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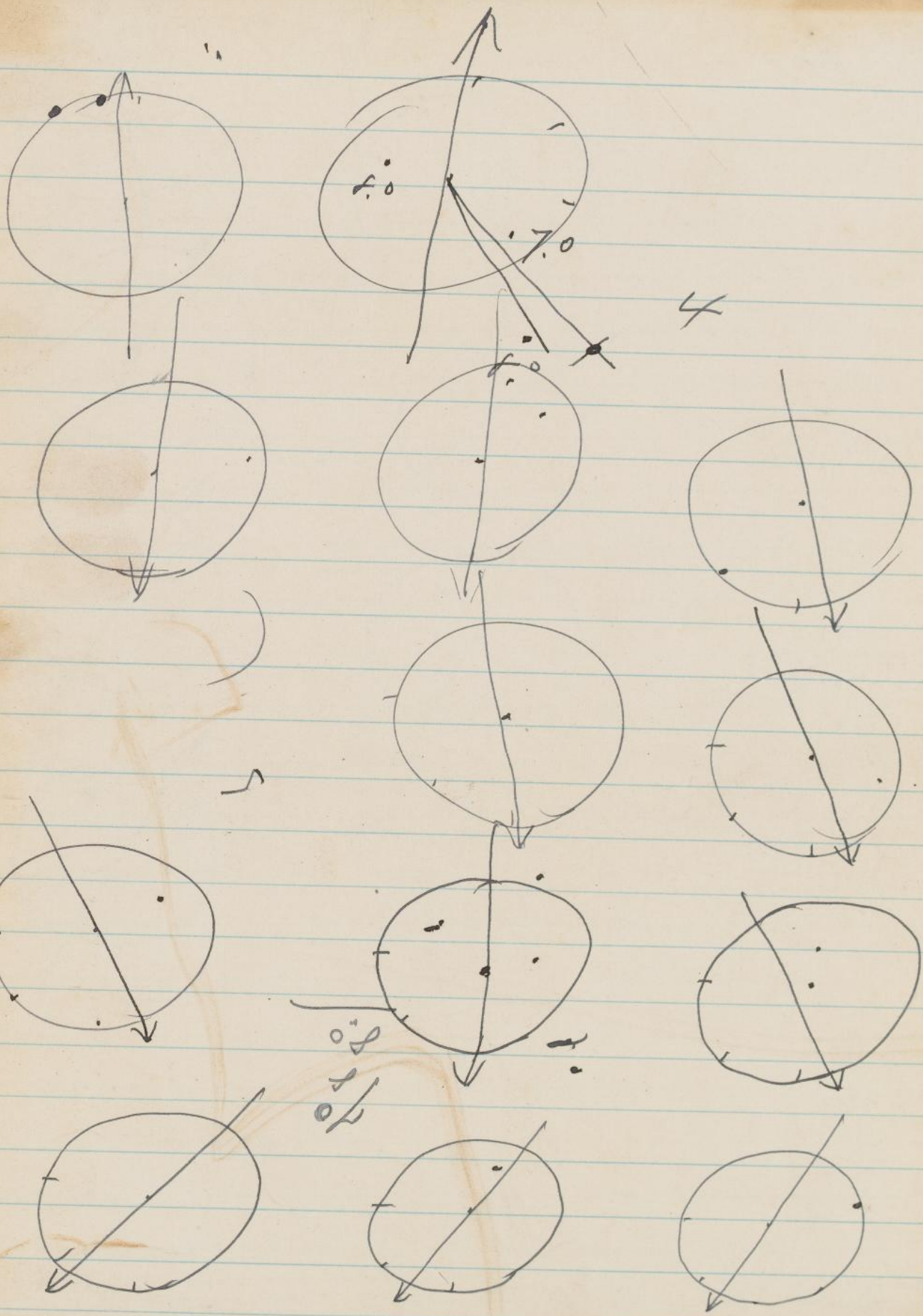
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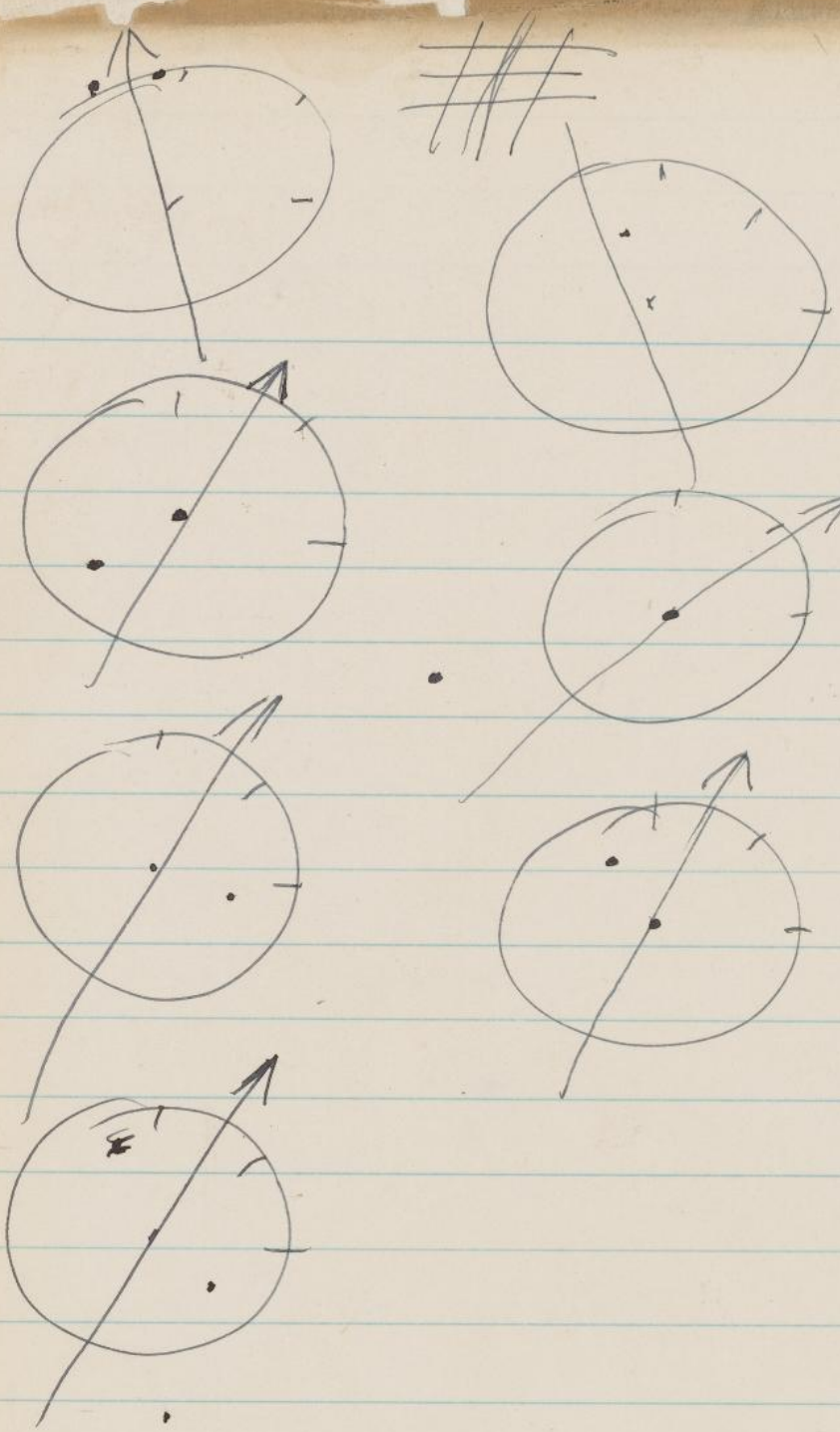
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70° to 80° (Dennis. Distances.

Dennis. Distances.

No.	Date.	No. Settings.	Av. Scale.	Av. Dev.	Resid. I.	Dist.	Obs.	No. Set. × Dist.	
41	Dec. 7.	5	0.9	0.88	−1.17	4	P.	20	−23.40 −1.17
42	Dec. 7.	5	2.2	1.00	−.80	4	W.	20	−16.00 −.80

80 to 90

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Decimes. Distances, Cor. for error in Ref.
70 to 80.

No.	Date.	No. Settings	Av. Time	Av. Dev.	Resid. T.	Dést.	Obs.	No. Set × Dist.	
41	Dec. 7.	5	0.9	0.44	−1.18	4	P.	20	−1.18
42	Dec. 7.	5						20	−0.80
							W.		

Corrections for error in ref., Decimes Distance, etc.

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Decims. Distances, Cor. for error in Ref.
0° to 80°.

No.	Date.	No. Settings.	Av. Time	Av. Dev.	Resid. T.	Dist.	Obs.	No. Set × Dist.	
41	Dec. 7.	5	0.9	0.88	−1.18	4	P.	20	−1.18
42	Dec. 7.	5	2.2	1.00	−0.80	4	W.	20	−0.80
				80 to 90.			P.		
							W.		

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90 to 100

No.	Date.	No. Settings.	Ar. Value	Ar. Dev.	Resid. I.	Distr.	Obs.		
43	Dec. 7.	5	1.3	.44	−1.32	3	Yr.	15	−19.80
44	" "	5	3.0	.81	−.81	3	Yr.	15	−12.15
								30	−31.95
									−1.06

100 to 110

1869phae.proj.1826.

90 to 100.

No.	Date.	No. Settings.	av. Time.	av. Dev.	Resid. I.	Dist.	obs.	No sets × Dist.	
							P.		
43	Dec. 7.	√	1.3	0.44	−1.32	3	W.	1√	−19.80 √
44	" "	√	3.0	0.81	−0.81	3	W.	1√	−12.1√
								30	−31.9 √
									−1.06

100 to 110.

P.

W.

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110 to 120

No.	Date.	No. Settings.	Av. Time.	Av. Dev.	Resid. I.	Dist.	Obs.		

120 to 130

45	Dec. 7.	1	—	—	+1.44	2	P.	2	+2.88 +1.44

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110 to 120.

No.	Date.	No. Settings	Av. Time	Av. Dev.	Resid. I	Dist.	Obs.	Res. Into Dist.
7							P.	
							W.	
				120 to 130			P.	
45	Dec. 4	1			+1.44	2	P.	2 / +1.44
							W.	

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240 to 250

No.	Date.	No. Settings.	av. Time	av. Dev.	Resid. I.	Dist.	Obs.		
1	Nov. 21	5	0.8	0."92	−.04	4	P.	20	−.80
11	Nov. 25.	5	1.0	.96	−.92	3	P.	15	−13.80
46	Dec. 9.	5	1.2	.46	−.54	1	P.	5	−2.70
								40	−17.30
									−.43
2	Nov. 21.	5	1.8	.58	−.13	4	Wr.	20	−2.60
12	Nov. 25.	5	0.8	.15	−.61	4	Wr.	20	−12.20
								40	−14.80
									−.37
			250 to 260						
3	Nov. 21.	5	1.0	.91	+1.23	4	P.	20	+24.60
19	Nov. 30.	5	1.0	.42	+.37	4	P.	20	+7.40
								40	+32.00
									+.80
4	Nov. 21.	5	2.5	.40	+.32	3	Wr.	15	+4.80
20	Nov. 30.	5	2.4	.37	−.07	4	Wr.	20	−1.40
								35	+3.40
									+.10

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240 to 250

No.	Date.	No. settings.	Av. Time.	Av. Dev.	Resid. I.	Dist.	Obs.	No sets × Dist.	
1	Nov. 21.	5	0.8	0.92	−.04	4	P.	20	−0.80
11	" 25.	5	1.0	0.96	−.93	3	P.	15	−13.95
46	Dec. 9.	5	1.2	0.46	−0.57	1	P.	5	−2.85
								40	−17.60
									−0.44
2	Nov. 21.	5	1.8	0.54	−0.13	4	W.	20	−2.60
12	" 25	5	0.8	0.15	−0.62	4	W.	20	−12.40
								40	−15.00
									−0.38
3	Nov. 26	5	1.0	250 to 260 0.91	+1.28	4	P.	20	+24.60
19	" 30.	5	1.0	0.42	+0.37	4	P.	20	+7.40
								40	+32.00
									+0.80
4	Nov. 21.	5	2.5	0.40	+0.32	3	W.	15	+4.80
20	" 30.	5	2.4	0.37	−0.07	4	W.	20	−1.40
								35	+3.40
									+0.10

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260 to 270

No.	Date.	No. Settings.	Av. Sum.	Av. Dev.	Resid. I	Dist.	Obs.	
13	Nov. 25.	5	1.3	.25	-.49	4	P.	20 -9.80
21	Nov. 30.	4	1.0	.37	+1.27	4	P.	16 +20.32
								36 +10.52
								+.29
14	Nov. 25.	5	1.8	.69	-.82	4	W.	20 -16.40
22	Nov. 30.	5	1.6	.88	-.11	4	W.	20 -2.20
47	Dec. 9.	5	3.5	.35	+.35	4	W.	20 +7.00
48	" "	5	0.9	.32	+.44	4	W.	20 +8.80
								80 -2.80
								-.04
5	Nov. 24.	5	1.0	250 to 240 .73	-.55	4	P.	20 -11.00
23	Nov. 30.	5	0.8	.42	+.81	4	P.	20 +16.20
25	" "	5	1.0	.46	+1.16	4	P.	20 +23.20
								60 +28.40
								+.47
24	Nov. 30.	5	1.4	.75	+.54	4	W.	20 +11.40
26	" "	5	1.2	.33	+1.17	4	W.	20 +23.40
49	Dec. 9.	5	4.0	.23	+.45	4	W.	20 +9.00
								60 +43.80
								+.73

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260 to 270.

No.	Date.	No. Settings.	Av. Error.	Av. Dev.	Resid. I.	Dist.	Obs.	No. Sets × Dist.	
13	Nov. 25.	5	1.3	0.25	−0.49	4	P.	20	−9.80
21	" 30.	4	1.0	0.37	+1.27	4	P.	16	+20.32
								36	+10.52
									+0.29
14	Nov. 25.	5	1.8	0.69	−0.82	4	W.	20	−16.40
22	" 30.	5.	1.6	0.58	−0.11	4	W.	20	− 2.20
47	Dec. 9.	5.	3.5	0.35	+0.33	4	W.	20	+ 6.60
48	" "	5	0.9	0.34	+0.42	4	W.	20	+ 8.40
								80	− 3.60
									− 0.04
				270 to 280.					
5	Nov. 24.	5	1.0	0.73	−0.64	4	P.	20	−12.80
23	" 30	5	0.8	0.42	+0.82	4	P.	20	+16.40
25	" 30.	5	1.0	0.46	+1.16	4	P.	20	+23.20
								60	+26.80
									+ 0.45
24	Nov. 30.	5	1.4	0.75	+0.57	4	W.	20	+11.40
26	" "	5	1.2	0.33	+1.17	4	W.	20	+23.40
49	Dec. 9.	5	4.0	0.23	+0.43	4	W.	20	+ 8.60
								60	+43.40
									+ 0.72

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280 to 290

No.	Date.	No. Settings.	av. Value	av. Dev.	Resid. I.	Dist.	Obs.		
6	Nov. 24.	5	1.3	.92	−.31	4	P.	20	−6.20
15	Nov. 29.	5	1.0	.90	+.62	3	P.	15	+9.30
27	" 30.	5	0.5	.44	+1.51	4	P.	20	+30.20
								55	+33.30
									+.61
16	Nov. 29.	5	1.2	.63	−.24	3	W.	15	−4.05
28	" 30.	5	1.6	.54	+1.22	4	W.	20	+24.40
50	Dec. 9.	5	1.6	.50	+.57	3	W.	15	+8.55
								50	+28.90
									+.58

290 to 300

14	Nov. 29.	5	1.2	.92	+.44	3	P.	15	+7.20
29	" 30.	5	0.6	.27	+.84	4	P.	20	+16.80
31	" "	5	1.3	.33	+.26	3	P.	15	+3.90
~~33~~	~~Dec. 4.~~	5	0.5	.23	[+4.90]	4	P.	20	
51	" 9.	5	1.0	1.23	+.49	3	P.	15	+7.35
								65	+35.25
									+.54
17	Nov. 29.	5	2.0	.81	+.44	3	W.	15	+7.20
30	" 30.	5	1.6	.17	+1.09	4	W.	20	+21.80
34	Dec. ~~4.~~	5	1.3	.29	+.63	4	W.	20	+12.60
								55	+41.60
									+.76

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280 to 290.

No.	Date.	No. Settings.	Av. Time.	Av. Dev.	Resid. I.	Dist.	Obs.	No. Sets. * Dist.	
6	Nov. 24.	✓	1.3	0.92	−0.39	4	P.	20	−7.80
15	" 29	✓	1.0	0.90	+0.✓9	3	P.	15	+8.8✓
27	" 30.	5	0.✓	0.4✓	+1.✓1	4	P.	20	+30.20
								✓✓	+31.2✓
									+0.✓7
16	Nov. 29.	✓	1.2	0.6✓	−0.80	3	W.	15	−4.✓0
24	" 30.	✓	1.6	0.✓4	+1.22	4	W.	20	+24.40
50	Dec. 9.	5	1.6	0.✓0	+0.✓6	3	W.	15	+8.40
								✓0	+28.30
									+0.✓7
				290 to 300			P.		
17	Nov. 29.	✓	1.2	0.92	+0.46	3	P.	15	+6.90
29	" 30	5	0.6	0.27	+0.8✓	4	P.	20	+16.80
31	" 30.	5	1.3	0.33	+0.26	3	P.	15	+3.90
51	Dec. 9.	✓	1.0	1.23	+0.49	3	P.	15	+7.3✓
								6✓	+34.9✓
									+0.✓4
18	Nov. 29.	✓	2.0	0.81	+0.46	3	W.	15	+6.90
30	" 30.	✓	1.6	0.17	+1.09	4	W.	20	+21.80
34	Dec. 4.	✓	1.3	0.29	+0.62	4	W.	20	+12.40
								✓✓	+41.10
									+0.7✓

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300 to 320

No.	Date.	No. Settings.	av. Value.	Av. Dev.	Resid. I.	Dist.	Obs.		
7	Nov. 24.	5	1.1	.27	+.27	4	P.	20	+5.40
35	Dec. 4.	5	1.0	.45	−.34	3	P.	15	−5.10
53	" 9.	5	0.7	.67	+1.31	3	P.	15	+19.65
								50	+19.95
									+.40
32	Nov. 30.	5	2.2	.93	+.44	3	W.	15	+13.20
52	Dec. 9.	5	1.5	.52	+.52	3	W.	15	+7.80
36	Dec. 4.	5	2.6	.67	+.41	3	W.	15	+6.15
								45	+27.15
									+.60
9	Nov. 24.	5	0.8	320 to 320 .77	+.56	3	P.	15	+8.40
37	Dec. 4.	5	1.4	1.06	+1.46	3	P.	15	+21.90
								30	+30.30
									+1.01
8	Nov. 24.	5	4.0	1.19	+.32	1	W.	5	+1.60
10	" "	5	1.7	.23	+1.62	3	W.	15	+24.30
38	Dec. 4.	5	1.7	.40	+.23	3	W.	15	+12.45
								35	+39.25
									+1.12

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300 to 310

No.	Date.	No. Settings	Av. Time	Av. Dev.	Resid. I.	Dist.	Obs.	No. Data × Dist.	
7	Nov. 24.	✓	1.1	0.27	+0.2✓	4	P.	20 ✓	+✓.00 ✓
3✓	Dec. 4.	✓	1.0	0.8✓	−0.3✓	3	P.	1✓ ✓	−✓.2✓ ✓
✓3	" 9.	✓	0.7	0.67	+1.31	3	P.	1✓ ✓	+19.6✓ ✓
								✓0 ✓	+19.40 ✓
									+0.39
32	Nov. 30.	✓	2.2	0.83	+0.88	3	W.	1✓ ✓	+13.20 ✓ ✓
36	Dec. 4.	✓	2.6	0.67	+0.40	3	W.	1✓ ✓	+6.00 ✓ ✓
✓2	" 9.	✓	1.✓	0.✓2	+0.✓2	3	W.	1✓ ✓	+7.80 ✓ ✓
								4✓ ✓	+27.00 ✓
									+0.60 ✓
9	Nov. 24.	✓	0.8	0.77	310 to 320 +0.✓4	3	P.	1✓ ✓	+8.10 ✓ ✓
37	Dec. 4.	✓	1.4	1.06	+1.46	3	P.	1✓ ✓	+21.90 ✓ ✓
								30 ✓	+30.00 ✓
									+1.0 ✓
8	Nov. 24.	✓	4.0	1.19	+0.30	1	W.	✓ ✓	+1.✓0 ✓ ✓
10	" "	✓	1.7	0.23	+1.66	3	W.	1✓ ✓	+24.90 ✓ ✓
3✓	Dec. 4.	✓	1.7	0.40	+0.82	3	W.	1✓ ✓	+12.30 ✓ ✓
								3✓ ✓	+36.70 ✓
									+1.11 ✓

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No.	Date.	No. Settings.	Av. Time	Av. Dev.	Resid. I.	Dist.	Obs.	

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Denios. Distances.

Date.	No. Obsvs.	P. Av. Obsd. (O-C)	P. Av. Res. Wts.	W. Rec'd. I. (O-C)	P. Dist.	W. Ds.
Mean Equ.	Wts.		Wts.			
1	20	−1.17	20	−.80	−23.40	−16.00
8	—	—	—	—	—	—
9	—	—	30	−1.06	—	−31.80
10	—	—	—	—	—	—
11	—	—	—	—	—	—
12	2	+1.44	—	—	+2.88	—
	22		30		=20.52	=47.80
24	40	−.43	40	−.37	−17.20	−14.80
25	40	+.50	35	+.10	+32.00	+3.40
26	36	+.24	80	−.04	+10.02	−2.80
27	60	+.47	60	+.72	+28.40	+43.80
28	55	+.61	50	+.58	+33.30	+28.90
29	65	+.54	55	+.76	+35.25	+41.60
30	50	+.40	45	+.60	+19.95	+27.15
31	30	+1.01	35	+1.12	+30.30	+39.25
	376		400		+171.92	+166.50
					+.46	+.42

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Dennis. Distances – (Refraction corrected)

Mean Long.	Wts.	(O – C)	Wts.	(O – C)	ρ (O-C) × Wts.	W. (O-C) × Wts.
7	20	−1.18	20	−0.80	−23.60	−16.00
8	—	—	—	—	—	—
9	—	—	30	−1.06		−31.80
10	—	—	—	—	—	—
11	—	—	—	—	—	—
12	2	+1.44	—	—	+2.88	—
	22		50		=20.794	
24	40	−0.44	40	−0.38	−17.60	−15.20
25	40	+0.80	35	+0.10	+32.00	+3.50
26	36	+0.29	80	−0.04	+10.44	−3.20
27	60	+0.45	60	+0.72	+27.00	+43.20
28	55	+0.57	50	+0.57	+31.35	+28.50
29	65	+0.54	55	+0.75	+35.10	+41.25
30	50	+0.39	45	+0.60	+19.50	+27.00
31	30	+1.00	35	+1.11	+30.00	+38.85
	376		400		+167.79	+163.90
					+0.45	+0.41

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No.	Date.	No. Settings.	Av. Vcnic.	Av. Dev.	Resid. I.	Dist.	Obs.
13)	10.02	14)	26.1		14)	6.71	
9)	6.44	11)	21.3		11)	6.24	
1)	1.44	1)	4.0		1)	1.19	
1)	.54	26)	51.4 (1.98		26	14.14 (.54	
24)	18.44 (.77		26			130	
	168		254			114	
	164		234			104	
			200				
			207				
	12.3 (13		7.80 (13		14)	8.46	
	9.4 (9		7.69 (9		11)	8.09	
	1.2 (1		.46 (1		1)	.32	
23)	22.9 (.99	23	15.45 (.67	23	26)	16.87 (.65	
	207		138			156	
	220		165			127	
	207		161			130	
	13						

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1869phae.proj.1826.

Denios. Distances.

L.

Dist. 4.					
Av. Time per setting.	Av. Dev. 1 setting	Av. Dev. 1 set.	Av. Time per setting.	Av. Dev. 1 setting.	Av. Dev. 1 set.
0.8	.92	−.04	1.8	.58	−.13
1.0	.91	+1.23	0.8	.15	−.61
1.0	.73	−.55	1.8	.69	−.82
1.3	.92	−.31	2.4	.37	−.07
1.1	.27	+.27	1.6	.88	−.11
1.3	.25	−.49	1.4	.75	+.57
1.0	.42	+.37	1.2	.33	+1.17
1.0	.37	+1.27	1.6	.54	+1.22
0.8	.42	+.81	1.6	.17	+1.09
1.0	.46	+1.16	1.3	.29	+.63
0.5	.48	+1.51	2.2	1.00	−.80
0.6	.27	+.44	3.5	.35	+.35
0.9	.88	−1.17	0.9	.38	+.44
			4.0	.23	+.45
12.3	7.30	10.02	26.1	6.71	8.46
0.95	.56	.77	1.86	.48	.60

Dist. 3.			Dist. 3.		
			2.5	.40	+.32 +
1.0	.90	+.62 ·	1.2	.63	−.27 +
1.2	.92	+.48 ·	2.0	.81	+.48 +
1.3	.33	+.26 ·	2.2	.83	+.88 +
1.0	.85	−.34 ·	2.6	.64	+.41 +
1.4	1.06	+1.46 ·	1.7	.40	+.83 +
1.0	1.23	+.49 ·	1.3	.44	−1.32 +
0.7	.67	+1.31 ·	3.0	.81	−.81 +
0.8	.77	+.56 ·	1.6	.50	+.57 +
1.0	.916	−.92 ·	1.5	.52	+.52 +
			1.7	.23	+1.68 +
9 | 9.4	7.69	6.44	11 | 21.3	6.24	8.09
1.04	0.85	0.72	1.94	.57	.74

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No.	Date.	Mn. Sidereal Time	Ap. Time.	Ap. Dec.	Reed. I.	Dist.	Obs.

