1915phae.proj...

KG
11366
v.990

CXXXVIII
138

NO.	Date	Page
9495	Nov. 1, 1915	1
9496	"	10
9732	Nov. 17, 1915	21

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Harvard Lunar Plates
Measures and Reductions
Martha C. Barton.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9995

Star Measures.

	d	x	r	d	r
1		15 8 8 8	17800	14758	17812
10.9		+ 72 60	16438 35	4732 35	17632
12		60	32	38	32
		74	178	60	14
		10.8616	10.8640	11.9824	11.9820
2		13904	17478	14320	17960
23.3		10980	10396 92	13878	83240
23		82	88	74 76	38
		96	70	26	18
		23.2922	23.2920	23.0494	23.0422
3		20050	17410	14096	18072
32.4		16210 09	11246 93	13270 62	88422 39
15.1		08	40	54	36
		34	02	34	86
		32.3836	32.3838	15.0789	15.0756

Moon Measures

1		19572	18222
22.0		16932	10850 51
14.3		32	52
44		70	18
		14.2640	14.2632
2		18568	18210
23		14822 17	11962 57
14.4		12	52
		58	18
		14.3798	14.3792
3	20076	19912	
23.8	11228 33	18732 36	
15	38	40	
	66	08	
	23.8834	23.8826	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

1915

Star Measures.

	d	x		y			
1		15°8'8"		17800		17358	17812
10.9		+7260		16938	35"	17332	17632
12		60		32		38 35	36
		74		778		60	19
		10.8616		10.8640		11.9829	11.9820
2		13909		17478		14320	17910
23.3		10980		10396		13878	8342
23		82		88 72		1476	38
		96		70		26	18
		23.2922		23.2920		23.0494	23.0422
3		20050		17410		14096	18072
32.9		16210		11296		13270	8842 39
10.1		0809		90 93		54 62	36
		34		02		34	86
		32.3836		32.3838		10.0789	10.0756

Moon Measures

1		19572	18223
22.5		16932	10850 51
19.3		32	52
41		70	18
		14.2640	14.2632
1		18568	18210
23		14822	11962
19.9		12 17	52 57
		58	18
		14.3798	14.3792
3	20076	19912	
23.8	11228	18732	
15	38 33	90 36	
	66	08	
	23.8839	23.8826	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

4
24.
15.1

18510	19460
16916 09	11040
02	44
96	68
15.1600	15.1574

5
24.2
16

19228	18568
16334	11962 65
2831	92
28	68
24.2897	24.2897

6
24.3
16.2
+X

19232	18574
16242	11560
92	68 64
30	74
24.2990	24.2990

7
24.1
17

19252	18598
18080	97886
6271	82
38	80
24.1180	24.1202

8
24
17.1

17958	17278
15746	95029 6
9043	490
50	52
17.2214	17.2290

	n	d		
9	13958	18162	19486	16238
23.5	11298 95	10890	13946	11780 76
17.5	92	88	98	72
	54	62	80	40
	23.7288	23.7274	17.5536	17.5536

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

4
29.
17.1

	18510	19460
	16916 09	11090
	02	99
	96	68
	15.1600	15.1579

5
29.2
16

	19228	18568
	16334 31	11962 65
	28	72
	28	68
	29.2897	29.2897

6
29.3
16.2
+1

	19232	18578
	16242	11560
	92	68 69
	30	79
	29.2790	29.2990

7
29.1
17

	19252	18598
	18080	97886
	62 71	82
	38	80
	29.1180	29.1204

8
29
17.1

	21598	17278
	18794	15029 96
	793	790
	50	52
	17.2214	17.2290

	n	d		
9	13738	18162	17736	16238
23.5 -	11298	10890	13716	11780 76
17.5 -	92	88	78	72
	54	62	80	90
	23.7288	23.7274	17.5536	17.5536

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

9493- Runes and Etc.

Nov 1 1915-

Exp. to Stars	8	05-		08	17		
" " Moon	8	10	42.2 ⌐	8	10	42.4 ⌐	
Clock fast		3	25.5- ⌐				
H. Sid T.	8	07	16.8 ⌐				
H. Long	4	44	31 05- ⌐				
G. Sid T.	12	51	47.85- ⌐				
G. M. N.	14	38	46.16 ⌐				
Interval	22	13	01.69 ⌐				
Reduction		3	38.38 ⌐				
G. M. T.	22	09	23.31 ⌐				

From Naut Alm.		R.A.		Dec.	
Moon - 4	10	23	00.15- ⌐	+ 8	08 09.0 ⌐
Motion in 1m			1.9696 ⌐		+ 14.255- ⌐
" " 9.3885-			18.49 ⌐	- 2	13.8
Tabular Place	10	23	18.64 ⌐	+ 8	05 55.2 ⌐

Moon's Age 24 days

Parallax	56'	50.33 ⌐
Semid	15'	30.9 ⌐
R.		930.9 ⌐
Aug.		11.0 ⌐
Ln. S-		-0.8 ⌐
R		941.1 ⌐
R.		2.0178
dR		-969 ⌐
(1+d/R		1.9205- ⌐
R.		3.6883

934 = 11.1

d = -5° 04.5- ⌐

24

-480.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

1915 Times and Etc.

Nov 1 1915

Eq. to Stars	8	02	08	17
" " Moon	8	10	42.2	8 10 42.9
Clock fast		0	23.5	
H Sud S.	8	07	16.8	
H. Long	9	19	31 05	t-T = -2h 16m
G Sid S.	12	51	47.85	
G M.M.	14	38	26.16	
Interval	23	13	01 69	
Reduction		3	38.38	
G. M. T.	22	09	23 31	

From Hank Ann N.A. Sec.

Moon	4	10	23	00 15.5	+8 08	09.0
Motion in m				1.7696		+14.255
" " 4.3885				1.79	-2	13.3
Sidereal Place	10	23		19.69	+8 05	09.9

Moons Age

Sidereal	26	20.33
Second	12	30.1
R.		130.9
Long		11
Lun. S.		-0.8
A		9911
H		2.0179
alt		-969
Hank		1.9205
H.		3.6872
		3.6873

939 = 11.1

a = -5° 04.5'
29
-480.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9995

Plate Center + Constants

3

	x	y	α	δ
	10.86 28	11.98 22	10 18 33.63	6 58 28.2
	23.27 21	23 09 33	25 23.16	8 28 47.6
	32 38 37	15 07 70	30 22 01	7 23 30.8
3	66.53 86	50 10 25	73 78.80	21 109 105.9
	22.17 95	16.70 08	10 29 46.27	7 36 55.3
	22	18	-5.56	+10 6.0
	-.17 95	+1.29 92	10 24 40.71	7 47 01.3
	31 5	966.5		
	-5.56	+10' 6.0		

Plate Center { A 10 24 41
D 7 47 01.0

x-ξ +302 x		+12.3 y	+95 λ	-1154 ξ
+5919	+5931	: +11350 + 150 = +11500	+99	= +11598 :
- 489	+11696	: +11207 + 288 = +11495	+102	= +11597 :
-9976	+14192	= +11216 + 188 = +11404	+195	= +11598 :
22378	+11189	+ 203	101	22729

η-η +570 η		- 17.3 λ	+5.7	- 7997
+2076	+5991	= 8067 - 188	= +7879 + 68	= +7947 : 0
-3303	+11522	= 8219 - 903	= +7316 + 131	= + 97 = 0
+ 883	+ 7538	= 8421 - 560	= +7861 + 86	= + 97 = 0
16.18	η + 8014	- 317	14	16.17 36

Tables a = -1.9 e = -3.1 a-e = +1.2 b+d = +2.3
Obs = +509.5 = -505.7 = +1.2 = +4.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

	ξ	η	$\Delta\xi$	-3.9ξ		$+7$	
1	-11.72	-6.2x	-50	+87 =	-3	+1	
2	+1.3x	+5.37	+1	-5 =	-4	0	
3	+10.87	-3.03	+38	-42 =	-4	0	
M	+0.37	-1.83	0	-1		+3	

$\Delta\eta$	-2.5η		-3ξ		$+7$
-27	+16 =	-11	+4 =	-5	+2
+4	-13 =	-9	-0 =	-9	-2
-10	+7 =	-3	-3 =	-6	+1
0	+5		0		+12

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9995. Standard Coordinates 8

