 1m 24.5

40.0' 45.6' 1m 24.6

39.8' 43.8' 1m 23.6

39.3' 44.3' 1m 23.6

39.8' 44.5' 1m 24.3

39.2' / 238.0' 45.3' / 267.1'

0m 48.40 0m 53.42

Dec. of 0m 39.66' 0m 44.52' 1m 24.18'

+54° 844 = Log 84.18 = 1.92521

+54° 53.7 " 7.5 = 0.87506

+55° 37' cos δ = 9.75491

Dec. = 2'.4 362".4 = 2,55918

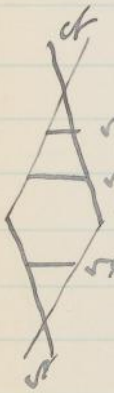
886.0 / 523.6 = +0' 53".6

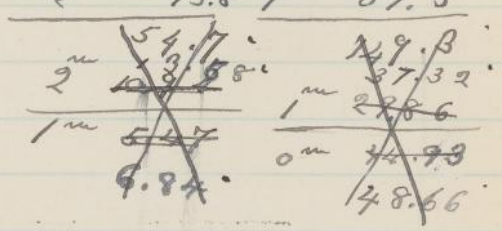
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1888phae.proj.1832.

+52°, 546, 541, 542 (R. 45150)

	541	542	546	546−541	546−542
5	48 37.4	49 21.1	50 12.9		
	49 57.9	49 50.6	50 36.5		
	98 35.3	99 11.7	100 49.4	+2m 14.1s	+1m 37.7s
	51 32.1	52 16.1	53 7.4		
	52 53.0	52 41.8	53 31.0		
	104 25.1	105 0.9	106 38.4	2m 13.3s	1m 37.5s
	54 24.0	55 7.8	55 58.9		
	55 44.0	55 36.9	56 22.6		
	110 8.0	110 44.7	112 21.5	2m 13.5s	1m 36.8s
	57 26.0	58 10.0	59 0.8		
	58 46.1	58 38.6	59 25.1		
	116 12.1	116 48.6	118 25.9	2m 13.8s	1m 37.3s





6	0 37.3	1 21.2	2 11.8		
	1 57.1	1 50.1	2 36.5		
	2m 34.4	3m 13.3	4m 48.3	2m 13.9	1m 35.0
				68.6	184.3
				2m 13.72s	1m 36.86s
				+ 1m 6.86s	+ 0m 48.43s

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1888phae.proj.1832.

4541 4542 4546 546+541 546+542

1m 20.5' 29.5' 23.6' 1m 44.1 53.1

1m 20.9' 28.7' 23.6' 1m 44.5 52.3

1m 20.0' 29.1' 23.7' 1m 43.7 52.8

1m 20.1' 28.6' 24.3' 1m 44.4 52.9

~~81.5' 115.9' 95.2'~~

~~1m 20.38 0m 28.98 0m 2.38' 1m 22.76' 0m 51.06'~~

Ded. of

+52°541 = +52° 22.2 ✓

~~Log 82.76 = 1.91782~~

~~" 7.5 = 0.87506~~

~~51.36 = 1.71008~~

~~7.5 = 0.87506~~

+52°542 = +52° 26.4 ✓

+52°546

Ded. = 52° 15.5 ✓

1m 19.8' 28.9' 24.7'

101.3' 144.8' 119.2'

1m 20.26' 0m 28.96' 23.98' 1m 44.24' 0m 52.94'

Log. 104.24 = 2.01703 ✓

" 7.5 = 0.87506 ✓

cos δ = 9.78624 ✓

427.9" = 2.63137 ✓

52.94 = 1.72378

7.5 = 0.87506 ✓

cos δ = 9.78492 ✓

262.5" = 2.38476 ✓

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1888phae.proj.1832.

+52° 546 and 548 (R. 45 150)

	546	548	548 − 546
5 h.	50 12.9	50 17.0	
	50 36.5	51 36.6	
	100 49.4	101 23.6	− 0m 34.2
	53 7.4	53 11.4	
	53 31.0	54 1.7	
	106 38.4	107 13.1	0m 34.7
	55 58.9	55 2.8	
	56 22.6	56 53.3	
	112 21.5	112 56.1	0m 34.6
	59 0.8	59 4.8	
	59 25.1	59 55.2	
	118 25.9	119 0.0	0m 34.1

37.6
34.40
0m 2752
0m 4376
17.20

2 11.8 6h 2 15.9
2 36.5 3 6.9
4 48.3 5 22.8

0 34.5
0 172.1
0m 32.42
− 0m 17.21

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1888phae.proj.1832

Δ 546	Δ 548	548 − 546
23.6′	49.6′	26.0
23.6′	50.3′	26.7
23.7′	50.5′	26.8
24.3′	50.4′	26.1
~~95.2′~~	~~200.8′~~	
~~$\overset{m}{o}$ 23.80′~~	~~$\overset{m}{\alpha}$ 50.20′~~	~~$\overset{m}{\delta}$ 26.40′~~

Dec. of

+52° 548 =
+52° 17.4

~~Log 26.40 = 1.42160~~
~~" 7.5 = 0.87506~~

+52° 5K6
Dec = 52° 15.5″

24.7′	51.0′	
119.9′	251.8′	
$\overset{m}{o}$ 23.98′	$\overset{m}{o}$ 50.36′	$\overset{m}{\delta}$ 26.38′

Log. 26.38 = 1.42127″
" 7.5 = 0.87506′
cos δ = 9.78668″
121.1″ = 2.08301″

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1888phae.proj.1832.

+49° 620, 625, and 629 (R. 45 157)

	620	625	629	620 − 25	620 − 29
5h.	20 19.8	21 39.1	21 57.0		
	21 14.5	22 29.9	22 49.4		
	41 34.3	44 9.0	44 46.4	−2m 34.7	−3m 12.1
	23 39.4	24 58.5	25 16.5		
	24 20.0	25 35.2	25 55.4		
	47 59.4	50 33.7	51 11.9	2m 34.3	3m 12.5
	29 39.6	30 59.4	31 16.9		
	30 21.1	31 36.0	31 56.4		
	60 0.7	62 35.4	63 13.3	2m 34.7	3m 12.6
	32 19.6	33 39.2	33 56.5		
	33 1.1	34 16.2	34 36.5		
	65 20.7	67 55.4	68 33.0	2m 34.7	3m 12.8
	35 2.2	36 21.7	36 39.0		
	35 44.0	36 59.5	37 19.5		
	70 46.2	73 21.2	73 58.5	2m 35.0	3m 12.8
				173.4	61.8
				−2m 34.68	−3m 12.36
				−1m 17.34	−1m 36.18



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1888phae.proj.1832

Δ620	Δ625	Δ629	620–625	620–629
54.7′	50.8′	52.4′	3.9″ ✓	2.3″ ✓
40.6′	36.7′	38.9′	3.9″ ✓	1.7″ ✓
41.5′	36.6′	39.5′	4.9″ ✓	2.0″ ✓
41.5′	37.0′	40.0′	4.5″ ✓	1.5″ ✓
41.8′	37.8′	40.5′	4.0″ ✓	1.3″ ✓
220.1′	198.9′	211.3′		

Dec. of 0^m 44.02′ 0^m 39.78′ 0^m 42.26′ 0^m 4.24′ 0^m 1.76′

+49°625 =
+49° 50.3 ✓

+49°629 =
+49°50.8 ✓

+49° 620
Dec = +49° ✓0.6″

Log. 4.24 = 0.62737 ✓
" 7.5 = 0.87506 ✓
cos δ = 9.40971 ✓
20.″7 ✓ = 1.31194 ✓

~~+3′ 2.″7 ✓~~

1.76 = 0.24551 ✓
7.5 = 0.87506 ✓
cos δ = 9.40947 ✓
+8.″7 ✓ = 0.93004 ✓

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1888phae.proj.1832.

+52° 564, +53° 505, +52° 569 (R. 45 158)

	564	505	569	569 − 64	569 − 05
5h.	59 0.0	59 38.4	60 44.7		
	59 25.1	61 0.4	61 25.1	~~3m 44.7~~	
	118 25.1	120 38.8	122 9.8	+3m 44.7 +1m 31.0	
6 h.	8 26.7	9 4.6	10 12.0		
	8 52.1	10 27.2	10 52.5		
	137 18.8	139 31.8	141 4.5	3m 45.7 1m 32.7	
	11 56.0	12 34.0	13 41.3		
	12 21.2	13 56.7	14 21.6		
	144 17.2	146 30.7	148 2.9	3m 45.7 1m 32.2	
	15 15.7	15 54.1	17 1.3		
	15 42.1	17 17.4	17 42.2		
	150 57.8	153 11.5	154 43.5		
	18 5.0	18 43.5	19 51.0		
	18 32.0	20 7.0	20 31.5		
	36m 37.0	38m 50.5	40m 22.5		



3m 45.7 1m 32.2

181.8 127.9

3m 45.45 1m 31.98

36.36 2.00

1m 9.42 0m 45.99

32.72

30

halfmean 0m 42.72

0m 45.99

3m 45.5 1m 32.0

3m 227.3 159.9

3m 45.46 1m 31.98

+1m 52.73 +0m 45.99

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Δ 564	Δ 505	Δ 569	505 − 569	569 − 564
25.1	1m 22.0	40.4	41.6	15.3
25.4	1m 22.6	40.5	42.1	15.1
25.2	1m 22.7	40.3	41.4	15.1
26.4	1m 23.3	40.9	42.4	14.5
~~42.1~~	~~40.6~~	~~42.1~~		

Dec. of ~~0m 25.52 1m 22.65 0m 40.52 0m 48.13 0m 15.00~~

+52°564 =
+52° 58.0

+53°505 =
+53° 2.1

+52°569
Dec. = 52° 54.7

~~Log. 48.13 = 1.68242~~
~~4 7.5 = 0.87506~~

~~15.00 = 0.17609~~
~~7.5 = 0.87506~~

27.0	1m	23.5	40.5	
129.1		114.1	202.6	
25.82	1m	22.82	40.52	0m 42.30 0m 14.70

42.30 = 1.62634
7.5 = 0.87506
cos δ = 9.77940
198.9 = 2.29980
− 3′ 10.″9

14.70 = 1.16732
7.5 = 0.87506
cos δ = 9.77973
66.″4 = 1.82211
+1′ 6.″4

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1888phae.proj.1832.

+51° 574, and 580 (R. 45 165)

	574	580	580 − 574
4h	39 17.0	40 57.2	3m
	39 55.1	41 18.1	
	79 12.1	82 15.3	+3m 3.2
580	41 45.7	43 26.0	
574	42 23.7	43 46.5	
	84 9.4	87 12.5	+3m 3.1
	44 2.7	45 43.0	
	44 40.1	46 3.1	
	88 42.8	91 46.1	+3m 3.3
	46 14.4	47 54.5	
	46 52.2	48 14.7	
	93 6.6	96 9.2	+3m 2.6
	48 30.2	50 10.5	
	49 8.3	50 30.4	
	97 38.5	100 40.9	+3m 2.4
			14.6
			3m 2.92
			+1m 3.146

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1888phae.proj.1832.

Δ 574	Δ 580	574 − 580
38.1	20.9	17.2
38.0	20.5	17.5
37.4	20.1	17.3
37.8	20.2	17.6

$$\frac{38.1}{189.4} \cdot \frac{19.9}{101.6} \cdot \frac{17.2}{17.56}$$

$0^m 37.8^s$ $\quad 0^m 20.32$ $\quad 0^m 17.56$

Dec. of
+51° 574 =
+51° 2.9

+51° 57′ 40″
Dec = 51° 2′ 0″

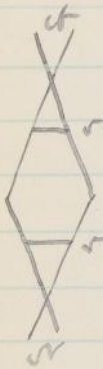
Log 17.56 = 1.24452
" 7.5 = 0.87506
cos δ = 9.79450
42.″5 = 1.91408
+1′ 22.″5

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1888phae.proj.1832.

Star 557 (the one wanted) not found. Transits of 556 taken + 50° 553 and 556 (R. 45 166)

	553	556	553 − 556
5h.	15 21.9 ✓	15 48.2 ✓	
	16 1.3 ✓	16 9.0 ✓	
	31 23.2 ✓	31 57.2 ✓	0m 34.0 ✓
553	18 8.4	18 34.2	
556	18 48.5	18 57.0	
	36 57.7 ✓	37 31.2 ✓	0m 33.3 ✓
			67.3
			33.65
			0m ~~13 4.6~~
			0m ~~6 79~~
			16.82



Star 557 (the one wanted) not found on either of the dates when looked for. Star 556 "somewhat doubtful". Transits taken, as above, to identify.

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553 556 553+556

39.4 ✓ 40.8 ✓

39.1 ✓ 22.8 ✓
78.5 43.6
39.25 ✓ 21.80 ✓ 1.05 ✓

Dec. of .

+50° 553 = Log. 61.05 = 1.78569 ✓
+50° 47.6 ✓ " 7.5 = 0.87506 ✓
cos ✓ 29.90166 ✓
+50° 556 2900" = 2.46241 ✓
Dec = +50° 36.4' ✓ +6.0
596.0 = 9' 56.0" ✓

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1888phae.proj.1832.

+55° 701, 704 and 706 (R. 45, 124)

	701	704	706	701 − 704	701 − 706
	~~701~~	~~704~~	~~706~~	~~701 − 01~~	~~706 − 01~~
0^h	44 38.1	46 29.3	47 47.4		
	45 17.1	47 16.6	48 59.8	~~3^m 50.7~~	~~6^m 52.0~~
	89 55.2	93 45.9	96 47.2	-3^m 50.7	-6^m 52.0
	49 52.2	51 42.6	53 1.1		
	50 30.5	52 31.2	54 13.0		
	100 22.7	104 13.8	107 14.1	3^m 51.1	6^m 51.4
	55 11.0	57 8.1	58 19.6		
	55 56.8	57 50.0	59 39.0		
1^h	111 7.8	114 58.1	117 58.6	3^m 50.3	6^m 50.8
	0 13.0	2 9.9	3 21.8		
	0 54.0	2 51.5	4 41.1		
	121 12.0	125 1.4	128 2.9	3^m 49.4	6^m 50.9
	5 58.0	7 56.2	9 7.1		
	6 44.7	8 37.4	10 27.0		
	132 42.7	136 33.6	139 34.1	3^m 50.9 / 252.4	6^m 51.4 / 256.5
				3^m 50.48	6^m 51.30
				-1^m 55.24	-3^m 25.65



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Δ701	Δ704	Δ706	701+704	706−701
39.0	47.3	1m 12.4	46.3	33.4
38.3	48.6	1m 11.9	46.9	33.6
45.8	41.9	1m 19.4	47.7	33.6
46.0	41.6	1m 19.3	47.6	33.3
46.7	41.2	1m 19.9	47.9	33.2
215.8	220.6	82.9	36.4	2.1
43.16	44.12	16.58	47.24	33.42
5m	0m	1m	1m 35.28	0m 33.42

+55° 704
Dec. = +55° 15.9

+55° 706
Dec. = 55° 2.0

+55° 701
Dec. = 55° 7.2

Log. 95.28 = 1.97900
" 7.5 = 0.87506
cos δ = 9.

47.24 = 1.94091
7.5 = 0.87506
cos δ = 9.75649
373.6 = 2.57246
46.0
12.5 = 4′ 32.″4

33.42 = 1.52401
7.5 = 0.87506
cos δ = 9.

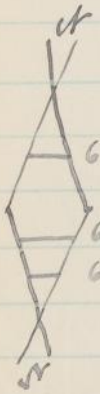
33.42 = 1.52401
7.5 = 0.87506
cos δ = 9.75712
143.3 = 2.15619
− 2′ 23.″3

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1888phae.proj.1832

+52° 639, 642 and 643 (R 45.125)

	639	642	643	642 - 639	642 - 643
1h	18 23.2	20 32.6	20 52.8		
	19 14.0	21 16.5	21 18.5		
	37 37.2	41 49.1	42 12.3	+4m 11.9	−0m 23.2
	22 28.8	24 38.2	24 45.0		
	23 5.6	25 8.1	25 24.9		
	45 34.4	49 46.3	50 9.9	4m 11.9	0m 23.6
	26 29.0	28 37.8	28 44.5		
	27 5.4	29 8.1	29 24.7		
	53 34.4	57 45.9	58 9.2	4m 11.5	0m 23.3
	30 4.8	32 14.0	32 20.6		
	30 41.3	32 43.9	33 0.4		
	60 46.1	64 57.9	65 21.0	4m 11.8	0m 23.1
	33 31.0	35 40.1	35 46.5		
	34 7.3	36 10.2	36 27.1		
	67 38.3	71 50.3	72 13.6	4m 12.0	0m 23.3
				59.1	116.5
				4m 11.82	0m 23.30
				+2m 5.91	−0m 11.65



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1888phae.proj.1832.

639	642	643	639−642	642+643
50.8	43.9	26.7	6.9	70.6
36.8	29.9	39.9	6.9	69.8
36.4	30.3	40.2	6.1	70.5
36.5	29.9	39.8	6.6	69.7
36.3 / 196.8	30.1 / 164.1	40.6 / 187.2	6.2	70.7

$0^m 39.36^s$ $0^m 32.82^s$ $0^m 37.44^s$ $0^m 6.54^s$ $1^m 10.26^s$

Dec. of 639 = +52° 47′ 6″

643 = +52° 55′ 5″

Dec = +52° 47′ 2″

Log. 6.54 = 0.81558

" 7.5 = 0.87506

cos δ = 9.74157

29.7″ = 1.47221

70.26 = 1.84671

7.5 = 0.87506

cos δ = 9.74090

314.2″ = 2.50267

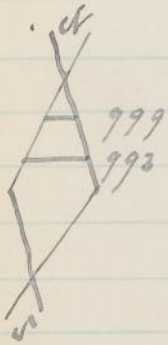
$\frac{886.0}{567.8}$ = 9′ 27.8″

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1888phae.proj.1832.