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Pleiads. Distances

P.

Dist. 2.

Av. √ min per setting.	Av. Dev. 1 setting.	Av. Dev. 1 set.
—	—	+1.44

Dist. 1.

1.2	.46	-.54

W.

Dist. 2.

Av. √ min per setting.	Av. Dev. 1 setting.	Av. Dev. 1 set.
4.0	1.19	+.32

Dist. 1.

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Phobos. Pos. angles.

No.	Date.	Mn. Time.	Mn. Pos.	Ar. Dev.	Corr. I.	Corr. Obs.

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Yr.	Date.	No. Settings.	Ar. Time	Ar. Dec.	Resid. I.	Dist. Obs.	

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No.	Date.	No. Settings.	Av. Time.	Av. Dev.	Resid. I.	Deit.	Obs.

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Denver Distances

		No. setts 5 settings.	No. setts 4 settings.	No. setts 3 settings.	No. setts 2 settings.	No. setts 1 setting.	Total No. setts.	Total No. settings.
P.	5							
	4	12	1				13	64
	3	9					9	45
	2					1	1	1
	1	1					1	5
		22	1			1	24	115
W.	5							
	4	14					14	70
	3	11					11	55
	2							
	1	1					1	5
		26					26	130
W.	5							
	4	14						
	3	11						
	2							
	1	1						

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No. sets rejected	Total Weight.	av. Time per setting.	av. Dev. 1 setting.	av. Dev. 1 set. Resid. I.	av. Dev. 1 set. Resid. II.
	256	.95	.56	.77	
	135	1.04	.85	.72	
1	2	—	—	1.44	
	5	1.20	.46	.54	
1	398	1.00	.67	.77	
	280	1.86	.48	.60	
	165	1.94	.57	.74	
1		—	—	—	
	5	4.00	1.19	.32	
1	450	1.98	.54	.65	

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Phobos. Pos. Angles.

P.

Mean day	Nov. 26.	Nov. 16.	Nov. 24.	Nov. 24.	Nov. 26.	Nov. 23.	Nov. 16.
W	65°	75°	85°	95°	105°	115°	125°
log. cos. W	9.6259	9.4130	8.9403	8.9403$_n$	9.4130$_n$	9.6259$_n$	9.7586$_n$
2 log. cos. W	9.2518	8.8260	7.8806	7.8806$_n$	8.8260$_n$	9.2518$_n$	9.5172$_n$
log. b	0.8396	0.8236	0.8388	0.8388	0.8396	0.8380	0.8236
c. log. a	8.6112	8.5842	8.6046	8.6046	8.6112	8.6017	8.5842
Sum. logs.	8.7026	8.2338	7.3240	7.3240$_n$	8.2768$_n$	8.6915$_n$	8.9250$_n$
Eq.	0.050	.017	.002	−.002	−.019	−.049	−.084
log. sin. W	9.9573	9.9849	9.9983	9.9983	9.9849	9.9573	9.9134
2 log. sin. W	9.9146	9.9698	9.9966	9.9966	9.9698	9.9146	9.8268
log. a	1.3888	1.4158	1.3954	1.3954	1.3888	1.3983	1.4158
c log. b.	9.1604	9.1764	9.1612	9.1612	9.1604	9.1620	9.1764
Sum.	0.4638	0.5620	0.5432	0.5532	0.5190	0.4749	0.4190
Eq.	2.909	3.648	3.493	3.574	3.304	2.985	+2.624
Sum Quantity	2.959	3.665	3.498	3.572	3.285	2.936	+2.540
(O−C)	+0.43	+1.01	−0.15	+0.95	+1.85	+0.53	+1.35
Log. (O−C)	9.6335	0.0043	9.1761$_n$	9.9777	0.2672	9.9191	0.1303
n diff. Co.	0.4711$_n$	0.5641$_n$	0.5434$_n$	0.5529$_n$	0.5165$_n$	0.4678$_n$	0.4048$_n$
Sum logs.	0.1046$_n$	0.5684$_n$	9.7195	0.5306$_n$	0.7837$_n$	0.3869$_n$	0.5351$_n$
Resid. in long.	−1.27	−3.70	+0.52	−3.39	−6.08	−2.44	−3.43
log. no. of days since Oct. 0.0	15 (57) 1.7559	46 (47) 1.6721	101 (55) 1.7404	74 (55) 1.7404	20 (57) 1.7559	100 (54) 1.7324	34 (47) 1.6721
Log. Arts (simply)	1.1761	1.6624	2.0043	1.8692	1.3010	2.0000	1.5315
Int. no. days since Oct. 0.0 + Log. Arts simply + log. diff. co.	3.4031	3.4990	4.2881	4.1625	3.5734	4.2002	3.6084
	1.6472	2.2269	2.5477	2.4221	1.8175	2.4676	1.9363
	44.4	168.6	352.9	264.3	65.7	293.6	86.4
Mean corresp. to log. given in line above.	2529.9	4925.0	19413.3	14537.8	3744.6	15856.2	4058.8

Recomp. ○

Mean day P. (Pos. Angles) Phobos = Nov. 22.2

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(Resids. × diff. Co.)

L.

Nov. 26.	Nov. 22.	Nov. 21.	Nov. 24.	Nov. 24.	Nov. 23.	Oct. 26.	Nov. 22.	Nov. 16.
135°	245°	255°	265°	275°	285°	295°	305°	315°
9.8495	9.6259	9.4130	8.9403	8.9403	9.4130	9.6259	9.7586	9.8495
9.6990	9.2518	8.8260	7.8806	7.8806	8.8260	9.2518	9.5172	9.6990
0.8396	0.8736	0.8955	0.8388	0.8388	0.8380	0.7023	0.8366	0.8235
8.6112	8.5988	8.5961	8.6046	8.6046	8.6017	8.5774	8.5988	8.5841
9.1498	8.6874	8.5576	7.3240	7.3240	8.2657	8.5315	8.9528	9.1066
-.141	-.049	-.018	-.002	.002	.018	.034	.090	.128
9.8495	9.9573	9.9849	9.9983	9.9983	9.9849	9.9573	9.9134	9.8495
9.6990	9.9146	9.9698	9.9966	9.9966	9.9698	9.9146	9.8268	9.6990
1.3888	1.4012	1.4039	1.3954	1.3954	1.3931	1.4226	1.4012	1.4159
9.1604	9.1632	9.1645	9.1612	9.1612	9.1620	9.2977	9.1632	9.1765
0.2482	0.4790	0.5382	0.5532	0.5532	0.5301	0.6349	0.3912	0.2914
1.771	-3.013	-3.453	-3.574	-3.574	-3.389	-4.314	-2.462	-1.956
1.630	-3.062	-3.471	-3.576	-3.572	-3.371	-4.280	-2.372	-1.828
+2.04	-2.08	-1.05	+1.14	-0.50	-0.75	+1.71	-1.65	-1.14
0.3096	0.3181	0.0212	0.0569	9.6990	9.8751	0.2330	0.2175	0.0374
0.2122	0.4860	0.5404	0.5534	0.5529	0.5274	0.6314	0.3751	0.2620
0.5218	0.8041	0.5616	0.6103	0.2519	0.4029	0.8644	0.5926	0.2994
-3.33	-6.37	-3.64	+4.08	-1.79	-2.53	+7.32	-3.91	-1.99
9	55	67	52	65	31	6	14	5
(57)	(53)	(52)	(55)	(55)	(54)	(26)	(53)	(47)
1.7559	1.7243	1.7160	1.7404	1.7404	1.7324	1.4150	1.7243	1.6721
0.4771	1.7404	1.8261	1.7160	1.8129	1.4914	0.7782	1.1461	0.9031
2.4452	3.9507	4.0825	4.0098	4.1067	3.7516	2.8246	3.2455	2.8372
0.6893	2.2264	2.3665	2.2694	2.3654	2.0192	1.4096	1.5212	1.1651
4.9	168.4	232.5	186.0	232.2	104.5	25.7	33.2	14.6
278.7	8926.9	12092.1	10228.2	12770.3	5644.2	667.7	1759.9	687.4
		Recomp. 0				Recomp. 0		Recomp. 0

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Phobos. Pos. Angles.

W.

	X		X	X	X	X
Mean day	Nov. 16.	Nov. 18.	Nov. 24.	Nov. 18.	Nov. 10.	Nov. 21.
W	75°	95°	105°	125°	135°	255°
log. cos. W	9.4130	8.9403 w	9.4130 w	9.7586 w	9.8495 w	9.4130 w
2 log. cos. W	8.8260	7.8806 w	8.8260 w	9.5172 w	9.6990 w	8.8260 w
log. b	0.8246	0.8280	0.8388	0.8280	0.7998	0.8355
co. log. a	8.5844	8.5872	8.6046	8.5857	8.5752	8.5961
Sum logs.	8.2350	7.2958 w	8.2694 w	8.9324 w	9.0740 w	8.2576 w
Σy.	.017	−.002	−.019	−.085	−.119	−.018
log. sin. W	9.9849	9.9983	9.9849	9.9134	9.8495	9.9849 w
2 log. sin. W	9.9698	9.9966	9.9698	9.8268	9.6990	9.9698 w
log. a	1.4156	1.4128	1.3954	1.4128	1.4248	1.4039
co. log. b	9.1760	9.1720	9.1611	9.1720	9.2002	9.1645
Sum.	0.5614	0.5814	0.5263	0.4116	0.3240	0.5382 w
Σy.	3.642	3.814	3.360	2.580	2.108	−3.453
Sum Quantities	3.656	3.812	3.341	2.495	1.989	−3.471
(O − C)	~~+2.12~~ ~~+4.12~~ 0.3263	+0.08	+0.68	+1.70	+1.98	−1.35
Log. (O − C)	~~0.6149~~	8.9031	9.8325	0.0043	0.2967	0.1303 w
" diff. Co.	0.5634 w	0.5812 w	0.5239 w	0.3971 w	0.2986 w	0.5405
Sum logs.	0.8897 w	9.4843 w	0.3564 w	0.4087 w	0.5953 w	0.6708 w
Resid. in long	~~+1.7833~~ ~~−7.76~~ ~~+15.08~~	−0.31	−2.27	−2.52	−3.94	−4.69
	4	4	3	2	2	2
Log. no. days since Oct. 0.0	1.6721 (47)	1.6902 (49)	1.7404 (55)	1.6902 (49)	1.6128 (41)	1.7160 (52)
Log. Hrs. (simply)	0.6021	1.6532	1.5315	1.3222	0.3010	1.3010
log. no. days since Oct. 0.0 + Log. Hrs. simply + Log. diff. Co.	2.8376	3.9246	3.7954	3.4095	2.2124	3.5577
	1.1655	2.2344	2.0554	1.7193	0.5996	1.8415
	14.6	171.6	113.6	52.4	4.0	69.4
No. corresponding to log. in 3d line above.	688.0	8406.2	6248.8	2567.4	163.1	3609.9

Recomp. b

Mean day Phobos (W. obs.) Pos. Angles Nov. 21.7

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Resids. in P.A. changed into Resids. in longitude by diff. Co.

W.

Nov. 21.	Nov. 20.	Nov. 25	Nov. 27.	Nov. 23.	Nov. 16.
26 5°	27 5°	28 5°	29 5°	31 5°	32 5°
8.9403u	8.9403	9.4130	9.6259	9.8495	9.9134
7.8806u	7.8806	8.8260	9.2518	9.6990	9.8268
0.8325	0.8327	0.8393	0.8396	0.8340	0.8236
8.5961	8.5919	8.6076	8.6128	8.6017	8.5842
7.3172u	7.3052	8.2729	8.7042	9.1887	9.2346
−.002	.002	.019	.051	.138	.172
9.9983u	9.9983u	9.9849u	9.9573u	9.8495u	9.7586u
9.9966u	9.9966u	9.9698u	9.9146u	9.6990u	9.5172u
1.4039	1.4041	1.3924	1.3872	1.3983	1.4158
9.1645	9.1673	9.1607	9.1604	9.1620	9.1764
0.5650u	0.5720u	0.5229u	0.4622u	0.2593u	0.1094u
−3.673	−3.733	−3.333	−2.899	−1.817	−1.286
−3.675	−3.731	−3.314	−2.848	−1.679	−1.114
~~−0.07~~ −0.02	−0.49	−0.27	+1.11	+3.63	+0.52
8.3010u	9.6902u	9.4314u	0.0453	0.5599	9.7160
0.5653	0.5718	0.5204	0.4544	0.2251	0.0469
8.8663	0.2620u	9.9518u	0.4998	0.7850	9.7629
−0.07	−1.83	−0.89	+3.16	+6.10	+0.58
20	14	35	32	16	1
1.7160 (52)	1.7076 (51)	1.7442 (56)	1.7634 (58)	1.7324 (54)	1.6721 (47)
1.3010	1.1461	1.5441	1.5051	1.2041	0.0000
3.0173	2.8537	3.2883	3.2685	2.9365	1.6721
1.8663	1.7179	2.0645	1.9596	1.4292	0.0469
73.5	52.2	116.0	91.1	26.9	1.1
3822.1	2663.8	6496.8	5284.5	1450.8	52.4

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Decios. Distances,
Mean date for different longitudes.

	Mean date.	No. obs.	Mean day	No. obs.
7½°	Dec. 7.	1	Dec. 7.	1
8½	~	~	~	~
9½	~	~	Dec. 7.	2
10½	~	~	~	~
11½	~	~	~	~
12½	Dec. 7.	1	~	~
24½	Nov. 24.	3	Nov. 23.	2
25½	Nov. 26.	2	Nov. 26.	2
26½	Nov. 28.	2	Dec. 3.	4
27½	Nov. 24.	3	Dec. 3.	3
28½	Nov. 24.	3	Dec. 3.	3
29½	Dec. 2.	4	Dec. 1.	3
30½	Dec. 2.	3	Dec. 4.	3
31½	Nov. 29.	2	Nov. 29.	3

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Denver. Pos. angles.

P.

Mean day.	1879 Dec. 10	Dec. 12.	Dec. 7.	Nov. 23,	Nov. 27,	Dec. 12.
W	55	6	7	85	9	10
log. cos. W	9.7586	9.6259	9.4130	8.9403	8.9403$_n$	9.4130$_n$
2 log. cos. W	9.5172	9.2518	8.8260	7.8806	7.8806$_n$	8.8260$_n$
log. b.	1.2306	1.2216	1.2378	1.2533	1.2530	1.2216
co. log. a	8.2661	8.2778	8.2553	8.2093	8.2214	8.2778
Sum log.	9.0139	8.7512	8.3191	7.3374	7.3550$_n$	8.3254$_n$
Zy.	.103	.056	.021	.002	−.002	−.021
log. sin. W	9.9134	9.9573	9.9849	9.9983	9.9983	9.9849
2 log. sin. W	9.8268	9.9146	9.9698	9.9966	9.9966	9.9698
log. a	1.7339	1.7222	1.7447	1.7965	1.7786	1.7222
co. log. b	8.7694	8.7784	8.7622	8.7467	8.7470	8.7784
Sum.	0.3301	0.4152	0.4767	0.5398	0.5222	0.4704
Zx.	2.138	2.601	2.997	3.466	3.328	2.954
Sum Quantities	2.241	2.657	3.018	3.464	3.326	2.933
(O − C)	+1.85	−1.69	+1.15	+0.89	+0.28	−0.16
Log. (O − C)	0.2672	0.2279$_n$	0.0607	9.9494	9.4472	9.2041$_n$
" Diff. Co.	0.3504$_n$	0.4244$_n$	0.4794$_n$	0.5401$_n$	0.5219$_n$	0.4643$_n$
Sum logs.	0.6176$_n$	0.6523	0.5404$_n$	0.4895$_n$	9.9691$_n$	9.6714
Resid. in log.	−4.15	+4.49	−3.47	−3.09	−0.93	+0.47
Wts.	16	5	20	40	49	27
log. no. of days since Nov. 0.0	1.6021 (40)	1.6232 (42)	1.5682 (37)	1.3617 (23)	1.4314 (27)	1.6232 (42)
log. wts.	1.2041	1.6990	1.3010	1.6021	1.6902	1.4314
log. mean day × wts × diff. co.	3.1566	3.7466	3.3489	3.5039	3.6435	3.5219
	1434.2	5579.6	2233.1	3190.8	4400.5	3325.8
log. total wt.	1.5545	2.1234	1.7807	2.1422	2.2121	1.5987
	35.9	132.9	60.4	138.7	163.0	79.2

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Resids. in P. A. changed into Resids. in Longitude by diff. Co.

Nov. 8,	Nov. 17,	Nov. 26,	Nov. 26,	Nov. 28,	Nov. 24,	Nov. 20	Nov. 20,
11	12	13	14	22	23	24	25
9.6259w	9.7586w	9.8495w	9.9134w	9.8495w	9.9134w	9.9573w	9.9849w
9.2518w	9.5172w	9.6990w	9.8268w	9.6990w	9.8268w	9.9146w	9.9698w
1.2079	1.2426	1.2542	1.2542	1.2538	1.2539	1.2492	1.2492
8.1746	8.1867	8.2125	8.2125	8.2178	8.2064	8.1936	8.1936
8.6343w	8.9465w	9.1657w		9.1706w	9.2871w	9.3574w	9.4126w
-.043	-.088	-.146		-.148	-.194	-.228	-.259
9.9573	9.9134	9.8495		9.8495w	9.9134w	9.9573w	9.9849w
9.9146	9.8268	9.6990		9.6990w	9.8268w	9.9146w	9.9698w
1.8254	1.8133	1.7875		1.7822	1.7936	1.8064	1.8064
8.7921	8.7574	8.7425		8.7462	8.7461	8.7508	8.7508
0.5321	0.3975	0.2328		0.2274w	0.3665w	0.4718w	0.5270w
3.405	2.494	1.707		-1.688	-2.325	-2.963	-3.365
3.362	2.409	1.561		-1.436	-2.519	-3.191	-3.624
+0.12	+0.22	+2.24		+0.71	-0.15	+0.01	-0.14
9.0792	9.3424	0.3502		9.8513	9.1761w	8.0000	9.2304w
0.5266w	0.3818w	0.1934w		0.2639	0.4012	0.5039	0.5529
9.6058w	9.7242w	0.5436w		0.1152	9.5773w	8.5039	9.7896w
-0.40	-0.53	-3.50		+1.30	-0.38	+0.03	-0.62
40	21	10		3	90	138	81
(8)	(17)	(26)		(28)	(24)	(20)	(20)
0.9031	1.2304	1.4150		1.4472	1.3802	1.3010	1.3010
1.6021	1.3222	1.0000		0.4771	1.9542	2.1399	1.9085
3.0318	2.9344	2.6084		2.1882	3.7356	3.9448	3.7687
1076.0	859.8	405.9		154.2	5440.0	8806.4	5870.8
2.1287	1.7040	1.1934		0.7410	2.0554	2.6438	2.4677
134.5	50.6	15.6		5.5	226.7	440.4	293.6

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Mean day	Nov. 26.	Nov. 18.	Nov. 21.	Nov. 23.	Nov. 20.	Nov. 12.
w	26ν	27ν	24ν	29ν	30ν	31ν
Log. cos. w	9.9983w	8.9403	9.4130	9.6249	9.7586	9.849ν
2 log. cos. w	9.9966w	7.8806	8.8260	9.2518	9.5172	9.6990
Log. b.	1.2542	1.2452	1.2514	1.2530	1.2492	1.2262
Co. log. a	8.2125	8.1888	8.1976	8.2035	8.1936	8.1783
Sum logs.	9.4633w	7.3146	8.2750	8.7086	8.9600	9.1035
Zy.	−.291	.002	.019	.051	.091	.127
Log. sin. w	9.9983w	9.9983w	9.9849w	9.9573w	9.9134w	9.849ν w
2 log. sin. w	9.9966w	9.9966w	9.9698w	9.9146w	9.8268w	9.6990w
Log. a	1.7875	1.8112	1.8024	1.7965	1.8064	1.8217
Co. log. b	8.7458	8.7548	8.7486	8.7467	8.7508	8.7738
Sum	0.5299w	0.5626w	0.5208w	0.4578w	0.3840w	0.2945w
Zy.	−3.388	−3.653	−3.317	−2.869	−2.421	−1.970
Sum Quantities	−3.679	−3.651	−3.297	−2.818	−2.330	−1.843
(O − C)	−0.14	−0.24	−0.43	−0.16	−0.24	0.00
Log. (O − C)	9.1461w	9.4472w	9.6335w	9.2041w	9.3802w	0.0000
" diff. Co.	0.5657	0.5624	0.5183	0.4499	0.3674	0.2655
Sum logs.	9.7118w	0.0096w	0.1518w	9.6540w	9.7476w	0.2655
Resid. in log.	−0.51	−1.02	−1.42	−0.45	−0.56	1.84
Wts.	9ν (26)	15ν (18)	210 (21)	176 (23)	136 (20)	70 (12)ν
Log. no. of days since Nov. 0.0	1.4150ν	1.2552ν	1.3222ν	1.3617ν	1.3010ν	1.0792ν
Log. Wts.	1.9777ν	2.1903ν	2.3222ν	2.2455ν	2.1335ν	1.8451ν
	3.9584	4.0040	4.1627ν	4.0571ν	3.8019ν	3.1894ν
	9086.6	10185.9	14544.5	11405.1	6337.2	1548.1
Log. total wt.	2.5434ν	2.7527ν	2.8405ν	2.6954ν	2.5009ν	2.1106ν
	349.5	565.8	692.6	495.9	316.9	129.0

Mean day for P. (Pos. Cycles. Demos) = Nov. 22.2ν

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X + XV.