Cape Nr 1818 – Mg 6.3 Cape Nr 1439 Mg 8.6 Cape Nr 1447 Mg 5.2

C	10 17 46.51	10 27 33.87	10 29 35.06
1	46.57	33.85	35.00
2	46.52	33.85	35.03
Mean	10 17 46.53	10 27 33.86	10 29 35.03
Plate	47.10	47.30	46.98
a	10 18 33.63	10 25 23.16	10 30 22.01
A	10 27 41	10 27 41	10 27 41
a-A	− 6 07.37	+ 0 42.16	+ 5 41.01
Sph(a-A)	− 367.33	42.16	+ 340.97
log	2.565064	1.629900	2.532711
cos δ	9.996785	9.994523	9.997638
η	1.069084	0.127377	1.036333
ξ	−11.7241	+ 1.3409	+ 10.8726
ξ	− 50	41	+ 88.38
ξ	10 27.09	23.3410	32.8913
X	10 26.28	23.2921	32.3837
X-ξ	+ 59.19	− 48.9	− 49.76
δ	+17 03 00.7	+8 33 22.7	+7 28 7.1
1	1.2	23.0	7.3
2	1.1	22.7	7.2
Mean	7 03 01.1	8 33 22.8	7 28 7.2
Plate	− 4 32.8	− 4 35.2	− 4 37.1
d	6 28 28.2	8 28 47.6	7 23 30.1
b	7 47 1.0	7 47 01.0	7 47 01.0
δ-D	− 48 32.8	+ 41 46.6	− 23 30.9
Tan(δ-D)	− 29 13.0	+ 25 06.7	− 14 10.9
n	3.464374 n	3.399100	3.150104 n
η	0.795794 n	0.730255	0.781235 n
ξ	90875	91734	91130
ξ	21322	23527	20726
ξ	82791	64815	82390
η	− 62797	+ 53737	− 30286
η	+ 00190	+ 00002	+ 00173
η	17746	23796	17887
η	19822	23083	19770
η-η	+ 2076	− 3303	+ 883

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Standard Coordinates

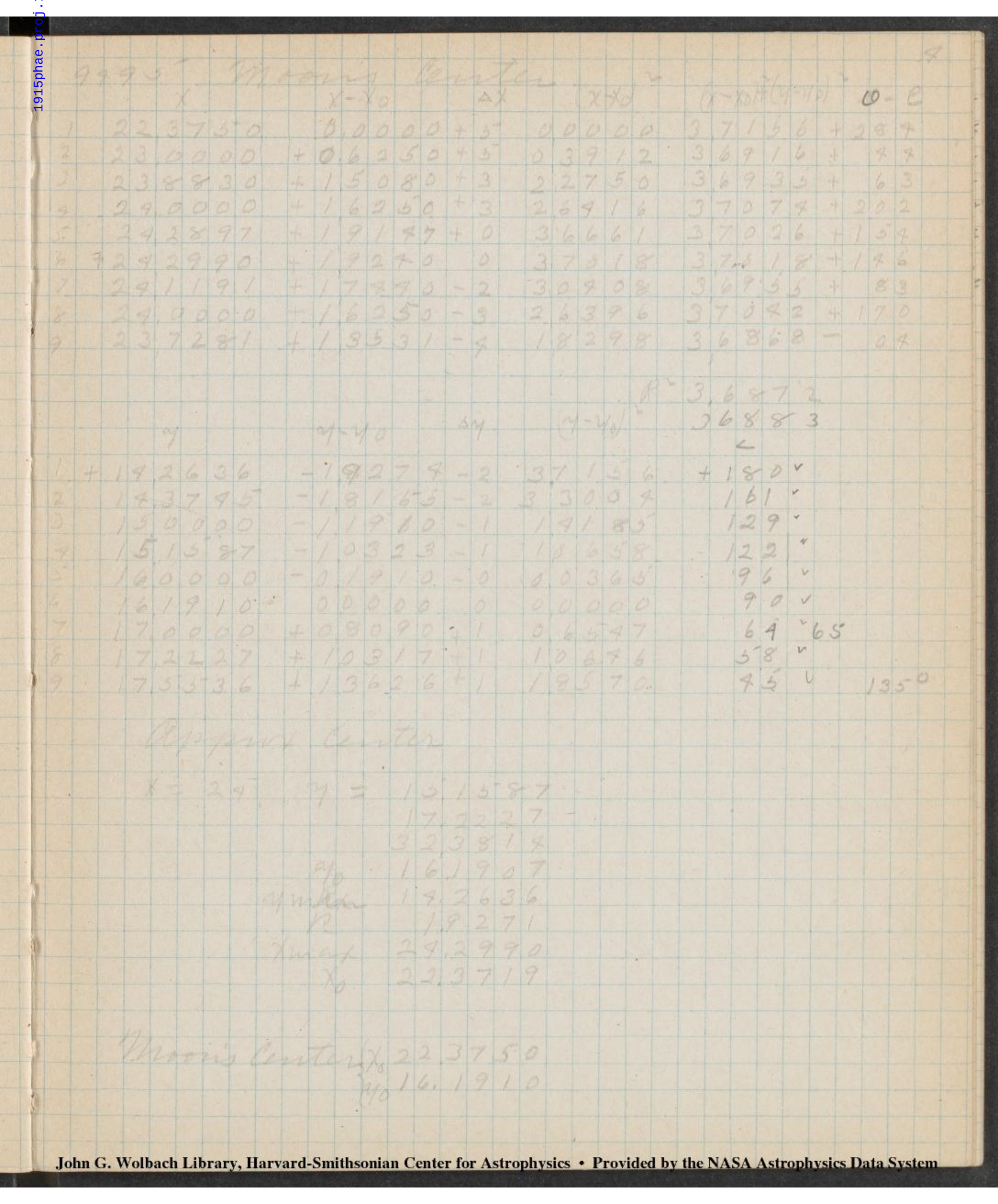
	Cygni Nov 1918 – mg 6.3	Cygni 1939 mg 8.6	Cygni 1949 mg 5.2
c	10 17 46.51	10 29 35.87	10 29 35.06
I	46.57	35.85	35.00
C	46.52	35.85	35.03
Mean	10 17 46.53	10 29 35.86	10 29 35.03
Prec	97.10	97.30	96.98
α	10 18 33.63	10 35 23.16	10 30 22.01
A	10 29 91	10 29 91	10 29 91
α-A	− 6 07.37	+ 0 52.16	+ 5 71.01
Sin(α-A)	− 367.33	42.16	+ 390.97
log	2.565061	1.629900	2.532711
log	9.996782	9.995223	9.996638
ξ_0	1.069081	0.127337	1.036633
ξ_{10}	−11.72411	+ 1.39099	+ 10.87235
ξ_1	− 50	+ 1	+ 88 ? 38
ξ	10.27099	23.39110	32.88133
X	10.86282	23.29921	32.38837
X-ξ	+ .59183	− .09189	− .99296
c	+7 03 00.9	+8 33 22.7	+7 28 7.1
I	1.2	23.0	7.3
C	1.1	22.7	7.2
Mean	7 03 01.1	8 33 22.8	7 28 7.2
Prec	− 9 32.8	− 9 35.2	− 4 37.1
δ	6 38 28.2	8 28 47.6	7 23 30.1
D	7 47 1.0	7 47 01.0	7 47 01.0
δ-D	− 48 32.8	+ 41 46.6	− 23 30.9
Tan(δ-D)	− 29 13.0	+ 25 06.7	− 14 10.9
log	3.964394	3.399110	3.150104
η_0	0.795799	0.730225	0.781254
(Tan δ	9.08775	9.17347	9.11306
ξ_0	2.13822	0.25477	2.07226
η_1	8.27791	6.98135	8.23900
η_0	− 6.27799	+ 5.37337	− 3.02856
η_1	+ 0.01900	+ 0.00002	+ 0.01733
η	11.77746	23.37336	19.79887
γ	11.98822	23.09333	15.07770
γ-η	+ .21076	− .28002	− 4.72117

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9995 Moons center

	x	x-x0	Δx	(x-x0)²	(x-x0)²+(y-y0)²	O-C
1	22.3750	0.0000	+5	0.0000	3.7156	+284
2	23.0000	+0.6250	+5	0.3912	3.6916	+44
3	23.8830	+1.5080	+3	2.2750	3.6933	+63
4	24.0000	+1.6250	+3	2.6416	3.7079	+202
5	24.2897	+1.9197	+0	3.6861	3.7026	+154
6	+24.2990	+1.9290	0	3.7018	3.7018	+146
7	24.1191	+1.7490	-2	3.0603	3.6933	+83
8	24.0000	+1.6250	-3	2.6376	3.7042	+170
	23.7281	+1.3531	-9	1.8298	3.6868	-04

R² 3.6872
6883

	y	y-y0	Δy	(y-y0)²	
	+19.2636	-1.9279	-2	3.7156	+180
	14.3795	-1.8165	-2	3.3007	161
	15.0000	-1.1910	-1	1.4185	129
	15.1587	-1.0323	-1	1.0658	122
	16.0000	-0.1910	-0	0.0365	96
	16.1910	0.0000	0	0.0000	90
	17.0000	+0.8090	+1	0.6547	64
	17.2227	+1.0317	+1	1.0646	58
	17.5536	+1.3626	+1	1.8570	45