+51° 993 and 999 (R46 151)

	993	999	993 − 999
9h.	50 26.7	51 42.4	
	51 35.6	52 16.6	
	102 2.3	103 59.9	−1m 56.7
	58 53.3	60 10.0	
	59 58.1	60 29.4	
	118 51.4	120 39.4	−1m 48.0
10h	1 4.6	2 21.0	
	1 59.4	2 40.0	
	123 4.0	125 1.0	−1m 57.0
	3 8.1	4 24.5	
	4 2.5	4 43.7	
	127 10.6	129 8.2	−1m 57.6
	5 15.0	6 31.5	
	6 9.2	6 50.6	
	131 24.2	133 22.1	−1m 57.9
			277.2
			−1m 55.44
			−0m 57.72



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1888phae.proj.1832.

$\Delta 993$	$\Delta 999$	$993-999$
1^m	$8.9'$	$34.2'$
1^m	$7.8'$	$19.4'$
	$54.8'$	$19.0'$
	$54.4'$	$19.2'$
	$54.2'$	$19.1'$
	$177.1'$	$110.9'$
0^m	59.42	$0^m\ 22.18'$ $0^m\ 37.24'$

Dec. of

$+51°\,999 = +51°\,51.5$

$+51°\,993 = +51°\,49.1$

Log. $37.24 = 1.57101'$

" $7.5 = 0.87506'$

" cos. $\delta = 9.79090'$

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1888phae.proj.1832.

+54° 1550 and 1551 (R 47 175)

	1550	1551	1551 − 1550
15h	5 29.1	6 13.0	
	6 45.0	6 32.6	
	12 14.1	12 45.6	0m 31.5
	7 13.7	7 57.5	
	8 29.4	8 18.0	
	15 43.1	16 15.5	0m 32.4
	8 52.5	9 36.4	
	10 8.9	9 56.8	
	19 1.4	19 33.2	0m 31.8
	11 49.5	12 33.7	
	13 6.0	12 54.0	
	24 55.5	25 27.7	0m 32.2 / 21.8
	13 33.0	14 17.0	
	14 49.5	14 38.0	
	28 22.5	28 55.0	0m 32.5
			15 0.4
			0m 32.08
			0m 15.04



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1888phae.proj.1832.

Δ 1550	Δ 1551	1551 − 1550
1^m 15.9′	19.6′	
1^m 15.7′	20.5′	
1^m 16.4′	20.4′	
1^m 16.5′	20.3′	
1^m 16.5′	21.0′	
81.0′	101.8′	
0^m 16.20′	0^m 20.36′	0^m 4.16′

Dec. of

+54° 1550 =
+54° 46.5

Log. 4.16 = 0.61909′
" 7.5 = 0.87506′
" cos δ = 9.76150″

+54° 1551
= +54° 41.1

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1888phae.proj.1832.

Pkw. + 50° 1962. 1967 + 1969. (R KY. 193)

	1962	1967	1969	$1962\frac{7}{2}-67\frac{2}{7}$	$1962\frac{7}{7}-69$
15^h	29 32.3	31 51.8	32 1.0		
	30 48.8	32 32.4	32 41.5		
	60 21.1'	64 24.2'	64 42.5'		
				$+4^m$ 3.1'	-0^m 18.3
	33 19.5	35 39.9	35 48.2		
	34 36.6	36 20.1	36 30.2		
	67 56.1'	72 60.0'	72 18.4'		
				4^m 3.9'	-0^m 18.4
	36 58.6	39 19.0	39 27.9		
	38 17.2	40 1.1'	40 10.7		
	75 15.8'	79 20.1'	79 38.6'		
				4^m 4.3'	-0^m 18.5
	40 43.0	~~52 19.2~~ 43 2.4	43 11.6		
	42 1.0	43 45.1	43 55.0		
	82 44.0'	86 47.5'	87 6.6'		
				4^m 3.5'	-0^m 19.1
	50 0.3	52 19.2	52 28.7		
	51 19.0	53 3.0	53 12.9		
	101 19.3'	105 22.2'	105 41.6'		
				4^m 2.9'	-0^m 19.4
				17.7"	93.7'
				4^m 3.54'	-0^m 18.74'
				2^m 1.77'	-0^m 9.37'



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1888phae.proj.1832.

Δ 1962	Δ 1967	Δ 1969	1969 − 1967	1962 − 1967
$1^m\ 16.5'$	$0^m\ 40.6'$	$0^m\ 40.5'$		
$1^m\ 17.1'$	$0^m\ 40.2'$	$0^m\ 42.0'$		
$1^m\ 18.6'$	$0^m\ 42.1'$	$0^m\ 42.8'$		
$1^m\ 18.0'$	$0^m\ 42.7'$	$0^m\ 43.4'$		
$1^m\ 18.7'$	$0^m\ 43.8'$	$0^m\ 44.2'$		
88.9'	209.4'	212.9'		
$1^m\ 17.78'$	$0^m\ 41.88'$	$0^m\ 42.58'$	$0^m\ 0.70'$	$0^m\ 35.20'$

Dec. of
+50° 1962 =
+50° 7.3

Log. 0.70 = 9.84510'
" 7.5 = 0.87506'
" Cos. δ = 9.80759'

8.5.20 4.54 654'
7.5 = 0.87506'
Cos. δ = 9.80728'

+50° 1969 =
+50° 3.2

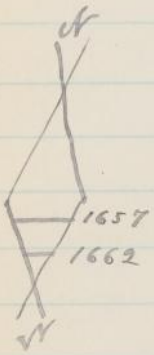
+50° 1967 =
+50° 3.1

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1888phae.proj.1832.

Oph. + 53° 1657. 1662 (R 47. 199)

	1657	1662	62 57 1657 − 1662
15h 19m	22.5	21 13.1	
20	4.5	21 40.8	
39	34.0	42 53.9	3m 19.9
22	17.5	24 1.2	
22	53.0	24 28.2	
45	10.5	48 30.4	3m 19.9
25	7.2	26 51.1	
25	43.0	27 19.4	
50	50.2	54 10.5	3m 20.3
27	19.4	29 33.0	
28	25.3	30 1.5	
56	14.7	59 34.5	3m 19.8
30	33.9	32 17.6	
31	9.4	32 45.9	
61	43.3	65 3.5	3m 20.2
			100.1
			3m 20.02
			1m 40.01



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1888phae.proj.1832.

1657 1662 1657–1662

$0^m\ 35.0'$ $0^m\ 27.7'$

$0^m\ 35.5'$ $0^m\ 28.0'$

$0^m\ 35.8'$ $0^m\ 28.3'$

$0^m\ 35.9'$ $0^m\ 28.5'$

$0^m\ 35.5'$ $0^m\ 28.3'$

$177.7'$ $140.8'$

$0^m\ 35.54'$ $0^m\ 28.16'$ $0^m\ 738$

Dec. of

+53° 1657 =

+53° 3.7

+53° 1662

= +53° 2.4

Log. 7.38 = 0.86806

" 7.5 = 0.87506

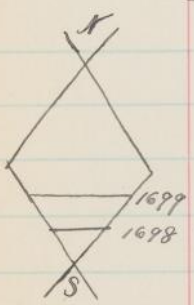
" cos. δ = 9.77896

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1888phae.proj.1832.

+53° 1698 and 1699 R47.206

	1698	1699	1699 − 1698
15h 40m	39.3	42 14.9	
41	17.0	43 13.0	
81	56.3'	85 27.9'	− 3m 31.6'
43	43.5	45 19.0	
44	21.5	46 18.0	
88	5.0'	91 37.0'	− 3m 32.0'
47	8.4	48 46.3	
47	47.2	49 43.2	
94	55.6'	98 27.5	− 3m 31.9'
50	36.7	52 12.5	
51	15.6	53 11.7	
101	52.3'	105 24.2	− 3m 31.9'
53	37.3	55 12.8	
54	16.8	56 13.0	
107	54.2'	111 25.8	− 3m 31.6'
			159.0'
			− 3m 31.80'
			− 1m 45.90'



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1888phae.proj.1832.

Δ 1698	Δ 1699	1699 − 1698
37.7′	58.1′	
38.0′	59.0′	
38.8′	58.9′	
38.9′	59.2′	
39.6′	60.2′	
193.0	295.4	
0m 38.6.0′	0m 59.08′	0m 20.48

Dec. of ☉.

+53° 1699 =
+53° 12.8

+53° 1698 =
+53° 10.3

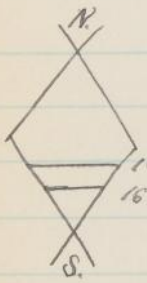
Log. 20.48 = 1.31133′
" 7.5 = 0.87506
cos. δ = 9.77756

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1888phae.proj.1832.

+53° 1698 and 1699 R. 47 217

	1698	1699	1699−98
15^h	48 57.0	50 32.5	
	49 41.6	51 37.6	
	98 38.6 '	102 10.1 '	3^m 31.5 '
	52 3.6	53 39.5	
	52 48.3	54 44.4	
	104 51.9 '	108 23.9 '	3^m 32.0 '
	57 22.5	58 57.6	
	58 8.5	60 4.0	
	115 31.0 '	119 1.6	3^m 31.6 '
			95.1 '
			3^m 31.70 '
			1^m 35.85 '



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1888phae.proj.1832

Δ1698 Δ1699 1699−1698

44.6' 1ᵐ 5.1'

44.7' 1ᵐ 4.9'

46.0' 1ᵐ 6.4'

135.3' 16.4'

δᵐ 45.10' 1ᵐ 5.47' δᵐ 20.37

Dec. of
+53°1699 =
+53° 12.3

log. 20.37 = 1.30889
" 7.5 = 0.87506
" cos. δ = 9.77756

+53°1698 =
+53° 10.3

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1888phae.proj.1832.

+53 1698 and 1699 R. 47. 213.

	1698	1699	1698 − 99
	$15^h\ 57^m\ 54.1$	59 29.5	
	58 39.6	60 35.5	
	116 33.7′	120 5.0′	$-3^m\ 31.3'$
	16^h 1 11.4	2 47.0	
1699	1 58.0	3 54.2	
1698	123 9.4′	126 41.2′	$-3^m\ 31.8'$
	5 1.2	6 36.8	
	5 55.9	7 52.3	
	130 57.1′	134 29.1′	$-3^m\ 32.0'$
	8 18.4	9 53.8	
	9 16.1	11 12.0	
	137 34.5′	141 5.8′	$-3^m\ 31.3'$
	13 27.5	15 3.0	
	14 26.8	16 22.1	
	147 53.8′	151 25.1′	$-3^m\ 31.8'$
			157.7′
			$-3^m\ 31.54'$
			$-1^m\ 45.77'$

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1888phae.proj.1832

Δ 1698 Δ 1699 1699–98

45.5' 1m 6.0'

46.6' 1m 7.2'

54.7' 1m 15.5'

57.7' 1m 18.2'

58.8' 1m 19.1'

263.3' 66.0'

0m 52.66' 1m 13.20' 0m 20.54

Dec. of

+53°1699 = Log 20.54 = 1.312600

+53°12.3 " 7.5 = 0.875060

" cos. δ = 9.777560

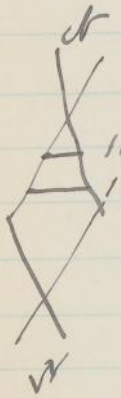
+53° 1698 =

+53° 10.8

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1888phae.proj.1832.

+54° 1831 and 1832 (R. 47100)



	1832	1831	1831-32
13h.	40 11.5	40 22.5	
	41 18.6	41 1.7	
	81 30.1	81 24.2	−0m 5.9′
	41 41.8	41 51.9	
	42 48.1	42 31.5	
	84 89.9 / 2	84 23.4	−0m 6.5′
	43 10.0	43 20.1	
	44 16.0	43 58.9	
	87 26.0	87 19.0	−0m 7.0′
	44 44.0	44 54.0	
	45 49.5	45 32.7	
	90 33.5	90 26.7	−0m 6.8′
	46 14.1	46 24.9	
	47 20.4	47 3.3	
	93 34.5	93 28.2	−0m 6.3′
			32.5″
			− 0m 6.5×0′
			− 0m 3.2×5″

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1888phae.proj.1832.

41832	41831	1832 - 31
1m 7.1s	0m 39.2s	
1m 6.8s	0m 39.6s	
1m 6.0s	0m 38.8s	
1m 5.5s	0m 38.7s	
1m 6.3s	0m 38.4s	
31.2s	193.7s	
1m 6.24s	0m 38.74s	0m 27.70

Dec. of
+54°1832 =
+54° 28.0

+54°1831
= +54° 29.5

Log 27.70 = 1.44248
" 7.5 = 0.87506
" cos. δ = 9.76417

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1888phae.proj.1832.

+53° 345 351 and 355 (B.45 142)

345–51 345–55

345		351		355	
42	36.3	43	35.0	44	35.5
43	59.1	44	42.1	45	38.1
86	35.4	88	17.1	90	13.6
				1m	41.7
				3m	38.2
46	25.0	47	23.2	48	23.6
47	47.1	48	30.3	49	26.4
94	12.1	95	53.5	97	50.0
				1m	41.4
				3m	37.9
50	1.0	50	58.5	52	0.2
51	22.6	52	6.7	53	2.6
101	23.6	103	5.2	105	2.8
				1m	41.6
				3m	39.2
53	39.0	54	35.9	55	38.0
55	0.8	55	44.8	56	40.5
108	39.8	110	20.7	112	18.5
				1m	40.9
				3m	38.7
57	1.0	57	58.2	59	0.0
58	22.8	59	6.9	60	1.7
115	23.8	117	5.1	119	1.7
				1m	41.3
				3m	37.9
					206.9'
					191.9'
				1m	41.38'
				3m	38.38'
				0m	50.69'
				1m	49.19'



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1888phae.proj.1062

Δ 345	351	355	345+51	345−55
1m 22.8'	1m 7.1'	1m 2.6'	2m 29.9	20.2
1m 22.1'	1m 7.1'	1m 2.8'	2m 29.2	19.3
1m 21.6'	1m 8.2'	1m 2.4'	2m 29.8	19.2
1m 21.8"	1m 8.9"	1m 2.5'	2m 30.7	19.3
1m 21.8' / 110.1'	1m 8.7' / 40.0'	1m 1.7' / 12.0'	2m 30.5	20.1
1m 22.02	1m 8.00	1m 2.40'	2m 30.02'	19.62'

Dec. of
+53° 35 1 =
+53° 18.5 ✓

+53° 35 5 =
+53° 23.9 ✓

+53° 34 5
Dec. = +53° 22.3 ✓

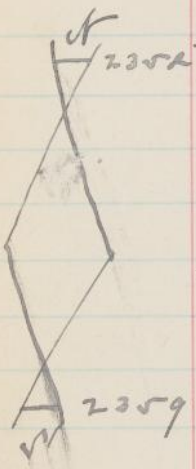
Log 150.02 = 2.17615 ✓
7.5 = 0.87506 ✓
cos δ = 9.77602 ✓
671.8 ✓ = 2.82723 ✓
886.0
214.2 = +3' 34.2" ✓

19.62 = 1.29270 ✓
7.5 = 0.87506 ✓
cos δ = 9.77556 ✓
87.8 ✓ = 1.94832 ✓
−1' 27.8" ✓

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1888phae.proj.1832.

+50° 2358 and 2359 (R 48, 42)



	2358	2359	2359 − 58
21h	2m 56.1	3m 49.0	
	3m 13.0	4 7.4	
	6m 9.1	7m 56.4	1m 47.3'
	4 40.4	5 33.3	
	4 57.5	5 51.6	
	9m 37.9'	11m 24.9'	1m 47.0'
	6 24.3	7 16.6	
	6 41.0	7 35.0	
	13m 5.3'	14m 51.6'	1m 46.3'
	8 5.7	8 59.0	
	8 23.6	9 17.0	
	16m 29.3'	18m 16.0'	1m 46.7'
	9 47.7	10 41.1	
	10 5.4	10 59.1	
	19 53.1'	21 40.2'	1m 47.1'
			234.4'
			1m 46.88'
			0m 53.44'

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1888phae.proj.1832.

A 2358	A 2359	2058+59
+ 0m 16.9'	+0m 18.4'	
0m 17.1'	0m 18.3'	
0m 16.7'	0m 18.4'	
0m 17.9'	0m 18.0'	
0m 17.7'	0m 18.0'	
86.3',	91.1'	
0m 17.26'	0m 18.22'	0m 35.48'

Dec. of
+50°2358 =
+50° 31.0

+50°2359
=+50° 13.3

Log 35.48 = 1.54998'
" 7.5 = 0.87506'
" cos. δ = 9.80470'

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1888phae.proj.1832.

+51° 2171 and 2172 (R48, 49)

	2171	2172	2172 − 71
2h.	28m 58.7	29 18.3	
	30 6.0	30 24.1	
	59m 4.7'	59m 42.4'	0m 37.7'
	30 53.5	31 13.0	
2171	32 0.7	32 19.0	
2172	62m 54.2'	63m 32.0'	0m 37.8'
	32 49.1	33 8.5	
	33 56.5	34 14.7	
	66m 45.6'	67m 23.2'	0m 37.6'
	34 54.0	35 13.3	
	36 1.4	36 19.7	
	70m 55.4'	71m 33.0'	0m 37.6'
	36 49.1	37 8.7	
	37 56.7	38 15.0	
	74m 45.8'	75m 23.7'	0m 37.9'
			188.6'
			0m 37.72'
			0m 18.86'

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1888phae.proj.1832.

