

KG

11366
u962

LXXXV



4456

4465

4466



1913phae.proj.19366F

Harvard Keener Plates.

Measures and Reductions

Mary Fowler

Volume ~~LXXXV~~

Plate no.	Date	Page
4456	Dec. 11, 1913	1
4465	Dec 13, 1913	10

4

1

8

12

2

16

26

3

2

44520

Stars - Measured

1915 Mar 17.

1

d	N	d	N
17604	19520	17430	16160
8.5 10820	16295	16896	11662
12.6 1518	90	0092	5860
06	05	12	62
<u>12.6787</u>	<u>.6777</u>	<u>8.4485</u>	<u>4501</u>
2 18827	18716	19903	18410
16.2 17750	978676	1138970	1692023
26.1 4644	77	69	20
30	22	20	00
<u>26.1080</u>	<u>.1054</u>	<u>16.1451</u>	<u>.1457</u>
3 18234	17810	17445	19972
22.6 16290	9750	14121	1325798
17.2 92	4348	1922	9998
30	21	45	78
<u>17.1942</u>	<u>.1928</u>	<u>22.6676</u>	<u>.6627</u>

Density 5.

4450 Star Measures

1915 March 17.

d	N	d	N
✓ 17604	19520	17480	16160
85 10829	1629591	18896	11662
126 1518	90	0092	5860
06	05	12	62
<u>12.6787</u>	<u>6777</u>	<u>8.4485</u>	<u>4501</u>
2 18827	18716	19903	18410
162 17750	977676	1136970	16920
201 4644	77	69	2023
30	22	20	00
<u>26.1080</u>	<u>1054</u>	<u>10.1451</u>	<u>.1487</u>
3 18234	17810	17445	19972
226 16290	9750	14121	13297
172 9290	4848	1922	9998
30	21	45	78
<u>17.1942</u>	<u>1928</u>	<u>22.6676</u>	<u>.6677</u>

Density 5.

4456

d

y

Moon Measures

1915 Mar 17.

2

N

d

N

$\frac{1}{19.0}$ 16010
 18.3 14672
 6070
 12
18.1343

18150
 943041
 5247
 53
1289

2
 18.3
 19.0

3
 18.1
 19.8
 min
 in
 sec

4
 18.1
 20.0

5
 18.6
 21.0

6
 19.0 18744
 21.4 1498073
 80
 45
21.3766

18294
 1205561
 58
 18
3746

19206
 1159087
 91
 20
18.2372

19080
 994029
 3029
 70
18.0862

19018
 1004920
 2025-
 31
18.0998

18040
 1307090
 8890
 54
18.5536

17690
 1527771
 78
 94
2415

18709
 1785749
 50
 11
0857

18782
 1769390
 00
 20
1019

19789
 1424538
 2638
 71
5544

4456

d

y

Moon Measures

1915 Mar 17

2

d

N

$\frac{1}{190}$ 16010
 14672
 183 6070
 12
18,1343

$\frac{1}{18150}$
 943041
 5247
 53
1289

$\frac{2}{183}$
 19.0

$\frac{3}{181}$
 198
 min
 2
 11

$\frac{7}{181}$
 200

$\frac{5}{186}$
 21.0

$\frac{6}{190}$ 18744
 214 1498073
 80
 45
21,3766

18294
 1205561
 58
 18
3746

19206
 1159057
 91
 20
18,2372

19080
 994029
 30
 70
18,0862

19018
 1004920
 2020
 31
18,0998

18040
 1357090
 88
 54
18,5536

17690
 1527771
 78
 94
2411

18709
 1785749
 50
 11
0857

18782
 1769390
 00
 20
1019

19789
 1424538
 26
 71
5544

4456 *Onion's Measures*
 d 4 N d 2 N

1915 Mar. 17.

3

7 19450
 20.0 12889
 21.6 8689
 may 47
 in 21.6560

19318
 15844
 6858
 25
 .6536

7
 schatell
 17302
 8 10921
 20.2 1033
 20.6 02
21.6379

17065
 1342020
 19
 70
6353

17240
 9429
 21
 32
20.2189

16801
 1459301
 97
 09
20.2206

441-6 Mount measured

1911.5 Mar 17

3

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{4}$

7	19450	19315
20.0	12889	15844.8
21.6	86	68.8
new	47	25
	<u>216560</u>	<u>6536</u>
scratched		
8	17302	17065
20.2	10921	13420.20
21.6	11.33	19
	02	70
	<u>216379</u>	<u>6353</u>