Apparent Center

x = 24 y = 15.1587
17.2227
32.3814
y_0 16.1907
y_{max} 19.2636
R 1.9271
x_{max} 24.2990
x_0 22.3719

Moons Center x_0 22.3750
y_0 16.1910

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Conditional Equations

1	- 0.0	+ 0.0	- 548.5
2	- 1.13	+ 27.0	- 80.0
3	- 1.80	+ 95.0	- 75.0
4	- 1.67	+ 327.0	- 204.0
5	- 6.36	+ 294.0	- 29.9
6	0.0	+ 280.0	0.0
7	+ 1.41	+ 148.5	+ 67.0
8	+ 1.67	+ 275.0	+ 175.0
9	+ 1.83	- 55	+ 54
	+ 4.91	+ 1422.5	+ 247.4
	- 4.96	- 55	- 936.5
	- .05	+ 1437.0	- 689.1
		- 124.5	- 29.6
		+ 1312.5	- 659.5

	a	b	c
a + 22	+ 0	+ 17	- 21
b - 9	+ 14	+ 16	- 8
c - 38	+ 33	+ 10	+ 5
	+ 35	+ 9	+ 6
	+ 42	+ 1	+ 5
	+ 42	0	+ 4
	+ 38	- 7	- 7
	+ 36	- 9	- 11
	+ 30	- 12	- 20

+8°

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9495 Conditional Equations

— 11 —

			O-C	new O-C
1	0.00 - 1.93	= +2.84		
2	+0.62 - 1.82	= +.94		
3	+1.31 - 1.19	= +.63		
4	+1.62 - 1.03	= +.202		
5	+1.91 - 0.19	= +1.54		
6	+1.92 2.00	= +1.86		
7	+1.74 +0.81	= +.83		
8	+1.62 +1.03	= +1.70		
9	+1.35 +1.36	= -.04		
	0 + 96	= +96	+188	+167
	+40 + 91	= +131	-87	-95
	+99 + 60	= +159	-96	-91
	+105 +52	= +157	+75	+51
	+124 + 10	= +134	+20	+25
	+125 0	= +125	+21	+25
	+113 -40	= +73	+10	+3
	+105 -51	= +54	+116	+105
	+88 -68	= +20	-29	-6
			+400	-207

+20.18 - .05 = +1437.0 +1312.5 +12.29 Δ

- .05 +13.11 = ~~-689.1~~ -659.5 - 2.96 Δ

+ .05 - 0 = + 3.3 +3.2

+13.11 = -692.4 b = -52.8

+20.18 = +1437 - 2.6 = +1434.4 a = +71.3 - 0.23 Δ

+13.11 = -656.3 b = -50.0

+20.18 = +1312.5 - 2.5 = +1310.0 a = +65.0 + 0.56 Δ

Arc Measured 135°.0

p/n = .09 $\frac{\Delta V}{\Delta t}$ = +21.4

Inn 5 R 1.92

-2RC = -1.92 $\frac{+21.4}{.09}$ = +238 ΔR = +2.9

Corr +0.5

Δb = +0.″99 Δδ = +0″.2 ΔR = +2.9

Δa = -1.s08 Δa = -0s.09

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

9995 Conditional Equations 3

			−11				O−C
1	0.00	−1.93	= +284	0	+96	= +96	+188
2	+0.62	−1.82	= +44	+40	+91	= +131	−87
3	+1.51	−1.19	= +63	+99	+60	= +159	−96
4	+1.62	−1.03	= +202	+105	+52	= +157	+45
5	+1.91	−0.19	= +154	+124	+10	= +134	+20
6	+1.92	0.00	= +146	+125	0	= +125	+21
7	+1.74	+0.81	= +83	+113	−40	= +73	+10
8	+1.62	+1.03	= +170	+105	−51	= +54	+116
9	+1.35	+1.36	= −04	+88	−68	= +20	−24
						+400	−207

+20.18 − .05 = +1437.0 +1312.5
− .05 +13.11 = −687.1 −659.5

+ .05 − 0 = + 3.3 +3.2

+13.11 = −677.4 b = −52.8

+20.18 = +1437 − 2.65 +1438.4 a = +71.3

+13.11 = −656.3 b = −50.0

+20.18 = +1312.5 − 2.5 = +1310.0 a = +65.0

Arc Measured 135°

$p/h = .09$ $\frac{2V}{h} = +21.4$

$\frac{+21.4}{.09} = +238$ $\Delta R = +2.9$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9495 Moon's Mean Position

x_0 22.3750
+32
22.3782

y_0 16.1910
−25
16.1885

From Plata Constants

x 22.3726

y 16.1737

ξ +0.3726

n −1.8263

log ξ 9.5712
cos δ 9.9962
8.5074
1.0677

log tan δ 9.1214
ξ 9.1425
7.0537
5.3173

$\delta - A$ +11.89

n, +.0000

A 10 24 41

log n_0 0.26157 n
7.33115
2.93042 n
8520

δ_0 10 24 52.89

$\delta - D$ −14 12.0

Red +2.82

D +07 47 01.0

δ' 10 24 55.71

S_0 7 32 49.0

Red −12.8

S' + 7 32 36.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

1915 Mean Position

X_0 22.2750
+32
22.3782

Y_0 16.1910
−25
16.1885

From Plate Constants

X 22.3726

Y 16.1737

ξ +0.3726

η −1.8263

log q 9.3712-9

cos δ 1.7796-3

8507-29

1.06777

log tan δ 1.1219

δ 1.1125

1 7037

5317.3

λ − λ 11.89

λ_0 10 27 41

log λ_0 0.26157

733113

273042

λ 10 27 53.69

Red −12.82

λ' 10 27 55.51

δ − D −11 120

D 07 17 01.0

δ_0 1 32 19.0

Red −12.8

δ' 1 32 36.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

50.82
+3,00

59.0
−13.0

4.73
+2.58

51.5
39.1
−12.9

10 44 49.53
47.47
+2.06

10 59 32.5
72.7
−10.2

+15
·1
3. +10
×
+5
0
·2
−5
−10
60 40 20 0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9 9 9 5

Reduction to Apparent Place

H+α 13 39 4 = 204° 51.0
H 3 14.5
α 10 24 9.5 2 7
G 22 52.0
G+α 9 16.9 = 139° 13.5

Cos G+α 9.8 7 9 3 n
g 1 3 5 5 0
Sen " 9.8 1 5 0 +
tan δ 9.1 2 2 1
8.8239

Log g' 1.2 2 4 3 n
" g 9.1 6 4 0

f + 3.2 4 2
g + 0.1 2 8
h − 0.5 5 0
+ 2.8 2 0

δ 7 32 48.8

Log Cos δ 9.9 9 6 2
1 0.8 0 1 8
1 . 0.7 9 8 0

Log Sen δ 9.1 8 3
Cos H+α 9.9.5 7 8 n
h 1 2 8 9 1
Sin H+α 9.6 2 3 5 n
Sec δ 0.0 0 3 8
8.8239

h' 0.3 6 5 2 n
h 9.7 4 0 3 n

g' 1 6.7 6 3 -
h' − 2.3 1 8
+ 6.2 8 0
− 12.8 0 1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

9 7 9 5 Reduction to Apparent Place

α + λ 13 39.9 = 204° 59.0 δ 17 32 47.5
17 3 19.5"
λ 10 29.9
α 22 52.0
G + λ 9 16.9 = 139° 13.5"

Log cos δ 9.9962
λ 0.8018
λ 0.7980

Log cos G + λ 9.8793 n
g 1.3950
Sun's 9.8150
Tan δ 9.1221
8.5237

Log sin δ 9.1183
Log cos H + λ 9.9578 n
h 1.2891
Sin H + λ 9.6235 n
Sin δ 0.0038
8.5237

Log f 1.2243 n
f 9.1060

h 0.3652 n
λ 9.7403 n

L + 3242
g + 0.128
h - 0.550
+ 2.820

g - 16.763
h - 2.318
+ 6.280
- 12.801

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9495

Lunar Parallax

α'	10	24	55.51	π	56'	50".38	
ϕ	8	07	16.80				
$\phi - \alpha'$	−2	17	38.71		9.869113		
	= −34°	24	40.65		8.218355		
					9.752215 n		
½(h−x')	−12	00.08			0.004335		
	−34	12	40.57		7.843980 n		