Nov. 5,	Nov. 4,	Dec. 12,	Dec. 7,	Nov. 26,	Dec. 10,	Dec. 14,
32	6	7	8	9	10	11
9.9134	9.6259	9.4130	8.9403	8.9403u	9.4130u	9.6259u
9.8268	9.2518	8.8260	7.8806	7.8806u	8.8260u	9.2518u
1.1950	1.1904	1.2216	1.2878	1.2538	1.2306	1.2164
8.1736	8.1738	8.2778	8.2553	8.2178	8.2661	8.2842
9.1954	8.6157	8.3254	7.3737	7.3522u	8.3227u	8.7524u
.157	.041	.021	.002	−.002	−.021	−.057
97586u	9.9573	9.9849	9.9983	9.9983	9.9849	9.9573
9.9172u	9.9146	9.9698	9.9966	9.9966	9.9698	9.9146
1.8264	1.8265	1.7222	1.7447	1.7822	1.7339	1.7158
8.8050	8.8096	8.7784	8.7622	8.7462	8.7694	8.7836
0.1486u	0.5507	0.4704	0.5035	0.5250	0.4731	0.4140
−1.4048	3.5554	2.954	3.188	3.350	2.972	2.594
−1.2551	3.5595	2.975	3.190	3.348	2.951	2.537
+1.61	+0.87	−0.16	−0.06	−0.06	−0.73	−1.15
0.2068	9.9395	9.2041u	8.7782u	8.7782u	9.8633	0.0607u
0.0973	0.5557u	0.4735u	0.5038u	0.5248u	0.4700u	0.4043u
0.3041	0.4952u	9.6776	9.2820	9.3030	0.3333u	0.4650
+ 2.01	−3.13	+0.48	+0.19	+0.20	−2.15	+2.92
1	4	63	105	85	55	36
0.6990 (57) log. no of days since Oct. 0.0	1.5441 (35)	1.8633 (73)	1.8325 (64)	1.7709 (59)	1.8513 (71)	1.8751 (75)
0.0000	0.6021	1.7993	2.0212	1.9294	1.7404	1.5563
0.7963	2.7019	4.1361	4.3575	4.2251	4.0617	3.8357
6.3	503.4	13680.4	22777.2	16791.9	11526.6	6850.1
0.0973	1.5578	2.2728	2.5250	2.4542	2.2104	1.9606
1.3	14.4	187.4	335.0	284.6	162.3	91.3

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	X	X	X			
Mean day.	Dec. 7.	Oct. 29.	Dec. 1.	Nov. 23.	Nov. 21.	Nov. 28.
w	125	135	145	235	245	255
log. cos. w	9.7586w	9.8495w	9.9134w	9.7586w	9.6259w	9.4130w
2 log. cos. w	9.5172w	9.6990w	9.8268w	9.5172w	9.2518w	8.8260w
log. b.	1.2397	1.1520	1.2503	1.2533	1.2514	1.2538
co. log. a	8.2553	8.1758	8.2309	8.2035	8.1976	8.2178
Sum logs.	9.0103w	9.0268w	9.3080w	8.9740w	8.7008w	8.2976w
z_y	-.102	-.106	-.203	-.094	-.050	-.020
log. sin. w	9.9134	9.8495	9.7586	9.9134w	9.9173w	9.9849w
2 log. sin. w	9.8268	9.6990	9.5172	9.8268w	9.9146w	9.9698w
log. a	1.7447	1.8242	1.7691	1.7965	1.8024	1.7822
co. log. b	8.7622	8.8480	8.7497	8.7467	8.7486	8.7462
Sum	0.3337	0.3712	0.0360	0.3700w	0.4656w	0.4982w
z_y	2.1556	2.3551	1.0086	-2.3444	-2.9210	-3.1449
Sum resultant	2.0554	2.2455	0.8446	-2.4344	-2.9710	-3.1690
(O-C)	-0.91	+1.055	+4.553	+0.600	+0.008	+0.008
log. (O-C)	9.9590w	0.0212	0.6561	9.7782	8.9031	8.9031
" diff. Co.	0.3126w	0.3512	9.9460w	0.3870	0.4729	0.5009
Sum logs.	0.2716w	0.3724w	0.6021w	0.1652	9.3760	9.4040
Resid. in log.	+1.87	-2.36	-4.00	+1.46	+0.24	+0.25
Wts.	10	1	1	65	130	88
log. no. of days since Oct. 0.0	1.8325 (68)	1.4624 (29)	1.7924 (62)	1.7324 (54)	1.7160 (52)	1.7709 (59)
log. Wts.	1.0000	0.0000	0.0000	1.8129	2.1139	1.9445
	3.1451	1.8136	1.7384	3.9323	4.3028	4.2163
	1396.7	65.1	54.8	8566.6	20081.7	16455.1
log. total wt.	1.3126	0.3512	9.9460	2.1999	2.5868	2.4454
	20.5	2.2	0.9	158.5	386.2	278.9

Mean day for Fr. (Pos. Angles. Decimos.) = Nov. 27.8

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Nov. 26	Nov. 26	Nov. 21	Dec. 5	Nov. 14	Nov. 21	Nov. 14
26	27	28	29	30	31	32
8.9403u	8.9403	9.4130	9.6259	9.7546	9.8495	9.9134
7.8806u	7.8806	8.8260	9.2518	9.5172	9.6990	9.8268
1.2542	1.2542	1.2514	1.2440	1.2472	1.2514	1.2337
8.2125	8.2125	8.1976	8.2447	8.1888	8.1976	8.1812
7.3473u	7.3473	8.2750	8.7405	8.9512	9.1480	9.2417
-.002	.002	.019	.055	.089	.141	.174
9.9983u	9.9983u	9.9849u	9.9573u	9.9134u	9.8495u	9.7586u
9.9966u	9.9966u	9.9698u	9.9146u	9.8268u	9.6990u	9.5172u
1.8875	1.8875	1.8024	1.7553	1.8112	1.8024	1.8188
8.7458	8.7458	8.7486	8.7560	8.7548	8.7486	8.7663
0.5299u	0.5299u	0.5208u	0.4259u	0.3926u	0.2500u	0.1023u
-3.388	-3.388	-3.317	-2.666	-2.471	-1.778	-1.266
-3.390	-3.386	-3.298	-2.611	-2.382	-1.637	-1.092
+0.26	+0.31	+0.33	+0.36	+0.60	+1.03	+1.55
9.2041	9.4914	9.5185	9.5563	9.7782	0.0128	0.1903
0.5302	0.5297	0.5183	0.4168	0.3769	0.2140	0.0382
9.9343	0.0211	0.0368	9.9931	0.1551	0.2268	0.2285
+0.54	+1.05	+1.09	+0.94	+1.43	+1.69	+1.69
100	152	179	157	105	55	11
(57)	(57)	(53)	(66)	(49)	(52)	(45)
1.7559 v	1.7559 v	1.7160 v	1.8195 v	1.6902 v	1.7160 v	1.6532 v
2.0000 v	2.1418 v	2.2529 v	2.1959 v	2.0212 v	1.7404 v	1.0414 v
4.2861 v	4.4674 v	4.4872 v	4.4322 v	4.0883 v	3.6704 v	2.7324 v
19324.1	29336.0	30704.3	27052.1	12254.6	4681.7	540.5
2.5302 v	2.7115 v	2.7712 v	2.6127 v	2.3941 v	1.9544 v	1.0796 v
339.0 v	514.6 v	590.5 v	409.9 v	250.1 v	90.0 v	12.0 v

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Dennis, Distances, P. obs.

Mean day.	Dec. 7.	Dec. 7.	Nov. 25.	Nov. 26.	Nov. 28.	Nov. 29.
w	7	12	24	25	26	27
log. cos. w	9.4130	9.7586	9.6259	9.4130	8.9403	8.9403
2 log. cos. w	8.8260	9.5172	9.2518	8.8260	7.8806	7.8806
log. b	1.2377	1.2377	1.2538	1.2542	1.2538	1.2538
co. log. a	8.2555	8.2555	8.2178	8.2125	8.2178	8.2178
Sum logs.	8.3192	9.0104	8.7234	8.2927	7.3522	7.3522
2y.	.021	-.102	-.053	-.020	-.002	.002
log. sin. w	9.9849	9.9134	9.9573	9.9849	9.9983	9.9983
2 log. sin. w	9.9698	9.8268	9.9146	9.9698	9.9966	9.9966
log. a	1.7445	1.7445	1.7822	1.7875	1.7822	1.7822
colog. b	8.7623	8.7623	8.7462	8.7458	8.7462	8.7462
Sum logs.	0.4766	0.3336	0.4430	0.5031	0.5250	0.5250
2y.	2.996	2.156	-2.773	-3.185	-3.350	-3.350
Sum Quantities (or Diff. Co.)	3.017	2.054	-2.826	-3.205	-3.352	-3.348
(O-C)	-1.17	+1.44	-0.43	+0.60	+0.28	+0.44
Log. (O-C)	0.0682	0.1584	9.6335	9.9031	9.4472	9.6421
" Diff. Co.	0.4796	0.3126	0.4512	0.5058	0.5253	0.5248
Sum logs.	0.5478	0.4710	0.0847	0.4089	9.9725	0.1969
Resid. in long.	3.53	-2.96	-1.22	2.56	0.94	1.54
Wts (simply.)	20	2	40	40	36	60
log. no. of days since Nov. 0.0	1.5682 (37)	1.5682 (37)	1.4472 (24)	1.4150 (26)	1.4472 (28)	1.4472 (28)
Log. "Wts (simply)"	1.3010	0.3010	1.6021	1.6021	1.5563	1.7782
log. diff. co.+ log. no. days.+ log. Wts.	3.3488	2.1818	3.5005	3.5229	3.5284	3.7502
Corr. number.	2232.5	152.0	3165.9	3333.5	3379.1	5626.0
log. diff. co.+ log. Wts.	1.7806	0.6136	2.0533	2.1079	2.0816	2.3030
	60.3	4.1	113.1	128.2	120.7	200.9

Mean day P. (Dennis, Distances) Nov. 29.3

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W. obs.

Nov. 28.	Dec. 2.	Dec. 2.	Nov. 29.	Dec. 7.	Dec. 7.	Nov. 23.
28	29	30	31	7	9	24
9.4130	9.6279	9.7286	9.8499	9.4130	8.9403u	9.6279u
8.8260	9.2518	9.5172	9.6990	8.8260	7.8806u	9.2518u
1.2538	1.2497	1.2497	1.2976	1.2377	1.2377	1.2537
8.2178	8.2326	8.2326	8.2233	8.2222	8.2222	8.2041
8.2976	8.7341	8.9995	9.1749	8.3192	7.3738u	8.7094u
.020	.054	.100	.150	.021	−.002	−.051
9.9849u	9.9573u	9.9134u	9.8495u	9.9849	9.9983	9.9573u
9.9698u	9.9146u	9.8268u	9.6990u	9.9698	9.9966	9.9146u
1.7822	1.7674	1.7674	1.7767	1.7445	1.7445	1.7995
8.7462	8.7503	8.7503	8.7474	8.7623	8.7623	8.7465
0.4982u	0.4323u	0.3445u	0.2231u	0.4766	0.5034	0.4570u
−3.149	−2.706	−2.211	−1.671	2.996	3.187	−2.864
−3.129	−2.652	−2.111	−1.521	3.017	3.145	−2.915
+0.61	+0.54	+0.40	+1.01	−0.80	−1.06	−0.37
9.7853	9.7324	9.6021	0.0043	9.9031u	0.0253u	9.5682u
0.4954	0.4236	0.3245	0.1821	0.4796u	0.5031u	0.4646
0.2807	0.1560	9.9266	0.1864	0.3827	0.5284	0.0328u
1.91	1.43	0.86	+1.54	2.41	3.38	
55	65	50	30	20	30	40
(28)	(32)	(32)	(29)	(37)	(37)	(23)
1.4472	1.5051	1.5051	1.4624	1.5682	1.5682	1.3617
1.7404	1.8129	1.6990	1.4771	1.3010	1.4771	1.6021
3.6830	3.7416	3.5246	3.1216	3.3488	3.5454	3.4284
4819.5	5515.7	3377.5	1323.1	2232.5	3535.1	2681.6
2.2354	2.2365	2.0235	1.6592	1.7806	1.9402	2.0667
172.1	172.4	105.6	45.6	60.3	95.5	116.6

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Denivo. Distances.

W. obs.

Mean day	Nov. 26.	Dec. 3.	Dec. 3.	Dec. 3.	Dec. 1.	Dec. 4.	Nov. 27.
w	25	26	27	28	29	30	31
log. cos. w	9.4130n	8.9403n	8.9403	9.4130	9.6259	9.7586	9.8499
2 log. cos. w	8.8260n	7.8806n	7.8806	8.8260	9.2518	9.5172	9.6990
log. b	1.2542	1.2479	1.2479	1.2479	1.2503	1.2449	1.2541
colog. a	8.2125	8.2366	8.2366	8.2366	8.2309	8.2430	8.2144
Sum logs.	8.2927n	7.3651n	7.3651	8.3105	8.7330	9.0051	9.1675
Δy.	−.020	−.002	.002	.020	.054	.101	.147
log. sin. w	9.9849n	9.9983n	9.9983n	9.9849n	9.9573n	9.9134n	9.8495n
2 log. sin. w	9.9698n	9.9966n	9.9966n	9.9698n	9.9146n	9.8268n	9.6990n
log. a	1.7875	1.7634	1.7634	1.7634	1.7691	1.7570	1.7856
colog. b.	8.7458	8.7521	8.7521	8.7521	8.7497	8.7551	8.7459
Sum logs.	0.5031n	0.5121n	0.5121n	0.4853n	0.4334n	0.3389n	0.2310n
Δy.	−3.185	−3.252	−3.252	−3.057	−2.713	−2.142	−1.700
Sum quantities	−3.205	−3.254	−3.250	−3.037	−2.659	−2.081	−1.553
(O−C)	+0.10	−0.04	+0.03	+0.25	+0.06	+0.60	+1.12
Log. (O−C)	9.0000	8.6021n	9.4633	9.7634	9.8808	9.7782	0.0492
" diff. Co.	0.5054	0.5124	0.5119	0.4824	0.4247	0.3183	0.1912
Sum logs.	9.5054	9.1145n	0.3752	0.2458	0.3055	0.0965	0.2404
Resid. in log.							
Wts (simply.)	35	80	60	50	55	45	35
log. no. of days since Nov. 9.0	(26) 1.4150	(33) 1.5185	(33) 1.5185	(33) 1.5185	(31) 1.4914	(34) 1.5315	(27) 1.4314
Log. "Wts (simply)	1.5441	1.9031	1.7782	1.6990	1.7404	1.6532	1.5441
Sum diff. co. + log. days. + log. Wts.	3.4649	3.9340	3.8086	3.6999	3.6556	3.5030	3.1667
	2916.8	8590.1	6435.8	5010.7	4534.2	3184.2	1467.9
log. diff. co. + log. Wts.	2.0499	2.4155	2.2901	2.1814	2.1651	1.9715	1.7353
	112.2	260.3	195.0	151.8	146.3	93.6	54.4

Mean day W. (Denivo. Distances) Dec. 1.6

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$$\text{tan. } \omega = \frac{b(\text{tan. } (P-b)}{a}$$

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$\log. w = \frac{b}{a} \log.(P - p)$

P	321.52	321.52	321.74	321.54	321.96
p	239.42	218.67	237.75	220.24	219.06
P − p	82.10	102.85	83.99	101.30	102.90
log. (P − p)	0.8774	0.6418	0.9777	0.6994	0.6401
" b	0.8396	0.8396	0.8240	0.8394	0.8000
colog. a	8.6112	8.6114	8.5844	8.6082	8.5752
log. w	0.3082	0.0928	0.3861	0.1470	0.0153
w	63.83	−51.08	67.65	−54.52	−46.01
Val. cor. to C.	64.89	132.97	75.18	124.62	138.26
" " " 0.	63.83	128.92	67.65	125.44	133.99
	−1.06	−4.05	−7.53	− 2.14	− 4.27

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321.61	321.61	321.75			321.52
55.78	52.84	31.99			228.40
265.83	268.77	289.76			93.12
1.1373	1.1682	0.4447w			1.2635w
0.8355	0.8355	0.8237			0.8396
8.5961	8.5962	8.5842			8.6113
0.5689	1.0999	9.8526w			0.7144w
74.90	85.46	−35.46			−79.08
250.43	265.56	325.32			106.78
254.90	265.46	324.54			100.92
+4.47	−0.10	−0.78			−5.86

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(P.) Phobos. Pos. angles.

Mean Long. 65	Mean day	Resid. in P. a.	Resid. in Long. by diff. Co.	Resids. Long. by formula	Resids. in Long. with proper signs.	Wts.	Product Resids. X Wts.
65°	Nov. 26.	+0.43	−1.27	−1.06	−1.27	15	−19.05
75	Nov. 16.	+1.05	−3.70		−3.70	46	−170.20
85	Nov. 24.	−0.15	+0.52		+0.52	101	+52.52
95	Nov. 24.	+0.95	−3.39		−3.39	74	−250.86
105	Nov. 26.	+1.85	−6.08	−5.86	−6.08	20	−121.60
115	Nov. 23.	+0.83	−2.44		−2.44	100	−244.00
125	Nov. 16.	+1.35	−3.43		−3.43	34	−116.62
135	Nov. 26.	+2.04	−3.33	−4.05	−3.33	3	−9.99
						393	−879.80
							−2.24
245	Nov. 22.	−2.08	−6.37		+6.37	55	+350.35
255	Nov. 21.	−1.05	−3.64		+3.64	67	+243.88
265	Nov. 24.	+1.14	+4.08		−4.08	52	−212.16
275	Nov. 24.	−0.50	−1.79		+1.79	65	+116.35
285	Nov. 23.	−0.75	−2.53		+2.53	31	+78.43
295	Oct. 26.	+1.71	+7.32		−7.32	6	−43.92
305	Nov. 22	−1.65	−3.91		+3.91	14	+54.74
315	Nov. 16.	−1.14	+1.99		+1.99	8	+15.92
325						298	+6,03.59
							+2.03
						691	−276.21
							−0.40

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IV. (Phobos. Pos. angles.)

Mean Long.	Mean day.	Resid. in P. a.	Resid. in long. by Diff. Co.	Resid. in long. by Formula.	Resids. in long. with proper signs.	Wts.	Product Resids. × Wts.
	Nov. 16.	~~+2.12~~ ~~+4.12~~	−7.76	−7.53	−7.76	4	−31.04
	Nov. 18.	+0.08	−0.31		−0.31	45	−13.95
	Nov. 24.	+0.68	−2.27		−2.27	34	−77.18
	Nov. 18	+1.70	−2.52	~~−1.14~~	−2.52	21	−52.92
	Nov. 10.	+1.96	−3.94	−4.27	−3.94	2	−7.86
						106	−142.95
							−1.73
	Nov. 21.	−1.35	−4.69	+4.47	+4.69	20	+93.80
	Nov. 21.	−0.01	−0.07	+0.10	+0.07	20	+1.40
	Nov. 20.	−0.49	−1.83		+1.83	14	+25.62
	Nov. 25.	−0.27	−0.89		+0.89	35	+31.15
	Nov. 27.	+1.11	+3.16		−3.16	32	−101.12
	Nov. 23.	+3.63	+6.10		−6.10	16	−97.60
	Nov. 16.	+0.52	+0.58	−0.98	−0.58	1	−0.58
						198	−47.33
							−0.24
						244	−230.28
							−0.94

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	65° Dec. 12.	75° Dec. 7.	135° Nov. 26.	325° Nov. 5.	65° Nov. 4.
P	322.54	322.56	322.64	323.21	323.25
p	237.88	240.04	220.06	38.45	239.12
P − p	84.66	82.52	102.58	284.76	84.13
log. tan. (P−p)	1.02993	0.88516	0.65140	0.57920	0.92479
" θ	1.22157	1.23777	1.25742	1.19754	1.19014
colog. a	8.27840	8.25555	8.21257	8.17337	8.17345
log. tan. w	0.52288	0.37750	0.11681	9.94823	0.35778
w	73.51	67.13	−52.69	−41.60	24.03
Val. corr. to C	68.46	70.24	132.00	321.47	69.36
" " " 0	73.51	67.13	127.31	318.40	66.02
	+5.05	−3.11	−4.69	−3.07	−3.34

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W.

125°	135°	145°				
Dec. 7.	Oct. 29.	Dec. 1.				
322.56	323.53	322.60				
218.90	221.40	211.24				
103.66	~~103.17~~ 102.12	111.36				
0.6143u	0.6681u	0.4077u				
1.2372	1.1523	1.2503				
8.2564	8.1758	8.2309				
0.1079u	9.9962u	9.8889u				
−52.04	−44.75	−37.75				
125.67	137.70	147.94				
127.96	135.25	142.25				
+2.29	+2.45	−5.69				

X

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(P.) Decinos. Pos. Angles.

Mean Long.	Mean day.	Resid. in P. a.	Resid. in Long. by Diff. Co.	Resid. in Long. by Formula	Resid. in Long. with proper signs.	Wts.	Product. Resid. × Wts.
55°	Dec. 10.	+1.85	−4.15		−4.15	16	−66.40
6 5	Dec. 12.	−1.69	+4.49	+5.05	+4.49	5	+22.45
7 5	Dec. 7.	+1.15	−3.47	−3.11	−3.47	20	−69.40
8 5	Nov. 23.	+0.89	−3.09		−3.09	40	−123.60
9 5	Nov. 27.	+0.28	−0.93		−0.93	49	−45.57
10 5	Dec. 12.	−0.16	+0.47		+0.47	27	+12.69
11 5	Nov. 8.	+0.12	−0.40		−0.40	40	−16.00
12 5	Nov. 17.	+0.22	−0.53		−0.53	21	−11.13
13 5	Nov. 26.	+2.24	−3.50	−4.69	−3.50	10	−35.00
14 5						228	−331.96
							−1.46
22 5	Nov. 28.	+0.71	+1.30		−1.30	3	−3.90
23 5	Nov. 24.	−0.15	−0.38		+0.38	90	+34.20
24 5	Nov. 20.	+0.01	+0.03		−0.03	138	−4.14
25 5	Nov. 20.	−0.17	−0.62		+0.62	81	+50.22
26 5	Nov. 26.	−0.14	−0.51		+0.51	95	+48.45
27 5	Nov. 14.	−0.24	−1.02		+1.02	155	+158.10
28 5	Nov. 21.	−0.43	−1.42		+1.42	210	+298.20
29 5	Nov. 23.	−0.16	−0.45		+0.45	176	+79.20
30 5	Nov. 20.	−0.24	−0.56		+0.56	136	+76.16
31 5	Nov. 12.	0.00				70	
32 5	Nov. 5.	+1.61	+2.01	−3.07	−2.01	1	−2.01
						1155	+734.48
							+0.6 K
						1383	+402.52
							+0.29

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(Sr.) Reduces. Pos. Angles.

Mean Long.	Mean day.	Resid. in P. a.	Resid. in Long. by Diff. Co.	Resid. in Long. by Formula.	Resids. in Long. with Proper Signs.	Wts.	Product Resids. X Wts.
	Nov. 4.	+0.87	−3.13	−3.34	−3.13	4	−12.52
	Dec. 12.	−0.16	+0.48		+0.48	63	+30.24
	Dec. 7.	−0.06	+0.19		+0.19	105	+19.95
	Nov. 28.	−0.06	+0.20		+0.20	85	+17.00
	Dec. 10.	−0.73	−2.15		+2.15	55	+118.25
	Dec. 14.	−1.15	+2.92		+2.92	36	+105.12
	Dec. 7.	−0.91	+1.87	+2.29	+1.87	10	+18.70
	Oct. 29.	+1.05	−2.36	−2.45	−2.36	1	− 2.36
	Dec. 1.	+4.53	−4.00	−5.69	−4.00	1	− 4.00
						360	+290.42
							+0.81
	Nov. 23.	+0.60	+1.46		−1.46	65	−94.90
	Nov. 21.	+0.08	+0.24		−0.24	130	−31.20
	Nov. 27.	+0.08	+0.25		−0.25	88	−22.00
	Nov. 26.	+0.16	+0.54		−0.54	100	−54.00
	Nov. 26.	+0.31	+1.05		−1.05	152	−159.60
	Nov. 21.	+0.33	+1.09		−1.09	179	−195.11
	Dec. 5.	+0.36	+0.94		−0.94	157	−147.58
	Nov. 18.	+0.60	+1.43		−1.43	105	−150.15
	Nov. 21.	+1.03	+1.69		−1.69	55	− 92.95
	Nov. 14.	+1.55	+1.69		−1.69	11	− 18.59
						1042	−966.08
							−0.93
						1402	−675.66
							−0.48

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Obs. Equations, Phobos. Pos. Asy.

P.

$a \sin. 65° + b \cos. 65° + c = -19.05$

$a \sin. 75° + b \cos. 75°$

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Phobos. Pos. Angles.
P. Obs.

65°	+.906 a +.423 b + c = −19.05	15
75°	+.966 a +.259 b + c = −170.20	46
85	+.996 a +.087 b + c = +52.52	101
95	+.996 a − .087 b + c = −20.86	74
105	+.966 a − .259 b + c = −121.60	20
115	+.906 a − .423 b + c = −244.00	100
125	+.819 a − .574 b + c = −116.62	34
135	+.707 a − .707 b + c = − 9.99	3
245	−.906 a −.423 b + c = +30.35	55
255	−.966 a −.259 b + c = +243.88	67
265	−.996 a −.087 b + c = −212.16	52
275	−.996 a +.087 b + c = +116.35	65
285	−.966 a +.259 b + c = +78.43	31
295	−.906 a +.423 b + c = −43.92	6
305	−.819 a +.574 b + c = +54.74	14
315	−.707 a +.707 b + c = +15.92	8

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Obs. Equations. Phobos. Pos. Angles.
P. Obs.

6r°	+13.60 a + 6.34 b + 1r c = −19.0 r
7r	+44.40 a + 11.90 b + 46 c = −170.20
8r	+101.00 a + 8.79 b + 101 c = +52.52
9r	+73.70 a − 6.44 b + 74 c = −250.86
10r	+19.30 a − 5.18 b + 20 c = −121.60
11r	+90.60 a − 42.30 b + 100 c = −244.00
12r	+27.80 a − 19.r06 + 34 c = −116.62
13r	+2.12 a − 2.12 b + 3 c = −9.99
24r	−49.80 a − 23.30 b + 55 c = +350.35
25r	−64.70 a − 17.40 b + 67 c = +243.88
26r	−51.80 a − 4.r2 b + 52 c = −212.16
27r	−64.70 a + r.66 b + 6r c = +116.3r
28r	−29.90 a + 8.03 b + 31 c = +78.43
29r	−r.44 a + 2.r4 b + 6 c = −43.92
30r	−11.r0 a + 8.04 b + 14 c = +54.74
31r	−r.66 a + r.66 b + 8 c = +1r.92

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Phobos. P. Obs.

Normal for a.

+ 185.00 a	+ 86.20 b	+ 204.00 C	= − 260.00
+ 1970.00 a	+ 528.00 b	+ 2040.00 c	= − 7550.00
+ 10200.00 a	+ 888.00 b	+ 10200.00 c	= + 5302.00
+ 5430.00 a	− 475.00 b	+ 5450.00 c	= − 18500.00
+ 372.00 a	− 100.00 b	+ 386.00 c	= − 2350.00
+ 8210.00 a	− 3830.00 b	+ 9060.00 c	= − 22100.00
+ 773.00 a	− 542.00 b	+ 945.00 c	= − 3250.00
+ 4.49 a	− 4.49 b	+ 6.36 c	= − 21.20
+ 2480.00 a	+ 1160.00 b	− 2740.00 c	= − 17400.00
+ 4190.00 a	+ 1130.00 b	− 4330.00 c	= − 15800.00
+ 2680.00 a	+ 234.00 b	− 2690.00 c	= + 11000.00
+ 4190.00 a	− 366.00 b	− 4210.00 c	= − 7510.00
+ 894.00 a	− 240.00 b	− 927.00 c	= − 2340.00
+ 29.60 a	− 13.80 b	− 32.60 c	= + 239.00
+ 132.00 a	− 92.50 b	− 161.00 c	= − 629.00
+ 32.00 a	− 32.00 b	− 45.30 c	= − 90.00
+ 41772.09 a	− 1669.79 b	+ 13155.46 c	= − 81259.00

+ 41,80 a − 1.67 b + 13,20 c = − 81,30

− 1.67 a + 3.57 b − 5,84 c = + 3.66

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Phobos. P. Eq.