42171	42172	2171–72
1m 7.3'	1m 5.8'	
1m 7.2'	1m 6.0'	
1m 7.4'	1m 6.2'	
1m 7.4'	1m 6.4'	
1m 7.6'	1m 6.3'	
36.9'	31.7'	
1m 7.38'	1m 6.14	0m 1.24'

Dec. of
+51°2171 =
+51° 39.4

Log 1.24 = 0.09342'
" 7.5 = 0.87506'
" cos. δ = 9.79282 59'

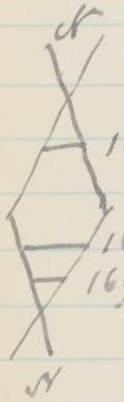
+51°2172
= +51° 39.3

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1888phae.proj.1832.

+53° 1697, 1698 and 1699 (R48,46)

	1697	1698	1699	1698−9.7	1698−9.8
19h.	52m 37.4	53 18.6	54 54.0		
	52 51.5	53 29.8	55 25.0		
	105 28.9	106m 48.4	110m 19.0	1m 19.5	−3m 30.6
	56 8.2	56 49.3	58 24.8		
	56 21.5	57 0.2	58 56.0		
	112m 29.7	113m 49.5	117m 20.8	1m 19.8	−3m 31.3
	59 44.4	60 24.9	62 0.3		
	59 57.5	60 36.5	62 32.5		
	119m 41.9	121 1.4	124m 32.8	1m 19.5	−3m 31.4
20h	3 24.9	4 5.0	5 40.5		
	3 37.1	4 17.4	6 13.5		
	7m 2.0	8m 22.4	11m 54.0	1m 20.4	−3m 31.6
	6 53.4	7 33.0	9 8.2		
	7 5.3	7 45.6	9 41.9		
	13m 58.7	15m 18.6	18m 50.1	1m 19.9	−3m 31.5
				99.1	156.4
				1m 19.82	−3m 31.28
				0m 39.91	−1m 45.64



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1888phae.proj.1832.

Δ 1697	Δ 1698	Δ 1699	1698+97	1699−98
0^m 14.1′	0^m 11.2′	0^m 31.0′		
0^m 13.3′	0^m 10.9′	0^m 31.2′		
0^m 13.1′	0^m 11.6′	0^m 32.2′		
0^m 12.2′	0^m 12.4′	0^m 33.0′		
0^m 11.9′	0^m 12.6′	0^m 33.7′		
64.6′	58.7′	161.1′		
0^m 12.92′	0^m 11.74′	0^m 32.22′	0^m 24.66′	0^m 20.48′

Dec. of

+53° 16 97 = +53° 23.5

+53° 16 99 = +53° 12.8

+53° 16 98 = +53° 10.8

Log 24.66 = 1.39199′ 20.48 = 1.31133′

" 7.5 = 0.87506 7.5 = 0.87506

" cos. δ = 9.77662′ cos. δ = 9.77756′

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1888phae.proj.1832.

+54° 1831, 1832, and 1834 (R48, 48)

	1831	1832	1834	1831-1832	1831-34
20h	44 43.2	45 0.1	46 45.8		
	45 41.7	45 31.0	47 4.0		
	90m 24.9'	90m 31.1'	93m 49.8'	−0m 6.2'	−3m 24.9'
1A34	47 49.0	48 6.0	49 51.7		
	48 47.8	48 37.4	50 10.0		
1A31	96m 36.8'	96m 43.4'	100m 1.7'	−0m 6.6'	−3m ~~24.9~~ ~~18.8~~'
1A32					
	52 1.0	52 18.0	54 4.5		
	53 0.5	52 50.0	54 22.0		
	105m 1.5'	105m 8.0'	108m 26.5'	0m 6.5'	3m 25.0'
	55 10.9	55 27.7	57 14.5		
	56 10.0	55 59.9	57 31.5		
	111m 20.9'	111m 27.6'	114m 46.0'	0m 6.7'	3m 25.1'
	58 13.0	58 30.0	60 17.4		
	59 13.0	59 2.5	60 34.0		
	117m 26.0'	117m 32.5'	120m 51.4'	0m 6.5'	3m ~~25.4~~ ~~18.3~~'
				32.5'	~~25.0.3~~ ~~18.X~~ 25.0.6'
				−0m 6.50'	−3m ~~23.74~~
				−0m 3.25'	−1m ~~41.87~~ 42.53'

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1888phae.proj.1832

41831	41832	41834	1831-32	1831+34
0m 58.5'	0m 30.9'	0m 18.2'		
0m 58.8'	0m 31.4'	0m 18.8'		
0m 59.5'	0m 32.0'	0m 17.5'		
0m 59.1'	0m 32.2'	0m 17.0'		
1m 0.0'	0m 32.5'	0m 16.6'		
295.9'	0m 159.0'	87.6'		
0m 59.18'	0m 31.80'	0m 17.52'	0m 27.38'	1m 16.70'

Dec. of
+54° 18 32 = +54° 28.0

+54° 18 34 = +54° 29.9

+54° 1831 = +54° 29.5

Log 27.38 = 1.43743'
" 7.5 = 0.87506'
" cos. δ = 9.76417

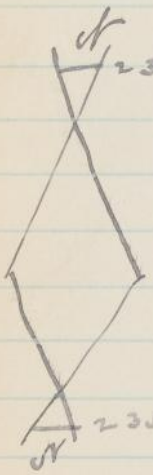
76.70 = 1.88480'
7.5 = 0.87506'
cos. δ = 9.76 [illegible]

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1888phae.proj.1832.

+50° 2358 and 2359 (R 48, 52)

	2358	2359	2359 − 58
21h.	16m 51.0	17 46.7	
	17 10.5	18 2.8	
	34m 1.5	35m 49.5'	1m 48.0'
	18 34.8	19 30.5	
	18 54.6	19 46.1	
	37m 29.4'	39m 16.6'	1m 47.2'
	20 23.2	21 19.0	
	20 43.5	21 54.8	
	41m 6.7'	42m 53.8'	1m 47.1'
	21 58.1	22 54.5	
	22 18.5	23 10.0	
	44m 16.6'	46m 4.5'	1m 47.9'
	23 38.5	24 34.5	
	23 58.7	24 49.8	
	47m 37.2'	49m 24.3'	1m 47.1'
			237.3'
			1m 47.46'
			0m 53.73'



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1888phae.proj.1832

A2358 A2359 2358+59

+0m 19.5' +0m 16.1'

0m 19.8' 0m 15.6'

0m 20.3' 0m 15.8'

0m 20.4' 0m 15.5'

0m 20.2' 0m 15.3'
100.2' 78.3'

0m 20.04' 0m 15.66' 0m 35.70'

Dec of .
+50° 23 58 =
+50° 31.0

Log. 35.70 = 1.55267'
" 7.5 = 0.87506'
" Cod. δ = 9.80470'

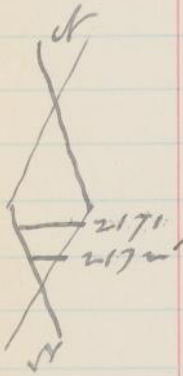
+50° 2359
= +50° 13.3

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1888phae.proj.1832.

+51° 2171 and 2172 (R 48, 54)

	2171	2172	2172 − 71
21h	48m 32.9	48 52.5	
	49 38.5	49 57.0	
	98m 11.4	98 49.5	0m 38.1
	50 22.5	50 48.3	
	51 29.5	51 48.0	
	101m 53.0	102m 31.3	0m 38.3
	52 20.8	52 40.0	
	53 26.5	53 45.0	
	105m 47.3	106m 25.0	0m 38.7
	54 22.1	54 41.7	
	55 28.1	54 46.5	
	109m 50.2	109m 28.2	0m 38.0
	56 16.8	56 36.5	
	57 23.0	57 41.5	
	113m 39.8	114m 18.0	0m 38.2
			19 10.3
			0m 38.26
			0m 19.13



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1888phae.proj.1832.

2181 2172 2171-72

1m 5.6' 1m 4.5'

~~m 6.0~~

1m 6.0' 1m 4.7'

1m 5.7' 1m 5.0'

1m 6.0' 1m 4.8'

1m 6.2' 1m 5.0'

22.5' 24.0'

1m 5.90' 1m 4.80' m 1.10'

Dec. of

+51° 2171 =

+51° 39.4

Log 1.10 = 0.04139

" 7.5 = 0.87506

" cos. δ = 9.79266

+51° 2172 =

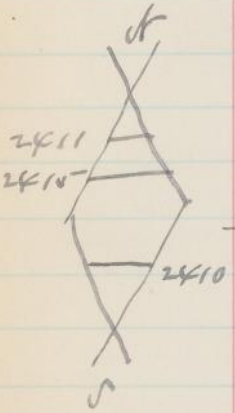
+51° 39.3

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1888phae.proj.1832.

+50°2410, 2411, and 2415 (R 48, 56)

	2410	2411	2415	2411–10	2411–15
22h	10m 31.4	11 2.0	11 34.1		
	11 25.0	11 51.4	12 27.5		
	21m 56.4	22m 53.4	24m 1.6	0m 57.0	−1m 8.2 / −2m 5.2
	12 57.5	13 28.7	14 1.0		
	13 51.3	14 17.6	14 53.6		−1m 8.3 / −2m 5.8
	26m 48.8	27m 46.3	28m 54.6	0m 57.5	
	15 30.0	16 1.5	16 33.5		
	16 23.9	16 50.0	17 26.0		−1m 8.0 / −2m 5.6
	31m 53.9	32m 51.5	33m 59.5	0m 57.6	
	17 55.5	18 27.0	18 59.0		
	18 49.9	19 15.8	19 51.0		−1m 7.7 / −2m 4.6
	36m 45.4	37m 42.3	38m 50.0	0m 56.9	
	20 24.3	20 56.1	21 28.4		
	21 18.7	21 44.0	22 20.0		−1m 8.8 / −2m 5.4
	41m 43.0	42m 40.1	43m 48.4	0m 57.1	
				286.1	26.6 / 40.5″
				0m 57.22	−2m 5.32 / −1m 8.10″
				0m 28.61	−1m 2.66 / −0m 34.05″



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1888phae.proj.1832.

Δ 2410	Δ 2411	Δ 2415	2411+10	2415−11
0m 53.6′	0m 48.4′	0m 53.4′		
0m 53.8′	0m 48.9′	0m 52.6′		
0m 53.9′	0m 48.5′	0m 52.5′		
0m 54.4′	0m 48.3′	0m 52.0′		
0m 54.4′	0 47.9′	0m 51.6′		
270.1′	244.0′	262.1′		
0m 54.02′	0m 48.80′	0m 52.42′	1m 42.6′	0m 3.82′

Log. 102.6 = 2.01123′
" 7.5 = 0.87506
" cos. δ = 9.80498′

3.82 = 0.58206′
= 0.60428
7.5 = 0.87506
cos. δ = 9.80489′

Dec. of
+50° 24.0 =
+50° 17.2

+50° 24.15 =
+50° 23.6

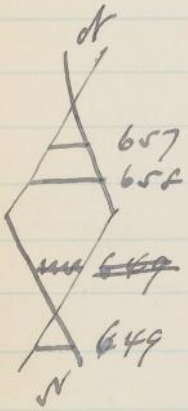
+50° 24.11 =
+50° 20.5

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1888phae.proj.1832.

+51° 649, 657 and 658 (1848, 65)

	649	658	657	658−49	658−57
21h.	15 30.2	17 17.4	17 22.5		
	15 48.2	17 57.0	17 46.7		
	31m 18.4	35m 14.4	35m 9.2	+3m 56.0	+0m 5.2
	18 36.9	20 43.5	20 28.7		
	18 55.0	21 3.3	20 53.0		
	37m 31.9	41m 26.8	41m 21.7	3m 54.9	0m 5.1
	21 30.2	23 17.1	23 22.5		
	21 48.5	23 37.4	23 46.6		
	43m 18.7	47m 14.5	47m 9.1	3m 55.8	0m 5.4
	24 26.9	26 14.0	26 19.4		
	24 45.5	26 34.0	26 43.6		
	49m 12.4	53m 8.0	53m 3.0	3m 55.6	0m 5.0
	29 24.7	31 11.3	31 17.0		
	29 43.3	31 32.1	31 41.9		
	59m 8.0	63m 3.4	62 58.9	3m 55.4	0m 4.5
				277.7	25.2
				3m 55.54	0m 5.04
				+1m 57.77	+0m 2.52



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1888phae.proj.1832

Δ649	Δ658	Δ657	-658+649	658-657
	+		−	
0m 18.0	0m 39.6	0m 24.2	-21.6	+15.4
0m 18.1	0m 39.8	0m 24.3	-21.7	+15.5
0m 18.3	0m 40.3	0m 24.1	-22.0	+16.2
0m 18.6	0m 40.0	0m 24.2	-21.4	+15.6
0m 18.6	0m 40.8	0m 24.9	-22.2	+15.9
91.6	208.5	121.7		
0m 18.32	0m 40.10	0m 24.34	- 0m 21.78	0m 15.76

Dec. of
+51°649 =
+51° 58.6

+51°657 =
+51° 54.7

+51° 56.2
Dec = +51° 56' 6"

Log. -21.78" = 1.33406
7.5" = 0.87506
cos δ = 9.74997
-100.7" = 2.00309
776.0"
776.3 = 13' 56.3"

15.76" = 1.19756
7.5" = 0.87506
cos δ = 9.79024
72."9 = 1.86290
1' 12.9"

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1888phae.proj.1832.

+51° 750 and 751 (R 48, 68)

	750	751	750 − 751′
21h	56 25.3	56 43.6	
	57 21.7	57 7.4	
	113m 47.0′	113m 51.0′	−0m 4.0′
750	57 57.2	58 15.0	
751	58 52.8	58 39.2	
	116m 50.0′	116m 54.2′	−0m 4.2′
	59 20.8	59 38.4	
22h.	0 16.0	0 2.6	
	119m 36.8′	119m 41.0′	−0m 4.7′
	1 15.2	1 33.5	
	2 11.7	1 57.9	
	3m 26.9′	3m 31.4′	−0m 4.5′
	5 27.0	5 45.5	
	6 23.5	6 9.7	
	11m 50.5′	11m 55.2′	−0m 4.7′
			22.1′
			−0m 4.42′
			−0m 2.21′

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1888phae.proj.1832

4750 4751 " 750-751

$\overset{m}{0}$ 56.4' $\overset{m}{0}$ 23.8'

$\overset{m}{0}$ 55.6' $\overset{m}{0}$ 24.2'

$\overset{m}{0}$ 55.7' $\overset{m}{0}$ 24.2'

$\overset{m}{0}$ 56.5' $\overset{m}{0}$ 24.4'

$\overset{m}{0}$ 56.5' $\overset{m}{0}$ 24.2'

280.7' 120.8'

$\overset{m}{0}$ 56.14 $\overset{m}{0}$ 24.16' $\overset{m}{0}$ 31.98'

Red. of
+51° 75' =
+51° 48.4

+51° 750
=+51° 45.4

log 31.98 = 1.50488'

" 7.5 = 0.87506'

" cos δ = 9.79146'

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1888phae.proj.1832.

+51° 817, 818 (B48, 70)

	817	818	818−17
21h.	24 53.6	25 17.9	
	25 35.5	26 15.0	
	50m 29.1'	51m 32.9'	1m 3.8'
	26 55.8	27 20.5	
	27 37.7	28 16.8	
	54m 33.5'	55m 37.3'	1m 3.8'
	29 2.5	29 27.0	
	29 44.5	30 23.3	
	58m 47.0	59m 50.3'	1m 3.8'
	31 2.6	31 27.4	
	31 44.6	32 24.1	
	62m 47.2'	63m 51.5'	1m 4.3'
	33 8.4	33 32.8	
	33 50.5	34 29.6	
	66m 58.9'	68m 2.4'	1m 3.5'
			18.7
			1m 3.74'
			0m 4.87'



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4817	4818	818 − 817

$\bar{o}^m$ 41.9′ $\bar{o}$ 57.1″

o^m 41.9′ $\bar{o}$ 56.3″

$\bar{o}^m$ 42.0′ $\bar{o}^m$ 56.3″

$\bar{o}^m$ 42.0′ $\bar{o}^m$ 56.7″

$\bar{o}^m$ 42.1′	$\bar{o}^m$ 56.8′	
209.9′	283.2′	
$\bar{o}^m$ 41.98′	$\bar{o}^m$ 56.64′	$\bar{o}^m$ 14.66″

Dec. ℓ

+51°817 =

+51° 4.7

+51°8.18

= +51° 8.4

log 14.66 = 1.16613′

" 7.5 = 0.87506′

" cos. δ = 9.79825′

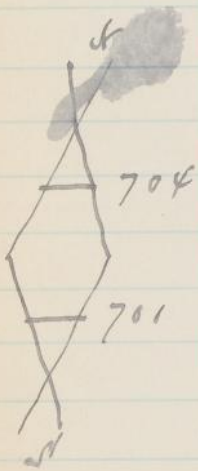
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1888phae.proj.1832.