9.957727
0.000000
0.082551
0.040278

$\alpha - \alpha'$ −24 00.16
= −1 36.01

γ 47 37 13.8

δ +7 32 36.2

$\gamma - \delta$ 40 04 37.6

9.826470
8.218355
9.808716
0.131553
7.958504

$\delta - \delta'$ 33 12.8

δ	+8	05	49.8	α	10	23	19.50 D
Am Eph'd	+8	05	55.2	Am Eph	10	23	18.67
O−C		−6.2		O−C			+0.83
Curv. of Plate		+0.6					+0.01
2nd Order Eq		0.0					
Irr Corr		+0.2					−0.07
δ	+8	05	49.2	α	10	23	19.76
O−C		−6.0					+0.82

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

1915-

Lunar Parallax

α' 10 24 55.51 s
α 8 07 16.80 -
α'-α -2 17 38.72 -
δ' -34° 24 90.65 -
½ Δ α -12 00.08 -
δ -34 12 90.57 -

π 56' 30.33"
7.869103 -
8.218335 -
7.752215n -
0.0049350 -
7.757318n -

7.993727
0.000000 -
0.008251 -
0.002476 -

α' - α - 24 00.16 s
- 1 36.01 -

γ 77 37 13.8 -

δ 17 32 36.2 -

δ' - δ 40 09 37.6 -

9.826470 -
8.218335 -
7.956716 -
0.121353 -
7.956504 -

δ' 12.4 -

α 18 05 49.0 - α 10 23 17.30 -

Ang Dist 18 05 55.2 Ang Dist 10 23 18.67 -

O-C - 6.2 - O-C + 0.56 -

Corr. of Plate +0.6 +0.01
2nd Order Eq 0.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9 496 ; Star Measures.

	d		r		d		r	
1	19882		20102		17446		18782	
10.1	18332		11652		12802		13308	
12.6		28		5051		908		08
		76		94		50		79
	10.15550		10.15556		12.45542		12.95530	
2	19488		18260		19320		16700	
22.5	14438		13312		13292		12722	
23.6		38		12		8287		22
		86		64		12		86
	22.50551		22.50550		23.60028		23.60016	
3	18936		18028		20358		17250	
31.6	12428	27	19564	63	13352	54	14220	
15.7		30		8263		56		32
		48		28		56		64
	34.65516		34.65536		15.7000		15.6972	

Moon Measures.

1					19882		18110	
22.5					15586	79	12370	
17.5						72		8879
-4						78		02
					14.4302		14.4279	
2					19902		18068	
23					13976		19010	
14.6						8882		00
						18		87
					14.5930		14.5930	
3	18306		19820					
23.6	12378		15362					
15		6672		60				
		06		422				
	23.59340		23.59420					

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9 996 : Star Measures.

	d	x		d	x
1	19882	20102	17446	17782	
10.1	18332	16352	12802	13308	
12.6	28	3051	908	08	
	76	11	50	19	
	10.13350	10.12356	12.13942	12.13530	
2	14988	18260	19320	16700	
22.3	14938	13312	12272	11722	
23.6	38	12	8287	22	
	86	69	12	16	
	22.30351	22.30350	23.60228	23.60216	
3	18936	18028	20350	17250	
31.6	12924 27	19369 63	13352 27	19220	
13.7	30	62	36	32	
	48	28	36	69	
	13.63136	13.63136	13.70000	13.63972	

Upon Measures.

1			19882	18110
22.3			13356 79	12370
19.3			12	8879
-1			18	02
			19.19302	19.19279
2			19902	18068
23			13776 52	19010
19.6			58	00
			18	59
			19.19930	19.19930

3	18986	19820
23.6	12934 27	15946
15	62	764
	98	492
	23.19334	23.59486

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9496 Moon Measures.

4

24

15.7

18340
12356 53
50
30
15.5982

19956
15922 17
992
72.
15.5948

5

24.6

16

19078
17890
8286
78
24.1192

19394
10550
50
94
24.1156

6

24.2

16.3

+X

19238
17718
18
38
24.1520

19372
10872
68
72
24.1498

7

24

17.1

19172
15110
10
70
17.1062

20122
11208 97
80
58
17.1080

8

23.2

18

Slender

19034
16910 14
18
38
23.2120

18976
10470
60
80
23.2180

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9996

L	18390	19956
9	12356 53	13922
3.7	50	9127
	30	72
	12.3982	12.3718

1	19874	19399
9.1.	19850	10350
16	8486	30
	78	99
	29.11198	29.11256

6	19238	19372
9.2	17718	10872
6.3	18	68
+X	38	76
	29.1320	29.1998

7	19172	20122
29	18110	11208
17.1	10	8077
	10	37
	17.1062	17.1090

1	19039	18976
23.2	16710	10470
15	1817	2060
	38	80
	23.1120	23.1586

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

08	19			08	31	
8	27	51.6		8	31	51.8
	3	25.5				
08	21	26.2		$\delta - \alpha = -2^h\ 02^m$		
4	44	31.05				
13	05	57.25				
19	38	46.16				
22	27	11.09				
	3	40.70				
22	23	30.39				

Moon 22^h	10	23	00.15	+8 08	09.0
Motion 1m			1.9697		-18.262
23.5065			+ 46.30	-5	35.2
Tabular Place	10	23	46.45	+8 2	33.8

934 = 11.4

$a = -504.7$
24
-480.7

Mercuris Aga 24 days.

Parallax	5' 6" 50."87
Semid	15' 31".0
R	931.0
avg	11.4
Err (5)	-0.8
R	941.6
R	2.01884
dR	-970
1+a/R	1.92114
R	3.69718

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9496 Lunes ☿ Etc

mv-1·15"

Epp. T-Stars	08	19		08	31		
" Moon	8	29	5' 1.6"	8	31	2' 1.8"	
Clock fast		3	25.5"				
M. Sid T.	08	21	26.2"	$\phi - \chi = -2^h\ 02^m$			
M. long	9	44	31.05"				
9 Sid T.	13	05	57.25"				
Sid T. M.N.	14	38	16.16"				
Interval	22	27	11.07"				
Reduction		3	40.97"				
9 M.T.	22	23	30.39"				

From Naut Alm.	R. A.			Decl.	
Moon 22h	10	23	00.15"	+8 08	09.0
Motion 1m			1.9697"		-14.242"
23.5065"			16.30"		-3 35.2"
Tabular Place	10	23	16.49"	+8 2	33.8"

Moons Age 24 days.

Parallax	3' 6" 30."37
Semid	15' 31".0
R	931.0
Corr	1.7
Km	-0.8
R	931.9
R	2.01897
adc	-970
V+c.R	1.01397
R+	3.01715

734 - 11.4

a = -3047

-480.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9996 Plate Constants. 19

X	10,15⁻5⁻3	22,5⁻05⁻0	34,65⁻26
ξ	10,2709	23,3910	32,8813
X-ξ	− 1156	+ 8360	− 1,2287

Y	12,95⁻36	23,6022	15,6986
η	11,7746	23,3736	14,9887
Y-η	+ 6790	+ 2286	+ 7099

X-ξ	+500X	+87,2Y	+4,7X	−5⁻05⁻6
−115⁻6	+5078	= +3922 + 1086	= 5⁻608 + 48	= +5⁻05⁻6 = 0
−8360	+11252	= +2892 + 1058	= 49⁻50 + 106	= +5⁻05⁻6 = 0
−12287	+15826	= +5⁻539 + 1369	= 4908 + 149	= +5⁻05⁻7 = +1

Y-η	+500Y	−90,5⁻X	+9,2Y	−12150
+6790	+6227	= +13017 − 919	= +12098 + 52	= +12150 = 0
+2286	+11801	= +14087 − 2037	= +12050 + 99	= 99 = −1
+7099	+7879	= +14978 − 2869	= +12684 + 66	= 50 = 0

Tables a = −1,8 e = −3,0 a−e = +1,2 −b+d = +2,2
Obs = −5⁻04,7 = −5⁻04,2 = +,5 = +3,3

O−C −5029 −5012 +1,1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9996 Plate constants. 19

x	10.15"53	22.50"0	31.65"26
y	10.2707	23.3410	32.8813
x-y	- 1156	- 8360	- 1.2281

x	12.95"3.6	23.6022	15"69 86
y	11.7796	23.3736	14.9887
y-y	+ 6170	+ 2286	+ 10079.

x.y 1.5004 7.7.24 + 1.7x - 2956
-1156 + 2078 = + 1201 + 1x = 2104 + 1x = + 5536 + 0
-1360 + 11252 = + 1892 + 2 3x = 9920 + 1x = + 5536 + 0
-12287 + 15826 = + 3531 + 1369 = 9908 + 149 = + 5057 + 1
22.2300 + 11115" + 1426 + 109 = 22.9889

y-y 1.5004 - 90.5A + 1.2y - 1x10
16790 + 6127 = 13017 = 119 + 12698 + 52 = 11410 4
+ 1284 + 1201 = 1487 - 2257 = + 12020 + 99 = 99 -1
+ 7099 + 7999 = 14998 - 2484 = 11514 + 66 = 50 0
16.35"19 + 8176 - 2012 + 69 = 15"75"97