Normal for b.

+	86.20 a +	40.20 b +	95.10 c = −	121.00
+	528.00 a +	142.00 b +	547.00 c = −	2020.00
+	888.00 a +	77.30 b +	888.00 c = +	461.00
−	477.00 a +	41.50 b −	477.00 c = +	1620.00
−	100.00 a +	26.80 b −	104.00 c = +	632.00
−	3830.00 a +	1790.00 b −	4230.00 c = +	10300.00
−	542.00 a +	380.00 b −	663.00 c = +	2280.00
−	4.49 a +	4.49 b −	6.36 c = +	30.00
+	1160.00 a +	543.00 b −	1280.00 c = −	8160.00
+	1130.00 a +	303.00 b −	1170.00 c = −	4270.00
+	234.00 a +	20.40 b −	235.00 c = +	978.00
−	366.00 a +	32.00 b +	364.00 c = +	647.00
−	240.00 a +	64.50 b +	249.00 c = +	626.00
−	13.80 a +	6.45 b +	15.20 c = −	112.00
−	92.50 a +	64.60 b +	113.00 c = +	440.00
−	32.00 a +	32.00 b +	47.30 c = +	90.00
−	1669.79 a +	3568.24 b −	5844.76 c = +	36770.00

− 1.67 a + 3.57 b − 5.84 c = + 3.66

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Phobos. Pos. Angles. P. Th.

Normal for c.

+	204.00 a +	95.10 b +	225.00 c = −	286.00
+	2040.00 a +	547.00 b +	2120.00 c = −	7820.00
+	10200.00 a +	888.00 b +	10200.00 c = +	5302.00
+	5450.00 a −	477.00 b +	5480.00 c = −	18600.00
+	386.00 a −	104.00 b +	400.00 c = −	2440.00
+	9060.00 a −	4230.00 b +	10000.00 c = −	24400.00
+	945.00 a −	663.00 b +	1160.00 c = −	3980.00
+	6.36 a −	6.36 b +	9.00 c = −	30.00
−	2740.00 a −	1280.00 b +	3020.00 c = +	19250.00
−	4330.00 a −	1170.00 b +	4490.00 c = +	16300.00
−	2690.00 a −	235.00 b +	2700.00 c = −	11000.00
−	4210.00 a +	368.00 b +	4220.00 c = +	7540.00
−	927.00 a +	249.00 b +	961.00 c = +	2430.00
−	32.60 a +	15.20 b +	36.00 c = −	263.40
−	161.00 a +	113.00 b +	196.00 c = +	766.00
−	45.30 a +	45.30 b +	64.00 c = +	127.20
+	13155.46 a −	5844.76 b +	45281.00 c = −	17104.20

Cor. for c.	+ 13.20 a − 5.84 b + 45.30 c = −17.10		−17.00
" " a	+ 41.80 a − 1.67 b + 13.20 c = −81.30		−81.23
" " b	− 1.67 a + 3.57 b − 5.84 c = + 3.66		+ 3.65

$-1.67a = +3.66 - 3.57b + 5.84c$

$+1.67a = -3.66 + 3.57b - 5.84c$

$+a = -2.19 + 2.14b - 3.50c$

$-28.90 + 28.20b - 46.20c - 5.84b + 45.30c = -17.10$

$22.40b - 0.90c = +11.80$

$22.40b = +11.80 + 0.90c$

$b = +0.53 + 0.04c$

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$+a - 0.04b + 0.32c = -1.94$

$+a = -1.94 + 0.04b - 0.32c$

$-2.19 + 2.14b - 3.50c = -1.94 + 0.04b - 0.32c$

$+2.10b - 3.18c = +0.25$

$+b = +0.12 + 1.51c$

$+0.53 + 0.04c = +0.12 + 1.51c$

$+0.41 = +1.47c$

$c = +0.28$

$b = +0.12 + 0.42 = +0.54$

$a = -1.94 + 0.02 - 0.09 = -2.01$

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Obs. Equations.

7½°	+.966a +.259b + c	4
9½	+.996a −.087b + c	4½
10½	+.966a −.259b + c	34
12½	+.819a −.574b + c	21
13½	+.707a −.707b + c	2
25½	−.966a −.259b + c	20
26½	−.996a −.087b + c	20
27½	−.996a +.087b + c	14
28½	−.966a +.259b + c	35
29½	−.906a +.423b + c	32
31½	−.707a +.707b + c	16
32½	−.574a +.819b + c	1

+ 3.86a + 1.04b + 4c = − 31.04
+ 44.80a − 3.92b + 45c = − 13.95
+ 32.80a − 8.81b + 34c = − 77.18
+ 17.20a − 12.10b + 21c = − 52.92
+ 1.41a − 1.41b + 2c = − 7.86

− 19.30a − 5.18b + 20c = + 93.80
− 19.90a − 1.74b + 20c = + 1.40
− 13.90a + 1.22b + 14c = + 25.62
− 33.80a + 9.06b + 35c = + 31.15
− 29.00a + 13.50b + 32c = − 101.12
− 11.30a + 11.30b + 16c = − 97.60
− 0.57a + 0.82b + c = − 0.58

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Phobos. Po. Aug. Wash. Obs.

Normal for a.

+	14.90 a	+ 4.01 b	+ 15.40 c = −	120.00
+	2010.00 a	− 176.00 b	+ 2020.00 c = −	627.00
+	1080.00 a	− 289.00 b	+ 1120.00 c = −	2530.00
+	296.00 a	− 208.00 b	+ 361.00 c = −	910.00
+	1.99 a	− 1.99 b	+ 2.82 c = −	11.10
+	372.00 a	+ 100.00 b	− 386.00 c = −	1810.00
+	396.00 a	+ 34.60 b	− 398.00 c = −	27.90
+	193.00 a	− 17.00 b	− 195.00 c = −	356.00
+	1140.00 a	− 306.00 b	− 1180.00 c = −	1050.00
+	841.00 a	− 392.00 b	− 928.00 c = +	2930.00
+	128.00 a	− 128.00 b	− 181.00 c = +	1100.00
+	0.32 a	− 0.47 b	− 0.57 c = +	0.33
+	6473.21 a	− 1379.85 b	+ 250.65 c = −	3411.67
Corr. for a.	+ 6.47 a	− 1.38 b	+ 0.25 c = −	3.41

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Phobos. Pos. Aug. W. Obs.

Normal for b.

+	4.01 a +	1.08 b' +	4.16 c = −	32.20
−	176.00 a +	15.40 b' −	176.00 c = +	54.90
−	289.00 a +	77.60 b' −	300.00 c = +	680.00
−	208.00 a +	146.00 b' −	254.00 c = +	640.00
−	1.99 a +	1.99 b' −	2.82 c = +	11.10
+	100.00 a +	26.80 b' −	103.60 c = −	486.00
+	34.60 a +	3.03 b' −	34.80 c = −	2.44
−	17.00 a +	1.49 b' +	17.10 c = +	31.20
−	306.00 a +	82.10 b' +	317.00 c = +	283.00
−	392.00 a +	182.00 b' +	432.00 c = −	1360.00
−	128.00 a +	128.00 b' +	181.000 = −	1100.00
−	0.47 a +	0.67 b +	0.82 c = −	0.48
−	1379.85 a' +	666.16 b +	80.86 c = −	1280.92
Nor. for b. −	1.38 a +	0.67 b' +	0.08 c = −	1.28

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Phobos. Pos. aug. Gr. Obs.

Normal for c.

+	15.40a +	4.16b +	16.00c = −	124.00	
+	2020.00a −	176.00b +	2020.00c = −	630.00	
+	1120.00a −	300.00b +	1160.00c = −	2620.00	
+	361.00a −	254.00b +	441.00c = −	1110.00	
+	2.82a −	2.82b +	4.00c = −	15.70	
−	386.00a −	103.60b +	400.00c = +	1876.00	
−	398.00a −	34.80b +	400.00c = +	28.00	
−	195.00a +	17.10b +	196.00c = +	358.00	
−	1180.00a +	317.00b +	1220.00c = +	1090.00	
−	928.00a +	432.00b +	1020.00c = −	3230.00	
−	181.00a +	181.00b +	256.00c = −	1560.00	
−	0.57a +	0.82b +	1.00c = −	0.58	
+	2506.65a +	80.86b +	7134.00c = −	5398.28	

Nor. for c	+	0.25a +	0.08b +	× 7.13c = −	5.40	(−5.28
" " b	−	1.38a +	0.67b +	× 0.08c = −	1.28	(−1.24
" " a	+	6.47a −	1.38b +	0.25c = −	3.41	

\+ a + 0.32b + 28.52c = − 21.60

\+ a = − 21.60 − 0.32b − 28.52c

\+ 1.38a − 0.67b − 0.08c = + 1.28

\+ a = + 0.93 + 0.49b + 0.06c

− 21.60 − 0.32b − 28.52c = + 0.93 + 0.49b + 0.06c

0 = 22.53 + 0.81b + 28.58c

28.56c = − 22.53 − 0.81b

c = − 0.79 − 0.03b

\+ a − .21b + .04c = − .53

a = − .53 + .21b − .04c

+.53 + .21b − .04c = + 0.93 + .49b + .06c

+.28b = − .10c − 1.46

+c = − 2.80b − 14.60

−2.80b − 14.60 = − 0.79 − 0.03b

−2.776 = +13.81

b = − 4.99 c = − .63 a = − 1.56

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Nor. for a. (P.) $+41.80a - 1.67b + 13.20c = -81.30$

" " " (W.) $+ 6.47a - 1.38b + 0.25c = - 3.41$

$+48.27a - 3.05b + 13.45c = -84.71$

Nor. for b (P.) $- 1.67a + 3.57b - 5.84c = + 3.66$

" " " (W.) $- 1.38a + 0.67b + 0.08c = - 1.28$

$- 3.05a + 4.24b - 5.76c = + 2.42$

Nor. for. c (P.) $+ 13.20a - 5.84b + 45.30c = - 17.10$

" " " (W.) $+ 0.25a + 0.08b + 7.13c = - 5.40$

$+ 13.45a - 5.76b + 52.43c = - 22.50$

Combined Normals. $+ 48.3a - 3.05b + 13.4c = - 84.7$

$- 3.05a + 4.24b - 5.76c = + 2.42$

$+ 13.4a - 5.76b + 52.4c = - 22.5$

$-a + 1.39b - 1.89c = +.79$

$a = -.79 + 1.39b - 1.89c$

$+a - .43b + 3.91c = - 1.70$

$a = -1.70 + .43b - 3.91c$

$-.79 + 1.39b - 1.89c = -1.70 + .43b - 3.91c$

$+.96b = -.91 - 2.02c$

$+b = -.95 - 2.10c$

$a = -.79 - 1.32 - 2.92c - 1.89c = -2.11 - 4.81c$

$-2.11 - 4.81c = -1.70 - .41 - .90c - 3.91c = -2.11 - 4.81c$

$b = -.95$

$a = -1.70 + .41 = -1.29$

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Decinos. Pos. aug. P. Obs.

55°	+.819 a + .574 b + c	16
6	+.906 a + .423 b + c	5
7	+.966 a + .259 b + c	20
8	+.996 a + .087 b + c	40
9	+.996 a − .087 b + c	49
10	+.966 a − .259 b + c	27
11	+.906 a − .423 b + c	40
12	+.819 a − .574 b + c	21
13	+.707 a − .707 b + c	10
14		
22	−.707 a − .707 b + c	3
23	−.819 a − .574 b + c	90
24	−.906 a − .423 b + c	134
25	−.966 a − .259 b + c	81
26	−.996 a − .087 b + c	95
27	−.996 a + .087 b + c	155
28	−.966 a + 259 b + c	210
29	−.906 a + .423 b + c	176
30	−.819 a + .574 b + c	136
31	−.707 a + .707 b + c	70
32	−.574 a + .819 b + c	1

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Obs. Equations.

+	13.10 a +	9.18 b +	16.00 c = −	66.40
+	4.53 a +	2.12 b +	5.00 c = +	22.45
+	19.30 a +	5.18 b +	20.00 c = −	69.40
+	39.80 a +	3.48 b +	40.00 c = −	123.60
+	48.80 a −	4.26 b +	49.00 c = −	45.57
+	26.10 a −	6.99 b +	27.00 c = +	12.69
+	36.20 a −	16.90 b +	40.00 c = −	16.00
+	17.20 a −	12.10 b +	21.00 c = −	11.13
+	7.07 a −	7.07 b +	10.00 c = −	35.00
−	2.12 a −	2.12 b +	3.00 c = −	3.90
−	73.70 a −	51.70 b +	90.00 c = +	34.20
−	125.00 a −	58.40 b +	138.00 c = −	4.14
−	78.20 a −	21.00 b +	81.00 c = +	50.22
−	94.60 a −	8.26 b +	95.00 c = +	48.45
−	154.00 a +	13.50 b +	155.00 c = +	158.10
−	203.00 a +	54.40 b +	210.00 c = +	298.20
−	159.00 a +	74.40 b +	176.00 c = +	79.20
−	111.00 a +	78.10 b +	136.00 c = +	76.16
−	49.50 a +	49.50 b +	70.00 c =	
−	0.57 a +	0.82 b +	1.00 c = −	2.01

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Demios. Pos. Obs.

Normal for a.

+	172.00 a +	120.00 b +	210.00 c = −	870.00
+	20,50 a +	9.60 b +	22.60 c = +	108.00
+	372.00 a +	100.00 b +	386.00 c = −	1388.00
+	1580.00 a +	139.00 b +	1590.00 c = −	4940.00
+	2380.00 a −	208.00 b +	2390.00 c = −	2230.00
+	681.00 a −	182.00 b +	705.00 c = +	331.00
+	1310.00 a −	612.00 b +	1450.00 c = −	579.00
+	296.00 a −	208.00 b +	361.00 c = −	191.00
+	50.00 a −	50.00 b +	70.70 c = −	247.00
+	4.49 a +	4.49 b −	6.36 c = +	8.27
+	5430.00 a +	3810.00 b −	6630.00 c = −	2520.00
+	15600.00 a +	7300.00 b −	17250.00 c = +	518.00
+	6120.00 a +	1640.00 b −	6330.00 c = −	3930.00
+	8950.00 a +	781.00 b −	8990.00 c = −	4580.00
+	23700.00 a −	2080.00 b −	23900.00 c = −	24300.00
+	41200.00 a −	11000.00 b −	42600.00 c = −	60500.00
+	25300.00 a −	11800.00 b −	28000.00 c = −	12600.00
+	12300.00 a −	8670.00 b −	15100.00 c = −	8460.00
+	0.32 a −	0.47 b −	0.57 c = +	1.15
+	145466.31 a −	2096.38 b −	141621.63 c = −	12637.58

Nor. for a + 145. a − 20.96 − 142 c = − 126.

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1969phae.proj..1026.

Deimos. Pos. aug. P. Obs.

Normal for b.

+	120.00a+	84.30 b+	147.00c = +	610.00
+	9.60a+	4.49 b+	10.60c = +	47.50
+	100.00a+	26.80 b+	104.00c = −	359.00
+	139.00a+	12.10 b+	13.90 c = −	432.00
−	208.00a+	18.10 b−	209.00c = +	194.00
−	182.00a+	48.90 b−	189.00c = −	88.80
−	612.00a+	286.00 b−	676.00c = +	270.00
−	208.00a+	146.00 b−	254.00c = +	134.00
−	50.00a+	50.00 b−	70.70c = +	247.00
+	4.49a+	4.49 b−	6.36c = +	8.27
+	3810.00a+	2670.00 b−	4650.00c = −	1770.00
+	7300.00a+	3410.00 b−	8060.00c = +	242.00
+	1640.00a+	441.00 b−	1700.00 c = −	1050.00
+	781.00a+	68.20 b−	785.00c = −	400.00
−	2080.00a+	182.00 b+	2090.00c = +	2130.00
−	11000.00a+	2960.00 b+	11400.00c = +	16200.00
−	11800.00a+	5540.00 b+	13100.00c = +	5890.00
−	8670.00a+	6100.00 b+	10600.00c = +	5950.00
−	0.47a+	0.67 b+	0.82c = −	1.65
−	20906.38a+	72053.05 b+	20866.26c = +	26601.32

Corr. for b $-20.9a + 72.1b + 20.9c = +26.6$

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Dennis, Pos. Asy. P. Ob.

Normal for c.

+	210.00a+	147.00b+	256.00c = −	1060.00
+	22.60a+	10.60b+	25.00c = +	112.00
+	386.00a+	104.00b+	400.00c = −	1388.00
+	1590.00a+	13.90b+	1600.00c = −	4944.00
+	2390.00a−	209.00b+	2400.00c = −	2230.00
+	705.00a−	189.00b+	729.00c = +	343.00
+	1450.00a−	676.00b+	1600.00c = −	640.00
+	361.00a−	254.00b+	441.00c = −	233.00
+	70.70a−	70.70b+	100.00c = −	350.00
−	6.36a−	6.36b+	9.00c = −	11.70
−	6630.00a−	4650.00b+	8100.00c = +	3078.00
−17250.00a−	8060.00b+	19000.00c = −	571.00	
−	6330.00a−	1700.00b+	6560.00c = +	4070.00
−	8990.00a−	7455.00b+	9020.00c = +	4600.00
−23900.00a+	2090.00b+	24000.00c = +24500.00		
−42600.00a+11	400.00b+	441000.00c = +62600.00		
−28000.00a+	1310.00b+	31000.00c = +13900.00		
−15100.00a+	10600.00b+	18500.00c = +10400.00		
−	0.57a+	0.82b+	1.00c = −	2.01
−141621.63a+	20866.26b+	167841.00c = +112173.29		

Nor. for c. $-142a + 20.9b + 164c = +112.$ $(+111.10)$

" " a $+145a - 20.9b - 142c = -126.$ x (-126.55)

" " b $-20.9a + 22.1b + 20.9c = +26.6$ x $(+26.44)$

$-a + 1.06b + c = +1.27$

$a = +1.06b + c - 1.27$

$a = 0.14b + 0.98c - 0.87$

$1.06b + c - 1.27 = 0.14b + 0.98c - 0.87$

$.92b = -.02c + .40$

$b = -.02c + .43$

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$-a + .15b + 1.18c = +.79$

$-a = +.79 - .15b - 1.18c$

$a = -.79 + .15b + 1.18c$

$a = 1.06b + c - 1.27$

$.15b + 1.18c - .79 = +1.06b + c - 1.27$

$-.91b = -.18c - .48$

$.91b = .18c + .48$

$b = +.20c + .53$

$-.02c + .43 = +.20c + .53$

$c = -.45$

$b = +.44$

$a = -1.25$

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Deimos. Pos. Aug. W. Obs.

65°	+.906a + .423b + c	4
75	+.966a + .259b + c	6
85	+.996a + .087b + c	10
95	+.996a − .087b + c	8
105	+.966a − .259b + c	5
115	+.906a − .423b + c	36
125	+.819a − .574b + c	10
135	+.707a − .707b + c	1
145	+.574a − .819b + c	1
235	−.819a − .574b + c	6
245	−.906a − .423b + c	130
255	−.966a − .259b + c	88
265	−.996a − .087b + c	100
275	−.996a + .087b + c	152
285	−.966a + .259b + c	179
295	−.906a + .423b + c	157
305	−.819a + .574b + c	105
315	−.707a + .707b + c	56
325	−.574a + .819b + c	11

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Decins. Pos. Asy. W. Obs.

Obs. Equations.

$+3.62a+1.69b+4.00c=+3.48$
$+60.90a+16.30b+63.00c=-9.84$
$+105.00a+9.14b+105.00c=-6.05$
$+84.70a-7.40b+85.00c=-5.45$
$+53.10a-14.20b+55.00c=-40.05$
$+32.60a-15.20b+36.00c=-41.56$
$+8.19a-5.74b+10.00c=-9.10$
$+0.71a-0.71b+1.00c=+1.05$
$+0.57a-0.82b+1.00c=+4.53$

$-53.20a-37.30b+65.00c=+39.10$
$-118.00a-55.00b+130.00c=+10.30$
$-85.00a-22.80b+88.00c=+7.39$
$-99.60a-8.70b+100.00c=+16.00$
$-151.00a-13.20b+152.00c=+46.54$
$-173.00a+46.40b+179.00c=+56.48$
$-142.00a+66.40b+157.00c=+56.16$
$-86.00a+60.30b+105.00c=+62.65$
$-38.90a+38.90b+55.00c=+56.40$
$-6.31a+9.01b+11.00c=+17.05$

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Decimas. Pos. Aug. Yr. Obs.

Normal for a.

+ 13.10 a +	6.12 b +	14.50 c = +	12.60
+ 3710.00 a +	993. b +	3840.	c = −	599.
+ 11000.00 a +	960. b +	11000.	c = −	637.
+ 7170.00 a −	627. b +	7200.	c = −	462.
+ 2820.00 a −	754. b +	2920.	c = −	2120.
+ 1060.00 a −	496. b +	1170.	c = −	1360.
+ 67.10 a −	47. b +	82.	c = −	75.
+ 0.50 a −	1. b +	1.	c = +	1.
+ 0.32 a −	0. b +	1.	c = +	3.

+ 2830.00 a +	1980. b −	3460.	c = −	2080.
+ 13900.00 a +	6490. b −	15300.	c = −	1220.
+ 7220.00 a +	1940. b −	7480.	c = −	6280.
+ 9920.00 a +	867. b −	9960.	c = −	1590.
+ 22800.00 a +	1990. b −	23000.	c = −	7020.
+ 29900.00 a −	8030. b −	31000.	c = −	10100.
+ 20200.00 a −	9430. b −	22300.	c = −	7980.
+ 7400.00 a −	5190. b −	9030.	c = −	5380.
+ 1510.00 a −	1510. b −	2140.	c = −	2190.
+ 39.80 a −	57. b −	69.	c = −	107.
+141560.82 a −	10916. b −	97511.	c = −43529.

Nor. for a. + 142. a − 10.9 b − 97.5 c = − 43.5

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Deimos. Pos. Aug. W. Obs.

Journal for b.

+	6.	a+	3.	b+	7.	c = +	6.
+	993.	a+	266.	b+	1030.	c = −	160.
+	960.	a+	84.	b+	960.	c = −	55.
−	627.	a+	55.	b−	629.	c = +	40.
−	754.	a+	202.	b−	781.	c = +	568.
−	496.	a+	231.	b−	547.	c = +	632.
−	47.	a+	33.	b−	57.	c = +	52.
−	1.	a+	1.	b−	1.	c = −	1.
−	0.	a+	1.	b−	1.	c = −	4.
+	1980.	a+	1390.	b−	2420.	c = −	1460.
+	6490.	a+	3020.	b−	7150.	c = −	566.
+	1940.	a+	520.	b−	2010.	c = −	168.
+	867.	a+	76.	b−	870.	c = −	139.
+	1990.	a+	174.	b−	2010.	c = −	614.
−	8030.	a+	2150.	b+	8310.	c = +	2710.
−	9430.	a+	4410.	b+	10400.	c = +	3730.
−	5190.	a+	3640.	b+	633.	c = +	3770.
−	1510.	a+	1510.	b+	2140.	c = +	2190.
−	57.	a+	81.	b+	99.	c = +	153.
−	10916.	a+	17847.	b+	7103	c = +	10684.

− 10.9 a + 17.8 b + 7 1. c = + 10.7

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Decmos. Pos. Aug. W. Obs.

Normal for c.

+	14. a +	7. b +	16. c = +	14.90
+	3840. a +	1030. b +	3970. c = −	620.
+	11000. a +	960. b +	11000. c = −	637
+	7200. a −	629. b +	7220. c = −	463.
+	2920. a −	781. b +	3020. c = −	2200.
+	1170. a −	547. b +	1300. c = −	1500.
+	82. a −	57. b +	100. c = −	91.
+	1. a −	1. b +	1. c = +	1.
+	1. a −	1. b +	1. c = +	5.
−	3460. a −	2420. b +	4220. c = +	2540.
−	15300. a −	7150. b +	16900. c = +	1300.
−	7480. a −	2010. b +	7740. c = +	650.
−	9960. a −	870. b +	10000. c = +	1600.
−	23000. a −	2010. b +	23100. c = +	7070.
−	31000. a +	8310. b +	32000. c = +	10500.
−	22300. a +	10400. b +	24600. c = +	8820.
−	9030. a +	633. b +	11000. c = +	6570.
−	2140. a +	2140. b +	3020. c = +	3100.
−	69. a +	99. b +	121. c = +	187.
−	97511. a +	7103. b +	15932 9. c = +	36848.