+55° 701 and 704 (R4887)

701 − 704

701	704	704 − 701
20h 11m 50.0	13 44.9	
12 33.2	14 38.7	− 3 50.4
24 23.2	28 23.6	1m 0.4
	24 13.6	



15 0.6	16 55.6	
15 44.0	17 39.9	
30 44.6	34 35.5	3m 50.9
18 15.2	20 9.8	
18 58.5	20 54.3	
37 13.7	41 4.1	3m 50.4
21 44.0	23 38.5	
22 26.6	24 23.1	
44 10.6	48 1.6	3m 51.0
25 0.4	26 54.1	
25 42.7	27 39.8	
50 43.1	54 33.9	3m 50.8
		263.8
		3m 52.40
		1m 56.35
		3.5
		− 3 50.70
		Mean = − 1 55.35

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~~4701~~ ~~4704~~ ~~704 + 701~~

	0~ 43.2	
~~0m 43.2~~	~~0m 43.8~~	~~47.0~~
0m 43.4	0m 44.3	47.7
0m 43.3	0m 44.5	47.4
0m 42.6	0m 44.6	47.2
0m 42.3	0m 45.7	44.0
~~214.8~~	~~934.9~~	
~~0m 42.96~~	~~0m 46.58~~	~~0m 3.62~~
		37.7

Dec. of
+55°704 =
+55° 15.9
+55° 701
Dec = +55° 7.2"

~~26" = 0.55471"~~
~~7.5 = 0.47506"~~
~~cos δ =~~

47.54 = kmm.

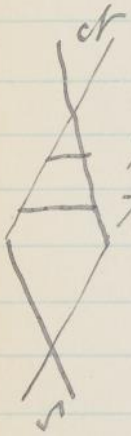
47.54 = 1.94221"
7.5 = 0.47506"
cos δ = 9.78649"
37.42 = 2.57376"
46.0
11.2 = 4' 31.2"

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+52° 753 and 757 (R48,89)

	753	757	757−53
21h	3m 29.0	4 5.0	
	4 37.0	4 27.1	
	8 6.0	8 32.1	0m 26.1
	4 58.5	5 24.5	
	6 6.8	5 56.9	
	11m 5.3	11 31.4	0m 26.1
	8 1.2	8 37.0	
	9 10.0	9 0.0	
	17 11.2	17 37.0	0m 25.8
	9 35.4	10 1.5	
	10 44.9	10 35.1	
	20 20.3	20 46.6	0m 26.3
	11 9.3	11 45.2	
	12 18.8	12 9.0	
	23 28.1	23m 54.2	0m 26.1
			130.4
			0m 26,08
			0m 13.04



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~~4753~~ ~~4757~~ ~~753-57~~

1m 8.0' 0m 22.1'

1m 8.2' 0m 22.4'

1m 8.8' 0m 23.0'

1m 9.5' 0 23.6'

1m 9.5' 0m 23.8'

~~41.1'~~ 14.9'

1m 8.~~42~~ 0m 22.98' 0m ~~45.84'~~

Dec. of

+52° 753 =

+52° 24.8

+52° 757 =

+52° 27.7

Log ~~8.44~~ 45.84' = 1.66124'

" 7.5 = 0.87506

" Cos. δ = 9.78507'

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1888phae.proj.1832.

+52° 750, 752 and 758 (R48,91)

	750	752	758	758-750	758-52,
21h	20m 17.6	21 7.7	22 7.9		
	21 16.9	21 27.0	22 45.6		
	41 34.5'	42m 34.7'	44 53.5'	3m 19.0'	2m 18.8'
	23 13.6	24 4.0	25 4.1		
	24 13.4	24 23.5	25 42.0		
	47 27.0'	48 27.5'	50m 46.1'	3m 19.1'	2m 18.6'
	26 13.3	27 2.3	28 2.9		
	27 12.2	27 22.0	28 40.5		
	53m 24.5'	54m 24.3'	56m 43.4'	3m 18.9'	2m 17.1'
	29 13.2	30 3.5	31 4.0		
	30 13.5	30 24.0	31 42.4		
	59 26.7'	60 27.5'	62 46.4'	3m 19.7'	2m 18.9'
	32 11.9	33 2.1	34 2.7		
	33 12.9	33 22.9	34 41.5		
	65 24.8'	66 25.0'	68m 44.2'	3m 19.4'	2m 19.2'
				96.1'	94.6'
				3m 19.22'	2m 18.92'
				1m 39.61'	1m 9.46'



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Δ750	Δ752	Δ758	758−52	750−58
0m 59.3′	0m 19.3′	0m 37.7′		
0m 59.8′	0m 19.5′	0m 37.9′		
0m 59.9′	0m 19.7′	0m 37.6′		
1m 0.3′	0m 20.5′	0m 38.4′		
1m 1.0′	0m 20.8′	0m 38.8′		
300.3′	99.8′	190.4′		
60.06′	19.96′	38.08′	18.12′	21.98

Dec. of

+52° 750 =
+52° 52.3

+52° 752 =
+52° 55.3

+52° 758 =
+52° 54.0

Log 18.12 = 1.25816′
" 7.5 = 0.87506
" Cos δ = 9.78037′

21.98 = 1.34203′
7.5 = 0.87506
Cos. δ = 9.78060

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1888phae.proj.1832.

+54° 809, 818 and 819 (B48, 93)

	809	818	819	818−809	819−18
21h	49m 10.1	–	51 25.0		
	50 18.5		52 15.4		
	99 28.6'		103 40.4'	4m 11.8'	
	54 16.5	56 4.0	56 30.9		
	55 22.5	56 59.8	57 18.6		
	109 39.0'	113 3.8'	113 49.5'	4m 10.5'	0m 45.7'
	58 9.4	59 57.1	60 24.0		
	59 16.2	60 54.0	61 13.0		
	117 25.6'	120 51.1'	121 37.0'	4m 11.4'	9m 45.9'
22h	1 59.9	3 47.5	4 14.1		
	3 7.0	4 44.5	5 3.5		
	5m 6.9'	8 32.0'	9m 17.6'	4m 10.7'	0m 45.6'
	5 32.4	7 19.8	7 47.0		
	6 40.0	8 17.9	8 36.5		
	12 12.4	15 37.5'	16 23.5'	4m 11.1'	0m 46.0'
				55.5	183.2'
				4m 11.1'	0m 45.80'
				2m 5.55'	0m 22.90'

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1809	1818	1819	809-19	818-19
1m 8.4'		0m 50.4		
1m 6.0'	0m 55.8'	0m 47.7		
1m 6.8'	0m 56.9'	0m 49.0		
1m 7.1'	0m 57.0'	0m 49.4		
1m 7.6'	0m 57.9'	0m 49.5		
35.9'	227.6'	246.0'		
1m 7.18'	0m 56.90'	0m 49.20'	0m 17.98'	0m 7.70'

Decrease

+54° 809 = +54° 32.4

+54° 818 = +54° 32.7

+54° 819 = +54° 33.5

Log 17.98 = 1.25479'

" 7.5 = 0.87506'

" cos δ = 9.76342'

7.70 = 0.88649'

7.5 = 0.87506

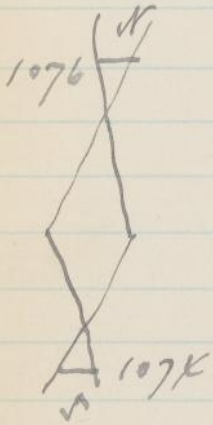
Log cos. δ = 9.76340'

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1888phae.proj.1832.

+50° 1074 and 1076 (B48,95)

	1074	1076	1076 − 74
22h	35m 14.0	35 56.0	
	35 37.4	36 7.0	
	70m 51.4'	72m 3.0'	1m 11.6'
	36 28.2	37 10.2	
	36 51.5	37 21.3	
	73 19.7'	74 31.5'	1m 11.8'
	37 48.6	38 31.2	
	38 12.5	38 42.3	
	76 1.1'	77 13.5'	1m 12.4'
	39 6.1	39 48.0	
	39 29.1	39 59.5	
	78 35.2'	79 47.5'	1m 12.3'
	40 25.0	41 6.5	
	40 48.0	41 18.0	
	81 13.0'	82 24.5'	1m 11.5'
			59.6'
			1m 11.92'
			0m 35.96'



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1888phae.proj.1832

Δ1074	Δ1076	1074+1078
+	+	
0^m 23.4′	0^m 11.0′	
0^m 23.3′	0^m 11.1′	
0^m 23.9′	0^m 11.1′	
0^m 23.0′	0^m 11.5′	
0^m 23.0′	0^m 11.5′	
116.6′	56.2′	
0^m 23.32′	0^m 11.24′	0^m 34.56′

Dec. of
+50°1074 =
+50°15.9

+50°1076
= +50° 22.1

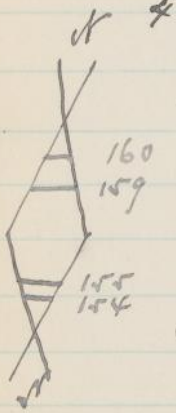
log. 34.56 = 1.538574″
" 7.5 = 0.875061′
" cos. δ = 9.804433°

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1888phae.proj.1832.

+50° 154, 155, 159, 160 (R45, 89)

	155	154	159	155−54	155−159
4h	23 9.3	23 30.5	23 53.3		
	24 6.9	23 42.6	24 40.0		
	47 16.2	47 13.1	48 33.3	+0m 3.1	−1m 17.1
	29 28.2	29 49.4	30 12.5		
	30 26.1	30 1.6	30 58.9		
	59 54.3	59 51.0	61 11.4	0m 3.3	1m 17.1
	32 15.0	32 36.2	32 59.8		
	33 13.3	32 49.0	33 45.9		
	65 28.3	65 25.2	66 45.7	0m 3.1	−1m 17.4
	36 4.1	36 25.6	36 45.5		
	36 59.0	36 34.2	37 34.8		
	73 3.1	72 59.8	74 20.3	0m 3.3	1m 17.2
				12.8	68.8
				+0m 3.20	−1m 17.20
				+0m 1.60	−0m 38.60



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Δ155	Δ154	Δ158	155−54	155+58
0m 57.6'	0m 12.1'	0° 46.7'	45.5	1m 44.3
0m 57.9'	0m 12.2'	0° 46.4'	45.17	1m 44.3
0m 58.3'	0m 12.8'	0° 46.1'	45.5	1m 44.4
0m 54.9'	0m 8.6'	0° 42.3'	46.3	1m 44.2
228.7	45.7	188.5		
0m 57.17'	0m 11.42'	0° 47.12'	0m 45.75'	1m 44.29'

Dec. of

+50° 15.4 =
+50° 25.0 ✓

+50° 15.9 =
+50° 25.5

+50° 15.5
Dec. +50° 25.7" ✓

45.7 ✓ = 1.66039 ✓
7.5 = 0.47506 ✓
cos δ = 9.40399 ✓
214.5" ✓ = 2.33944 ✓
+3' 34.5"

104.29 = 2.01826 ✓
7.5 = 0.47506 ✓
cos δ = 9.40316 ✓
49.1" ✓ = 2.69648 ✓
46.0
34.9 = −6' 24.9" ✓

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1888phae.proj.1832.

+50° 154, 155, 159, 160 (R45, 89) Oow.

155–160

	155		160	
4h	23	9.3 r	24	14.4 r
	24	6.9 v	24	21.0 r
	47	16.2	48	35.4

−1m 19.2 .



	29	28.2 r	30	33.0 r
	30	26.1 v	30	39.5 v
	59	54.3	61	12.5

1m 18.2 .

	32	15.0 v	33	20.1 r
	33	13.8 v	33	26.5 r
	65	28.3	66	46.6

1m 18.3 .

	36	4.1 v	37	6.0 r
	36	59.0 v	37	15.5 r
	73	3.1	74	21.5

1m 18.4 .

74.1 .

−1m 18.52 .

−0m 39.26 .

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1888phae.proj.1832.

Δ155	Δ160	155+160
$\overset{m}{0}$ 57.6	0^m 6.6	1^m 4.2
$\overset{m}{0}$ 57.9	0^m 6.5	1^m 4.4
$\overset{m}{0}$ 58.3	0^m 6.4	1^m 4.7
$\overset{m}{0}$ 54.9	$\overset{m}{0}$ 9.5	$\overset{m}{1}$ 4.4
228.7	29.0	
$\overset{m}{0}$ 57.17	$\overset{m}{0}$ 7.25	$\overset{m}{1}$ 4.42

Dec. of
+50°160 =
+50° 38.7

+50° 155
Dec. = +50° 2 8.7

64.42 = 1. 4 0.90 ν
7.5 = 0.47 ν 0.6 ν
100 = 9.40 ν 9.5 ν
306.9 ν = 2.X 4 7 0 3 ν
446.0 ν
579.1 ν = −9′ 39.″1 ν

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+58° 345, 351, 355 (R45, 179)

	345	351	355	345 − 351	345 − 351
5h	44 51.8	45 34.5	46 51.2		
	45 58.5	46 58.3	47 37.4		
	.90 50.3	92 32.8	94 28.6	1m 42.5	3m 38.8
	48 5.4	48 47.3	50 4.4		
	49 11.5	50 11.8	50 50.7		
	.97 16.9	98 58.6	100 55.1	1m 41.7	3m 38.2
	55 43.7	56 24.6	57 42.9		
	56 48.6	57 49.5	58 28.0		
	.112 32.3	114 14.1	116 10.9	1m 41.8	3m 38.6
	59 28.8	60 8.4	61 27.7		
6h	0 32.9	1 33.8	2 12.4		
	.120 1.7	121 42.2	123 40.1	1m 40.5	3m 38.4
	5 54.8	6 34.1	7 53.9		
	6 58.3	8 0.3	8 37.8		
	.12m 53.1	14 34.4	16 31.7	1m 41.3	3m 38.6
				207.8	192.1
				1m 41.56	3m 38.42
				0m 50.78	−1m 49.21

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Δ 345 Δ 351 Δ 355 351+45 345−55

I^m 6.7' I 23.8' O 46.2'

I^m 6.1' I^m 24.0' O 46.3'

I^m 4.9' I 24.9' O 45.1'

I^m 4.1' I 25.4' O 44.7'

I^m 3.5' I 26.2' O 43.9'

95.3' 124.3' 226.2'

I^m 5.06' I^m 24.86' O 45.24' 2^m 29.92' O 19.82'

Dec of

+58°35.1 =

+58° 18.5 ✓

+53°35.5 =

+58°23.9 ✓

+5° 34.5

Dec = +5° 22.3 ✓

149.9 ✓ = 2.17546 ✓

7.5 ✓ = 0.87506 ✓

cos δ = 9.77602 ✓

671.3 ✓ = 2.82694 ✓

46.0

214.7 ✓ = +3' 34.7 ✓

19.82 = 1.29710 ✓

7.5 = 0.87506 ✓

cos δ = 9.77556 ✓

84.7 ✓ = 1.94772

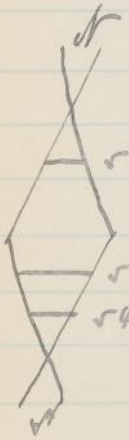
− 1' 24.7 ✓

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+52° 542, 546, 548 (R45 180)

542	546	548	546−542	546−548
6h 26 24.0	27 3.5	27 7.6		
26 41.4	27 39.1	28 9.6		
53 5.4	54 42.6	55 17.2	+1m 37.2'	−0m 34.6'
28 28.0	29 6.0	29 10.4		
28 44.2	29 42.8	30 13.0		
57m 12.2	58 48.8	59 23.4	1m 36.6'	0m 34.6'
30 54.8	31 40.7	31 45.0		
31 19.3	32 9.6	32 40.0		
62 14.1	63 50.3	64 25.0	1m 36.2'	0m 34.7'
33 6.2	33 52.6	33 56.6		
33 34.5	34 21.4	34 52.1		
66 40.7	68 14.0	68 48.7	1m 33.3'	0m 34.7'
35 22.4	36 8.1	36 12.5		
35 46.8	36 37.1	37 7.8		
71 9.2	72 45.2	73 20.3	1m 36.0'	0m 35.1'
			179.3'	173.7'
			+1m 35.86	−0m 34.74'
			+0m 47.93'	−0m 17.37



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1888phae.proj.1832

4542	4546	4548	546+42	548−46
17.4'	35.6'	2.0'	53.0	26.4
16.2'	36.8'	2.6'	53.0	25.8
24.5'	28.9'	55.0'	53.4	26.1
28.3'	28.8'	55.5'	57.1	26.7
24.4'	29.0'	55.3'	53.4	26.3
110.8'	159.1'	170.4'		
22.16'	31.82'	58.08'	53.98' ~~9.66~~	26.26'

Dec. of

+52° 54 2 =
+52° 26.4 ✓

+52° 54 8 =
+52° 17.4 ✓

+52° 54 6

Dec. = +52° 15.2" ✓

53.9 ✓ = 1.73223 ✓
7.5 ✓ = 0.87506 ✓
cos ∆ = 9.78492 ✓
247.3" ✓ = 2.39321 ✓
846.0
634.7 = −10' 34.7" ✓

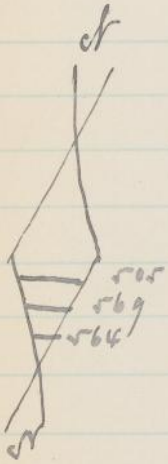
26.26 = 1.41929 ✓
7.5 ✓ = 0.87506 ✓
cos ∆ = 9.78668 ✓
120.5" ✓ = 2.08103 ✓
− 2' 0.5" ✓

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1888phae.proj.1832.