Table a = -1.5 e = -3.0 a-e = + 1.5 b+1 = + 1.2
C.o = -5"04.7 = -5"04.2 = + .5 = + 3.3

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

A = −2.3
B = +1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9496 Moon's center 15"

	x	x − x₀	Δx	(x − x₀)²	(x−x₀)² + (y−y₀)²	
1	22.2289	0.0000	+4	0.0000	3.6956	+38
2	23.0000	+0.7710	+4	0.5950	3.6863	−55
3	23.5937	+1.3647	+3	1.8632	3.6887	−31
4	24.0000	+1.7710	+2	3.1371	3.7065	+197
5	24.1174	+1.8884	+1	3.5664	3.6896	−22
6 +	24.1509	+1.9209	0	3.6898	3.6898	−20
7	24.0000	+1.7710	−2	3.1357	3.7045	+127
8	23.2150	0.9860	−4	0.9714	3.6913	−5

3.6918

	y	y − y₀	Δy	(y − y₀)²	h
1 +	14.9288	−1.9222	−2	3.6956	180°
2	14.5930	−1.7580	−2	3.0913	156°
3	15.0000	−1.3510	−1	1.8255	134°
4	15.5965	−0.7545	−1	0.5694	113°
5	16.0000	−0.3510	−0	0.1232	100°
6	16.3510	0.0000	0	0.0000	90°
7	17.1051	+0.7541	+1	0.5688	67°
8	18.0000	+1.6490	+2	2.7199	31°

149°

Apparent center

x = 29 y 15.5965
17.1051
32.7016
y_0 16.3508
y_{min} 14.9288
R 1.9220
x_{max} 24.1509
x_0 22.2289

Moon's Center $\begin{cases} x_0 & 22.2290 \\ y_0 & 16.3510 \end{cases}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9.176 Moon's center 13

	x	x − x₀	Δx	α − N	(x N) (y N)	
1	22.2290	0.0000	9	0.0000	3.6756	+ 3
2	23.0000	+0.7710	9	0.5950	3.6863	− 5
3	23.5937	+1.3647	2	1.8632	3.6887	− 3
4	24.0000	+1.7710	−2	3.1371	3.7065	+ 1
5	24.1179	+1.8889	11	3.5669	3.6976	− 3
6	24.1907	+1.9207	0	3.6978	3.6978	− 2
7	24.0000	+1.7710	−2	3.1357	3.7065	+ 12
8	23.2150	0.7860	−9	0.7711	3.6913	− 3

3.6918

	y	y − y₀	Δy	β − M	(y M) (x M)	
1	17.7228	−1.7232	−2	3.6156		
2	17.5930	−1.7530	−2	3.0113		
3	15.0000	−1.3310	−1	1.8235		
4	15.5965	−0.7345	−1	0.5411		
5	16.0000	−0.3310	−0	0.1232		
6	16.3310	0.0000	0	0.0000		
7	17.1051	+0.7741	1	0.5984		
8	18.0000	+1.6690	+2	2.7179		

179°

Approx. Center

x = 22.9 y 15.5965

17.1051

20.1016

y₀ 16.3308

y − y₀ 1.7757

x₀ 1.7220

x − x₀ 21.1509

y₀ 22.2249

Moon's Center { x₀ 22.2290
y₀ 16.3310

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Formation of Normals.

1	- 0.0	+ 0.0	- 73.0
2	- 1.35	- 42.5	+ 97.0
3	- 1.84	- 42.0	+ 42.0
4	- 1.33	+ 26.0	- 110.0
5	- 0.66	- 41.5	+ 7.5
6	- 0.0	- 38.4	+ 0.0
7	+ 1.33	+ 22.5	+ 95.5
8	+ 1.63	- 4.9	- 8.2
	+ 2.96	+ 485.0	+ 242.0
	- 5.18	- 169.3	- 191.2
	- 2.22	+ 315.7	+ 50.8

	a	b	c
a + 23	+ 0	+ 13	- 25
b - 7	+ 18	+ 12	- 26
c - 38	+ 31	+ 9	- 29
	+ 41	+ 5	- 33
	+ 44	+ 2	- 36
	+ 44	+ 0	- 38
	+ 41	- 5	- 43
	+ 23	- 12	- 50

$+8^0$

$-2.22 + 12.59 = -3.73$

$+[\ ] - .29 = +1.37$

$+12.30 = -2.36$

$+16.96 = +10.47 - .43 = +10.07$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9496 Conditional Equations. 16

						O-C	new O-C
1	+ 0,0	- 1,92	= + 38	+ 0	- 14	= -14	+ 5.2	+ 27
2	+ 0,77	- 1,76	= - 55	+ 15	- 13	= + 2	- 57	- 83
3	+ 1,36	- 1,35	= - 31	+ 26	- 10	= + 16	- 47	- 76
4	+ 1,77	- 0,75	= + 147	+ 35	- 6	= + 29	+ 118	+ 85
5	+ 1,89	- 0,35	= - 22	+ 37	- 3	= + 34	- 56	- 92
6	+ 1,92	- 0,00	= - 20	+ 38	- 0	= + 38	- 58	- 96
7	+ 1,77	+ 0,75	= + 127	+ 35	+ 6	= + 41	+ 86	+ 43
8	+ 0,99	+ 1,65	= - 5	+ 19	+ 12	= + 31	- 56	- 106
							+ 256	- 274

average 66

16.96 - 2.22 = + 315.7 + 10.47

- 2.22 + 12.59 = + 50.8 - 3.73

+ 2.22 - 0.29 = + 41.2

- 0.19 Δ

+ 12.30 = + 92.0 b = + 7.5

16.96 = + 315.7 + 16.5 = + 332.2 a = + 19.6

+ .61

Arc Measured 1490

$\frac{p}{h}$ = .15 $\frac{\Sigma V}{h}$ = - 2.2

Inv 3 R 1.92

- 2Rθ = - 1,92 $\frac{-2.2}{.15}$ = - 14.5 ΔR = - 0.2

Corr + .5

Δ b = + 0,36 Δ δ = + 0.2

ΔR = - 0,7

Δ q = - 1.17 Δ q = - 0.09

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

1896 Conditional Equations 16

1	+ 0.0	- 1.96	= + 3"		
2	+ 0.17	- 1.76	= - 5"		
3	+ 1.36	- 1.25"	= - 31		
4	+ 1.17	- 0.75"	= + 1.77		
5	+ 1.79	- 0.25"	= - 2.2		
6	+ 1.92	0.00	- 2.0		
7	+ 1.77	+ 0.75"	= + 1.27		
8	+ 0.78	+ 1.65"	= - 5"		

16.76 - 2.22 = + 3.13.1

- 2.22 + 1.25.7 = 1.30.5

+ 2.22 - 0.29 = 1.41.2

1.12.30 = + 92.0 b = + 1.2

16.76 = 1.313.7 + 1.65 = 1.20.2 a = + 17.6

Arc Measured 1896

$\frac{P}{h} = -1.5$ $\frac{\Sigma V}{h} = -2.2$

$\frac{-2.2}{15} = -14.7$ $\Delta i = -0.2$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9996 Moon's Mean Position

x_0 22.2290"
+10"
22.2300"

y_0 16.3510"
+7"
16.3517"

From Plate Constants

x 22.9889"

y 15.7597"

ξ +0.9889"

η −2.2403"

log ξ 9.99315"
cos δ 9.99628"
8.50729"
1.79163"

log tan δ 9.11994"
ξ" 99903"
7.05394"
6.16331"

$x - A$ +31.02"

η_1 +0.0001"

A 10 29 91."

log no 035033 n"
7.331115"
301918 n"

x_0 10 24 72.03"

Red +02.82

x' 10 25 14.84"

S·D −17 23.1"

D 7 47 01.0"

δ_0 7 29 35.9"

Red −12.8

δ' 7 29 23.1"

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Curv. of Plate +0.6 +0.01
2nd Order Rej 0.0

In Corr +0.2 −0.07

δ +8 02 28.1 α 10 23 47.92

O−C −5.7 +0.97

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9996 Lunar Parallax 18

α'	10	25	19.89	π	56	30.87	
δ	8	21	26.2				
$\delta - \alpha'$	−2	03	48.64			9.869113	
	= −30°	57	9.6			8.218843	
	−	10	55.37			9.711129 n	
	−30	46	14.23			0.000429	
						7.803094 n	

9.995727
0.000000
0.006590
0.023317

$\gamma - \alpha'$ − 21 50.76

= − 1 27.38

γ 96 31 39.2

δ 7 29 23.1
39 02 16.1
$\delta - \delta$

9.826790
8.218843
9.799922
0.139274
7.983829

$\delta - \delta'$ 33 09.8

δ +8 02 27.9 α 10 23 17.46

Am Eph δ +8 02 33.8 Am Eph α 10 23 96.45

O-C −5.9 O-C +1.01

Corr of Date +0.6 +0.01
2nd Order 0.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9732 Star Measures 21

	x		d		z		d		z
1			19872		19300		18398		20020
11.8			12212		16962		13786	89	14610
13.5			08		52		92		98
			60		00		92		24
			11.76574		11.76556		15.4606		15.45822
2			17670		19348		18592		19142
28.6			11334		15692		15430		12302
23.3			32		82		32		02
			76		42		08		46
			28.63440		28.63442		23.3166		23.31558
3			27160		19386		16560		18992
32.3			13488		13080		11332		14223
10.6			9290		7276		30		17
			52		98		68		9012
			32.36668		32.36682		10.5234		10.5219

Moon Measures.