Nor. for c, $-97.5a + 7.10b + 159.c = +36.8$ × (+36.88)

" " a $+142.a - 10.9b - 97.5c = -43.5$ (−43.29)

" " b $-10.9a + 17.86 + 71.c = +10.7$ ×

$-a + 1.63b + 6.51c = +0.98$

$a = -0.98 + 1.63b + 6.51c$

$-a + .07b + 1.63c = +0.38$

$a = -0.38 + .07b + 1.63c$

$-0.98 + 1.63b + 6.51c = -0.38 + .07b + 1.63c$

$+1.56b + 4.88c = +.60$

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$+a - .08b - 0.69c = -0.31$

$+a = -0.31 + .08b + 0.69c$

$-0.38 + .07b + 1.63c = -0.31 + .08b + .69c$

$+.94c = +.07 + .01b$

$.01b = +.94c - .07$

$b = +94.c - 7.$

$+146.6Kc - 10.92 + 4.88c = +.60$

$+151.52c = +11.52$

$c = +.08 \qquad b = +0.52 \qquad a = -.21$

Cor. for a. (P_1) $+142a - 10.9b - 97.5c = -43.5$

" " b (Y_1) $+145a - 20.9b - 142c = -126.$

$+287.a - 31.8b - 239.5c = -169.5$

Cor. for b (P_2) $-20.9a + 22.1b + 20.9c = +26.6$

" " " (Y_2) $-10.9a + 17.8b + 71.c = +10.7$

$-31.8a + 39.9b + 91.9c = +37.3$

Cor. for c (P_3) $-142a + 20.9b + 168c = +112.$

" " " (Y_3) $-97.5a + 7.16b + 159c = +36.8$

$-240.a + 28.0b + 327c = +149.$

$+287a - 31.8b - 239.5a = -169.5$

$-31.8a + 39.9b + 91.9c = +37.3$

$-240.a + 28.0b + 327c = +149.$

$-a + 1.25b + 2.89c = +1.17$

$-a + .12b + 1.36c = +.62$

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1869phae.proj.1826.

Phobos. W. Obs.

Corr. for c. $+.25a + .086 + 7.13c = -5.40 \cdot (-5.40)$

" " b. $-1.38a + .67b + .08c = -1.28 \cdot (-1.38)$

" " a $+6.47a - 1.38b + .25c = -3.41 \quad (-3.71)$

$+a + .326 + 28.52c = -21.60$

$+a = -21.60 - .326 - 28.52c$

$-a + .4855b + .0580c = -.9275$

$-a = -.9275 - .4855b + .0580c$

$a = +.9275 + .4855b - .0580c$

$-21.60 - .326 - 28.52c = +.9275 + .4855b - .0580c$

$-22.5275 - .8055b = +28.4620c$

$.8055b = -28.4620c - 22.5275$

$b = -35.3346c - 27.9665$

$+a - .21336 + .0387c = -.5720$

$+a = -.5720 + .21336 - .0387c$

$-21.60 - .326 - 28.52c = -.5720 + .21336 - .0387c$

$-21.0280 - .53336 = +28.4813c$

$+.53336 = -28.4813c - 21.0280$

$+b = -53.4052c - 39.4300$

$-35.3346c - 27.9665 = -53.4052c - 39.4300$

$+18.0706c = -11.4635$

$c = -.6344$

$b = -5.5497$

$a = -1.7312$

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Nor. for c $-97.5a + 7.10b + 159c = +36,8$ $(+36,79)$

" " a $+142.a - 10,9b - 97.5c = -43,5$ $(-43,49)$

" " b $-10,9a + 17,86b + 71.c = +10,7$ $(+10.70)$

$-a + .0728b + 1.6308c = +.3774$

$-a = +.3774 - .0728b - 1.6308c$

$a = -.3774 + .0728b + 1.6308c$

$+a - .0768b - .6866c = -.3063$

$+a = -.3063 + .0768b + .6866c$

$-.3774 + .0728b + 1.6308c = -.3063 + .0768b + .6866c$

$+.9442c = +.0711 + .0040b$

$+.0040b = +.9442c - .0711$

$b = +236.05c - 17.775$

$-a + 1.6330b + 6.5138c = +.9817$

$a = -.9817 + 1.6330b + 6.5138c$

$-.3774 + .0728b + 1.6308c = -.9817 + 1.6330b + 6.5138c$

$+4.8830c + 1.5602b = +.6043$

$+1.5602b = -4.8830c + .6043$

$+b = -3.1297c + .3873$

$+236.05c - 17.775 = -3.1297c + .3873$

$+239.1797 = +18.1623$

$c = +.0759$

$b = +.1498$

$a = -.2427$

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Phobos. Pos. angles. M. Obs.
(carried to a larger number of decimals)

$$
\begin{aligned}
+3.86a + 1.04b + 4c &= -31.64\\
+44.80a - 3.92b + 45c &= -13.95\\
+32.20a - 8.81b + 34c &= -44.18\\
+17.20a - 12.10b + 21c &= -52.92\\
+1.41a - 1.41b + 2c &= -7.86
\end{aligned}
$$

$$
\begin{aligned}
-19.30a - 5.18b + 20c &= +93.80\\
-19.90a - 1.74b + 20c &= +1.40\\
-13.90a + 1.22b + 14c &= +25.62\\
-33.80a + 9.06b + 35c &= +31.15\\
-29.00a + 13.50b + 32c &= -101.12\\
-11.30a + 11.30b + 16c &= -97.60\\
-0.57a + 0.82b + c &= -0.58
\end{aligned}
$$

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1869phae.proj.1826.

Phobos. Obs. Eq. Y. Obs.

Normal for a.

+ 14.90a +	4.01b +	15.44c = +	119.81
+ 2008.83a −	175.69b +	2016.90c = −	625.24
+ 1078.47a −	289.32b +	1116.56c = −	2534.59
+ 295.84a −	207.26b +	361.20c = −	910.22
+ 1.99a =	1.99b +	2.82c = −	11.08
+ 373.26a +	100.08b −	386.40c = −	1812.22
+ 396.81a +	34.66b −	398.40c = −	27.89
+ 194.32a −	17.01b −	195.16c = −	357.14
+ 1143.12a −	306.32b −	1183.35c = −	1053.18
+ 840.42a −	392.52b −	927.68c = +	2931.47
+ 127.92a −	127.92b −	180.96c = +	1103.86
+ 0.32a −	0.47b −	0.57c = +	0.33
+6476.20a −	1379.75b +	240.40c = −	3415.71

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Phobos. Obs. Eq. W. Obs.

Normal for b.

+	4.01a +	1.08b +	4.16c = +	32.28
−	175.69a +	15.37b −	176.40c = +	54.68
−	289.32a +	77.62b −	299.54c = +	679.96
−	207.26a +	145.20b −	253.05c = +	637.69
−	1.99a +	1.99b −	2.82c = +	11.08
+	100.08a +	26.83b −	103.60c = −	485.88
+	34.66a +	3.03b −	34.80c = −	2.44
−	17.01a +	1.49b +	17.08c = +	31.26
−	306.32a +	82.08b +	317.10c = +	282.22
−	392.52a +	183.33b +	433.28c = −	1369.17
−	127.92a +	127.92b +	180.96c = −	1103.86
−	0.47a +	0.67b +	0.82c = −	0.48
Nor. for b	− 1379.75a +	666.61b +	83.19c = −	1297.22
Nor. " a	+ 6476.20a −	1397.87b +	170.40c = −	3476.01
" " c	+ 170.40a +	83.19b +	7144.00c = −	948.16

− a + 0.48b + 0.06c = − 0.93

+ a − 0.68b + 0.03c = − 0.54

a = + 0.93 + 0.48b + 0.06c

a = − 0.54 + 0.68b − 0.03c

.93 + .48b + .06c = − .54 + .68b − .03c

+ 1.47 + .09c = .20b

b = + 7.35 + .45c

+ a + .49b + 41.92c = − 34.91

+ a = − 34.91 − .49b − 41.92c

.93 + .48b + .06c = − 34.91 − .49b − 41.92c

+ 35.84 + 41.98c = − .97b

b = − 36.95 − 43.28c

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Phobos. obs. Eq. W. Obs.

Normal for c.

+	15.44 a +	4.16 b +	16.00 c = −	12.16
+	2016.90 a −	176.40 b +	2025.00 c = −	627.75
+	1116.56 a −	299.54 b +	1156.00 c = −	2624.12
+	361.20 a −	253.05 b +	441.00 c = −	1111.32
+	2.82 a −	2.82 b +	4.00 c = −	15.72
−	386.40 a −	103.60 b +	400.00 c = +	1876.00
−	398.40 a −	34.80 b +	400.00 c = +	28.00
−	195.16 a +	17.08 b +	196.00 c = +	358.68
−	1163.35 a +	317.10 b +	1225.00 c = +	1090.25
−	927.68 a +	433.28 b +	1024.00 c = −	3235.84
−	180.96 a +	180.96 b +	256.00 c = −	1561.60
−	0.57 a +	0.82 b +	1.00 c = −	0.58
+	240.40 a +	83.196 +	7144.00 c = −	5948.16

+7.35 + 1.45 c = −36.95 − 43.28 c

+44.30 = −43.73 c

c = −1.01

b = +6.90

a = +.93 + 3.31 − .06 = +4.18

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(rec'd. 9 ν)

Nov. Eq. Phobe. Nr. Obs. 1

Cor. for a $+6476.20a - 1379.7\nu b + 240.40c = -341\nu.71$

" " b $-1379.7\nu a + 666.616 + 83.19c = -1297.22$

" " c $+240.40a + 83.196 + 7144.00c = -\nu 948.16$

$+a - .216 + .04c = -.\nu 3$

$-a + .486 + .06c = -.94$

$+a + .3\nu b + 29.72c = -24.74$

$+a = -.\nu 3 + .216 - .04c$

$+a = +.94 + .486 + .06c$

$-.\nu 3 + .216 - .04c = +.94 + .486 + .06c$

$-1.47 - .10c = +.276$

$b = -\nu.44 - .37c$

$-24.74 - 29.72c - .3\nu b = +.94 + .486 + .06c$

$-25.68 - 29.78c = +1.836$

$b = -30.94 - 3\nu.88c$

$-\nu.44 - .37c = -30.94 - 3\nu.88c$

$+\nu.44 + .37c = +30.94 + 3\nu.88c$

$3\nu.\nu 1c = -2\nu.\nu 0$

$c = -.72$

$b = -\nu.17$

$a = -.\nu 3 - 1.09 + .03 = -1.\nu 9$

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1869phae.proj.1826.

Phobos. Pos. Aug. P. Obs.

Normal for a.

+	184.69a+	86.16b+	203.8c =	258.89
+	1974.61a+	529.28b+	2044.24c =	− 763.70
+	10120.36a+	884.27b+	10160.60c =	+ 283.51
+	5431.69a−	474.63b+	5383.80c =	−1888.38
+	373.26a−	100.08b+	386.40c =	− 2349.32
+	8208.36a−	3832.37b+	9060.00c =	−22106.40
+	775.62a−	543.63b+	946.90c =	− 3247.86
+	4.49a−	4.49b+	6.36c =	− 21.18
+	2483.03a+	1159.05b−	2740.65c =	− 1757.94
+	4188.68a+	1122.89b−	4336.24c =	− 1573.91
+	2682.20a+	234.09b−	2693.08c =	+ 1098.77
+	4191.27a−	366.43b−	4208.10c =	− 732.50
+	897.00a−	240.50b−	928.45c =	− 2348.98
+	29.59a−	13.82b−	32.64c =	+ 238.92
+	131.56a−	92.22b−	160.58c =	− 627.84
+	32.04a−	32.04b−	45.28c =	− 90.11
+	41708.75a−	1684.47b +	13117.13c =	−81366.84

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Phobos. Obs. Eq. P. Obs.

Nov. for b.

+	86.16a+	40.20b+	95.10c = +	120.78
+	529.28a+	141.85b+	547.86c = −	2027.08
+	884.27a+	77.26b+	887.79c = +	461.65
−	474.63a+	41.47b−	476.56c = +	1615.54
−	100.08a+	26.83b−	103.60c = +	629.89
−	+c. a+	1789.29b−	4230.00c = +	10321.20
−	a+	381.03b−	663.68c = +	2276.42
−	a+	4.49b−	6.36c = +	21.18
+	a+	541.03b−	1279.30c = −	8149.14
+	a+	301.02b−	1162.45c = −	4231.31
+	a+	20.43b−	235.04c = +	958.96
−	a+	32.04b+	367.90c = +	658.54
−	a+	64.48b+	248.93c = +	629.79
−	a+	6.45b+	15.24c = −	111.56
−	a+	64.64b+	112.56c = +	440.11
−	a+	32.04b+	45.28c = +	90.11
−	1684.47a+	3564.55b−	5436.33c = +	3463.52

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Phobos. obs. Eq. P. obs.

Corr. for c.

+	a+	b+	225.c = +	285.75
+	a+	b+	2116.c = −	7829.20
+	a+	b+	10201.c = +	5304.52
+	a−	b+	5476.c = −	18563.64
+	a−	b+	400.c = −	2432.00
+	a−	b+	10000.c = −	24400.00
+	a−	b+	1156.c = −	3965.08
+	a−	b+	9.c = −	29.97
−	a−	b+	3025.c = +	19269.75
−	a−	b+	4489.c = +	16339.86
−	a−	b+	2704.c = −	11032.32
−	a+	b+	4225.c = +	7562.75
−	a+	b+	961.c = +	2431.33
−	a+	b+	36.c = −	263.52
−	a+	b+	196.c = +	766.36
−	a+	b+	64.c = +	127.36
+ 13117.13	a−	5836.336 +	4528 3.c = −	17000.05

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Phobos. Eqs. of Cond. Obs.

Eqs. fr. a $+41708.75a - 1684.47b + 13117.13c = -81366.84$

" " b $-1684.47a + 3564.75b - 7836.33c = +3463.72$

" " c $+13117.13a - 7836.33b + 47243.00c = -17000.05$

$+a - .04046b + .3147c = -1.9708$

$-a + 2.1161b + 3.4648c = +2.0761$

$+a - .4449b + 3.4722c = -1.2960$

$+a = -1.9708 + .04046b - .3147c$

$+a = -2.0761 + 2.1161b + 3.4648c$

$-1.9708 + .04046b - .3147c = -2.0761 + 2.1161b + 3.4648c$

$+0.1053 - 3.7793c = +2.0776$

$b = +.0507 - 1.8207c$

$-2.0761 + 2.1161b + 3.4648c = -1.2960 + .4449b - 3.4722c$

$+1.6712b = +.7801 - 6.9170c$

$+b = +.4668 - 4.1390c$

$+.0507 - 1.8207c = +.4668 - 4.1390c$

$-.4041 = -2.3183c$

$c = +.1743$

$b = -.2667$

$a = -2.0166$

Finial values.

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Phobos. Mov. Eq. W. Obs.

Cov. for a $+6476.20a - 1379.75b + 240.40c = -345.71$

" " b $-1379.75a + 666.616 + 83.19c = -1297.22$

" " c $+240.40a + 83.19b + 7144.00c = -948.16$

$+a - .2130b + .0371c = -.5274$

$-a + .4830b + .0603c = -.9402$

$+a + .3460b + 29.7171c = -24.7428$

$+a = -.5274 + .2130b - .0371c$

$+a = +.9402 + .4830b + .0603c$

$-.5274 + .2130b - .0371c = +.9402 + .4830b + .0603c$

$+.2700b = -1.4676 - .0974c$

$+b = -5.4356 - .3607c$

$+a = -24.7428 - .3460b - 29.7171c$

$+.9402 + .4830b + .0603c = -24.7428 - .3460b - 29.7171c$

$+.8290b = -29.7774c - 25.6830$

$b = -35.9197c - 30.9807$

$-5.4356 - .3607c = -35.9197c - 30.9807$

$-35.5590c = +25.5451$

$+c = -.7184$

$b = -5.1765$

$a = -1.6029$

Finial values.

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Phobos. Pos. Asy. (P. + W.)

Sums of Intervals.

$+41708.75a - 1684.44b + 13117.13c = -81366.84$

$+ 6476.20a - 1379.75b + 240.40c = 3415.71$

Combined Equ. for a. $+48184.95a - 3064.22b + 13357.53c = -84782.55$

$-1684.44a + 3564.44b - 5836.33c = +3463.52$

$-1379.75a + 666.61b + 83.19c = -1297.22$

Com. Equ. for b. $-3064.22a + 4231.06b - 5753.14c = +2166.30$

~~$= 13117.13a$~~

$+13117.13a - 5836.33b + 42823.00c = -17000.05$

$+ 240.40a + 83.19b + 7144.00c = -5948.16$

Com. Equ. for c. $+13357.53a - 5753.14b + 52427.00c = -22948.21$

$+ a - .0636b + .2772c = -1.7590$

$+ a = -1.7590 + .0636b - .2772c$

$-a + 1.3808b - 1.8775c = +.7070$

$+a - 1.3808b + 1.8775c = -.7070$

$+a = -.7070 + 1.3808b - 1.8775c$

$-1.7590 + 0.0636b - .2772c = -.7070 + 1.3808b - 1.8775c$

$+1.3172b = +1.6003c - 1.0525$

$+b = +1.2149c - .7990$

$+a - .4307b + 3.9249c = -1.7180$

$+a = -1.7180 + .4307b - 3.9249c$

$-.7070 + 1.3808b - 1.8775c = -1.7180 + .4307b - 3.9249c$

$+.9501b = -1.0110 - 2.0474c$

$+b = -1.0641 - 2.1549c$

$+1.2149c - .7990 = -2.1549c - 1.0641$

$+3.3698c = -.2651$

$+c = -.0787$

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$+b = -.09\nu 6 - .7990 = -.8946$

$+a = -1.7\nu 9\nu - .0\nu 69 + .0218 = -1.7946$

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Denios. Pos. Asy. (P + W.)

Sums of normals.

$+145.a - 20.9b - 142.c = -126.$

$+142.a - 10.9b - 97.5c = -43.5$

Com. Nor. for a. $+287.a - 31.8b - 239.5c = -169.5$

$-20.9a + 22.1b + 20.9c = +26.6$

$-10.9a + 17.8b + 71.c = +10.7$

Com. Nor. for b. $-31.8a + 39.9b + 91.9c = +37.3$

$-142.a + 20.9b + 168.c = +112.$

$-97.5a + 7.1b + 159.c = +36.8$

Com. Nor. for c $-239.5a + 28.0b + 327.c = +148.8$

$+a - .11086 - .8345c = -.5906$

$+a = -.5906 + .11086 + .8345c$

$-a + 1.25476 + 2.8899c = +1.1730$

$+a - 1.25476 - 2.8899c = -1.1730$

$+a = -1.1730 + 1.25476 + 2.8899c$

$-.5906 + .11086 + .8345c = -1.1730 + 1.25476 + 2.8899c$

$+1.14396 = -2.0552c + .5824$

$+b = -1.7968c + .5091$

$-a + .11696 + 1.3653c = +.6213$

$+a - .11696 - 1.3653c = -.6213$

$+a = -.6213 + .11696 + 1.3653c$

$-1.1730 + 1.25476 + 2.8899c = -.6213 + .11696 + 1.3653c$

$+1.13786 = -1.5246c + .5517$

$+b = -1.3400c + .4849$

$-1.7968c + .5091 = -1.3400c + .4849$

$-.4568c = -.0242$

$+.4568c = +.0242$ $\quad c = +.0530$

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Decimos. Pos. adj. (P. + W.)

$b = -.0710 + .4849 = +.4139$

$a = -.5906 + .0459 + .0442 = -.5005$

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$R = a \sin. v + b \cos. v + c$

$m \sin. (v + \alpha) = a \sin. v + b \cos. v$

$\cos. \alpha \; m \sin. v + m \sin. \alpha \cos. v = a \sin. v + b \cos. v$

$m \cos. \alpha = a$

$m \sin. \alpha = b$

$a^2 + b^2 = m^2$

$\tan. \alpha = \frac{b}{a}$

$\Pi = V + \frac{2 \varepsilon \sin. v}{57.3}$

$m = \frac{2\varepsilon}{57.3} \qquad \varepsilon = 28.65\, m$

$R = v - M = 2 \varepsilon \sin. M.$

~~$v = M +$~~

$\varepsilon = \frac{v - M}{2 \sin. M.}$

$q = a(1 - \varepsilon)$

$R = m \sin. (v + \alpha) = 2 \varepsilon \sin. M.$

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Phobos. P. Obs.

$a = -2.0166$

$b = -0.2667$

$c = +0.1743$

Deimos. P. Obs.

$a = -1.25$

$b = +0.44$

$c = -0.45$

Phobos. W. Obs.

$a = -1.6029$

$b = -5.1765$

$c = -0.7184$

Deimos. W. Obs.

$a = -0.2427$

$b = +0.1498$

$c = +0.0749$

Phobos. (P. + W.)

$a = -1.7946$

$b = -0.8946$

$c = -0.0787$

Deimos. (P. + W.)

$a = -0.5005$

$b = +0.4139$

$c = +0.0530$

log. $-2.0166 = 0.304620$ w

$+4.067 = 0.609240$

Phobos. P. Obs.

log. $-0.2667 = 9.426023$

$+0.071 = 8.852046$

$+4.067$

log. $+4.138 = 0.616790$

$+2.034 = 0.308351$

$28.65 = 1.457125$

$58.24 = 1.765476$

0.30839

$1.45\overline{7}125$

$8.81270 = .071 = e.$

$-1.603 = 0.204934$

$+2.570 = 0.409868$

Phobos. W. Obs.

0.733886

$1.45\overline{7}125$

$9.276761 = 1.49 = e$

$-5.176 = 0.713994$

$+26.791 = 1.427988$

$+2.570$

$+29.361 = 1.467771$

0.733886

$2.19\overline{7}657$

(e comes the same using 4 decimals for a + b, instead of 3)

1.4677

$1.45\overline{7}1$

$0.0106 = .06$

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Phobos. (P. + W.)

log. 1.7946 = 0.2539677
3.2206 = 0.5079354

0.8946 = 9.9516289
0.8003 = 9.9032578
3.2206
4.0209 = 0.6043233
0.3021616

28.65 = 1.4571246
8.8450370
δ = .070 =

Deimos. P. Obs.

1.25 = 0.0969
1.562 = 0.1938

0.44 = 9.6434
0.194 = 9.2869
1.562
1.756 = 0.2443
0.12226
1.4571
8.6614
δ = .046 =

Deimos. W. Obs.

0.2427 = 9.3850698
0.0589 = 8.7701396

0.1498 = 9.1755118
0.0224 = 8.3510236
0.0589
0.0813 = 8.9100902
9.4550452
1.4571246
ϵ = 0.0100 = 7.9979206

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Deimos. (P. + W.)

0.5005 = 9.6994041
0.2505 = 9.3998502

0.4139 = 9.6168965
0.1713 = 9.2337908
0.2505
0.4218 = 9.6251066
9.8125533
1.4571246
$\delta = 0.023 = 8.3557427$

Long. of Perihelion.

−0.2667 = 9.4260233 Phobos. P. Obs.
−2.0166 = 0.3046201
7° 32′ = 9.1214034

−5.1765 = 0.7140361 Phobos. W. Obs.
−1.6029 = 0.2049061
72° 48′ = 0.5091300

−0.8946 = 9.9516289 Phobos. (P. + W.)
−1.7946 = 0.2539677
26° 30′ = 9.6976612

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Long. of Perihelion.

Dennis. P. Obs.

+.44 = 9.64345
−1.25 = 0.09691 w
−19° 24′ = 9.54654 w
160° 36′ or 340° 36′

Dennis. W. Obs.

+0.1498 = 9.17551118
−0.2427 = 9.38506988 w
− 31° 41′ = 9.79044420 w
148 19′ or 328° 19′

Dennis. (P. + W.)

+0.4139 = 9.61689754
−0.5005 = 9.69940411 w
−39° 35′ = 9.91749133 w
140° 25′ or 320° 25′

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Periods of Satellites of Mars as deduced from Marth's paper in No Page of the Astronomische Nachrichten. Vol. 96.

Deimos.

2ᵈ.163	= 2.4⁻⁻0932
360.	= 2.⁻⁻6302⁻
1.262436	= 0.1012093
24.	= 1.3802112
30ʰ.29ᵐ447ˢ	= 1.4814207

Period.

30ʰ 17ᵐ 54.⁻4113 2

	9.4747806
60.	= 1.7781⁻13
17ᵐ.906⁻⁻4	= 1.2⁻3.0193

	9.9⁻7⁻3806
	1.7781⁻13
⁻4.⁻4113 2	= 1.7.3⁻6893

Phobos.

1124.840	= 3.0⁻26324
360.	= 2.⁻⁻6302⁻
	9.⁻0367 01
24.	= 1.3802112
7ʰ.6⁻38737	= 0.8833813

Period.

7ʰ 39ᵐ 13.⁻94⁻9K

	9.8⁻49399
	1.7781⁻13
39ᵐ.2324324	= 1.⁻93647⁻2

	9.3662967
	1.7781⁻13
13ʰ.94⁻94	= 1.1KK4K60

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Cambridge Observations. 1877.

U. S. obs.

Deimos.		Phobos.	
s (corr)	Δs (corr)	s (corr)	Δs (corr)
1161."11	−6.72	234.37	−1.23
−6.72		−1.23	
1154.39		233.14	

Glasgow Observations.

H. S. P. obs.

Deimos.		Phobos.	
s (corr)	Δs (corr)	s (corr)	Δs (corr)
638."56	−4."07	222."27	+9.39
−4.07		+9.39	
634.51		231.66	

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Cambridge Observations 1877.

L. W. obs.

Log. 1161.11 = 3.0648733

" 32.3541 = 1.5099293

4.5747826

" 1154.39 = 3.0623525

32.5424 = 1.5124501

" 234.37 = 2.3699020

" 12.9531 = 1.1123734

3.4822754

" 233.14 = 2.3676164

" 13.0214 = 1.1146590

Glasgow Observations.