+52°564, 569, and 53°505 (R45 185)

	+52°564	569	53°505	569-64	569-505
5h	43m 46.2	45 32.0	44 25.1		
	44 14.7	46 14.8	45 49.0		
	88 0.9	91 46.8	90 14.1	43m 45.9	1m 32.7
	47 16.9	49 2.2	47 55.2		
	47 45.4	49 45.0	48 19.8		
	95 2.3	98 47.2	97 15.0	3m 44.9	1m 32.2
	51 25.1	53 10.3	52 8.3		
	51 53.5	53 53.9	53 28.0		
	103 18.6	107 4.2	105 31.3	3m 45.6	1m 32.9
	54 46.1	56 31.2	55 24.5		
	55 15.0	57 15.1	56 49.4		
	110 1.1	113 46.3	112 13.9	3m 45.2	1m 32.4
	57 45.4	59 31.1	58 28.8		
	58 14.7	60 14.5	59 42.7		
	116 0.1	119 45.6	118 13.5	3m 45.5	1m 32.1
				227.1'	162.3'
				+3m 45.42	+1m 32.46'
				+1m 52.71'	+0m 46.23



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1888phae.proj.1832

4564	4569	4505	569−64	569−505 / ~~505−69~~
0m 28.5s	0° 42.8′	1m 23.9s	14.3v	41.1v
0m 28.5s	0° 42.8′	1m 24.6s	14.3v	41.8v
0m 28.4s	0° 43.6′	1m 24.7s	15.2v	41.1v
0m 28.9s	0° 43.9′	1m 24.9s	15.0v	41.0v
0m 29.3s	0° 43.4′	1m 25.9s	14.1v	42.5v
143.6′	216.5′	124.0′		
0m 28.72s	0° 43.30′	1m 24.80s	0m 14.58s	0m 41.50s

Dec. of
+52°564 =
+52°58.0v

+53°505 =
+53°2.1

+52°569
Dec = +52° 57′ 7″

14.5t = 1.16376v
7.5 = 0.87506v
cos δ = 9.77973v
65.8v = 1.81855v
+1′ 5.2″v

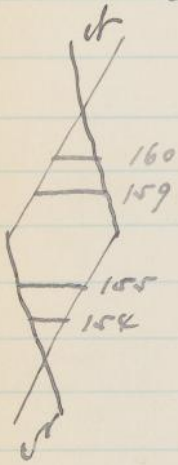
41.50 = 1.61805v
7.5 = 0.87506v
cos δ = 9.77940v
147.3v = 2.27251v
− 3′ 7.3″v

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1888phae.proj.1832.

+50° 154, 155, 159, 160 (R45, 178)

	155*	155	159	155 − 154	~~154 − 159~~	155 − 159
5h	3m 25.8	3 47.2	4 6.5			
	4m 19.7	3 56.0	4 56.0			
	7m 45.5	7 43.2	9 2.5	+0m 2.3	~~7m 19.2~~	−1m 17.0
	5 40.6	6 1.9	6 22.0			
	6 35.0	6 11.0	7 11.3			
12	15.6	12 12.9	13 33.3	+0m 2.7	~~7m 20.4~~	1 17.7
	8 10.2	8m 31.7	8 51.6			
	9 4.7	8 40.6	9 41.1			
17	14.9	17 12.3	18 32.7	+0m 2.6	~~7m 20.4~~	1 17.8
	10 14.4	10 35.8	10 55.7			
	11 9.0	10 ~~44.8~~	11 45.1			
21	23.4	21 20.6	22 40.8	+0m 2.8	~~7m 20.2~~	1 17.4
	12 36.1	12 57.5	13 17.6			
	13 30.8	13 7.0	14 7.1			
26	6.9	26 4.5	27 24.7	+0m 2.4	~~7m 20.2~~	1 17.8
				12.8	100.5	1 17.54
				2m 2.56	~~7m 20.10~~	−3.77
				+0m 1.28	~~0m 40.05~~	



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4155	4154	4152	155−54	155+59
0m 53.9	0s 8.8	0m 49.5	45.1	1m 43.4
0m 54.4	0m 9.1	0m 49.3	45.3	1m 43.7
0m 54.5	0s 8.9	0m 49.5	45.6	1m 44.0
0m 54.6	0m 9.0	0m 49.4	45.6	1m 44.0
0m 54.7	0m 9.5	0m 49.5	45.2	1m 44.2
272.1	45.3	247.2		
0m 54.42	0m 9.06	0m 49.44	0m 45.36	1m 43.86

Dec. of
+50°154 =
+50° 25.0

+50° 159 =
+50° 35.5

+50° 155
Dec. = +50° 24.7

45.36 = 1.65667
7.5 = 0.87506
cos δ = 9.80399
216.6" = 2.33572
+3' 36.6"

103.46 = 2.01647
7.5 = 0.87506
cos δ = 9.80314
491.1" = 2.69469
246.0
390.9 = −6' 30.9"

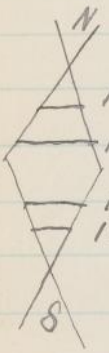
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1888phae.proj.1832.

+50, 155, 154, 159, 160 (R45 178) Cont.

155 – 160

	155	160	
5	3 25.8	4 27.1	
	4 19.7	4 37.0	
	7 45.5	9 4.1	1m 18.6.



	5 40.6	6 42.4	
	6 35.0	6 52.0	
R	15.6	13 34.4	1m 18.8.

	8 10.2	9 12.0	
	9 47	9 21.3	
	17 14.9	18 33.3	1m 18.4.

	10 14.4	11 16.6	
	11 9.0	11 25.6	
	21 23.4	22 42.2	1m 18.8.

	12 36.1	13 38.5	
	13 30.8	13 47.2	
	26 6.9	27 25.7	1m 18.8.
			93.4

– 1m 18.68

– 0m 39.34

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1888phae.proj.1832.

A155 A160 155+160

$\overline{0}^m 53.9^s \quad \overline{0}^m 9.9^s \quad T^m 3.8$

$\overline{0}^m 54.4^s \quad \overline{0}^m 9.6^s \quad T^m 4.0$

$\overline{0}^m 54.5^s \quad \overline{0}^m 9.3^s \quad T^m 3.8$

$\overline{0}^m 54.6^s \quad \overline{0}^m 9.0^s \quad T^m 3.6$

$\overline{0}^m 54.7^s \quad \overline{0}^m 8.7^s \quad T^m 3.4$

$272.1^s \quad 46.5^s$

$\overline{0}^m 54.42^s \quad \overline{0}^m 9.30^s \quad T^m 3.72^s$

Dec. of
+50° 16' =
+50° 38.7"

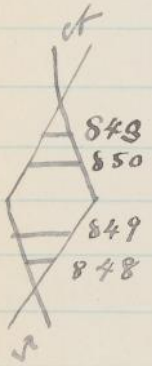
+50° 15'
Dec. = +50° 38.7"

$63.7'' = 1.0442'$ ✓
$\cos\delta = 0.87506$ ✓
$\cos\delta = 9.94029$ ✓
$303.6'' = 2.48229'$ ✓
$\frac{446.0''}{582.4''} = 9' 42.4''$ ✓

1888phae.proj.1832.

Feb. 2. 1844. (Rec. 130)

+ r3' PK3. PKA. PK9. Pr0.



	PKA	PK3	PK9	848 − 843
22h	7m 3A.r	r m Kr.0 r	7m 2K9 r	
	8 ~~49.2~~ r	6 1KK r	8 2A9 r	
	15 ~~57.7~~ 47.7	11 59.4	15 53.8	+3m ~~58.3~~ 48.3
	12 K.r r	10 10,r r	11 r0A r	
	12 35.0 r	10 40.r r	12 rKr r	
	24 39.5	20 51.0	24 45.3	3m 48.5
	16 27.1 r	1K 32.r r	16 13.r r	
	16 r7.2 r	1r 3.r r	17 16.7 r	
	33 24.3	29 35.7	33 40.2	3m 48.6
	20 r2.r r	18 r7.K r	20 39.0 r	
	21 22.0 r	19 24.9 r	21 K1.3 r	
	42 14.5	38 26.3	42 20.3	3m 48.2
	25 r5.1 r	23 r4.9 r	25 K1.r r	
	26 23.r r	2K 31.6 r	26 K3.0 r	
	52 18.6	48 30.5	52 24.5	3m 48.1
				~~251.7~~
				3m ~~50.84~~
				~~1m 56.17~~
				3m 1.7
				3m 48.34
				1m 54.17

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848 - 849	Δ 848	Δ 843	Δ 849	848 + 843	848 - 849
0m 6.1 ~~2.9~~	0m ~~30.7~~ 40.7	0m 29.4	1m 4.0		
0m 5.8 ~~4.2~~	0m 30.5	0m 30.0	1m 3.7		
0m 5.9 ~~4.1~~	0m 30.1	0m 31.3	1m 3.2		
0m 5.8	0m 29.5	0m 31.5	1m 2.3		
0m 5.4	0m 28.4	0m 32.7	1m 1.5	1m 0.82	0m 33.10
~~27.2~~	149.2	154.9	14.7		
~~0m 5.46~~	0m 29.84	0m 30.98	1m 2.94		
~~0m 2.73~~					
24.5					
0m 4.90					
0m 2.45					

Dec. of +53°843 = +53° 17.1

+53° 848 = +53° 7.7

+53° 849 = +53° 10.1

Log 60.82 = 1.78405

" 7.5 = 0.87506

" cos. δ = 9.77738

33.1 = 1.51983

7.5 = 0.87506

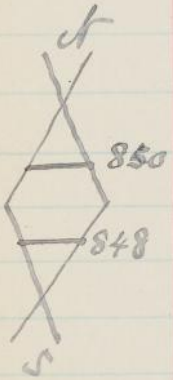
cos. δ = 9.77797

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1888phae.proj.1832.

Oct. 2. 12h. (R 44. 131)

+53° 44. 43. 49. 51.



44.	51.	848–850
22h 7m 34.1s	4m 56.1s	
4 49.2	9 27.3	
15 57.7 ·	18 23.4 ·	−2m 35.7s −1 17.85
4		
12 47.5	13 22.0	
12 35.0	13 53.6	
24 39.5 ·	27 15.6 ·	−2m 36.1s −1 18.05
16 27.1	17 43.9	
16 57.2	18 16.5	
33 24.3 ·	36 0.4 ·	−2m 36.1s −1 18.05
20 52.5	22 AA	
21 22.0	22 42.5	
42 14.5 ·	44 51.3 ·	−2m 36.8s −1 18.40
25 55.1	27 10.5	
26 23.5	27 44.5	
52 18.6 ·	54 55.0 ·	−2m 36.4s −1 18.20
		90.55
		−1m 18.110

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1888phae.proj.1832

1848	1850	848 − 850
0 30.7′	31.2′	
30.5′	31.6′	
30.1′	32.6′	
29.5′	33.7′	
28.4′	34.0′	
149.2′	163.1′	
m 0 29.84′	m 0 32.62′	m 0 2.78′

Dec. of +53°848
= +53° 7.7

Log 2.78 = 0.44404
" 7.5 = 0.87506
" cos. δ = 9.77~~5~~725

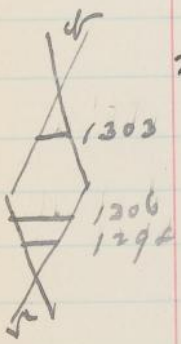
+53° 850
= +53° 18.6

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1888phae.proj.1832.

Oct. 11. 1888.

+49° 1303. 1298. 1306.



	1303	1298	1306	1303–1298	1303–1306
23h	4m 55.4s	3m 51.5s	5m 26.5s		
	5 54.4s	4 32.2s	6 41.5s		
	10 50.1'	8 23.7'	12 8.0'	2 20.4'	−1 17.9'
	9 41.0s	8 37.3s	10 11.9s		
	10 39.9s	9 23.4s	11 26.5s		
	20 20.9'	18 0.7'	21 38.4'	2 20.2'	−1 17.5'
	14 47.5s	13 44.4s	15 14.6s		
	15 46.1s	14 29.9s	16 33.0s		
	30 33.6'	28 14.3'	31 51.6'	2 19.3'	−1 18.0'
	18 35.9s	17 32.4s	19 7.5s		
	19 35.1s	18 14.5s	20 21.9s		
	38 11.0'	35 51.2'	39 29.4'	2 19.7'	−1 18.4'
	22 49.0s	21 46.4s	23 21.5s		
	23 49.5s	22 31.6s	24 35.0s		
	46 38.5'	44 18.4'	47 56.5'	2 20.1'	−1 18.0'

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1888phae.proj.1832

Δ 1303	Δ 1298	Δ 1306	1303+1298	1303+1306
58.7′	46.7′	I^m 15.0′	I^m 45.4′	2^m 13.7′
58.9′	44.1′	I^m 14.6′	I^m 45.0′	2^m 13.5′
58.6′ ~~59.2~~	45.5′	I^m 14.4′	I^m 44.1′	2^m 13.0′
59.2′	45.9′	I^m 14.4′	I^m 44.9′	2^m 13.6′
60.5′	44.8′	I^m 13.5′	I^m 45.3′	2^m 14.0′
			224.7′	67.8′
			I^m 44.94′	2^m 13.56′

Dec. +49°1303 = +49°57.0′

Dec. +49°1298 = +49°50.7′

Dec. +49°1306 = +49°51.6′

Log. 104.94 = 2.02094′ 133.56 = 2.12568′

" 7.5 = 0.87506′ 7.5 = 0.87506′

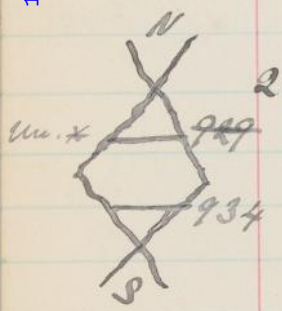
" Col. V = 9.80900′ Col. V = 9.80893′

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1888phae.proj.1832.

Oct 15, 1888

+53° Unv.* ~~Unv.*~~ and ~~934~~ (R. 48, 160)



	929	934	929-934
22h	16m 25.5s	16 56.3	
	16 36.5	17 15.0	
	33 2.0	34 11.3	−1m 9.3 −0m 34.65
	17 46.9	18 23.4	
	18 3.6	18 35.4	
	35 50.5	36 58.8	−1m 8.3 −0m 34.15
	19 4.5	19 41.0	
	19 21.3	19 53.7	
	38 25.8	39 34.7	−1m 8.9 −0m 34.45
	20 21.5	20 57.6	
	20 38.0	21 10.3	
	40 59.5	42 7.9	−1m 8.4 −0m 34.20
	21 40.0	22 16.4	
	21 56.8	22 29.0	
	43 36.8	44 45.4	−1m 8.6 −0m 34.30
			171.75
			−0m 34.35
	189 17 4.6		
22h	19m 11.5s		

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1888phae.proj.1832

Δ929	Δ934	Mn.* +934
11.0'	18.7'	29.7'
16.7'	12.0'	28.7'
16.8'	12.7'	29.5'
16.5'	12.7'	29.2'
16.8'	12.6'	29.4'
		146.5'
		m 29,30'

Dec. +53°934
= +53° 24.3

Log 29.30 = 1.46687
7.5 = 0.87506
" cos δ = 9.77536
131.0 = 2.11729
46.
7 5 .0 = +12 35.0
53° 24.3
53 36.9

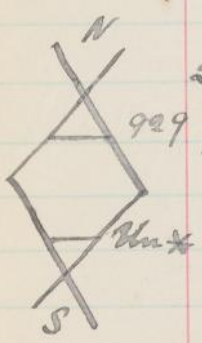
1.46647
0.87506
9.77321
130.4 = 2.11514
46.0
7 5 .6 = +12 35.6

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1888phae.proj.1832.

Oct 15, 1888

D. M. +53° 929 and Un.* (R 48, 162)



929	Un.*	929 − Un.*
$22^h\ 30\ 35.9$	31 45.4	
31 5.1	32 26.9	
61 41.0'	64 12.3'	$-2^m\ 31.3'$ $-1^m\ 15.65'$
33 14.8	34 24.5	
33 44.6	35 6.0	
66 59.4'	69 30.5'	$-2^m\ 31.1'$ $-1^m\ 15.55'$
45 57.4	47 9.1	
46 29.3	47 48.0	
92 26.7'	94 57.1'	$-2^m\ 30.4'$ $-1^m\ 15.20'$
49 8.6	50 21.0	
49 41.5	50 59.8	
98 50.1'	101 20.8'	$-2^m\ 30.7'$ $-1^m\ 15.35'$
52 16.8	53 29.9	
52 50.0	54 7.6	
105 6.8'	107 37.5'	$-2^m\ 30.7'$ $-1^m\ 15.35'$
56 16.2	57 30.2	
56 50.1	58 7.6	
113 6.3'	115 37.8'	$-2^m\ 31.5'$ $-1^m\ 15.75'$
		$92.85'$
535 190.3'		$-1^m\ 15.46'$
$22^h\ 44\ 50.86'$		

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1888phae.proj.1832

Δ 929	Δ Nw.*	929+Nw.*
29.2'	41.5'	1m 10.7'
29.8'	41.5'	1m 11.3'
31.9'	38.9'	1m 10.8'
32.9'	38.8'	1m 11.7'
33.2'	37.7'	1m 10.9'
33.9'	37.4'	1m 11.3'
		66.7'
		1m 11.12'

Dec. +53° 929
= +53° 46.8'

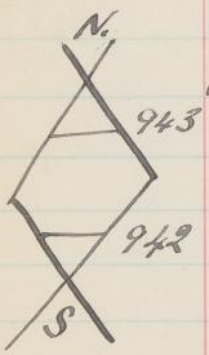
Log. 71.12 = 1.85199'
7.5 = 0.87506'
1 cos. δ = 9.77850'

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1888phae.proj.1832.