1							16884		17562
23.9							11992		12432
19.6							90		58
-4							88		70
							14.4895		14.4874
2							16828		17572
23							9770		14697
19.8							80		60
							36		66
							14.7058		14.7106
3			16820		19462				
22.7			18912		15406				
15			22		08				
			22		70				
			22.5904		22.5932				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

9732 Star Measures

	x		d		x		d
1		19872			19300		
11.8		12212			16962		
12.5		08			52		
		60			00		
		11.76354			11.76356		
2		17670			19348		
28.6		11334			15692		
23.3		32			82		
		76			92		
		28.63440			28.63442		
3		17160			19386		
32.3		13788	40		13080	76	
10.6		92			72		
		52			78		
		32.36682			32.36682		

	x		d		x		d
		17398			20020		
		13786	84		14610	04	
		92			98		
		92			29		
		15.14606			15.14282		
		18592			19172		
		15430			12302		
		32			02		
		08			46		
		23.31166			23.31358		
		16260			18992		
		11332			14223	20	
		30			17		
		68			7012		
		10.52349			10.52219		

Moon Measures

	x		d		x		d
1					16489		
23.9					11972		
19.6					10		
-1					88		
					17.18415		
					17362		
					12732	91	
					50		
					70		
					17.18771		
2							
23					16428		
19.8					9770	75	
					80		
					36		
					19.70258		
					17572		
					17099	71	
					60		
					66		
					17.17106		
3		16820			19762		
22.7		10912			15406		
15		22			08		
		22			70		
		22.59094			22.59432		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

7	18922	18514
22+	18538	8924
16	32	24
	32	12
	22.0388	22.0912

5	22.0000
21.9	-44
16.3	21.9956
-X	

6	17886	18544
22.1	16800 96	9652 56
17	92	60
	90	50
	22.1090	22.1108

7	17850	18598
22.9	8350	18038
18	52	48
	56	00
	22.9509	22.9544

8	18632	20624	17908
23	18312 08	20288	8188
18	04	90	80
	46	12	08
	18.0324	18.0334	18.0276

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

1	1 x 9 2 2	1 8 5 1 9
22+	1 8 5 3 8	8 9 2 4
16	3 2	2 9
	3 2	1 2
	22.0388	22.0912

5	22.0000.0
11.9	- 9 1
16.3	21.9956
-x	

6	1 7 8 8 6	1 8 5 4 9
22.1	1 6 4 0 0 96	9 6 5 2 56
17	9 2	6 0
	9 0	5 0
	22.1090	22.1108

1	1 7 8 5 0	1 8 5 9 8
22.9	8 3 5 0	1 4 0 3 8
18	3 2	4 8
	5 6	0 0
	22.9509	22.9549

8		1 8 6 3 2	1.7908
23		1 8 3 1 2 08	1 8 6
18		0 9	8 0
		9 6	0 8
		18.0324	18.0276

20629
20298
90
12
18.0339

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

P 732 Venus & Etc. 23

Nov 17 15h

Exp. to Stars	0	56			01	08	
" Moon	1	02	29.0		1	02	29.2
Clock fast		4	0.9				
M. Sid Time	0	58	28.7		$\phi - \alpha = +0^h\ 15^m$		
M Long	7	44	31.05				
G. Sid T.	5	42	59.75				
Sid T M.M.	15	41	51.06				
Interval	14	01	08.69				
Reduction		2	17.80				
G. M. T.	13	58	50.89				

From Nayt Alm.		R.A.			Dec.	
Moon 13h	0	41	51.57	+9	18	08.5
Motion m/h			1.8975			+13.370
" 58.8482		1	51.66		13	66.8
Tabular Place	0	43	43.23	+9	31	11.3

939 13.17

Moon's Age 11 d. 9 h

Polallax		55' 25.3"
Semid		15' 07.7"
R		907.7
Aug.		12.7
Dr.	3	-0.3
R		919.8
R		1.9717
dR		-934
(1+a)R		1.8783
R =		35'280

q = -497.7
24
-473.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Zones & Etc.

Nov. 17 '15 -

Exp. to Stars	0	56		01	08	
" Moon	1	02	29.0	1	02	29.2
Clock fast		9	0.9			
M. Sid Time	0	58	28.7	$\alpha - \lambda = +0^h\ 15^m$		
M Long	9	44	31.05			
G. Sid T.	5	42	59.75			
Sid T III.11.	15	41	31.06			
Equation	19	01	08.69			
Radiation		2	17.80			
G M.T.	13	58	30.69			

From Hand Abn	RA			Dec.		
Moon 13h	0	41	51.57	+9	18	09.5
Newton 1m			1.2972			+13.370
" 58.8982		1	31.66		13	06.6
Tabular Place	0	43	23.23	+9	31	11.3

Moons Age 11 days

Peculiar	53' 25.3"
Semid	15' 07.7"
R	9071"
Aug	12.7"
Ecc	-0.3"
R	9198"
R	1.9717"
dR	-939"
1+dR	1.8783"
R	35280"

134 12.17"

$q = -997.7$

$\frac{2-1}{-973.7}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Plate Center

X	Y
11.7655	15.4597
28.6341	23.3162
32.3675	10.5226
72.7671	49.2982
24.2557	16.4327
22	18
-2.2557	+1.5673
31.5	966.5
69.93	+732.40

	α	δ	
0h	36 48.33	+8° 53	29.0
	46 07.76	9 56	55.8
	48 07.41	8 12	13.9
	130 63.50	25 121	98.7
0	43 41.17	9. 00	52.9
	-1 09.93	+12	14.0
0	42 31.24	+9 13	03.9

Plate Center { A 0 42 31.09
D +9 13 07

X-Y	+500X	+58.9Y	-2.3X	-13300
+6537	+5883 = +12420	+907 = +13327	-27 = +13300	= 0
-2319	+14317 = +11998	+1369 = +13367	-66 = +13301	= +1
-3927	+16184 = +12757	+617 = +13374	-74 = +13300	= 0
23.8770"	+11938"	+961"	+55"	= 23.8729"

q-p	+500q	-60.5X	+1.2Y	-6608
-428	+7730 = +7302	-712 = +6590	+18 = +6608	= 0
-3345"	+11658 = +8313	-1732 = +6581	+28 = +09	= +1
+3292	+5261 = +8553	-1958 = +6595	+13 = +08	= 0
16.3677"	+8184"	-1494"	+19"	= 16.3828"
		5"	20	

Tables a = +.7 e = -.8 a-e = +1.5" b+d = -.5"
Obs = +497.7 = +501.2 = +3.5" = +1.8

O-C -498.4" -500.4" +2.3"

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Plate Center

X	Y	α	δ
11.7655	13.4597	0h 36 48.33	+8 53 29.0
28.6391	23.3162	9 07.76	9 56 55.8
32.3673	10.5226	8 07.71	8 12 13.9
1 2 7 6 7 1	9 9 2 9 8 2	130 63.50	25 121 98.7
29.2557	16.9327	0 93 71.17	9 00 52.4
22	18	-1 09.93	12 11.0
-2.2557	+1.5673	0 92 31.24	+9 13 03.9
31.5	166.5		
-69.93	+732.40		

Plate Center { A 0 92 31.6
D +9 13 04

X-ξ +500η +58.7η -2.3x -13300

+6537 +5883 + 920 + 909 : +13327.27 = +13300 =
-2319 +14317 +11998 # 1367 : +13367 - 66 = +13301 = 1
-3927 +16187 +12757 + 617 : +13378 - 78 = +13300 =
23.8770 +11938 + 961 + 55 = 23.8725