W. P. obs.

" 634.56 = 2.8025017

" 32.3541 = 1.5099293

4.3125310

" 634.51 = 2.8024325

32.5606 = 1.5126925

" 222.27 = 2.3468808

" 12.9531 = 1.1123734

3.4592546

" 231.66 = 2.3648511

12.4281 = 1.0944035

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Distances,

P. obs. Distances	P. obs. Resids.	W. obs. Distances	W. obs. Resids.
56.64	−0.04	57.44	−0.13
62.37	+1.23	62.05	+.32
60.83	−0.55	48.57	+.32
60.55	−.31	44.82	+1.68
51.26	+.27	55.86	−.61
44.84	+.56	60.70	−.82
54.75	−.92	57.53	−.27
60.82	−.49	55.11	+.48
58.84	+.62	56.87	−.07
56.01	+.48	58.84	−.11
56.38	+.37	59.69	+.57
60.01	+1.27	59.89	+1.17
59.99	+.81	58.72	+1.22
60.06	+1.16	55.70	+1.09
59.55	+1.51	51.88	+.88
56.00	+.84	52.00	+.63
52.39	+.26	46.50	+.41
47.13	−.34	40.88	+.83
43.08	+1.46	52.77	−.80
51.81	−1.17	54.14	−1.32
49.77	+1.44	54.58	−.81
47.69	−.54	54.48	+.35
51.26	+.49	54.87	+.44
48.49	+1.31	54.81	+.45
1310.52	+9.72	53.60	+.57
−9.72		48.26	+.52
1300.80		1410.51	+6.99
		−6.99	
		1403.52	

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Computation of semi-major axis of orbit of Deimos.

1310.52
−9.72
1300.80

P. obs.

Log. 1310.52 = 3.1174436
" 32.3541 = 1.5099293
4.6273729
" 1300.80 = 3.1142105
" 32."5959 = 1.5131624

1410.51
−6.99
1403.52

W. obs.

Log. 1410.51 = 3.1493762
" 32.3541 = 1.5099293
4.6593055
" 1403.52 = 3.1472146
" 32."5152 = 1.5120869

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$M : m = a'^3 : a^3$

M = Hall's value of mass.
a = " " " mean distance.

Cambridge Observations 1877. Waldo.

Deimos.

log. 32.3541^3 = 4.5297879
" 3095318. = 6.4907045
11.0204924
" 32.6049^3 = 4.5140006
3023314. = 6.4804434

Glasgow Obs. 1877. Pritchett.

Deimos.

11.0204924
log. 32.6052^3 = 4.5396807
3024344. = 6.4806317

Cambridge Obs. 1879. P. obs.

Deimos.

11.0204924
log. 32.5949^3 = 4.5394572
3026950. = 6.4810052

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Cambridge Obs. 1879. W. obs.

Deimos.

Log. 32.5152^s = 1.0204924
4.7136207
$3049\overset{s}{.}22$ = 6.4741317

Tabular Values of Mass.

$\frac{1}{3095313}$ Hall.

$\frac{1}{3023318}$ Waldo.

$\frac{1}{3024344}$ Pritchett.

$\frac{1}{3026950}$ Prof. Pickering.

$\frac{1}{3049522}$ Wendell.

$\frac{1}{3029167}$ Prof. Pickering.

$\frac{1}{3050820}$ Wendell.

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1869phae.proj.1826.

P. 60.

Log. +0°.29 = 9.4623980

" +06. = 2.9063370

+0.000379 = 6.5756030

28'.1630 = Daily motion by Hall.

Log. 28'.1634 = 2.4575093

" 360. = 2.5756302

1.262434 = 0.1012087

Log. 1.262434 = 0.1012087

" 24. = 1.3802112

30.29441 26 = 1.4814199

Log. 0.2944126 = 9.4744172

" 60. = 1.7781513

17.90476 = 1.2529685

Log. 0.904760 = 9.9563334

" 60. = 1.7781513

54.2861 = 1.7344847

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1869phae.proj.1826:

Period of Deimos.

Log. +0.°48 = 9.6812412 W. obs.
" 812. = 2.9095560
+ 0.0005911 = 6.7716272
285.1630

Log. 285.1636 = 2.4550941
" 360. = 2.5563025
1.d26243231 = 0.1012084
24. = 1.3802112
30h.298916 = 1.4781196

Log. 0.298916 = 9.4747866
" 60. = 1.7781513
17m.90349 = 1.2529379

Log. 0.903498 = 9.9559272
" 60. = 1.7781513
54.s210 = 1.7340785

P. obs. Weights 1383
W. " " 1402
2785

Log. 1402. = 3.1467480
" 2785. = 3.4448252
9.7019228
" 377. = 2.5763414
190. = 2.2782642

∴ Period by combination of P. & W. = 30h 17m 54.s40

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1869phae.proj.0026.

Period of Daniosa.

P. obs.

Log. −0.29 = 9.462390 v

" 406. = 2.906335 v

−0.000379 = 6.556030

245.1630 v

Log. 245.1626 = 2.455 0926 v

" 360. = 2.556302 v

" 1.d 262437 v = 0.1012099 v

" 24. = 1.380212 v

30.h 29496 v = 1.481421 1 v

" 0.29496 v = 9.474939 2 v

" 60. = 1.778 1 513 v

" 17.m 909790 v = 1.253090 v

" 0.909790 v = 9.958 9412 v

" 60. = 1.778 1513 v

" 54.s 587 v = 1.733 7092 v

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Period of Deimos.

From.

Log. 2 8 5. 1 6 3 0 = 2. 4 5 5 0 9 3 2 ν — Hartis Hall.
" 3 6 0. = 2. 5 5 6 3 0 2 5 ν — Ast. Nach. Vol. 96.
" 1. 2 6 2 4 3 5 8 ν = 0. 1 0 1 2 0 9 3 ν — Page 133.
" 2 4 = 1. 3 8 0 2 1 1 2 ν
30.h 2 9 8 4 5 4 5 ν = 1. 4 8 1 4 2 0 5 ν

" 0. 2 9 8 4 5 4 5 ν = 9. 4 7 4 8 7 8 1 ν
" 6 0. = 1. 7 7 8 1 5 1 3 ν
" 17. 9 0 7 2 7 2 ν = 1. 2 5 3 0 2 9 4 ν

" 0. 9 0 7 2 7 2 = 9. 9 5 7 7 3 7 5 ν
" 6 0. = 1. 7 7 8 1 5 1 3 ν
" 5 4. 4 3 6 ν = 1. 7 3 5 8 8 8 8 ν

" 2 8 5. 1 6 4 5 ν = 2. 4 5 5 0 9 5 4 ν — Halls final
" 3 6 0. = 2. 5 5 6 3 0 2 5 ν — value 1877.
" 1. 2 6 2 4 2 9 4 ν = 0. 1 0 1 2 0 7 1 ν
" 2 4. = 1. 3 8 0 2 1 1 2 ν
" 30.h 2 9 8 3 0 0 7 ν = 1. 4 8 1 4 1 8 3 ν

" 0. 2 9 8 3 0 0 7 ν = 9. 4 7 4 6 5 4 3 ν
" 6 0. = 1. 7 7 8 1 5 1 3 ν
" 17.m 8 9 8 0 4 5 ν = 1. 2 5 2 8 0 5 6 ν

" 0. 8 9 8 0 4 5 ν = 9. 9 5 3 2 9 8 1 ν
" 6 0. = 1. 7 7 8 1 5 1 3 ν
" 5 3.m 8 8 3 ν = 1. 7 3 1 4 4 9 4 ν

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Period of Phobos.

Phobos.

Hall's Final value 1877.

Log. 1128.794 = 3.052614
" 360. = 2.556302
" 0.d 31892 44 = 9.503678
" 24. = 1.380212
" 7.h 6 4 1860 = 0.883990

" 0.64 1860 = 9.815013
" 6.0. = 1.778151
" 39.m 2 1171 = 1.593826

" 0.21171 = 9.399969
" 60. = 1.778151
" 15.s 070 = 1.178120

" 1128.840 = 3.052624
" 360. = 2.556302
" 0.31891 15 = 9.503670
" 24. = 1.380212
" 7.h 6 3 7 37 = 0.883813

" 0.63737 = 9.815499
" 60. = 1.778151
" 39.m 23243 2 = 1.596426

" 0.23243 2 = 9.366299
" 60. = 1.778151
" 13.s 946 = 1.144472

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Period of Phobos.

Log. +0.40 = 9.6026600 v
" 807. = 2.9068733 v
+0.000649 vv = 6.6951846 v
" 1128.8405 =

P.

See p. 127 for more extended computation of mean daily motion and period of Phobos.

Log. +0.94 = 9.9731279 v
" 807. = 2.9068733 v
+0.00116 v = 7.0662744 v
" 1128.8405 v
" 1128.84125 = 3.0526326 v
" 360. = 2.5563025 v
" 0.3194912 v = 9.5036697 v
" 24. = 1.3802112 v
" 7.6538667 v = 0.8838809 v
" 0.6538667 v = 9.8154892 v
" 60. = 1.7781513 v
" 39.232009 v = 1.5936405 v
" 0.232009 v = 9.3655048 v
" 60. = 1.7781513 v
13.921 v = 1.1436561 v

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Decimo. Distances after cor. has been applied to Refraction.

P. obs. Distances.	Residuals	W. obs. Distances.	Residuals.
56.64	−0.04	57.44	−0.13
62.37	+1.23	62.05	+0.32
60.74	−0.64	48.55	+0.30
60.47	−0.39	44.80	+1.66
51.24	+0.25	55.85	−0.62
44.82	+0.54	60.70	−0.82
54.74	−0.93	57.50	−0.30
60.82	−0.49	55.09	+0.46
58.81	+0.59	56.82	−0.07
55.99	+0.46	58.84	−0.11
56.38	+0.37	59.69	+0.57
60.01	+1.27	59.89	+1.17
60.00	+0.82	58.72	+1.22
60.06	+1.16	55.70	+1.09
59.55	+1.51	51.88	+0.88
56.00	+0.84	51.99	+0.62
52.39	+0.26	46.49	+0.40
47.12	−0.35	40.87	+0.82
43.07	+1.45	52.77	−0.80
51.80	−1.16	54.14	−1.32
49.77	+1.44	54.58	−0.81
47.66	−0.57	54.46	+0.33
51.26	+0.49	54.85	+0.42
48.49	+1.31	54.79	+0.43
1310.20	+9.40	53.59	+0.56
−9.40		48.26	+0.52
1300.80		1410.31	+6.79
		−6.79	
		1403.52	

mean of obs. = 54.5917

(18.58) 54.2427 (16.75)

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Log. 1310.20 = 3.1173376 P. obs.
" 32.3541 = 1.5099293
4.6272669
" 1300.80 = 3.1142105
32.5879 = 1.5130564

Log. 1410.31 = 3.1493146 W. obs.
" 32.3541 = 1.5099293
4.6592439
" 1403.52 = 3.1472186
32.5106 = 1.5120253

Cambridge obs. 1679. P. obs.

11.0204924
Log. 32.5879° = 4.5391692
30291.67 = 6.4813232

Lane W. obs.

11.0204924
Log. 32.5106° = 4.5360759
30502.20 = 6.4844165

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Comet g. 1881.

	[74.06]	(+71.60)	(+70.40)
δ =	+74° 3′ 51″.0	+71 36 11.4	+70° 47 47.1
	Nov. 17.	Nov. 19.	Nov. 20.
M. A.	+3 22 12.	+6 18 0	+21 35 55
θ	5 19 21	7 41 53	22 51 46
t'	1 57 9	1 23 53	1 15 51
$t' = (\theta - t')$	+3 22 12	+6 18 0	+21 35 55
log. sin. t'	+ 9.8877+	9.9987+	9.7695w
Colog. cos. δ'	0.5613+	0.5008+	0.4830+
Log. $(t - t')$	1.2651+	1.3156+	1.0686+
log. $(t - t')$ (time)	0.0890+	0.1395+	9.8925w
Colog. cos. t'	0.1970+ v	1.1054w v	0.0921+ v
Log. tan γ	0.1543+ v	1.0627w v	0.0494+ v
γ	54°.97	94.95	48.°25
$\gamma - \delta'$	−19.09 v	+23.35 v	−22.55 v
Log. sin $(\gamma - \delta')$	9.5146w v	9.5981+ v	9.5838w v
Colog. sine γ	0.0868+ v	0.0016+	0.1272+ v
Log. $(\delta - \delta')$	0.3748w v	0.3731+	0.4744w
$(\delta - \delta')$			

The above parallaxes computed directly

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(+67.71)
+67 42 37.1
Nov. 22.

H. A.	+4	12	8
θ	5	4	2
δ'	0	1	27
$t' = (\theta - \delta')$	+4	12	35
log. sin. t'	9.9104+		
Colog. cos. δ'	0.4210+		
log. $(t - \delta')$	1.1847+		
log $(t - \delta')$ time	0.0114+		
Colog. cos. t'	0.3452+		
Log. Cot. γ	0.3021+		
γ	= 63.°1		
$\gamma - \delta'$	= 4.20		
log. sin. $(\gamma - \delta')$	8.8647		
Colog. sin. γ	0.0482		
log. $(\delta - \delta')$	9.6863		
$(\delta - \delta')$			

on the basis $\pi = 8.''8$

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1869phae.proj.1826.

log. 18.54 = 1.2690457

" 0.4453 = 9.9270109

1.1960566

2.4320446

7.7640120

1.1960566

1.7160223

9.4800343

log. 24. = 1.3802112

" 23. = 1.3617278

2.7419390

" √24. = 0.6901056

3.4320446

1.7160223

"

54.59

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1869phae.proj.1926.

Prob. error of distances.

P. obs.	W. obs.
0."136	0."109

Prob. error of "a"

P. obs.	W. obs.
0."067	0."067

Prob. error mean of dist.
(P. + W.)
0."067

Prob. error of "a"
(P. + W.)
0."071

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1869phae.proj.1826.

Values of semi-diam. and mass. from Comb. obs. 1879.

Semi-diam	Denom.	
32."5479		P. obs.
32.5106		W. obs.

Mass.

$\frac{1}{3029167}$	P. obs.
$\frac{1}{3050620}$	W. obs.

Semi-diam.	Denom.	
32.5492		(P.+W.)

Mass of Mars.

$\frac{1}{3039971}$	(P.+W.)

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Values of mean Semi diam of orbit of Deimos, and mass of Mars from Cambridge Obs. 1879.

a	
32."879	P. obs.
32."506	W. obs.

mass.	
$\frac{1}{3029.67}$	P. obs.
$\frac{1}{3078.20}$	W. obs.

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Prof. Error of Mean of distances. P. obs.

Log. 17.7 = 1.2690457
" 0.″44 = 9.9270109
1.1960566
2.0610771
0.″136 = 9.1349415

Log. 24. = 1.3802112
2
2.7604224
1.3617274
2/4.1221502
2.0610771

Same. W. obs.

Log. 16.7 = 1.2240148
" .″44 = 9.9270109
1.1510257
2.1139433
0.″109 = 9.0370424

Log. 26. = 1.4149733
2
2.8299466
" 25. = 1.3979400
2/4.2278866
2.1139433

1310.20 : 0.136 = 32.5879 : 0.″0034

Log. 32.5879 = 1.5130564
" 0.136 = 9.1349815
0.6480379
" 1310.20 = 3.1173376
0.0034 = 7.5307003

1410.31 : 0.109 = 32.5106 : 0.″002√

Log. 32.5106 = 1.5120253
" 0.109 = 9.0370424
0.5491077
" 1410.31 = 3.1493146
0.″002√ = 7.3997931

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1869phae.proj.1826.

32.5879
32.5106
9785

Log. 32.5492 = 1.5125404
" (")^3 = 4.5376212
11.0204924
30399853. = 6.4728712

Prob. error of "a" = mean dist.

54.5917 : 0.136 = 32.5879 : 0."081

Log. 0.136 = 9.1349815
" 32.5879 = 1.5130564
0.6480379
" 54.5917 = 1.7371266
0.081 = 8.9109113

Prob.

54.2427 : 0.109 = 32.5106 : 0."065

Log. 32.5106 = 1.5120253
" 0.109 = 9.0370424
0.5490077
" 54.2427 = 1.7343413
0.065 = 8.8147664

---

log. 32.5492 = 1.5125404
" (")^3 = 4.5376230
11.0204924
6.4828694

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18.58 — 24
16.75 — 26
35.33 — 50

Log. 35.33 = 1.5481436
" .4453 = 9.9270109
1.4751545
2.5440680
0".045 = 8.9310686

Log. 50. = 1.6989700
" 50² = 3.3979400
" 49 = 1.6901961
5.0887361
2.5440680

Prob. error mean of distances (P. + W.)

54.4204 : 0.045 = 32.5492 :

Log. 0.045 = 8.9310686
" 32.5492 = 1.5125410
0.4436276
" 54.4204 = 1.7357617
0".01 = 8.7078658

Prob. error of "a" (P. + W.)

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Finial computation of mean daily motion and period of Phobos. (See p. 117)

P. obs.

1128.8405 = 3.0526326
360. = 2.5563025
9.5036699
24. = 1.3802112
7.65387017 = 0.8833811

7h 39m 13.933
7 39 13.914
7 39 13.923 mean.

Log. 0.65387017 = 9.8154915
" 60. = 1.7781513
39.2322162 = 1.5936428

Log. 0.2322162 = 9.3658925
" 60. = 1.7781513
13.933 = 1.1440438

1128.8412 = 3.0526329
360. = 2.5563025
0.31891109 = 9.5036696
24. = 1.3802112
7.65386491 = 0.8833808

7 39 13.914

Log. 0.65386491 = 9.8154880
" 60. = 1.7781513
39.2319000 = 1.5936393

" 0.2319000 = 9.3653007
60. = 1.7781513
13.914 = 1.1434520

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N. 34.	N. 35	N. 36.	N. 37.	N.
Apr. 9. 1866 to	Aug. 27. 1866,	Oct. 21. 1866 to	Jan. 14. 1867	Apr. 26.
Aug. 26. 1866.	to Oct. 20. 1866.	Jan. 14. 1867.	to Apr. 26. 1867	to Oct. 19.
50.395 - 50.399.	9.73 - 9.74	5.41 - 6.50	14.116 - 16.134	49.391 -
50.401 -	9.75 - 13.110	6.51 - 8.64	18.149 - 18.150	
		9.77 - 9.79	18.151 - 18.154	
		10.80 - 10.81	19.155 - 19.156	
		10.82 - 11.92	19.157 - 19.163.	
		12.102 - 12.103	20.165 - 20.169.	
		12.104 - 12.106	24.173 - 24.175.	
		13.110 - 13.111	24.176 - 23.190.	
		13.112 - 14.115.	23.191 - 23.192	
		14.117 - 16.136.	23.194 - 23.195	
		17.137 - 23.184.	24.202 - 24.208	
		25.207 -	24.204 - 25.209.	
			25.210 - 26.212.	
			26.218 - 27.221	
			27.222 - 27.223	
			28.230 - 28.233	
			28.234 - 29.236	
			29.237 - 32.264.	
			32.264 - 32.265.	
			32.266 - 33.274.	
			33.275 - 34.276.	
			34.281 - 34.282.	
			34.283 - 35.284.	
			35.287 - 35.288.	
			35.289 - 35.290.	
			36.291 - 38.312.	
			39.313 - 39.314.	
			39.315 - 39.318.	
			39.319 - 39.320.	
			42.339 - 42.340.	
			42.341 - 42.342.	
			43.352 - 43.357.	
			46.364 - 45.366.	
			47.373 - 47.376.	
			47.377 - 47.378.	
			47.379 - 48.380.	
			48.381 - 49.386.	
			49.387 - 49.388.	
			49.389 - 49.390.	
			49.393 - 49.394.	

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1869phae.proj.1826.

h. 38.
v. 26. 1867.
Oct. 19. 1867.
Oct.
to Fe
h. 7.
t. 2. to
t. 21.
1866.

391 -
5.36 -
5.38 -
5.40 -
5.43 -
6.45 -
6.47 -
7.55 -
7.55 -
8.64 -
8.66 -
10.84 -
10.90 -
11.94 -
11.96 -
12.98 -
14.118 -
14.120 -
14.122 -
15.125 -
15.127 -
16.132 -
17.138 -
18.147 -
20.165 -
21.174 -
21.179 -
22.181 -
22.183 -
25.208 -
26.214 -
31. 258



64° 70.1
65° 70.5 .4
66° 70.9 .4

$$\tan(P-p) = \frac{a}{b}\tan w$$

$$-\sec^2(P-p)\,dp = \frac{a}{b}\sec^2 w\,dw$$

$$\frac{dp}{dw} = \frac{a\sec^2 w}{b\sec^2(P-p)} = \frac{a}{b}\sin^2 w + \frac{b}{a}\cos^2 w$$

$$\frac{a\cos^2(P-p)}{b\cos^2 w}$$

$$\cos^2(P-p) = \frac{b^2\cos^2 w}{S^2}$$

$$\tan^2(P-p) = \frac{a}{b}\tan w$$

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4. 38.	4. 39.	4. 40.	4. 5.	4. 6.	4. 7.
. 26. 1867.	Oct. 22. 1867.	Feb. 3. 1868.	aug. 26. to Sept. 10 1866	Sept. 12. to Oct. 2. 1866.	Oct. 2. to Oct. 21. 1866.
ct. 19. 1867.	to Feb. 1. 1868.	to June 28. 1868.			

1 -	5.36 - 5.37.	15.127 - 15.130
	5.38 - 5.39	16.131 - 16.135
	5.40 - 5.42	17.140 - 18.146
	5.43 - 5.44	18.152 - 18.153.
	6.45 - 5.46	19.159 - 19.160
	6.47 - 6.52	19.161 - 19.162
		20.166 - 20.167.
	7.53 - 7.54	20.171 - 20.172
	7.55 - 7.60	24.199 - 24.205.
	8.61 - 8.65	26.216 - 26.217
	8.66 - 10.83	27.224 - 27.225.
	10.84 - 10.85	27.226 - 27.227
	11.90 - 11.93	28.221 - 28.229.
	11.94 - 11.95.	28.231 - 29.238.
	11.96 - 11.97	29.239 - 30.246.
	12.98 - 13.107	30.247 - 30.248.
	14.118 - 14.119	30.249 - 31.254.
	14.120 - 14.121	32.259 - 32.260.
	14.122 - 15.123	32.262 - 35.285.
	15.125 - 15.126	36.292 - 36.293.
	15.128 - 15.129	36.294 - 36.295
	16.132 - 16.135	38.310 - 38.311.
	17.138 - 17.139	39.316 - 39.317.
	18.147 - 19.158	40.327 - 41.338
	20.165 - 20.170.	44.337 - 42.038
	21.174 - 21.177.	42.343 - 42.344.
	21.179 - 21.180.	44.355 - 44.356.
	22.181 - 22.182.	45.368 - 45.369.
	22.183 - 22.184.	45.365 - 47.374.
	25.208 - 25.211	47.382 - 49.392.
	26.214 - 26.215.	50.396 -
	31.258 -	

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1869phae.proj.1826.

U. 13.	U. 14.	U. 15.	U. 16.	U.
Apr. 1. 1868.	Oct. 10. 1868	Dec. 22. 1868	Apr. 28. 1869	Oct. 2
to Oct. 9. 1868	to Dec. 19. 1868.	to Apr. 22. 1869	to Oct. 17. "	to Aug.
6.48 – 6.62	7.47 – 7.59	17.141 – 17.208		60.156 –
	8.67 – 8.69	22.185 – 23.189.		60.184 –
	9.74 – 11.97	23.198 – 23.196,		63.213 –
	12.99 – 12.101	24.197 – 24.198.		70.250 –
	13.108 – 14.148	24.200 – 27.219.		31.258 –
		29.240 – 29.243.		33.270 –
		30.244 – 31.256.		33.272 –
		32.267 – 36.296.		34.277 –
		37.299 – 37.301.		37.308 –
		40.302 – 40.303.		38.307 –
		42.345 –		38.309 –
				40.327 –
				40.329 –
				41.334 –
				42.347 –
				44.358 –
				46.367 –
				46.370 –
				48.388 –

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1869phae.proj.1826.

U. 17.	U. 1.	U. 2.	U. 3.	U. 4.
t. 24. 1869.	June 9. to July 6.	July 9. to July	July 24 to	Aug. 13. to
ugy. 17. 1870	1866.	22. 1866.	Aug. 11. 1866	Aug. 25. 1866.

6 – 10. 29
4 – 14. 19
18 – 26. 218
50 – 36. 244
18 – 38. 269.
20 – 22. 291.
2 – 38. 293.
7 – 34. 260.
8 – 37. 305.
7 – 38. 308.
9 – 40. 324.
5 – 40. 327.
9 – 41. 331.
2 – 41. 335.
7 – 43. 350.
– 44. 360.
– 46. 364.
– 46. 371.
– 46. 384.

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1869phae.proj.1826.

Lee N. 34.

No. 1.	No. 2.	No. 3.	No. 4.
June 9 to July 6. 1866.	July 9. to July 22. 1866.	July 24. to Aug. 11. 1866.	Aug. 26. to Sept. 10. 1866.
[illegible]	[illegible]	[illegible]	[illegible]

1869phae.proj.1826.

Sec N. 35.