Oct 15, 1888

D. M. +54° 942 & 943 (R 48, 164)



	943	942	943 − 942	
0^h	12 9.0	12 24.3		
	13 3.2	12 41.2		
	25 12.2′	25 5.5′	0^m 6.7′	3.35′
	13 33.4	13 48.8		
	14 28.8	14 5.8		
	28 2.2′	27 54.6′	0^m 7.6′	3.80′
	15 9.2	15 24.6		
	16 ~~23.9~~ 13.1	15 41.0		
	31 ~~23.1~~′	31 5.6′	0^m 7.5′	3.75′
	16 40.5	16 56.5		
	17 35.9	17 12.6		
	34 16.4′	34 9.1′	0^m 7.3′	3.65′
	18 18.0	18 33.4		
	19 13.3	18 50.5		
	37 31.3′	37 23.9′	0^m 7.4′	3.70′
				18.25′
				0^m 3.65′

15 5 75.2′

0^h 15^m 37.5^s

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1888phae.proj.1832

Δ 943	Δ 942	943+942
54.2′	16.9′	I^m 11.1′
55.4′	17.0′	I^m 12.4′
54.7′	16.4′	I^m 11.1′
55.4′	16.1′	I^m 11.5′
55.3′	17.1′	I^m 12.4′
		58.5′
		I^m 11.70′

Dec. +54°942
= +54° 24.0

Dec. +54°943
= +54° 35.4

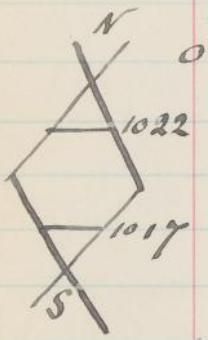
Log 71.70 = 1.85552
4 7.5 = 0.87506
" cos. δ = 9.76400

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1888phae.proj.1832.

Oct 15, 1888

D.M. +55° 1017 and 1022. (R48, 166)



	1017	1022	1017 − 1022
	$0^h\ 27\ 44.5$	30 19.5	
	28 49.6	30 42.5	
	56 34.1′	61 2.0′	$-4^m\ 27.9'$ $\quad -2^m\ 13.95'$
	31 21.4	33 55.9	
	32 25.3	34 19.5	
	63 46.7′	68 15.4′	$-4^m\ 28.7'$ $\quad -2^m\ 14.35'$
	34 59.7	37 34.1	
	36 3.7	37 57.4	
	71 3.4′	75 31.5′	$-4^m\ 28.1'$ $\quad -2^m\ 14.05'$
	38 31.9	41 5.9	
	39 35.3	41 29.6	
	78 7.2′	82 35.5′	$-4^m\ 28.3'$ $\quad -2^m\ 14.15'$
	42 8.7	44 44.4	
	43 13.9	45 7.3	
	85 22.6′	89 51.7′	$-4^m\ 29.1'$ $\quad -2^m\ 14.55'$
			$71.05'$
			$-2^m\ 14.21'$

$35\ 3^m\ 114.0'$

$0^h\ 35^m\ 29.4'$

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1888phae.proj.1832

Δ 1017	Δ 1022	1017 + 1022
1m 5.1'	23.0'	1m 28.1'
1m 3.9'	23.6'	1m 27.5'
1m 4.0'	23.3'	1m 27.3'
1m 3.4'	23.7'	1m 27.1'
1m 5.2'	22.9'	1m 28.1'
		138.1'
		1m 27.62'

Dec. +55° 10' 17"
= +55° 4.0'

Dec. +55° 10' 22"
= +55° 12.8'

Log 87.62 = 1.94260
" 7.5 = 0.87506
" cos. δ = 9.75707

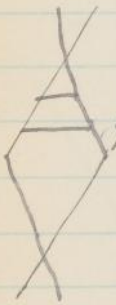
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1888phae.proj.1832.

Oct. 17, 1888.

D. M. +53° 958, b 961 (R 48, 168)

	958	961	958–961	
22h	42m 43.5s	44 41.8s		
	44 9.4s	45 12.9s		
	86 52.9'	89 54.7'	−3m 1.8'	−1m 30.90'
	45 49.0s	47 47.1s		
	47 15.5s	48 19.0s		
	93 4.5'	96 6.1'	−3m 1.6'	−1m 30.80'
	48 46.6s	50 45.0s		
	50 13.6s	51 17.0s		
	99 0.2'	102 2.0'	−3m 1.8'	−1m 30.90'
	51 53.4s	53 51.5s		
	53 21.1s	54 24.0s		
	105 14.5'	108 15.5'	−3m 1.0'	−1m 30.50'
	54 53.0s	56 51.2s		
	56 21.5s	57 24.0s		
	111 14.5'	114 15.2'	−3m 0.7'	−1m 30.35'
				153.45'
				−1m 30.690'



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Δ 958	Δ 961	958-961
1m 25.9'	31.1'	54.8'
1m 26.5'	31.9'	54.6'
1m 27.0'	32.0'	55.0'
1m 27.7'	32.5'	55.2'
1m 28.5'	32.8'	55.7'
		275.3'
		55.06'

Dec. +53° 958
= +53° 52.8'

+53° 961 =
+53° 56.9'

Log. 55.06 = 1.74084'
" 7.5 = 0.87506'
" cos δ = 9.77012'

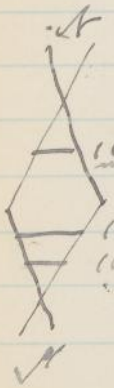
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1888phae.proj.1832.

Oct 17, 1888.

D. M. +52° 1020, 1023, 1024 (B48, 169)

	1020	1023	1024	1020−1023	1020−1024
23h	19m 11.3s	20 35s	20 11.2s		
	19 36.1s	20 56.0s	21 26.0s		
	38 47.4′	40 59.5′	41 37.2′	−2m 12.1′	−2m 49.8′



	22 5.2s	22 57.5s	23 4.9s	
	22 30.5s	23 50.0s	24 20.0s	
	44 35.7′	46 47.5′	47 24.9′	−2m 11.8′	−2m 49.2′
	24 48.9s	25 41.8s	25 49.4s	
	25 15.0s	26 33.7s	27 3.9s	
	50 3.9′	52 15.5′	52 53.3′	−2m 11.6′	−2m 49.4′
	27 28.8s	28 21.5s	28 29.5s	
	27 55.1s	29 13.1s	29 43.5s	
	55 23.9′	57 34.6′	58 13.0′	−2m 10.7′	−2m 49.1′
	30 9.6s	31 2.5s	31 10.0s	
	30 35.2s	31 54.5s	32 24.7s	
	60 44.8′	62 57.0′	63 34.7′	−2m 12.2′	−2m 49.9′
	32 50.3s	33 44.1s	33 52.0s	
	33 17.6s	34 35.0s	35 5.2s	
	66 7.9′	68 19.1′	68 57.2′	−2m 11.2′	−2m 49.3′
				69.6′	296.7′
				−2m 11.6′	−2m 49.45′
				−1m 58.0′	−1m 24.73′

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1888phae.proj.1832

Δ1020	Δ1023	Δ1024	1020+1023	1020+1023
24.8'	52.5'	1m 14.8'	1m 17.3'	1m 39.6'
25.3'	52.5'	1m 15.1m	1m 17.8'	1m 40.4'
26.1'	51.9'	1m 14.5'	1m 18.9'	1m 40.6'
26.3'	51.6'	1m 14.0'	1m 17.9'	1m 40.3'
25.6'	52.0'	1m 14.7'	1m 17.9'	1m 40.3'
27.3'	50.9'	1m 13.2'	1m 18.2'	1m 40.5'
			106.8'	241.7'
			1m 17.80'	1m 40.28'

Dec. +52° 1020 = +52° 37.5

Dec. +52° 1023 = +52° 19.2

Dec. +52° 1024 = +52° 21.0

Log 77.80 = 1.89098' 100.28 = 2.00121'.

" 7.5 = 0.87506 7.5 = 0.87506

" cos δ = 9.78471' cos. δ = 9.78458'

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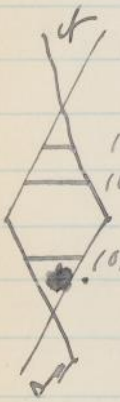
1888phae.proj.1832.

Oct 17, 1888.

D.M. +55° 1044, 1045, & 1049 (R. 48, 171)

	1045	1044	1049	1045-1044	1045-1049
23h	45 3.8 v	45 19.7 v	46 52.1 v		
	45 50.6 v	45 53.2 v	47 13.0 v		
	90 54.4 v	90 52.9 v	94 5.1 v	+1.5 v	
				~~-10.5~~ -3 10.7 v	
	48 18.1 v	48 34.0 v	50 5.9 v		
	49 4.5 v	48 47.7 v	50 27.5 v	+0.9 v	
	97 22.6 v	97 21.7 v	100 33.4 v	~~-9.1~~ -3 10.8 v	
	50 50.8 v	51 6.6 v	52 38.9 v		
	51 37.6 v	51 20.4 v	52 59.8 v		
	102 28.4 v	102 27.0 v	105 38.7 v	+1.4 v -3 10.3 v	
	53 31.3 v	53 47.0 v	55 19.0 v		
	54 17.4 v	54 1.0 v	55 40.5 v		
	107 48.7 v	107 48.0 v	110 59.5 v	+0.7 v -3 10.8 v	
	56 17.7 v	56 33.0 v	58 5.2 v		
	57 4.0 v	56 47.1 v	58 27.0 v		
	113 21.7 v	113 20.1 v	116 32.2 v	+1.6 v -3 10.5 v	

	6.1 s	53.1 s
mean =	0m 1.22 s	-3m 10.62 s
	0m .61 s	-1m 35.31 s



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1888phae.proj.1832.

Δ1045	Δ1044	Δ1049	1045+1044	1045+1049
46.8′	13.5′	20.9′	60.3′	67.7′
46.4′	13.7′	21.6′	60.1′	68.0′
46.8′	13.8′	20.9′	60.6′	67.7′
46.1′	14.0′	21.5′	60.1′	67.6′
46.3′	14.1′	21.8′	60.4′	68.1′
			30 1.5′	339.1′
			60.30′	67.82′

Dec. +55° 1044 = +55° 17.8′

Dec. +55° 1045 = +55° 8.0′

Dec. +55° 1049 = +55° 17.7′

Log	60.30 = 1.78032′	67.82 = 1.83136′
"	7.5 = 0.87506′	7.5 = 0.87506′
" cos. δ	= 9.75626′	cos. δ = 9.75629′

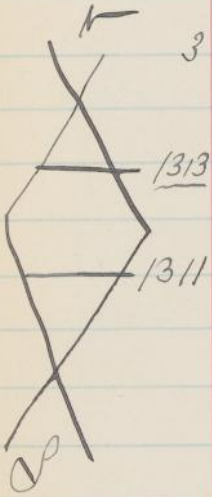
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1888phae.proj.1832.

New Series of Observations.

Jan. 9, 1890

Dm. +51° 1313 and +51° 1311



	1313		1311		1313 − 1311			
3	25	50.2	24	53.6				
	26	25.9	25	21.0				
	52	16.1	50	14.6	2	1.5	1	0.75
1313								
1311	29	4.4	28	6.7				
	29	39.0	28	34.5				
	58	43.4	56	41.2	2	2.2	1	1.10
	40	56.0	39	59.5				
	41	31.5	40	26.8				
	82	27.5	80	26.3	2	1.2	1	0.60
	43	21.5	42	25.0				
	43	57.0	42	52.5				
	87	18.5	85	17.5	2	1.0	1	0.50
	45	27.5	44	31.4				
	46	3.5	44	58.6				
	91	31.0	89	30.0	2	1.0	1	0.50
								3.45'
							+ 1	0.69'

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1888phae.proj.1832

A 1313	A 1311	
35.7	27.4	63.1
34.6	27.8	62.4
35.5	27.3	62.8
35.5	27.5	63.0
36.0	27.2	63.2

4.5

62.90

Log. 62.90 = 1.79865

" 7.5 = 0.87506

" cos. α = 9.79663

295.3' = 2.47034

886.0'

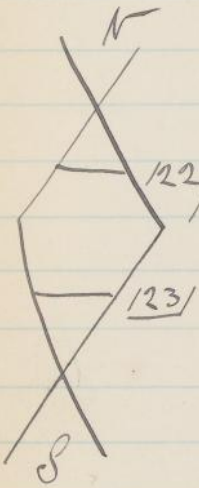
590.7 = +9 50.7

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1888phae.proj.1832.

Jan. 9 1890

Dm. +52° 1231 and 1229



	1231		1229				
4h	0	44.0	0	22.5			
	1	53.0	1	29.5			
	2	37.0	1	52.0	0	45.0	0 22.50
	2	42.0	2	20.5			
	3	51.0	3	27.5			
	6	33.0	5	48.0	0	45.0	0 22.50
	4	37.5	4	16.0			
	5	46.2	5	22.9			
	10	23.7	9	38.9	0	44.8	0 22.40
	6	47.4	6	25.9			
	7	56.3	7	33.0			
	14	43.7	13	58.9	0	44.8	0 22.40
	8	47.1	8	26.4			
	9	56.6	9	33.4			
	18	43.7	17	59.8	0	43.9	

1.80 :
+ 0 22.45'

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1888phae.proj.1632

6 79.0	67.0	136.0
69.0	67.0	136.0
68.7	66.9	135.6
68.9	67.1	136.0
~~69.5~~	~~67.0~~	~~136.5~~

3.6'
135.90'

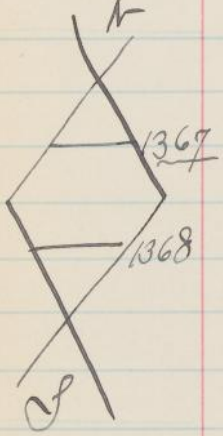
Log 135.90 = 2.13322'
" 7.5 = 0.87506'
" cos 2 = 9.78723'
624.5' = 2.79551
886.0
261.5 = − 4 21.5'

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1888phae.proj.1832.

Jan. 9 1890

Dm. +52° 1367 and 1365

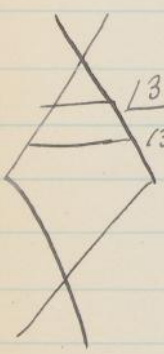


	1367	1365		
4	22 1.2	21 37.8		
	22 39.4	22 16.9		
	44 40.6	43 54.7	o 45.9′	o 22.95′
	23 39.2	23 ~~39.2~~ 15.1		
	24 16.6	23 55.0		
	47 ~~57.8~~ 56.3	47 10.1	o ~~47.7~~ 46.2	o 22.85
	26 21.1	25 56.5		
	26 58.3	26 37.0		
	53 19.4	52 33.5	o 45.9	o 22.95

2.75′

+ o 22.92′

Dm. +52 1367 and 1368



	1367	1368		
4	28 10.7	28 4.5		
	28 48.0	29 44.6		
	56 ~~48.7~~ 58.7	57 49.1	o ~~59.4~~ 50.4	o ~~29.70~~ 25.20

— o ~~29.70~~ 25.20

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1888phae.proj.1832

~~Δ1367~~ Δ1365

~~38.2~~

38.2' 39.1' 77.3'

37.4 39.9 77.3

37.2 40.5 77.7

1.3'

77.43'

Log .7743 = 1.88891'

" 7.5 = 0.87506'

" cos ~~2~~ = 9.78676'

355.4' = 2.55073

886.0

530.6 = +8 50.6'

37.3 40.1 2.8

Log 2.8 = 0.44716'

" 7.5 = 0.87506

" cos ~~2~~ = 9.78620'

+12.8' = 1.10842

+ 0 12.8'

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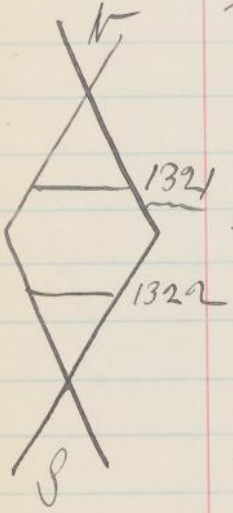
1888phae.proj.1832.

Jan. 9, 1890

Dm. +53° 1321 & 1322

	1321		1322					
4 h	42	50.2	44	20.5				
	43	33.2	45	4.2				
	86	23.4'	89	24.7'	3	1.3'	1	30.65'
	45	34.4	47	4.5				
	46	17.3	47	47.9				
	91	51.7	94	52.4	3	0.7	1	30.35
	48	22.5	49	51.8				
	49	4.9	50	36.4				
	97	27.4	100	28.2	3	0.8	1	30.40

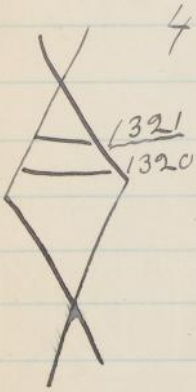
1,40
− 1 30.47'



Dm. +53° 1321 & 1320

	1321		1320					
4	55	13.5	55	10.6				
	55	49.0	55	48.0				
	111	2.5	110	58.5	0	4.0'	0	2.0'

+ 0 2.0'



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1888phae.proj.1832

1321 1322

43.0' 43.7' 86.7'

42.9 43.4 86.3

42.4 44.6 87.0

2.0

86.67'

Log 86.67 = 1.93787'
" 7.5 = 0.87506
" cos 2 = 9.77708
389.05 = 2.59001
886.0
497.0 = +8 17.0'

35.5' 37.5' 2.0'

Log 2.0 = 0.30103'
" 7.5 = 0.87506
" cos 2 = 9.77637
9.0 8.96 = 0.95246
+ 0' 9.0"

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1888phae.proj.1832.