η-η +500η -60.5x +1.2η -6608

-928 + 7730 = +7302 - 712 = +6590 + 18 = +6608 = 0
-3395 +11658 = +8313 - 1732 = +6581 + 28 = +69 = +1
+3292 +5261 = +8553 - 1958 = +6595 + 13 = +68 = 0
16.3677 +5187 - 1499 + 19 = 16.3828

Tables a = +.7 e = -.8 a-e = +1.5 bd = -.5
Obs = +497.7 = +501.2 = +3.5 = +1.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

Diff. taken together

	ξ	η	Δξ −2.5ξ	+17	+6
1	−10.88	−2.52	−37 + 27	= −7 −3	= −10
2	+6.86	+5.64	+13 − 17	= −4 +6	= +2
3	+10.71	+7.83	+26 − 27	= −19 +8	= −10
4	+1.84	−1.62	0 −5	−2	−1

	Δη −8η	+13	0
−8	+10 = +2	−11 = −9	= −9
+11	−22 = −11	+7 = −4	= −4
+32	−31 = +1	+11 = +12	= +12

0 +6 +2 = +8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

9732 Standard Coordinates 25

	Cape No 81 - Mg 6.5	Cape No 101 - Mg 8.8	Cape No 109 - Mg 8.6
C	0 36 01.76	0 45 20.98	0 47 20.69
I	1.75	20.99	20.75
E	1.75	20.97	20.75
Mean	0 36 01.75	0 45 20.98	0 47 20.73
Prec	46.58	46.78	46.68
α	0 36 48.33	0 46 07.76	0 48 07.41
A	0 42 31.00	0 42 31.00	0 42 31.00
α - A	-05 42.67	+03 36.76	+05 36.41
Stnd - A	-37.2.63	+216.75	+336.38
log "	2.53483 n	2.33596	2.52683
Cos δ	9.99475	9.99342	9.99557
ξ_0	1.03682 n	0.83662	1.02961
η_0	-10.8848	+6.8647	+10.7056
η_1	-34	+13	+46
ξ	11.1118	28.8660	32.7102
X	11 76 55	28.6341	32.3675
X - ξ	+65 37	-2319	-3427
C	+8 48 32.2	+9 52 01.5	+8 07 20.2
I	32.0	1.2	20.4
E	32.0	0.7	18.6
Mean	8 48 32.1	9 52 01.1	8 07 19.7
Prec	+4 56.9	+4 57.7	+4 57.2
S	8 53 29.0	9 56 55.8	8 12 13.9
D	+9 13 09.0	+9 13 09.0	+9 13 09.0
S - D	-0 19 35.0	+43 46.8	-1 00 55.1
tan (S-D)	-1175.0	+2631.9	+3650.5
log "	3.07004 n	3.42024	3.56235 n
η_0	0.40119 n	0.75139	0.89350 n
tan δ	9.19447	9.24377	9.15889
ξ_0	2.07336	1.67332	2.05892
M	8.32114	7.97100	8.27115
η_0	-25188	+5.6414	+7.8253
η_1	+90280	+0.00093	+0.0187
η	155022	23.6507	10.1934
ψ	154797	23.3162	10.5226
ψ - η	-428	-3345	+3292

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9732 standard coordinates

	Cygnus 81 - Mag 6.5	Cygnus 101 - Mag 8.5	Cygnus 109 - Mag 8.6
C	0 36 01.76	0 95 20.98	0 97 20.69
I	1.75	20.97	20.75
E	1.75	20.97	20.75
Mean	0 36 01.75	0 95 20.98	0 97 20.73
Prec	46.58	46.78	46.68
λ	0 36 48.33	0 96 07.76	0 98 07.41
A	0 42 31.00	0 92 31.00	0 92 31.00
λ-A	-05 42.67	+03 36.76	+05 36.41
sin λ-A	-342.63	+216.75	+336.38
log	2.53483 n	2.33596	2.52683
Cos	9.99970	9.99342	9.99557
F	1.03682 n	0.83662	1.02961
ξ	-10.8878	+6.8647	+10.7056
η	-39	+13	+16
ξ	11.1118	28.8660	32.7102
x	11 76.75	28.6391	32.3675
x-ξ	+65.37	-2319	-3427

C	+8 48 32.2	+9 52 01.5	+8 07 20.2
I	32.0	1.2	20.9
E	32.0	07	18.6
Mean	8 48 32.1	9 52 01.1	8 07 19.7
Prec	+4 56.9	+4 57.8	+4 57.2
δ	8 53 29.0	9 56 58.8	8 12 13.9
D	+9 13 09.0	+9 13 09.0	+9 13 09.0
δ-D	-0 19 39.0	+43 49.8	+1 00 56.1
tan δ/D	-1175.0	+26.319	+136 50.5
log	3.07004 n	3.42024	3.56233 n
M	0.90119 n	0.75139	0.89350 n
Cos	9.19949	9.29397	9.15889
ξ'	20736	16732	20592
η	8.32149	7.97000	8.27153
ξ'	-25188	+56419	+78253
η'	+90240	+10093	+90187
ξ	15.5022	23.6507	10.1934
η	15.7597	23.3162	10.5226
ξ-ξ	-428	-3345	+3292

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

A 20
B 412

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9732 Moon's Center

	X	X-X0	ΔX	(X-X0)²	(X-X0)²+(Y-Y0)²	6-C
1	23,8750	0,0000	0	0,0000	3,5374	+ 94
2	23,0000	-0,8750	↓	0,7656	3,5245	- 35
3	22,5918	-1,2832		1,6466	3,5213	- 67
4	22,0400	-1,8350		3,3672	3,5034	- 246 1/2
5	-21,9956	-1,8794		3,5321	3,5321	+ 31
6	22,1099	-1,7651		3,1156	3,5139	- 141
7	22,9524	-0,9226		0,8512	3,5120	- 160
8	23,0000	-0,8750		0,7656	3,5252	- 28

	Y	Y-Y0	ΔY		3,5280	α
1	-17,7887	-1,8806	- 2	3,5374		+180° V
2	17,7082	-1,6608	- 2	2,7589		208 V
3	15,0000	-1,3690	- 2	1,8747		223 V
4	16,0000	-0,3690	- 0	0,1362		259 V
5	16,3690	0,0000	0	0,0000		270 V
6	17,0000	+0,6310	+ 1	0,3983		289-290
7	18,0000	+1,6310	+ 2	2,6608		331 V
8	18,0300	+1,6610	+ 2	2,7596	15,2°	332 V

Approx. Center

X = 23

Y 17,7082
18,0300
32,7382
Y0 16,3691
of min 17,7887
R 1,8807
X min 21,9956
X0 23,8756

Moon's Center { X0 23,8750
Y0 16,3690

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj...

9732 Moon's Center

	X	X-X0	ΔX	(X-X0)²	(X-X0)²+(Y-Y0)²	O-C
1	23.8750	0.00000	0	0.00000	3.5374	+ 44
2	23.0000	-0.8750	↓	0.7656	3.5245	- 35
3	22.5918	-1.2832		1.6466	3.5213	- 67
4	22.0400	-1.8350		3.3672	3.5034	- 246
5	21.9956	-1.8794		3.5321	3.5321	+ 31
6	22.1099	-1.7651		3.1156	3.5139	- 191
7	22.9529	-0.9226		0.8512	3.5120	- 160
8	23.0000	-0.8750		0.7656	3.5252	- 28

	Y	Y-Y0	ΔY		3.5280	X
1	17.9889	-1.8806	-2	3.5379		+170°
2	19.7082	-1.6608	-2	2.7589		208
3	15.0000	-1.3690	-2	1.8747		223
4	16.0000	-0.3690	-0	0.1362		238
5	16.3690	0.0000	0	0.0000		270
6	17.0000	+0.6310	+1	0.3983		289
7	18.0000	+1.6310	+2	2.6608		
8	18.0300	+1.6610	+2	2.7596		

Approx Center

X = 23

Y 19.7082 + 2.0 + 81 -
18.8392 + 0.81 + P -
32.2282 + 2.81 + P -

Y0 16.3691

Y min 19.9884

R 1.8807

X min 21.9956

X0 23.8776

Moons Center { X0 23.8750
Y0 = 16.3690

1915phae.proj...

Formation of Normals.