No. 6.	No. 7.	No. 13.	No. 14.
Sept. 12 to Oct. 2. 1866.	Oct. 2. to Oct. 21. 1866.	Apr. 1. 1867. to Oct. 9.	Oct. 10. to Dec. 19. 1867.
~~80.637 - 81.669~~		73.771 - 74.762	60.469 - 65.883
		75.899 - 76.898	79.603 - 80.672
		76.899 - [illegible]	84.667 - 85.670
		77.694 - 78.693	86.683 - 87.704
		89.706 - 90.705	96.769 - 97.779
		100.792 - 101.[illegible]	97.771 - 97.772
			97.773 - 97.774
			99.782 - 100.794
			102.817 - 103.834
			103.823 - 103.824

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1869phae.proj.1826.

U. 15	U. 16.	U. 17.	* U. 34.
Dec. 22. 1865 to Apr. 22. 1869.	Apr. 24. to Oct. 14. 1869.	Oct. 25. 1869 to May 17. 1870.	Apr. 9. 1866 to Aug. 26. 1866.

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Red Stars.

D M. + 2° 37

Birmingham's paper on probable variability of the Red Stars of Sch.'s list. M. N. Vol. 34. p. 410.

Burnham Cat. of Red Double Stars in M. N. Vol. 36. p. 334.

D. M. − 0° 46 was observed Nov. 15. 1868 and the record says "Not in heaven."

Hagy Star. 0h 43m + 2° 42'

Very Red Star = D M. 1°(2)#2

Double H. C. 130. Principal star red.

Zone (D M.) − 1° 950. (Book 15. p. 35) Red Star.

D M. + 2° 190 (Book 14. p. 77.) Red Star.

D M + 1° 221 (" " " 76) Very " "

" + 1° 218 " " " " " Red Star.

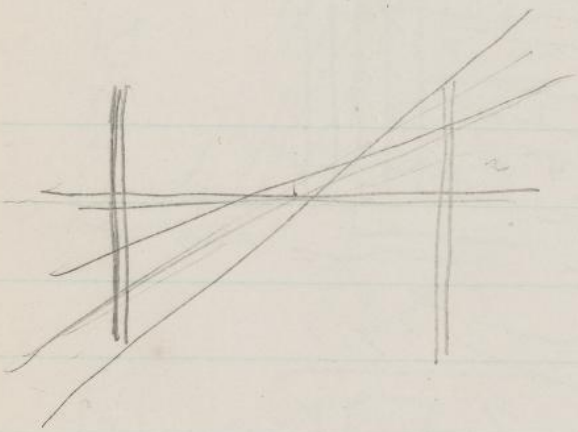
For Red Stars see Book 50, p. 56.

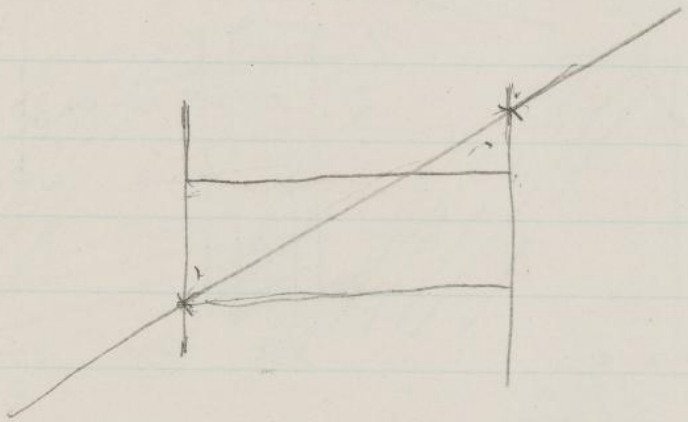
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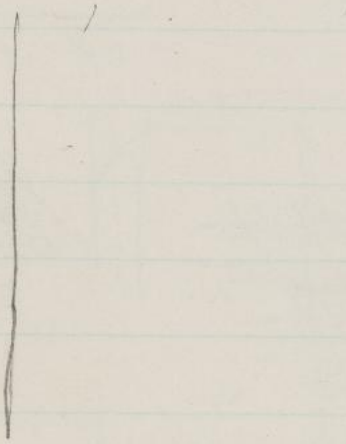
1869phae.proj.1826.

+2.996
30
89.880

+19.9
30
60 | 598.0 (+9
540
58.0

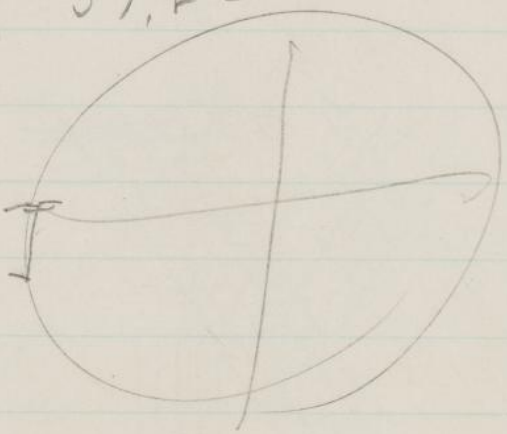






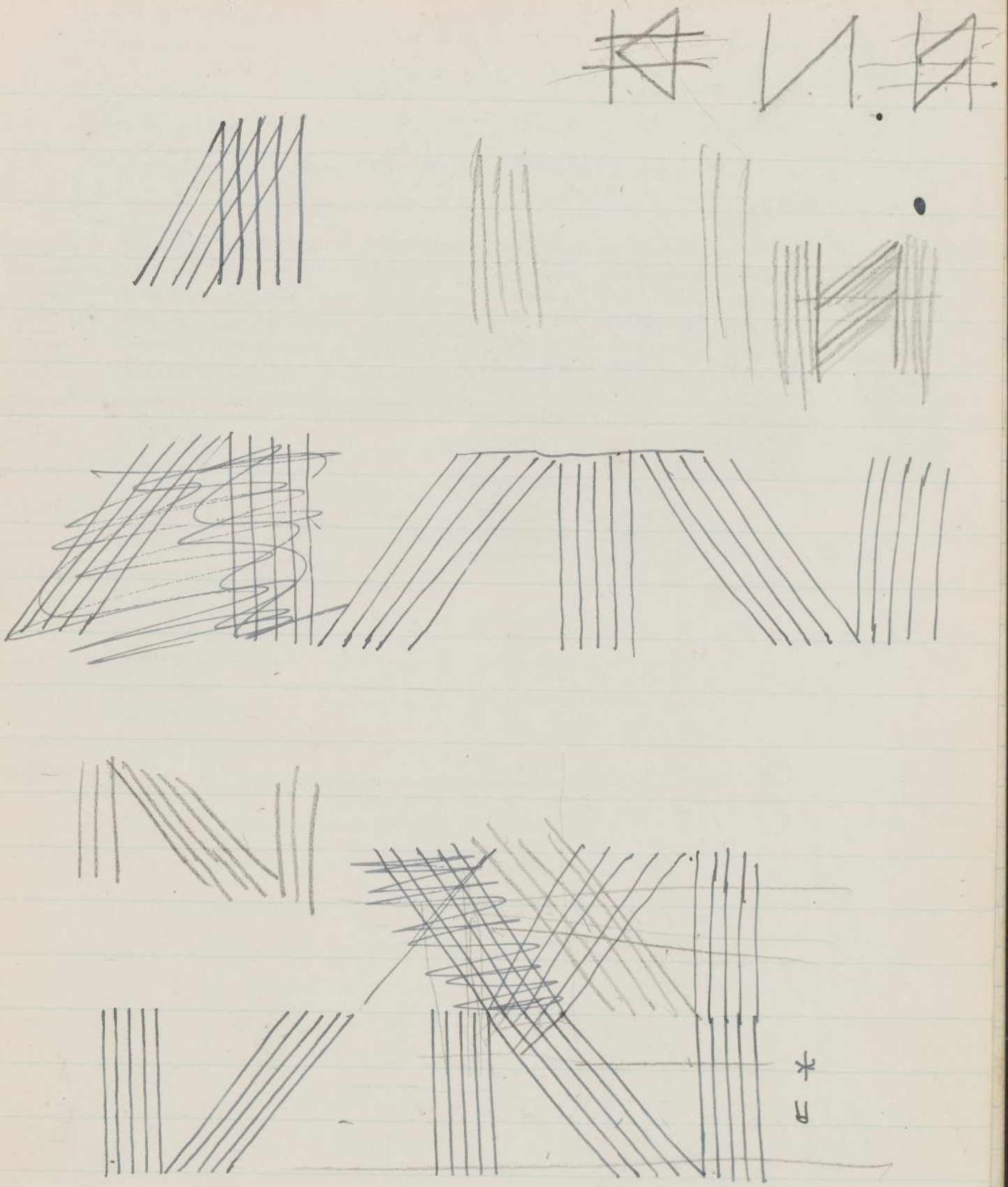
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$$\begin{array}{r} 2\,\text{⊼}.163 = 2.\text{⊼⊼}0932 \\ 360 = \underline{2.\text{⊼⊼}6302\text{⊼}} \\ 0.1012093 \\ 24 = \underline{1.3802112} \\ 30.\text{⊼}29\text{⊼}447\text{⊼} = 1.\text{⊼}41\ 4205 \end{array}$$

$$\begin{array}{r} 9.474\text{⊼}60 \\ 60 = \underline{1.77\text{⊼}1\text{⊼}13} \\ 17.\text{⊼}906\text{⊼⊼}4 = 1.2\text{⊼}30193 \end{array}$$

$$\begin{array}{r} 9.9\text{⊼}7\text{⊼}340 \\ \underline{1.771\text{⊼}113} \\ \text{⊼}4.\text{⊼}41132\text{⊼} = 1.73\text{⊼}6\text{⊼}93 \end{array}$$

$$\begin{array}{r} 2,4\text{⊼⊼}0\text{⊼}46 \\ \underline{\quad\quad 46} \\ 2,4\text{⊼⊼}093\text{⊼} \end{array}$$

$$\begin{array}{r} 20\text{⊼} \\ 140 \\ \hline 143\,|\,64.000\,(44 \\ \quad\text{⊼72} \\ \hline \quad 680 \\ \quad\text{⊼72} \\ \hline \quad 1080 \\ \quad 1001 \\ \hline \quad\quad 790 \\ \quad\quad 71\text{⊼} \\ \hline \quad\quad 7\text{⊼} \end{array}$$

$$\begin{array}{r} 1124.440 = 3.0\text{⊼}26324 \\ 360. = \underline{2.\text{⊼⊼}6302\text{⊼}} \\ 9.\text{⊼}036701 \\ 24. = \underline{1.3802112} \\ 7.\text{⊼}6\text{⊼}38737 = 0.8\text{⊼}3\text{⊼}\text{⊼}13 \end{array}$$

$$\begin{array}{r} 9.\ 81\text{⊼}4939 \\ 60 = \underline{1.771\text{⊼}113} \\ 39.\text{⊼}2324324 = 1.\text{⊼}9364\text{⊼}2 \end{array}$$

$$\begin{array}{r} 9.3662967 \\ \underline{1.771\text{⊼}113} \\ 13.\text{⊼}94\text{⊼}94 = 1.14444\text{⊼}0 \end{array}$$

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N. 35.	N. 36.	N. 37.	N. 38.
Aug. 27, to	Oct. 21, 1866	Jan. 14. to	Apr. 26. to
Oct. 20, 1866.	to Jan. 14, 1867.	Apr. 26. 1867.	Oct. 19, 1867.

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U. 39, Oct. 22, 1867, to Feb. 1, 1868.	U. 40. Feb. 3. to June 26. 1868.	* Early
~~94.789 - 95.767~~	~~[illegible] - [illegible]~~	~~50.397 - 50.392~~
~~[illegible] - 99.790~~	~~[illegible] - 96.936~~	~~50.399 - 50.407~~
~~[illegible] - [illegible]~~	~~74.496 -~~	
~~103.[illegible] - 103.[illegible]~~		
~~104.[illegible] - [illegible]~~		
~~[illegible] - [illegible]~~		
~~[illegible] -~~		

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N. 34.

Late,

No. 4.
Aug. 13. to
Aug. 25, 1466.

√0.397 - √0.398
√2,412 - √2,414
√4,426 - √4,427
√4,428 - √5.429
√5,430 - √5,431
√5,432 - √5,433
√6.438 - √6.439
√6.440 - √6.√√
√9.457 - √9.√√8
√9.√√9 - 60.√√0
60.√√1 - 61.√√4
60.√√3 - 61.474
61.√√5 - 62.486
63.489 - 63.494
64.√√5 - 6√.√06
6√.√07 - 6√.√08
66.√10 - 66.√10
67.√16 - 69.√37
69.√38 - 69.√39
69.√43 - 70.√44
70.√√5 - 70.√46
7√.√√6 - 78.612
78.623 - 78.614
83.660 - √√.669
91.721 - 94.749
94.750 - 98.778
100.799 - 102.809
104.828 -

√6.√√4 - √9.446
√9.463 - 60.√√2
60.√√7 - 61.476
61.477 - 6√.√08
6√.√09 - 6√.√09
66.√09 - 67.√√1
67.√√2 - 68.√30
68.√31 - 70.√√1
79.619 - 79.623
79.627 - 80.630
80.632

Book N. 17. from 1869. Oct. 24. to 1870. May 17.

Book N. 18. from 1871. Nov. 4 to 1872. Nov. 27.

Book N. 19. from 1869. Dec. 24. to 1874. Sept. 2.

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1869phae.proj.1826.

Alt. Rows.	Page. ~~46.~~ 42	No. ~~447~~ 338
264		
353	79	620
498	80	633
499	90	712
573	98	782
574		
592		
632		
672		
677		
703		
710		
711		
738		
739		
740		
741		
767		
812		
813		
714 } 719 }	Prob.	

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Special Cases. which ~~disagree~~ cannot be reconciled with the chief authorities.

Page.	No.
2	13.
~~2~~	~~15.~~
2	16
4	28
13	107
18	146
23	188
34	276

For plot of ~~no.~~ obs. of ~~number~~ of β Persei see book No. page 124.

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Swifts' Comet.

Nov. 11. 1880. Chron. 3451.

Readings of chron. sheet.

Use	1	6'8	32.3	*	2	9	16.1
	1	58	6'9.8	∈	"	"	21,6'
	1	6'9	2.8	*	"	"	34,6'
	"	"	21.4	∈	2	10	6,6'
Use	"	"	45,8	*	2	11	12,2
	2	0	14.0	∈	"	"	27.6
	"	"	16.0	*	"	"	30.4
	"	"	36.4	∈	"	12	4,6'
Use	2	1	4.7	*			
	"	"	33.7	∈			
	"	"	35'.3	*			
	"	"	6'4.4	∈			
	2	2	44.0				
	2	3	13.7				
	"	"	14.9				
	"	"	33.6				
	2	4	7,6				
	"	"	38,0				
Use	2	6'	6'8,3	*			
	"	6	13,4	*			
	"	"	16'.4	∈			
	"	"	48,6'	∈			
Use	2	7	16,9	*			
	"	"	31,8	*			
	"	"	38,8	∈			
	2	8	6,3	∈			

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1869phae.proj.1826.



Nov. 11. 1850.

*

0	30.0	=	7′	30″	÷ 2 =	3′	45″
0	30.2	=	7	33	=	3	46.5
0	30.6	=	7	39	=	3	49.5
0	15.1	=	3	46.5	=	1	53.2
0	14.9	=	3	43.5	=	1	51.7

∈

0	21.6	=	5′	24″	=	2′	42″
0	21.4	=	5	21	=	2	40.5
0	20.7	=	5	10.5	=	2	35.2
0	33.1	=	8	16.5	=	4	~~8.2~~
0	32.5	=	8	7.5	=	4	3.8

10^h 36 by sheet, -5 / 10 31 C. M. S. / 24 / 10 7 Yr. M. S.

log. cos. 46° 58′ 8.″71 = 9.834 0345

∈ + *

6′	27″	=	387″ =
6	27	=	387″
6	24.7	=	384.7
6	1.4	=	361.4
5	55.5	=	355.5

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1869phae.proj.1826.

Pos. of Comp. Star from Rümker's Cat.

Pos. for 1836 =	$23^h\ 15^m\ 13^s.600$	$+46°\ 43'\ 2''.61$
Prec. for 44 yrs =	$+2\ \ 2.892$	$+14\ \ 25.04$
Pos.	$23\ \ 17\ \ 16.492$	$+46\ \ 57\ \ 27.65$

log. $\Delta\alpha$ = 9.39415w
−99
9.39316w

log. cau. δ = 0.02970
−0.26476 = 9.42286
+3.07122
+2.80646

$\Delta\delta$ = 19.″7089
−45
+19.7044

9.41481w
−85
9.41423w
−7
9.41416w
0.02605
−0.27556 = 9.44021w
3.07032
+2.79476 = Prec. for 1836
+2.80646 = " " 1840
Prec. for mid. d. +2.80061

+19.6749
−2
+19.″6747
+19.6747
+19.7044
+19.6796

23 15 13.600
+2 3.227
23 17 16.827

+46 43 2.61
14 26.34
46 57 28.95

9.39409w
−99
9.39310w
0.02971
−0.26473 = 9.42281w
3.07122
+2.80649

19.7089
−45
+19.7044

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∴ R. A. + Dec. 1850.0 = $23^h\ 17^m\ 16.827$ $+46°\ 57'\ 28.95$

log. g.	1.3744+
" cos.(G+L)	9.9929+
" sum.	1.3673+
Zy.	+23.30
log. h.	1.2960+
" cos.(H+L)	9.9708+
" sin. δ	9.8638+
" sum	1.1106
Zy.	+12.90
" ć	0.7172+
" cos. δ	9.8341+
" sum.	0.5513+
Zy.	+3.56
δ' − δ	+ 39".76

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1869phae.proj.1826.

23h 17m 16.s827 +46° 57′ 28.″9

f	+3.631
Log. g.	1.3744
" sin (G+f)	9.2550w
" Corr. d	0.0297
" sum	0.6591w
" 15	1.1761
" result	9.4830w
Zy.	−0.3047
Log. h	1.2690+
" sin (H+f)	9.6533+
" Corr. d	0.1659+
" sum	1.0882+
" 15	1.1761
" result	9.9121+
" Zy.	+0.817
f′ − f	+4.s144

23h 17m 16.827
+4.144
23 17 20.971

46° 57′ 28.″9
39.76
46° 58′ 8.″71

Po. Comp. Star Nov. 11. 1870.

R. A. Dec.

23h 17m 20.971′ 46° 58′ 8.″71

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1869phae.proj.1826.

Dcáp. = 889."8

Corr. from page 143.

Log. 384.7 = 2.5847110
9.8340345n
264.1 = 2.4217455n

" 384.7 = 2.5845n1222
9.8340345n
262.n = 2.4191n67

" 361.4 = 2.5n7981
9.8340345n
246.6 = 2.3920226

" 35n.n = 2.5508396
9.8340345n
242.6 = 2.3847431

889.8 − 264.1 = 625.7
262.n = 627.3
246.6 = 643.2
242.6 = 647.2

Same ± 2 = 312.8 = n' 12."8
313.6 = n 13.6
321.6 = n 21.6
323.6 = n 23.6

46° 58' 8."71

log. cos. 47 3 21.n = 9.8333279
" " 47 3 22.3 = 9.8333261
" " 47 3 30.3 = 9.8330a0
" " 47 3 32.3 = 9.8330 3n

log. 384 2.5847110
9.8333279
2.4210389 = 263.7

2.5845n1222
9.8333261
2.4184483 = 262.1

2.n7981
9.8330a0
2.3912961 = 246.2

2.n508396
9.8330 3n
2.3841431 = 242.2

889.8 − 263.7 = 626.1
263.7 = 626.1
262.1 = 627.7
246.2 = 643.6
242.2 = 647.6
171.1
mean = 634."22
+10' 34."22
46° 58' 8."71
47° 8 42."93 =
Dec. ∈

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1869phae.proj.1826.

	*			⩵	
1	58	47.30	1	59	10.60
2	0	0.90	2	0	24.70
2	1	20.00	2	1	44.05
2	6	5.85	2	6	31.95
2	7	24.35	2	7	50.05

⩵ − *

+ 23.530
+ 23.80
+ 24.05
+ 26.10
+ 25.70

122.95

Mean + 24.5590

23h	17m	20.971	46	58	8.71
		+24.590		10	34.22
Pos. ⩵ =	23	17 45.561	47°	8′	42.93

Nov. 11. 1880.

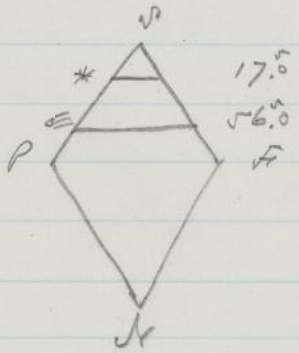
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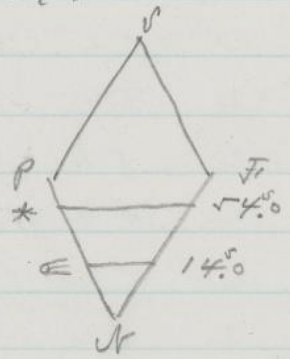
1869phae.proj.1826.

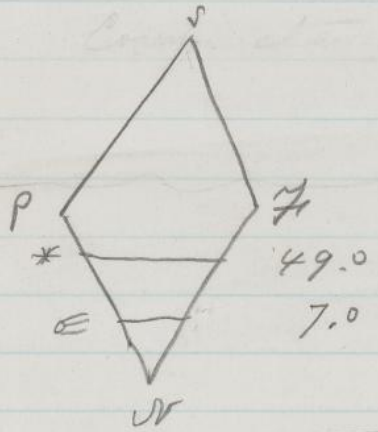
Comet III. 1869.

Reduction of obs. from Book N. 19.

1869, Dec. 24.

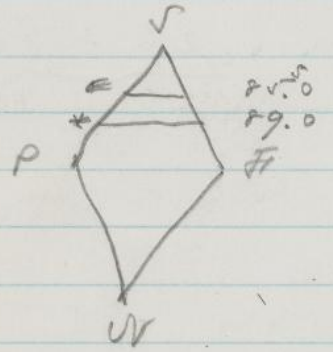


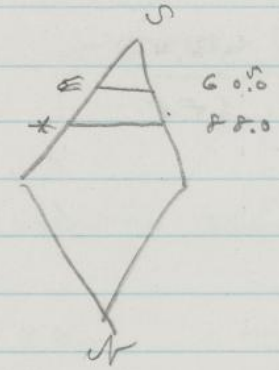




Comp. star 2 Arietis.

1869, Dec. 30





Comp. star 41 Arietis.

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1869phae.proj.1826.

Comet III. 1869.

1869, Dec. 31, Ho obs. with equat,

Time.	R. A. Comet.	Dec. Comet,
4 19 18.0	2h 52m 5.0s	26° 32′ 55″
4 39 41.0	2 52 6.0	32 37
4 42 32.5	2 52 7.0	32 25
5 3 44.6	2 52 13.1	33 9
5 7 23.0	2 52 14.5	32 45
4h 46m 32s	2 52 9.12	26° 32′ 46″.2
31.82		
+2.4 Corr.		
34.22		

10h 4 20.3 C. M. S. Pos. of Comet as above.

1870, Jan. 3. Ho obs. with equat,

Time.	R. A's of Comet.	Decs. of Comet,
3h 26m 21.0s	3h 10m 18.1s	26 30 10
4 12 8.7	3 10 33.5	26 30 36
3 49 14.87	3 10 25.80	26 30 23.0
−4. Corr.		
10.87		

8h 55m 18.8 Pos. of Comet as above.

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1869phae.proj.1826.

Pos. ε Arietis 1870.0

	R. A.	Dec.
	1h 59m 50.s92	+22° 50' 47."82
	− .064	− .33
Pos. Dec. 24.69 = 1	59 50.858	22 50 47.49

Pos. 41 Arietis

	2	42	37.73	26	44 37.61
			−17.54	− 1	15.59
Pos. Dec. 30.69.	2	42	20.19	26	43 22.02

Pos. ε Arietis 1869.0

1h 59m 47.s584 +22° 50' 30."47

Pos. 41 Arietis 1869.0

2h 42m 16.644 +26° 43' 7."0 +

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1869phae.proj.1826.

	+ Arcetis Dec. 24.	+ 41 Arcetis Dec. 30.
Δ	$+ 2^s.100$	$+ 2.^s164$
Log. g.	1.1655+	1.1703+
" sin. (G.+)	9.8860+	9.9379+
" cos. δ	9.6244+	9.7019+
" sum	0.6759+	0.8161+
" r	1.1761	1.1761+
" result	9.4998+	9.6400+
2ρ	+ 0.316	+ 0.436
Log. h	1.3104+	1.3097+
" sin. (H++)	9.6540+	9.7221+
" sec. δ	0.0355+	0.0491+
" sum.	0.9999+	1.0809+
" r	1.1761	1.1761
" result.	9.8238+	9.9048+
2ρ	+ 0.666	+ 0.803
$\Delta' - \Delta$	+ 3.082	+ 3.403

	10^h 20m C.M.T.	9^h 27m C.M.T.
	-.07	-.11
(G. + +) =	3^h 21.m1	4^h 0.m4
(H + +) =	1^h 47.m2	2 7.3
Dec. =	+22.°54	+26.°72

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1869phae.proj.1826.