Jan. 9 1890

Dm. +55° 1344 & 1345

	1344		1345					
5	29	48.5	31	17.0				
	30	54.2	32	26.0				
	60	42.7	63	43.0	3	0.3	1	30.15
	32	59.8	34	27.5				
	34	4.9	35	37.5				
	67	4.7	70	5.0	3	0.3	1	30.15
	36	7.4	37	36.1				
	37	13.6	38	45.2				
	73	21.0	76	21.3	3	0.3	1	30.15
							− 1	30.15



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1888phae.proj.1832

65.7′ 69.0′ 134.7′

65.1′ 70.0 135.1

66.2 69.1 135.3

0.1

135.03′

Log 135.03 = 2.13043′

" 7.5 = 0.87506

" cos α = 9.75785

579.9′ = 2.76334′

1886.0

306.1 = + 5′ 6.1′

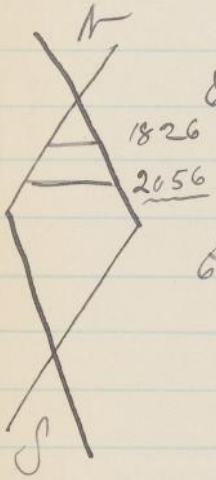
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1888phae.proj.1832.

Jan. 9 1890

Dec. +49°2056 & +50°1826

	+49°2056	+50°1826			
5	57 5.0	58 34.4			
	58 22.5	58 50.2			
	115 27.5	117 24.6	1	57.1	0 58.55



	59 ~~30.0~~ ~~50.0~~	60 59.0			
δ	60 47.7	61 15.5			
	120 87.7	122 14.5	1	26.8	0 ~~48.40~~ 58.40
	1				

6	1 48.3	3 17.6			
	2 6.2	3 34.0			
	3 54.5	6 51.6		57.1	

~~0.95~~

~~0 48.48~~

.95

~~0 58.48~~

	1 48.3	3 17.6			
	3 6.2	3 34.0			
	4 54.5	6 51.6	1	57.1	0 58.55

1.50

0 58.50

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1888phae.proj.1832

77.5′ 15.8′ 61.7′

~~7~~ 57.7 16.5 61.2

77.9 16.4 61.5

1.4

61.47′

log. 61.47 = 1.78866′

" 7.5 = 0.87506

" cos α = 9.80813

296.4′ = 2.47185

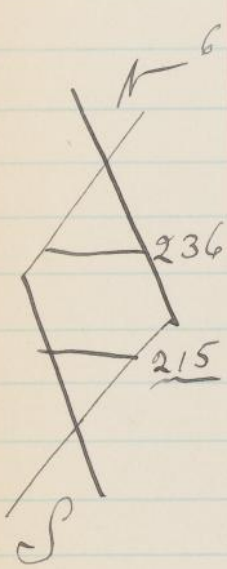
− 4′ 56.4

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1888phae.proj.1832.

Jan. 9, 1890

Dm. +54° 215 & +55° 236



	215	236		
21	19.2	20 37.4		
22	28.0	21 57.5		
43	47.2	42 34.9	1 12.3	0 36.15
23	47.0	23 5.5		
24	56.5	24 25.5		
48	43.5	47 31.0	1 12.5	0 36.25
				+ 0 36.20

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1888phae.proj.1832

68.8 80.1 148.9

69.5 80.0 149.5
0.4
149.20

Log 149.20 = 2. 17377
" 7.5 = 0.87506
" cos δ = 9.75823
641.3 = 2.78206
605.7
886.0
280.3 = − 4 40.3
244.7 = − 4 4.17

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1888phae.proj.1832.

Jan. 17 1890

Dm. +55° 1045 and 1049

	1045	1049		
5	17 32.1	9 0.4		
	7 59.0	9 41.7		
	15 31.1	18 42.1	3 11.0	1 35.50
	10 41.9	12 9.9		
	11 8.9	15 51.0		
	21 50.8	28 0.9	3 10.1	1 35.05
	13 20.8	14 49.2		
	13 48.8	15 30.4		
	27 9.6	30 19.6	3 10.0	1 35.00
	15 48.3	17 16.5		
	16 14.9	17 57.1		
	32 3.2	35 13.6	3 10.4	1 35.20
	18 28.9	19 57.2		
	18 55.2	20 37.8		
	37 24.1	40 35.0	3 10.9	1 35.45
				1.2.0
				-1 35.24

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1888phae.proj.1832.

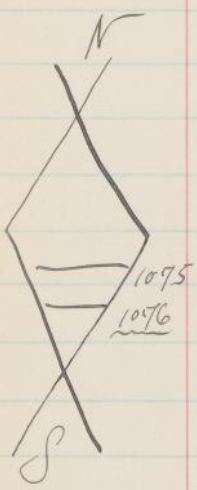
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1888phae.proj.1832.

Jan. 17, 1890

Dm. +50° 1076 and 1075

	1076		1075	
5	45	0.5	44	36.6
	45	33.9	45	32.0
	90	34.4	90	8.6
	49	6.7	48	42.8
	49	41.4	49	39.2
	98	48.1	98	22.0
	50	41.8	50	17.1
	51	15.1	51	12.9
	101	56.9	101	30.0
	52	30.0	52	5.5
	53	58.4	53	56.2
	106	28.4	106	1.7
	57	8.8	56	44.2
	57	32.1	57	29.9
	114	40.9	114	14.1



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1888phae.proj.1832

33.4 55.4 22.0

34.7 56.4 21.7

33.3 55.8 22.5

28.4 50.7 22.3

23.3 45.7 22.4

0.9

22.18

Log 22.18 = 1.34596

" 7.5 = 0.87506

" cos 2 = 9.80305

105.7 = 2.02407

− 1′ 45.7

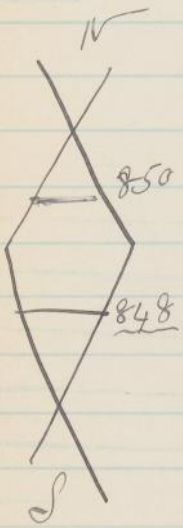
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1888phae.proj.1832.

Jan. 17 1890

Dm. + 53° 8 48 & 8 50

	8 48		8 50	
6h	21	17.1	22	25.3
	21	38.8	23	5.8
	42	55.9	45	31.1
	24	51.4	26	59.3
	25	12.9	26	40.5
	50	4.3	53	39.8
	27	3.4	28	11.8
	27	25.2	28	52.8
	29	43.0	30	51.2
	30	4.3	31	32.0
	32	59.0	33	7.5
	32	21.9	33	48.5



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1848	1850		
21.7	40.5	~~18.8~~	62.2
21.5	41.2	~~19.7~~	62.7
21.8	41.0	~~19.2~~	62.8
21.3	40.8	~~19.5~~	62.1
22.9	41.0	~~18.1~~	63.9
		0.3	3.7
		19.06	62.74

~~log~~ 19.06 = 1.280072

u 7.5 = 0.87506

u cos 2 = 9.77728

= 1.93246

~~85.6~~

~~8860~~

~~80014~~ = = 13204

62.74 = 1.79754

7.5 = 0.87506

cos 2 = 9.77728

281.8 = 2.44988

886.0

604.2

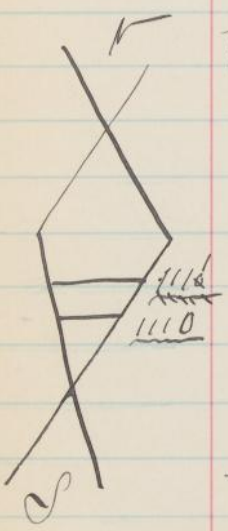
- 10 4.2

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1888phae.proj.1832.

Jan. 18, 1890

Dm. +51° 1110 & 1111



	1110		1111					
3h	43	2.3	41	37.9				
	43	21.5	42	49.4				
	86	23.8	84	27.3	1	56.5	0	58.25
	45	22.1	44	2.3				
	45	46.2	45	14.4				
	91	8.3	89	16.7	[1	51.6]		
	47	46.7	46	12.3				
	47	56.1	47	23.8				
	95	32.8	93	36.1	1	56.7	0	58.35
	49	46.8	48	23.0				
	50	5.8	49	34.5				
	99	52.6	97	57.5	1	55.1	0	57.55
	53	23.8	52	59.4				
	53	42.5	53	10.0				
	107	6.3	106	9.4	1	56.9	0	58.45

0.60

+0 58.15

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19.2	71.5	52.3 ~~7.7~~
~~24.1~~	~~72.1~~	~~12.0~~
19.4	71.5	52.1
19.0	71.5	52.5
18.7	70.6	51.9

0.8
52.20

Log 52.20 = 1.71767
" 7.5 = 0.87506
" cos 2 = 9.99494
244.2 = 2.38767
— 44.2

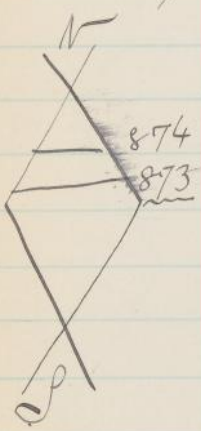
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1888phae.proj.1832.

Jan. 24/1890

Dm. +50 873 & 874

	873		874	
7	25	46.5	26	3.6
	26	56.0	26	41.0
	52	42.5	52	44.6



	27	24.5	27	41.7
	28	34.0	28	18.7
	55	58.5	56	0.4

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1888phae.proj.1832.

Δ873 Δ874

69.5 37.4 32.1

69.5 37.0 32.5

32.30

Log 3230 = 1.509120
n 7.5 = 0.87506
" cos 2 = 9.80058

153.1 = 2.18484
– 2 33.1

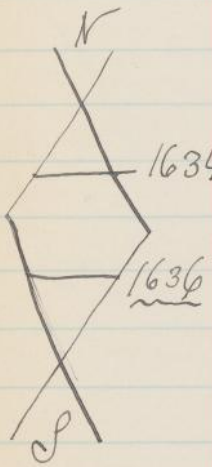
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1888phae.proj.1832.

Jan. 27 1890

Dm. +51° 1636 & 1634

	1636		1634	
6	9	29.9	7	25.1
	10	25.4	8	24.2



	13	0.8	10	56.2
	13	56.9	11	54.6
	16	36.0	14	29.5
	17	30.8	15	29.8
	20	18.4	18	12.8
	21	13.5	19	12.4
	23	50.3	21	45.5
	24	46.1	22	44.9

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1888phae.proj.1832.

55.5	59.1	114.6
56.1	58.4	114.5
54.8	60.3	115.1
55.1	59.6	114.7
55.8	59.4	115.2

4.1
114.82

Log 114.82 = 2.06002
" 7.5 = 0.87506
" 602.2 = 9.79192

533.3 = 2.72700
886.0

352.7 = − 5 52.7

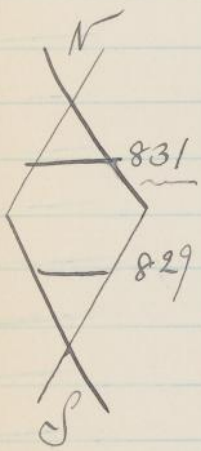
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1888phae.proj.1832.

Jan. 27/1890

Dm. +54° 831 & 829

	831		829	
6	47	14.5	46	33.2
	48	18.9	46	55.0



	49	28.7	48	48.0
	50	32.4	49	9.9
	51	39.0	50	58.0
	52	42.5	51	19.8
	53	59.8	53	14.8
	54	59.0	53	40.4

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1888phae.proc.1832.

64.4 21.8 86.2

63.7 21.9 85.6

~~6~~ 3.5 21.8 85.3

59.2 25.6 84.8

21.9

85.48

Log 85.48 = 1.93186

" 7.5 = 0.87506

" cos 2 = 9.76159

370.3 = 2.56851

~~886.0~~

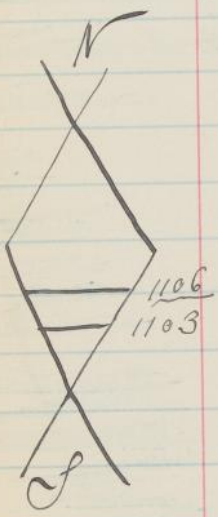
515.7 = +8 35.7

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1888phae.proj.1832.

Jan. 28 1890

Dkn. +49 1106 & 1103



1106		1103	
43	15.8	42	45.3
44	0.5	42	59.2
87	16.3	85	44.5
46	26.7	45	56.0
47	11.7	46	10.8
93	38.4	92	6.8
48	1.9	47	30.5
49	46.5	47	45.7
97	48.4	95	16.2
51	21.6	50	50.7
52	7.0	51	5.8
103	28.6	101	56.5
44	50.6	44	20.0
45	36.3	44	35.2
90	26.9	88	55.2

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1888phae.proj.1832.

44.7	13.9	30.8
45.0	14.8	30.2
44.6	15.2	29.4
45.4	15.1	30.3
45.7	15.2	30.5

1.2

30.24

Log 30.24 = 1.48058

" 7.5 = 0.87506

" cos 2° = 9.80934

146.2 = 2.16498

+2 26.2

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1888phae.proj.1832.

New Var. discovered by Photography

Feb. 21, 1890

	Var.	*a	*b	Var.-*a	Var.-*b	
6	15 12.3 ✓	13 49.3 ✓	14 28.6 ✓			
	16 8.4 ✓	14 7.4 ✓	15 20.9			
	31 20.7	27 56.7	29 49.5	3 240	/ 42.00	1. 31.2
	17 59.8 ✓	16 36.2 ✓	17 14.6 ✓			
	18 54.9 ✓	16 53.4	18 9.0 ✓			
*a.	36 54.7	33 29.6	35 23.6	3 25.1	/ 42.55	/ 31.1
Var.						
	20 49.5 ✓	19 25.4 ✓	20 2.3 ✓			
*b	21 41.7 ✓	19 41.1	20 58.4			
	42 31.2	39 6.5	41 0.7	3 24.7	/ 42.35	/ 30.5
	23 38.5 ✓	22 14.4 ✓	22 50.1 ✓			
	24 29.8 ✓	22 28.9	24 48.0 ✓			
	48 8.3	44 43.3	47 38.1	3 25.0	/ 42.50	/ 30.2
	26 56.4 ✓	25 32.0 ✓	26 7.0 ✓			
	27 46.9 ✓	25 46.6 ✓	27 5.3			
	54 43.3	51 18.6	53 12.3	3 24.7	/ 42.35	/ 31.0

/.75

+ / 42.35

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1888phae.proj.1832

		Δ Var.	Δ*a	Δ*b	Var.-*a	Var.+*b
2	0 45.60	56.1	18.1	52.3	38.0	108.4
1	0 45.55	55.1	17.2	54.4	37.9	109.5
5	0 45.25	52.2	15.7	56.1	36.5 ~~6.1~~	108.3
.2	0 4510	51.3	14.5	57.9	368 ~~3.4~~	109.2
.0	0 45.50	50.5	14.6	58.3	35.9	108.8
	2.0				2	4.2
	0 45.40				0.1	108.84
					37.02	

log 37.02 = 1.56844
" 7.5 = 0.87506
" cos δ = 9.89423
21.76 = 2.33773
- 3 37.6

log 108.84 = 2.03679
" 7.5 = 0.87506
" cos δ = 9.89342
638.7 = 2.80527
886.0
247.3
+ 4 7.3

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1888phae.proj.1832

Feb. 21 1890

Var. dise. by Photography

Comp Star a = Cord. Zones 4^h 1157

Cord. Zones 4^h 1157 = 4^h 34 28.05 $-38°$ 25 3.1 (1875.0)

+0 15.64 +0 54.3

+0 32.12 +0 7.8

4 35 20.17 $-38°$ 26 1.3

34 43.69 4 8.6

$68°$ 40 55.35

Log 11/15 = +0.12606

" sin d = +9.96922

" tan L = −9.89709

−0.98171 = −9.99437

+3.07143

2.0842 = 0.31894

15 = 1.17609

31.26 = 1.49503

Log n = 1.30215

" cos d = +9.56056

" 15 = 1.17609

109.3 = +2.03880

4^h 34 28.05 -38 25 3.1

+0 31.26 +1 49.3

*1890.0 = 4 34 59.31 −38 23 13.8

+1 42.35 −3 37.6

4 36 41.66 −38 26 51.4

−0.15 −18.2

4 36 41.51 −38 27 9.6

4 35 59.31 −38 23 13.8

+20.84 +1 12.9

4 35 20.15 −38 22 0.9

+1 42.35 −3 41.2

4 37 2.50 −38 25 42.1

Var. 19 ores 21

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1888phae.proj.1832

Feb. 21 1890

Ap. Place Reduction

$f = -0.539$ ✓
$\mathcal{G} = 12\ 35.1$ ✓
$\mathcal{H} = 19\ 53.8$ ✓
$\log g = +0.5497$ ✓
" $\log h = +1.2811$ ✓
" $i = -0.8626$

$\mathcal{G} = 12\ 35.1$ $\mathcal{H} = 19\ 53.8$
$\alpha = 4\ 35.0$ $\alpha = 4\ 35.0$
$17\ 10.1$ $0\ 28.8$

$-38\ 23\ 14$

$\log 1/5 = +8.8239$
$\log g = +0.5497$
" $\sin \mathcal{G}+L = -9.9896$
" $\tan L = -9.8988$
$+0.183$ $+9.2620$

$\log 1/5 = +8.8239$
" $h = +1.2811$
" $\sin \mathcal{H}+L = +9.0981$
" Inc. L $= +0.1058$
$+0.204 = +9.3089$
$+0.183$
$+0.387$
-0.539
-0.152 = corr in Dec.

$\log g = +0.5497$
" $\cos^2 \mathcal{G}+\mathcal{H} = -9.3344$
$-0.77 = -9.8841$

$\log h = +1.2811$
" $\cos \mathcal{H}+L = +9.9966$
" $\sin L = -9.7931$
$-11.77 = -1.0708$

" $i = -0.8626$
" $\cos L = +9.8942$
$-5.71 = -0.7568$
-0.77
-11.77
-18.25 = corr in R. Dec.