1	- 0.0	+ 0.0	- 177.0
2	+ 1.94	+ 30.5	+ 58.0
3	+ 1.70	+ 8.5.5	+ 92.0
4	+ 0.17	+ 113.0	+ 20.5
5	- 0.00	- 5.8.5	+ 0.0
6	- 1.11	+ 248.0	- 89.0
7	- 1.50	+ 147.0	- 26.1.0
8	- 1.44	+ 24.5	- 4.6.5
	+ 3.36	+ 6485	+ 1705
	- 4.05	- 58.5	- 573.5
	- 0.69	+ 5.90.0	- 703.0

	a	b	c
	0	- 19	- 7 ✓
a	+ 10	- 9 - 17	- 11 ✓
b	+ 10	- 13 - 14	- 12 ✓
c	+ 15	- 18 - 4	- 7 ✓
		- 19 0	- 4 ✓
		- 18 + 6	+ 3 ✓
		- 9 + 16	+ 22 ✓
		- 9 + 14	+ 23 ✓

+9.5

$-0.69 + 14.12 = -1.36$

$+[\ ] - .03 = -0.46$

$+14.09 = -0.90$

$14.04 = -9.41 - 0.44 = -9.85$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Conditional Equations 27

					O-C	new O-C
1	0,00	-1,88	= +94	0 + 50 = +50	+44	+40
2	-0,87	-1,66	= -35	-35 + 44 = +9	-44	-50
3	-1,28	-1,37	= -67	-51 + 36 = -15	-52	-67
4	-1,83	-0,37	= -296	-73 +10 = -63	-183	-190
5	-1,88	0,00	= +31	-75 0 = -75	+106	+102
6	-1,76	+0,63	= -141	-70 -17 = -87	-59	-51
7	-0,92	+1,63	= -160	-37 -43 = -80	-80	-58
8	-0,87	+1,66	= -28	-35 -44 = -79	+51	+79

+201 -913

Average 1.8

14.04 - 0.69 = +590.0 -9.91

-0.69 + 14.12 = -903.0 -1.36

+.69 - .03 = + 28.9

- 0.69

0 + 14.09 = -374.6 b = - 26.6

14.09 = +590 - 18.3 = +571.7 a = + 40.1

- 0.70

Arc Measured 152°

$\frac{p}{4}$ = -15.5 $\frac{\Sigma V}{4}$ = -25.2

Im 3 R 1.88

-2RC = +0.75 $\frac{-25.2}{155}$ = +163 ΔR = -2.0

Corr -0.2

ΔR = -1.8

Δb = -0.78 Δδ = -0".2

Δq = -0.52 Δφ = -0s.02

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

						O-C
1	0.00	−1.88	= + 99	0	+50 = +50	+99
2	−0.87	−1.66	= − 35	−35	+44 = +9	−44
3	−1.28	−1.37	= − 67	−51	+36 = −15	−52
4 ½	−1.83	−0.37	= − 246	−73	+10 = −63	−183
5	−1.88	0.00	= + 31	−75	0 = −75	+106
6	−1.76	+0.63	= − 141	−70	−17 = −87	−54
7	−0.92	+1.63	= − 160	−37	−43 = −80	−80
8	−0.87	+1.66	= − 28	−35	−44 = −79	+51

+201 − 413

14.09 − 6.69 = +590.0
−6.69 + 14.12 = −403.0
+.69 − .03 = + 25.9

0 + 14.09 = −377.6 k = −26.6

14.09 = +590 − 18.3 = +571.7 h = +40.1

Arc measured 132°

$\frac{h}{4}$ = 15.5 $\frac{\Sigma k}{4}$ = −25.2

$\frac{-25.2}{.133}$ = −143 −2.0

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Nuovis Mean Position

χ_0	23.8750	η_0	16.3690
	+20		−13
	23.8770		16.3677

From Plate Constants

χ	23.8424	η	16.3828
ξ	+1.8424	η	−1.6172

log ξ	0.26539	log tan δ	9.1997
log cos δ	9.99761	ξ	0.5308
	8.50724		7.0537
	1.76354		6.7839

$\alpha - A$	+58.01	η_1	+.0006
A	0 42 31.00	log η_0	0.20893n
			7.33113
α_0	0 43 29.01		2.87778n
			759.7
Red	+4.30	$\delta - D$	−12 34.7
α'	0 43 33.31	D	+9 13 04.0
		δ_0	+9 00 29.3
		Red	+29.7
		δ'	+9 00 59.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Winona Mean Position x1

x_0	23.5750	y_0	16.3690
	+20		−13
	23.5770		16.3677

From Plate Constants

x	23.8429	y	16.3828
ξ	+1.8429	η	−1.6172

$\log \xi$	0.26539	$\log \tan \delta$	9.1997
$\log \delta$	9.9996 1	ξ	0.5308
	8.50729		7.05337
	1,76354		6.78339

$\lambda - A$	+58.01	η	+.0006
A	0 42 31.00	$\log \eta_0$	0.20893 n
λ_0	0 43 29.01		73115
	+9.30		2.87718 n
λ_{cd}			7 39.7
λ'	0 43 33.31	δD	−12 34.7
		D	+9 13 09.0
		δ_0	+9 00 29.3
		δ_{cd}	+29.7
		δ'	+9 00 59.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

0	42	54.13 49.80 +7.33	23	48	50.7 17.9 32.8
44		20.56 16.25 +7.31	7	07	51.0 21.7 29.3
52		06.39 01.82 +7.57	+38	02	53.8 18.7 35.1

.3

.40

.30

.1

.20

.½

.10

53 50 45 40

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

H+α 2 57.7 = 43° 40.5′ δ 79 00.5′
H 2 11.2
α 00 43.5′
CG 22 58.5′
G+α 23 42.0 = −7° 30′

log cos 9.9976
i 0.6704
i 0.6650

Cos G+α 9.9987
q 1.3597
Sin G+α 8.8946 n
tan δ 9.2501
8.8239

log Sin δ 9.1947
Cos H+α 9.8593
h 1.2997
Sin H+α 9.8392
Sec δ 0.0054
8.8239

log q′ 1.3584
q 8.2783 n

log h′ 0.3537
" h 9.9679

f +3.390
g +0.019
h +0.929
+4.300

q′ +22.825
h′ +2.256
i +4.624
+29.705

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

H+k 2 54.7 = 13° 40.5' δ 19 00.5'
1+ 2 11.2
2 000 93.5'
CG 22 58.5'
G+k 23 52.0 = -9° 30'

log cos 9.99996
c 0.67079
i 0.66350

log cos G+k 9.9987
q 1.35597
Sin G+k 8.89946 n
log δ 9.30011
8.82387

log Sin δ 9.17747
log cos H+k 9.85993
k 1.29797
Sin H+k 9.83992
Sec δ 0.00057
8.82387

log q' 1.35584
q 8.27883 n

log k' 0.35534
k 9.96479

f +3.390
g +0.019
k +0.929
+4.300

q' +22.825
k' +2.256
i +9.629
+29.705

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9732 Lunar Parallax 3D

α'	0	43	33.31
ϕ	0	58	28.7
$\phi - \alpha'$	+14	55	39
=	+30	43	50.85
		1	21.16
	3	42	29.69

9.995727	
0.000000	
0.000091	
9.995818	

δ	42	14	43.8
δ	9	00	59.0
$\gamma - \delta$	33	13	44.8

9.826900	
8.207399	
9.738787	
0.172247	
9.945034	

$\delta - \delta'$		30	17.3
δ	+9	30	16.3
Am Eph's	9	31	11.3
O-C		+5.2	
Curv. of Plate		+0.4	
2nd. Order Ref.		0.0	
Im Corr		-0.2	
δ	+9	31	16.1
O-C		+7.8	

π 55' 25.''3

9.869713
8.207399
8.813337
0.00602
6.895917

$\alpha - \alpha'$ 2' 42.31

= +10.82

α	0	43	44.13
Am. Eph's	0	43	43.23
O-C			+0.90
			-0.00
			-0.02
α	0	43	44.11
			+0.88

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

9132 Lunar Parallax 30

α'	0	43	33.31	π	55'	25.3"
ϕ	0	58	28.7			
$\phi - \alpha'$	+14	55.39		9.869713		
$= +30$	43	50.85		8.207399		
	1	21.16		8.813327		
3	42	29.69		0.000602		
				6.899541		

9.937727
0.000004
0.000091
9.937818

$\alpha - \alpha'$ 2' 42.31
= 162.82

γ 42 14 43.8

δ 9 00 59.0

$\gamma - \delta$ 33 13 44.8

9.826740
8.207399
9.738877
0.172244
7.944500

$\delta - \delta'$ 30 17.3

δ 31 16.3

α 0 43 44.13

Ann Eph's 9 31 11.3 Ann Eph's 0 43 43.23

O-C +3.0 O-C +0.90

Corr of Plate +0.4
2nd Order Reg 0.0

-0.02

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae..proj..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1915phae.proj...



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System