	+ arietis. Dec. 24.	41 arietis. Dec. 30.
log. q	1.16[illegible]+	1.1763+
log. cos.(G.+f)	9.80[illegible]6+	9.6977+
" sum	0.9711+	0.8740+
Zy.	+9.36	+7.48
log. h	1.3104	1.3097+
" cos.(A+f)	9.9[illegible]06+	9.9[illegible]92+
" sin. δ	9.[illegible]890+	9.6[illegible]29+
" sum	0.8[illegible]00+	0.8918+
Zy.	+7.08	+7.79
log. i	9.6873w	0.1287w
" cos. δ	9.9645+	9.9[illegible]09+
" sum	9.6[illegible]18w	0.0796w
Zy.	−0.4[illegible]	−1.20
δ' − δ	+1[illegible].″99	+14.″07

+ arietis.

Mean Pos. 1869.0 =	1h	59m	47.s[illegible]84	+22°	[illegible]0′ 30.″4[illegible]
			+3.042		+1[illegible].99
Pos. 1869. Dec. 24 =	1	59	[illegible]0.666	+22	[illegible]0 46.44

41 arietis.

Mean Pos. 1869.0 =	2h	42m	16.644	+26°	43′ 7.″0[illegible]
			+3.403		+14.07
Pos. 1869. Dec. 30. =	2	42	20.047	+26	43 21.1[illegible]

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1869phae.proj.1826.

Dec. 24.

Dec. 22° 50' 46".44

≡

56.5	= 14'	0"	÷ 2 =	7'	0"
14.0	= 3	30	=	1	45
7.5	= 1	45	=	0	52

*

17.5	= 4'	15"	÷ 2 =	2'	8"
54.0	= 13	30	=	6	45
49.0	= 12	15	=	6	8

≡ − *

4' 52" = 292" = 2,465383

9.964519

269.1 = 2,429902

* − ≡

5' 0" = 300

5 16 = 316

Log. 300. = 2,477121

9.964519

276.5 = 2,441640

Log. 316 = 2.499431

9.964519

277.9 = 2.463950

269".1 = 4' 29".1

276.5 = 4 36.5

277.9 = 4 37.9

½ of above.

2' 15"

2' 18"

2' 19"

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1869phae.proj.1826.

	22°	50′	46.″4	
log. cos.	22	53	1	= 9.964400
		53	4	= 9.964397
		53	5	= 9.964396

292 = 2.465343
9.964400
269.0 = 2,429743

300 = 2.477121
9.964397
276.4 = 2,441518

316 = 2.499431
9.964396
277.9 = 2,463827

269.0
276.4
277.9
223.3

Mean = 274.4

at 10h 43m 32.s Pos. = 1h 57m 35.s2 = R.A. ∈ Dec. 24. from below
+ 22° 55′ 20.″8 = Dec. ∈ Dec. 24.

Corrected for error of Chronometer.

∈	4h	33	25	4h 33m 53.s	
		34	21		
		40	20	4 40 27	Mean 4h 58m 16.s2
		40	34		
5		40	4	5 40 25.5	
		40	13		
*	4	36	6	4h 36m 14.s5	
		36	23		
		42	19	4 42 47.5	Mean − 2m 15.s5
		43	16		
5		42	29.5	5 42 33.0	
		42	36.5		

∈ − *
− 2m 21.s5
− 2 20.5
− 2 4.5
46.5

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1869phae.proj.1826.

1869. Dec. 30.

Dec. 41 arietis = 26° 43' 21."5

log. cos. dec. = 9.9⁻0946

≡

8⁻.0 21' 15" ÷2 = 10 37."5

60.0 15 0 = 7 30

*

89.0 22' 15" ÷2 = 11' 7."5

88.0 22 0 = 11 0

* − ≡ ~~30".0~~

30".0 ~~=~~ log. 30. = 1.477121

~~30.0~~ 9.9⁻0946

26.8 = 1.427067

3' 30" = 210"

log. 210. = 2.322219

9.9⁻0946

187.6 = 2.273165

26° 43' 21."5

log. cos. dec. 26 43 7."5 = 9.9⁻0960

" " " 41 47."4 = 9.9⁻1045

1.477121

9.9⁻0960

26.8 = 1.427081

Dec. ≡ at

= 26° 41' 33."9

2.322219

9.9⁻1045

187.6 = 2.273264

214.4

Mean = 107."2

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* Lunes.

4	5	8	4h	5m	52.5s
4	6	37			
4	18	29	4	19	13
4	19	57			

63.5s

61.5s mean

≡ 4 6 13 4h 6m 57.5s

7 38

19 43

20 43 4 20 13

4h 14m 34.2s mean.

+ 6.0 chron. cor.

4 14 40.2

60.5s

≡ − * = 61.7s

4h	14m	40.2s
18	36	41.9
9	37	58.3
		+ 4.
9	38	2.3
	−1	34.7
9	36	27.6

at 9h 36m 27.6s C. M. S.

≡

R. A. Dec.

2h 43m 21.5s 26° 41′ 33.″9

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Yr. 2^h #123.

2^h 4^- $2^s.81$ $+2^s$ 29.69 2^h 6^- $32^s.50$

$+25°$ $48'$ $7.''3$ 12 36.4 $+26$ 0 43.7

log. $\Delta_0 \delta = 9.845917$ -76 $9.845841+$ 9.68841 $9.534256+$

$\Delta_0 \delta = 17.0761$ 30 $+17.0731$ 17.19 17.1331

.34218 3.07100 3.41318 3.402 11 $3^s.408$ mean 44 13632 13632 149.954

17.1331 mean 44 6F5324 6F5324 60)75.F564(12. 60 15 120 33.F

2^h 4^- 2.81 $+2.$ 29.95 2 6 32.76

$+25°$ $47'$ $7.''3$ 12 33.9 $+26$ 0 41.2

$9.845926+$ -76 $9.845850+$ $9.68837+$ 9.534239

+.34217 3.07100 3.41317 3.402 3.40F $3.40F$ 44 13632 13632 149.952

$+17.0759$ -31 $+17.0728$ 17.19 17.1289 44 6F5156 6F5156 753.6716 $12'$ $33.''67$

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	2^h	4^m	2.41		$+2\overline{5}°$	$4\overline{5}'$	7.″3
		2	29.9$\overline{5}$			12	33.6
Pos. *	2	6	32.76		+26	0	40.9

for 1869.0

t	$+2.\overline{5}100$
log. g.	1.16$\overline{5}\overline{5}_+$
" sin.(G+L)	9.8962$_+$
" cos. δ	9.6$\overline{8}\overline{4}4_+$
" sum	0.7$\overline{5}01_+$
" r	1.1761
" result	9.$\overline{5}7$40$_+$
$2y$	$+0.37\overline{5}$
log. h	1.3104$_+$
" sin.(H+L)	9.67$\overline{8}4_+$
" sec. δ	0.0464$_+$
" sum	1.03$\overline{5}2_+$
" r	1.1761
" result	9.$\overline{8}\overline{5}91$+
$2y$	+0.723
$t'-t$	+ 3.19$\overline{8}$

$-.0\,y$

log. g.	1.16$\overline{5}\overline{5}$
" cos.(G+L)	9.7$\overline{8}$98$_+$
" sum	0.9$\overline{5}\overline{5}3_+$
$2y$	+9.02
log. h	1.3104$_+$
" cos.(H+L)	9.94$\overline{4}$0$_+$
" sin. δ	9.64$\overline{2}$0$_+$
log. sum	0.8964$_+$
$2y$	+7.88
log. i	9.68$\overline{7}3_+$
" cos. δ	9.9$\overline{5}$36$_+$
" sum	9.6$\overline{4}$09$_+$
$2y$	+0.44
$\delta'-\delta$	+17.″34

$(G+L) = 3^h\ 2\overline{7}.\overline{8}$

$(H+L) = 1\ \ \overline{5}3.9$

	2	6	32.76	+ 26°	0′	40.″9
			+3.20			+17.3
Pos. Comp.	2	6	3$\overline{5}$.96	+ 26	0	$\overline{5}$8.2

star 1869. Dec. 24

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1869phae.proj.1826.

Clock 1327.

Oct 15 Comet Hartwig. 1880.

~~9h~~	~~48m~~	~~50.8~~	~~10h~~	~~32m~~	~~49.6~~
9	50	54.6		"	~~56.3~~
	61	2.9			
	"	40.0	~~10~~	~~33~~	~~24.6~~
	"	56.3		"	~~31.9~~
	62	19.2			
	"	27.1	10	34	53.2
	63	4.8		35	8.0
	"	19.8		"	50.2
	"	~~40.6~~		36	8.7
	"	~~48.7~~			
	64	51.0			
	"	59.2			
	65	36.7			
	"	52.9			
10	4	16.6			
	"	23.0			
	5	1.0			
	"	20.4 (22.79)			
	"	~~46.0~~			
	"	~~52.8~~			
	9	42.0			
		49.8			
10	10	28.3			
		49 3			

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1869phae.proj.1826.

Oct. 18. Comet. Hartwig. Chron. 3451.

~~22h 53m 12.3~~
~~36.6~~
~~54.7~~

~~54~~

54 22.2
46.9
55 6.2
38.6

56 2.1
" 26.7
" 46.6
57 18.3

" 36.3
58 1.3
" 21.3
58.7

59 20.6
46.8
23 0 6.2
" 37.6

~~1 2.8~~
~~28.0~~

~~23h 2m 13.3~~
~~26.6~~

23 2 45.7
" " 59.6
" 3 32.3
" " 52.3

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1869phae.proj.1826.

Dec. 24. 1869. +26° 0′ 58.″2

0 = − *

292 = 2.46538829
9.9536004
262.4 = 2.4189833

300 = 2.4771213
9.9536004
269.6 = 2.4307217

316 = 2.4996871
9.9536004
284.0 = 2.4532875

26 0 58.2

log. cos.

26 3 9.4 = 9.9534654
3 13.0 = 9.9534617
3 20.2 = 9.9534545

2.46538829
9.9534654
262.1 = 2.4188483

2.4771213
9.9534617
269.5 = 2.4307830

2.4996871
9.9534545
283.9 = 2.4531416

81.5

mean = 271.8

26	0	58.2
	+4	31.8
+26	5	30.0 =

Dec. Comet Dec. 24. 1869.

24	6m	9s.96
	−2.	15.5
2	4	20.5

R. A. Comet at

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Dec. 30. 1869.

Comp star W. Hora 2^h 10 ν 6.

Pos. 1825.0 = 2^h 41^m 53.71 + 26° 21′ 32″.1

+3^s.499 +15″.26

2	41	ν3.71	26	21	32.1
	2	33.96		11	11.4
P 2	44	27.67	+26	32	43.ν

9.944108 +
−76
9.944032
9.698ν98
9.642630

15.112ν +
−27
15.1098 +
15.26
.3698
15.1849 mean
44
6073396
6073396
668.13ν6

+.43917 =
3.07100
3.ν1017
3.499
1.00917
mean 3.ν0458
44
14018432
14018432
154.201ν2

2^h 41 ν3.71
+2 34.20
2 44 27.91

26° 21 32.1
11 8.1
26 32 40.2

9.944116 +
76
9.944040
9.698ν98
9.642638

15.1100 +
−27
15.1073 +
15.26
.3673
15.1836
44
6073344
6073344
668.07ν4

0.43918 =
3.07100
3.ν1018
3.499
1.00918
mean 3.ν0459

26 21 32.1
11 8.1
26 32 40.2

R.A. 1869.0 = 2^h 44^m 27.91

Dec. 1869.0

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1869phae.proj.1826.

Dec. 30. 1869.

+26° 32′ 40″.2

f	+2.164
log. q	1.1763+
" sin(G+t)	9.9404+
" tan. δ	9.6986+
" sum	0.8153+
" 15	1.1761
" result	9.6392+
2y	+0.436
log. h	1.3097+
" sin.(H+t)	9.7287+
" sec. δ	0.0418+
" sum	1.0802
" 15	1.1761
" result	9.9107+
2y	+0.814
f′ − f	

log. q	1.1763+
" cos.(G+t)	9.6903+
" sum	0.8666
2y	+7.36
" h	1.3097+
" cos.(H+t)	9.9266+
" sin. δ	9.6502+
" sum	0.8865
2y	7.70
" δ′	0.1287n
" cos. δ	9.9516+
" sum	0.0803n
2y	−1.20
δ′ − δ	

−.11 day.

G + t = 4h 2.m6

H + t = 2 9.5

2h 44m 27.s91 + 3.41 = 2 44 31.32

26° 32′ 40″.2 + 13.9 = 26 32 54.1

(Pos. Clar Dec. 30, 1869)

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log. cos. 26° 32' 54.1
(Dec. 30) 9.9516024

≡ − ✳

log. 30" = 1.4771212
9.9516024
26.4 = 1.4287236

13.4

log. cos. 26 32 40.7 = 9.9516023
1.4771212
26.″4 = 1.4287235

✳ = 26° 32' 54.″1
− 26.4
Res. ≡ Dec. 30. 69 = 26 32 27.7

✳ = 2h 44m 31.s32
+ 1 3.0
R.A. ≡ Dec. 30.69 = 2 44 34.3

4 6 55.5
+6. Chr. cor.
4 7 1.5
14 36 41.9
9 30 19.6
4.
9 30 23.6
−1 33.4
Time = 9 28 50.2 C. M. T.

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1869phae.proj.1826.

36.0

2 6 ~~25.96~~ +26 0 58.2

4 22.1

−2 21.√

−2 20.√

−2 4.√ 4 29.√

2 4 14.√

4 17.√

4 31.√ 4 43.9

+26 √ 20.3

√ ~~28.7~~

√ 4 2.1

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1869phae.proj.1826.

For Jan. 3. 1870.

Pos. + .59 arcsec. from B. A. C.

3h 10m 58.93 +26 31 34.3

+3.56,5

71.30

~~9.997490~~

3	10	58.93
	1	11.30
3	12	10.23

9.9997 25 +
−78

9.69964

+49786 = 9.697101 +

		3.07102
		3.56884
		3,56
		1,13384
mean		3.56694
		20
		71.33880

+13.49.

269.8

~~13.4486~~

26	31	34.3
	+4	29.8
26	36	4.1

13.4093 +
−.0024

13.4069

13,49

.8969

mean 13.4484
20

268.9680

3	10	58.93
	1	11.34
3	12	10.27

26°	31'	34."3
	4	29,0
26	36	3.3

Pos. star Jan. 1870.0

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1869phae.proj.1826.

1870. Jan. 3.

Dec. 26 36 3.3

f	−0.463
log. g	0.8751+
" sin (G+t)	9.0686w
" tan. δ	9.6996+
" sum	9.6433w
" r	1.1761
" result	8.4672w
2y	−0.029
log. b	1.3086+
" sin. (H++)	9.7645+
" sec. δ	0.0486+
" sum	1.1217+
" r	1.1761
" result	9.9456+
2y	+0.882
t'−t	−0.010

log. g.	0.8751+
" cos. (G+t)	9.9970w
" sum	0.8721w
2y	−7.45
" L	1.3086+
" cos. (H++)	9.9104+
" sin. δ	9.6510+
" sum	0.8700+
2y	+7.41
" c'	0.2811w
" cos. δ	9.9514+
" sum	0.2325w
2y	−1.71
δ'−δ	−1.75

G++ 12h 26.9m

H++ 2 22.2

−.13

Pos. 1870.0 = 3 12 10.27

−0.01

Pos. 1870. Jan. 3. = 3 12 10.26

26 36 3.3

−1.75

26 36 1.55

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1869phae.proj.1826.

1869. Dec. 31.

Pos. 49 Aristis.

2 53 4.49 + 2 1 4.7

+3.15 + 14.60
19 19
3163 13140
3151 1460
6677 7740

2 3 4.49 2 1 4.7
1 6.77 4 37.4
2 4 11.77 2 6 32.1

9.964349 + 14.37 1 +
-76 26
9.964273 + 14.34
9.647070 14.60
1.134
14.6721
19
131048
14672
276.7768

+.44807 = 9.651343 +

3.07100 2 1 4.7
3.71907 4 36.8
3.715
1407 2 6 31.5
3.71704
19
31673336
3717704
66.72376

Dec. star 1869.0

2 3 4.49
1 6.72
2 4 11.31

Pos. star
1869.0

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1869phae.proj.1826.

1869. Dec. 31.

Dec. = 2ʳ 56ᵐ 31ˢ.5

f	+2.175
log. g	1.1782n
" sin.(G+t)	9.9496+
" tan. δ	9.6871+
" sum	0.8149+
" 15	1.1761
" result	9.6388+
zy	+0.435
log. h	1.3095+
" sin.(H+t)	9.7459+
" sec. δ	0.0461+
" sum	1.1015+
" 15	1.1761
" result	9.9254+
zy	+0.842
t'−t	+3.452

log. g.	1.1782n
log.cos.(G+t)	9.6581+
" sum	0.8363
zy	+6.86
" h	1.3095+
" cos.(H+t)	9.9193+
" sin. δ	9.6409+
" sum	0.8697+
zy	+7.41
" i	0.1743n
" cos. δ	9.9539
" sin	0.1282n
zy	−1.34
δ'−δ	+12.93

G + t = 4ʰ 11ᵐ.7

H + t = 2 15.4

~~.05~~

−.07

Pos. stars. 1869.0 = 2ʳ 54ᵐ 11ˢ.31 2° 56' 31".5

+3.45 +12.9

" " 1869 Dec. 31 = 2ʳ 54ᵐ 14ˢ.76 2° 56' 44".4

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1869phae.proj.1826.

1869. Dec. 24.

4	33	33
18	13	2,5
10	20	30.5
		4-
10	20	34.0
	1	41.7
10	18	52.3

Mean time Camb.

4	40	7
18	13	2.5
10	27	4.5
		4.
10	27	8.
	1	43
10	25	25

Mean Camb. time.

5	40	8
18	13	2.5
11	27	5.5
		4.
11	27	9.
	1	53
11	25	16

Mean Camb. time.

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Dec. 30. 1869.

4 7 3
18 36 40.9 — 1 33.381 (62) 1 33.443
9 30 21.1
+ 4-
9 30 25
1 33
9 29 52 = mean Camb. time

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1869phae.proj.1826.

Nova Cygni.

Discovered by Schmidt Nov. 24. 1876.

Pos. for 1876.0 by Weiss =

α 21^h 36^m 50^s δ = + 42° 16.7

This position he calls approximate and was obtained through thick Cirrus clouds.

Ref. Astr. Nach. Band 89. p. 13.

References in Ast. Nach.

~~Becker~~ Band 89. p. 13 Becker.

" " " " Weiss.

" " " " Schmidt.

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1869phae.proj.1826.

Nova Cygni.

Ast. Nach. Band 89. p. 13. Becker.
" " " " pp. 61. 79. Copeland.
" " " " " 61. Holetschek.
" " " " " 9. 10. 13. 41. 159. Schmidt.
" " " " " 63. Secchi.
" " " " " 37. Vogel.
" " " " " 13. Weiss.
" "

See ast. Nach. B. 89. p. 13.

Place as determined by Schmidt from γ Cygni, D. M. +42° 4182 and D. M. +41° 4237 =

21ʰ 36ᵐ 50.ˢ39 +42° 16′ 30.″5

Schmidt uses also two stars "p" = Weiss Nr. 864. also x = a 9 mag.

A. N. B. 89. p. 9

Given for 1876.0

p = 21ʰ 35ᵐ 18.ˢ94	+42° 42′ 38.″5
x = 21 34 56.04	+42 31 26.0
A = 21 36 50.01	+42 19 26.1

A = Nova.

Nova 3 to 4 mag.

Schmidt. —

13ᵐ comp. a. = A + 4.ˢ25 +14.″5

A. N. B. 89. p 159.

Place of comp. a. for 1876.0 =

21ʰ 36ᵐ 54.ˢ82 +42° 16′ 50.″6

The above was from Jan 9. 1877.

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1869phae.proj.1826.

Same — On Feb. 17, 1877 "a star B. D. 9.5 followed 24s.01 upon A and was 76" south"

A. W. B. 89. p. 13. — On ~~Dec~~ Dec. 5. 1876 Nova 4.5 mag. according to Becker.

A. W. 89. 61 — On Dec. 5. 1876. star = 4.5 mag. = 17 Cygni
" " 7 1/3 hrs then 17 Cygni.

A. W. 89. ~~61~~ 79. — On Jan. 9. = 7 mag. by Copeland.

A. W. 89. 61. — Spectrum note by Copeland.
Jan. 2. star of red color and abt. 7 mag.
Spectrum faint con. intersected by five bright lines.

A. W. B. 90. 351 — On Sept. 2. 1877. Copeland found star to be 10.5 mag. and of decided blue tint. — precedes B. D. +42° 4484 about 25s — Star monochromatic. absolutely.

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1869phae.proj.1826.

Schmidt.

On July 2. 1877. Nova = 9 mag. = A.

a. n. Comp. with star x

B. 91 $x = A + 4^s.2\nu \quad + 15''.\nu$

~~169~~, 62 Also.

13^m	y	$= A - 1^s.0$	$- 45''$	2 Obs.
13	z	$= A - 1.6$	$- 81$	2 "
$12.\nu$	x	$= A + 4.6$	$+ 20$	2 "

Bruhns.

a. n.	* 12–13 mag.	δx	$= 4^s.\nu 8$	$+ 0'$	$18''.1$
B. 91.	* 13 "		0.0	$- 1$	10
p 3ν1,	* 13 "		$- 3.\nu$	$- 1$	10
	* under 13 "		$- 8.8$	$+ 0$	$\nu 0$

		4.25	15".5					
		0		1.0	45	1.6	81	
Sch.		+ 4.6	20"	~~0.0~~	~~70"~~	~~3.5~~	~~70"~~	July 13.1877
Br.		4.5ν	18.1	0.0	70"	3.5	70"	Jan 5.7 1877
H.C.		4.8	17	+ .5	59"	3.1	53"	Nov. 23 1880

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Notes with reference to records (originals) of Double Star Ob.

1006 = No. 120 Sch. Cat. Vol. 62. p. 333 Art. Mach.

1008 = " No. 13 14 of Cat. " " " " " " "

1022 = Sch., Vol. 62, p. 333 Art. Mach. = M.X. 242.

1107 = " " " " " " "

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Chronograph readings of ε Pegasi and stars following.

		Diff.					
0m	27.6	0	0	10m	22.7	0	0
2	42.4	2	14.8	12	16.2	1	53.5
2	59.6	2	32.0 -	12	54.4	2	31.7 -
3	3.8	2	36.2	13	45.5	3	22.8 -
3	47.4	3	19.8	14	1.3	3	38.6 -
3	50.3	3	22.7 -	14	31.3	4	8.6 -
4	6.2	3	38.6 -	14	45.2	4	52.5 -
4	36.2	4	8.6 -	14	47.1	4	54.4 -
4	39.8	4	12.2	14	51.0	5	24.3 -
4	53.9	4	26.3	16	0.2	5	37.5 -
5	13.5	4	45.9				
5	20.0	4	52.4 -				
5	21.9	4	54.3 -				
5	56.3	5	24.7 -				
6	5.1	5	37.5 -				

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1869phae.proj.1826.

γ Pegasi. Chronograph readings of γ Pegasi and stars following.

22	17.4				29	7.2			
24	40.3	2	24.9	−	30	17.9	1	10.7	
24	46.8	2	31.4	−	30	19.3	1	12.1	
24	44.6	2	33.2	−	30	32.4	2	25.2	−
24	46.3	2	42.9	−	30	33.4	2	26.2	
25	0.2	2	44.8	−	30	34.4	2	31.2	−
25	3.9	2	48.5	−	30	40.0	2	32.8	−
25	13.2	2	57.8	−	30	41.8	2	34.6	
25	42.0	3	26.6	−	30	50.0	2	42.8	−
25	52.8	3	37.4	−	32	55.4	2	44.2	−
26	1.9	3	46.5	−	32	4.9	2	57.7	−
26	6.2	3	50.8	−	32	33.5	3	26.8	−
26	33.3	4	17.9	−	33	24.7	4	21.5	−
26	34.7	4	19.3	−	33	52.4	4	45.2	−
26	37.1	4	21.7	−	34	1.8	4	54.6	−
27	1.2	4	45.8	−	34	6.8	4	59.6	−
27	10.5	4	55.1	−	34	39.5	5	32.3	−
27	15.0	4	59.6	−	35	43.5	5	36.3	−
27	24.0	5	8.6		35	24.3	6	17.1	−
27	47.7	5	32.3	−					
27	52.1	5	36.7	−					
28	32.7	6	17.3	−					

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1869phae.proj.1826.

Transits of θ' Ceti and stars following.

41 22.4
47 25.4

50 21.7
54 24.7
57 18.3
57 23.6
56 15.2
56 17.7
56 59.7
60 47.2
61 2.4
61 56.4
62 54.8
63 1.2
63 8.7
63 16.7

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1869phae.proj.1826.

Transits of ε Aquarii and stars following.

0 7.2
2 8.0
2 14.8
2 16.5
2 26.7
2 33.7
5 6.5

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1869phae.proj.1826.

The "Comet reticule" consists of two occulting bars inclined at an angle of 44° 53'.5 to each other.
One bar being placed in the meridian and the other crossing from S. foll. to N. prec. the diff. R.A is given by the diff. of time of transit over the vertical bar, and the diff. of Dec.
$= [(\delta - I - (\delta_1 - I_1)]$ (colan. 44° 53'.5) (co. Dec.)

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1960phae.proj.1026.

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List of errors in Nautical Al.

Ecl. Jupiter's Sat.

July. 6. Dis. Sup. I. not starred.

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