Ra.

Var. 1900.0 = 4 37 2.50 -38 25 $\frac{42.1}{38.5}$ (corr for prec.)
~~Cor. for prec.~~ = 0 0

1888phae.proj.1832.

Feb. 21, 1890

Var. Star disc. by Photography

Comp. Star b = Cord. Zones 4h 1186

Cord. Zones 4h 1186 = 4h 35 24.31 −38° 32 59.1 (1875.0)
+0 15.60 +0 54.5
4 35 39.91 − 38 32 4.6
68 54 58.65

Log 11/15 = +0.12606
11 sin α = 9.96991
11 tan δ = 9.90114
−0.9934 = −9.99711
+3.0713
+2.0779 = 0.31763
15 = 1.17609
31.17 = 1.49372

Log r = 1.30215
11 cos δ = 9.55597
11 15 = 1.17609
108.2 = 2.03421

4h 35 24.31 −38 32 59.1
+0 31.17 +1 48.2
*1890.0 4 35 55.48 −38 31 10.9
+0 46.40 +4 7.3
4 36 40.88 −38 26 3.6
−0.15 1 18.2
4 36 40.73 −38 26 21.8
7

4 35 55.48 −38 31 10.9
+ 20.78 +1 12.1
*1900.0 4 36 16.26 −38 29 58.8
+0 45.88 +4 13.3
Var. 4 35 [illegible].14 −38 25 45.5 = Co

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Nov. 1900.0 = 4^h 37 1.66 − 38 25 51.5

Cor. for refrac.

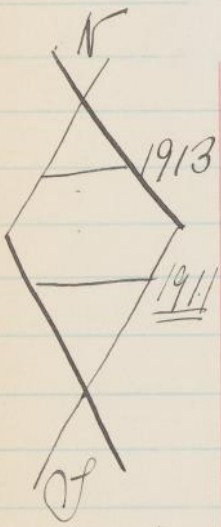
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Apr. 1, 1890

Dec. +50° 1911 & 1913

	1913	1911			
8h	46 21.5	44 36.9			
	47 4.5	45 14.3			
	93 26.0	89 51.2	3	34.8	1 47.40
	49 25.8	47 41.5			
	50 9.2	48 18.6			
	99 35.0	96 0.1	3	34.9	1 47.45
	52 30.2	50 46.2			
	53 13.9	51 23.0			
	105 44.1	102 9.2	3	35.4	1 47.45
	55 34.5	53 50.5			
	56 18.5	54 27.1			
	111 53.0	108 17.6	3	35.4	1 47.70
	58 51.3	57 7.8			
	59 35.5	57 44.3			
	118 26.8	114 52.1	3	34.7	1 47.35
					2.35
					−1 47.47



+50° 1911 = 12 13 16.7 − 1 45.6

1913 = 15 2.3

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1888phae.proj.1832.

Reduction carefully checked.

43.0'	37.4'	80.4'	
43.4	37.1	80.5	
43.7	36.8	80.5	+50 1911 = +50 8.7 " 1913 = " 17.6 26.3 +50° 13.2
44.0	36.6	80.6	
44.2	36.5	80.7 2.7 80.54	

log 80.54 = 1.90601
" 75 = 0.87506
" 0022 = 9.80610
- 386.6 = 2.58717
886.0
499.5 = -8 19.5

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1888phae.proj.1832.

Apr. 1, 1890

Dm. +51°, 1779 & 1774

	1779		1774					
9h	11	12.5	9	9.7				
	12	12.0	9	47.7				
	23	24.5	18	57.4	4	27.1	2	13.55
	14	54.5	12	51.8				
1779	15	54.0	13	30.2				
	30	48.5	26	22.0	4	26.5	2	13.25
1774	18	36.2	16	33.9				
	19	36.0	17	12.0				
	38	12.2	33	45.9	4	26.3	2	13.15
	22	24.5	20	22.0				
	23	24.2	20	59.8				
	45	48.7	41	21.8	4	26.9	2	13.45
	32	4.2	30	30.0				
	33	2.4	30	29.7				
	65	6.6	60	39.7	4	26.9	2	13.45
								1.85
							+2	13.37

+51° 1779 = 12 35 13.3 +2 14.8

+51 1774 = 12 32 58.5

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1888phae.proj.1832.

Reduction carefully checked.

59.5'	38.0'	97.5'
59.5	38.4	97.9
59.8	38.1	97.9
59.7	37.8	97.5
58.2	39.7	97.9

+51°1774 = +51 47.3
" 1779 = " 55.0
2.3
51.15

97.9
3.7
97.74'

Log 97.74 = 1.99007'
" 7.5 = 0.87506'
" cos δ = 9.79079'
452.8' = 2.65592
886.0
433.2 = +7' 13.2"

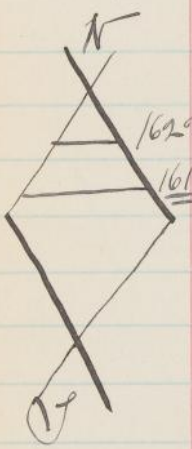
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1888phae.proj.1832.

Apr. 1, 1890

Dm. +53° 1618 & 1622

	1618		1622					
10^h	5	24.0	12	47.0				
	6	19.1	13	19.6				
	11	43.1	26	6.6	14	23.5	7	11.75



	14	2.5	21	2^{5}.5				
	14	59.0	21	59.5				
	29	1.5	43	25.0	14	23 49.5	7	11.75
							−7	11.75

+53 1618 = 13 14 56.1 6 14.0

53 1622 = 21 10.1

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1888phae.proj.1832.

Reduction carefully checked

55.1′ 32.6″ 22.5″

56.5	34.0	22.5
		22.50

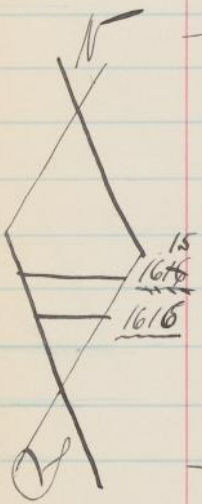
1618 = +53 28.2
1622 = " 29.8
+53° 29.0′

Log 22.50″ = 1.35218
" 7.5″ = 0.87506
" cos δ = 9.77456
100.4″ = 2.00180
− 1 40.4

1888phae.proj.1832.

Aphe. 1888

Dm. +54 1615 & 1616



	1616		1615				
16	40	22.0′	39	31.5′			
	41	2.9′	40	49.5′			
	81	24.9′	80	21.0′	1	3.9′	0 31.95′
	42	15.5	41	25.2			
	42	57.0	42	43.5			
15	85	12.5	84	8.7	1	3.8	0 31.90
	44	33.0	43	42.5			
	45	13.7	45	0.2			
	89	46.7	88	42.7	1	4.0	0 32.00
	46	22.9	46	32.5			
	47	4.1	46	50.5			
	93	27.0	92	23.0	1	4.0	0 32.00
	48	15.1	47	25.0			
	48	57.0	48	43.6			
	97	12.1	96	8.6	1	3.5	0 31.75

4.60′
+0 31.92

+54 1615 = 6
+54 1615 =

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Reductions carefully checked.

40.9	7 / 18.0	37.1 / ~~22.9~~
41.5	7 / 18.3	36.8 / ~~23.2~~
40.7	7 / 17.7	37.0 / ~~23.0~~
41.2	7 / 18.0	36.8 / ~~23.2~~
41.9	7 / 18.6	36.7 / ~~23.3~~

0.6 , 4.4

~~23.12~~ 36.88

+54°1615 = +54 6.7
" 1616 = " 4.2
10.9
+54 5.4

~~log~~ 23.12 = 1.36399
" 7.5 = 0.87506
" cos 2 = 9.76835
101.7 = 2.00740

36.88 = 1.56679
7.5 = 0.87506
cos 2 = 9.76835
162.3 = 2.21020
-2 42.3

~~+1 41.7~~

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Dec. 1 1890

Dm. 454 1745 & 1747

	1745		1747				
10	2	41.0	4	44.2			
	3	7.2	4	58.5			
	5	48.2	9	42.7	3	54.5	1 57.25
	18	30.2	20	35.0			
1745	18	57.7	20	47.2	3		
	37	27.9	41	22.2	4	54.3	1 57.15
1747	21	21.8	23	16.4			
	21	39.0	23	39.0			
	43	0.8	46	55.4	4	54.6	1 57.30
	25	3.5	26	58.0			
	25	20.7	27	20.6			
	50	24.2	54	18.6	4	54.4	1 57.30
	27	52.5	29	48.0			
	28	10.5	30	9.8			
	56	3.0	59	57.8	4	54.8	1 57.40

1.40

− 1 57.28

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Reduction carefully checked.

26.2′	14.3′	40.5′
27.5	12.2	39.7
17.2	22.6	39.8
17.2	22.6	39.8
18.0	21.8	39.8

+54 17.5 = 54 44.1
" 17.7 = 30.9
175.0
+54 37.5

4.6
39.92′

Log 39.92 = 1.60119′
" 17.5 = 0.87506
" cos 2 = 9.76253′
173.3′ = 2.23878′
886.0′
712.7′ = +11 52.7′

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Opp. 2 1890

Dec. +51° 2010 and 2009



	2010		2009				
9h	27	4.4	26	27.3			
	27	56.4	26	48.2			
	55	0.8	53	15.5	1	45.3	0 52.65
	29	3.8	28	26.2			
	29	55.9	28	48.0			
	58	59.7	57	14.2	1	45.5	0 52.75
	31	6.7	30	28.4			
	31	58.5	30	50.4			
	63	5.2	61	18.8	1	46.4	0 53.20
	33	8.3	32	31.5			
	34	1.6	32	53.4			
	67	9.9	65	24.9	1	45.0	0 52.50
	35	11.3	34	33.9			
	36	4.4	34	56.5			
	71	15.7	69	30.4	1	45.3	0 52.65
	37	17.7	36	40.5			
	38	11.2	37	2.9			
	75	28.9	73	43.4	1	45.5	0 52.75
	39	17.9	38	40.1			
	40	10.8	39	3.4			
	79	28.9	77	43.5	1	45.4	0 52.70
							5.20
							+0 52.74

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1888phae.proj.1832.

Reduction carefully checked.

52.0	20.9	31.1
52.1	21.8	30.3
51.8	22.0	29.8
53.3	21.9	31.4
53.1	22.6	30.5
53.5	22.4	31.1
53.1	23.3	29.8

2009 = 15 22 53.3
2010 = 15 23 48.2
0 54.9

+51 2009 = +51 6.6
+51 2010 = +51 4.1
10.7
+51' 5.4

Log. 30.57 = 1.48530
" 7.5 = 0.87506
" cos δ = 9.79809
144.0 = 2.15845
−2 24.0

4.0
30.57

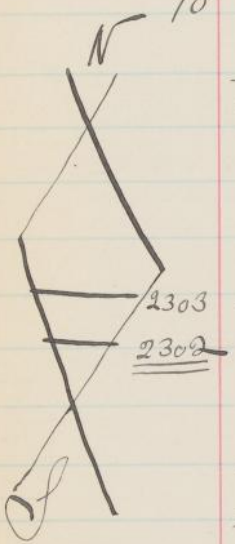
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1888phae.proj.1832.

Aqu. 2190

Dec. +50 2302 & 2303

	2302	2303		
10	19 25.8'	19 23.0'		
	20 1.5'	20 8.5'		
	39 27.3'	39 31.5'	0 4.2'	0 2.10'
	20 34.2	20 32.0		
	21 11.3	21 17.5		
	41 45.5	41 49.5	0 4.0	0 2.00
	21 53.0	21 50.8		
	22 29.7	22 36.2		
	44 22.7	44 27.0	0 4.3	0 2.15
	23 32.3	23 30.1		
	24 8.4	24 15.0		
	47 40.7	47 45.1	0 4.4	0 2.20
	24 47.9	24 45.4		
	25 24.2	25 30.6		
	50 12.1	50 16.9	0 3.8	0 1.90
				0.35
				− 0 2.07'



+50° 2302 = 16 28 17.5

+50 2303 = " 19.6

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1888phae.proj.1832.

Reduction carefully checked.

35.7'	45.5'	9.8'
37.1'	45.5'	8.4
36.7	45.4	8.7
36.1	44.9	8.8
36.3	45.1	8.8

+50 2302 = +50 3.8'
" 2303 = " 4.5
8.3
+50 4.2

4.5
8.90'

log 8.90 = 0.94939'
" 17.5 = 0.87506'
" cos 2 = 9.80746'
42.8' = 1.63191'
- 0 42.8'

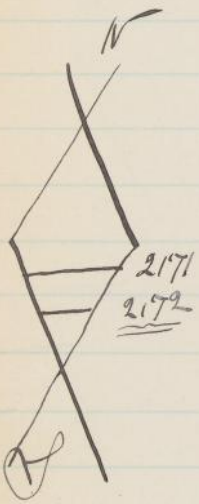
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1888phae.proj.1832.

Apr. 2 1890

Dm. +51 2172 + 2171

	2172	2171			
11	1 27.0	9 7.1			
	2 6.8	1 48.5			
	3 33.8	2 55.6	0 38.2	0 19.10	
	2 57.4	2 37.8			
	3 37.2	3 19.1			
	6 34.6	5 56.9	0 37.7	0 18.85	
	4 31.1	4 12.0			
	5 11.1	4 53.2			
	9 42.2	9 5.2	0 37.0	0 18.50	
	6 5.7	5 45.8			
	6 46.0	6 27.8			
	12 51.7	12 13.6	0 38.1	0 19.05	
	7 36.2	7 16.5			
	8 15.0	7 56.6			
	15 51.2	15 13.1	0 38.1	0 19.55	
	9 9.6	8 50.1			
	9 49.5	9 31.0			
	18 59.1	18 21.1	0 38.0	0 19.00	
	10 39.4	10 19.5			
	11 19.1	11 0.5			
	21 58.5	21 20.0	0 38.5	0 19.25	
					0.30
					+0 19.04



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1888phae.proj.1832.

Reduction carefully checked.

39.8	41.4	1.6
39.8	41.3	1.5
40.0	41.2	1.2
40.3	42.0	1.7
38.8	40.1	1.3
39.9	40.9	1.0
39.7	41.0	1.3
		2.6
		1.37

2171 = 17h 2m 44.7s
2172 = 3 3.6
0 18.1 (Dm.)

+51° 2171 = +51° 39.4
" 2172 = " 39.3
+51° 39.4

Log. 1.37 = 0.18672
" 7.5 = 0.87506
" cos δ = 9.79272
6.4" = 0.80450
−0 6.4

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1888phae.proj.1832.

Asn. 21890

Dm. +50° 2380, 2382

	2380		2382			
11	19	35.5'	20	13.4'		
	20	27.3'	20	41.0'		
	40	2.8'	40	54.4'	0 51.6'	0 25.80'
2380	21	13.8	21	52.0		
	22	6.0	22	19.2		
	43	19.8	44	11,2	0 51.4	0 25.70
2382	22	44.9	23	23.2		
	23	37.2	23	50.7		
	46	22.1	47	13.4	0 51.3	0 25.65
	24	17.1	24	56.0		
	25	98	25	22.4		
	49	26.9	50	18.4	0 51.5	0 25.75
						2.90.
						−0 25.72

+50° 2380 = 17 12 39.9

" 2382 = 13 5.3

0 25.4

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Reductions carefully checked.

λ2380	λ2382	
51.8	27.6	79.4
52.2	27.2	79.4
52.3	27.0	79.3
52.7	26.4	79.1
		1.2
		79.30

+50 2380 = 54.2
2382 = 46.2
50.2
+50

Log. 79.30 = 1.89927
" 7.5 = 0.87506
" Cos 2 = 9.80043
375.6 = 2.51747 6
8860
510.4 = +8 30.4

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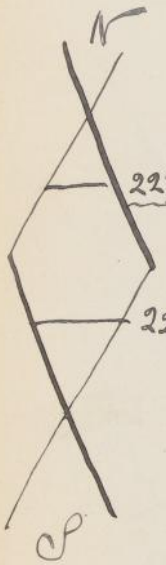
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2102

Apr. 5 1890

Dm. +51° 2273 & 2281

	2273	2281			
9	39 56.0	41 30.0			
	40 40.0	42 40.5			
	80 36.0	84 10.5	3	34.5	1 47.25
	43 9.6	44 45.0			
	43 55.0	45 54.5			
	87 4.6	90 39.5	3	34.9	1 47.45
	46 26.0	48 2.0			
	47 12.0	49 10.5			
	93 38.0	97 12.5	3	34.5	1 47.25
	49 45.5	51 22.0			
	50 31.8	52 29.7			
	100 17.3	103 51.7	3	34.4	1 47.20
	52 58.8	54 36.1			
	53 46.2	55 43.8			
	106 45.0	110 19.1	3	34.1	1 47.05
					1.20
					−1 47.24



Star not double No other star sufficiently near to be confounded with it.

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1888phae.proj.1832

Reduction carefully checked

44.0	10.5	54.5
46.4	9.5	54.9
46.0	8.5	54.5
46.3	7.7	54.0
47.4	6.9	54.3

$$\frac{2.2}{54.44}$$

17	50	2.8
	51	49.5
1	46	7.7

+51° 2273 = 38.4
" 2281 = 31.2
9.6
+51° 34.8

Log 54.44 = 1.73592
" 7.5 = 0.87506
" cos 2 = 9.99335
253.7 = 2.40433
886.0
633.3 = +10 32.3

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