17240	16801
9429.20	14593.01
21	97
32	09
<u>202189</u>	<u>202206</u>

4456	Times etc				
Exp. stations	1913 Dec 11	1 ^h	39 ^m	- 1 ^h	51 ^m
... Moon		1	44	38.5 ^v	44 38.7 ^v
clockfast			0	14.9 ^v	
H. Sid T.		1	44	23.7 ^v	$\theta - \alpha - 2^h 05^m$
H. long		4	44	31.0 ^v	
G Sid T.		5	88	54.75 ^v	
Sid T. in hour		17	18	22.44 ^v	
Interval		13	10	32.31 ^v	
Real			2	09.51 ^v	
G. m. T.		13	08	22.80 ^v	

From naut Alman	R. A	Decl.	
Moon 13 ^h	.3 48	47.35 ^v	+ 24° 52' 19.5 ^v
Motion in 1 ^m = 22683 ^v		7768 ^v	
" 8.38 ^v		+ 19.01 ^v	+ 1 05.1 ^v
Tabular place	3 49	06.36 ^v	+ 24 53 24.6 ^v

Moon's age	14 days.
Moon's parallax	55 59.12 ^v
... semidiam	15 16.8
R	9 16.8
Augmentation	+ 13.0
Irradiation (5)	- 0.8
P	929.0
R	1.9914
a/R	- 755 ^v
(1+a) P	1.8959
P ²	3.5944

$$934 = 13.45$$

$$917 = 13.0$$

$$a = -503.5$$

$$+ 24.0$$

$$479.5$$

4456 Times etc
 Exp. T. 1913 Dec 11 1^h 39^m - 1^h 51^m
 Moon 1 44 38.5 - 1 44 38.7
 clockfast 0 14.9

H. Sid. T. 1 44 23.7 G - x - 2^h 0^m
 H. Long 4 44 31.05
 G. Sid. 5 88 54.75
 Sid. T. h. non 17 18 22.44
 Interval 13 60 32.31
 Red 2 09.51
 G. m. T. 13 08 22.80

From Mount Allen R. A. Decl.
 Moon 13^h 3 46 47.35 + 24° 52' 19.5"
 Moon 1^h - 22683 7768
 8.38 + 19.01 + 1 04.1
 Tabular place 3 49 06.36 + 24° 53' 23.6"

Moon's age 14 days.
 Moon's parallax 55 59.12
 semidiam 15 16.8

934 = 1341
 917 = 130

R 9 16.8
 Augmentation + 13.0
 Irradiation (5) - 0.8
 P 9 29.0
 R 1.9914
 aR - 9.55
 (1 + a) P 1.8959
 R² 3.5944

a = 503.5
 = 24.8
 478.5

4456

Plate constant

5

x	8.4493	16.1469	22.6676
y	9.6457	17.7070	24.5718
x-y	-1.1964	-1.5601	-1.9042
y	12.6782	26.1067	17.1935
x	12.8370	26.9534	17.6014
y-x	-1.588	-8467	-4079

$$\begin{array}{rcll}
 x-y & +500x & -17.64 & +3.5x & +7932 \\
 -1.1964 + 4225 = -7739 - 223 & = -7962 + 30 & = -7932 & = 0 \\
 -1.5601 + 8073 = -7528 - 459 & = -7987 + 56 & = -7933 & = -1 \\
 -1.9042 + 11334 = -7708 - 303 & = -8011 + 79 & = -7932 & = 0 \\
 19.9812 + 9991 & -348 & +70 & = 21.7457
 \end{array}$$

$$\begin{array}{rcll}
 y-x & +500y & +15.3x & +3.5y & -9924 \\
 -1.588 + 6339 = +4751 + 129 & = +4880 + 44 & = +4924 & = 0 \\
 -8467 + 13053 = +4586 + 247 & = +4833 + 91 & = +4924 & = 0 \\
 -4079 + 8597 = +4518 + 349 & = +4865 + 60 & = +4925 & = +1 \\
 19.7552 + 9878 & +306 & +69 & = 20.2881
 \end{array}$$

Tables a = -0.5 e = -0.5 a-e = 0.0 b+a = +1.0
 Obs a = -503.5 e = -503.5 a-e = 0.0 b+a = +2.3

O-e -503.0" -503.0" 0.0 +1.3"

4456

Plate constant

5

x	8.4493	16.1469	22.6676
y	9.6457	17.7070	24.5718
x-y	-1.1964	-1.5601	-1.9042
u	12.6782	26.1067	17.1935
v	12.8370	26.9134	17.6014
u-v	-1.588	-8467	-4079

$$\begin{array}{rclcl}
 x-y & +100x & -1764 & +35x & +7932 \\
 -1.1964 + 4225 & = & -7739 - 223 & = & -7962 + 30 = -7932 & = 0 \\
 -1.5601 + 8073 & = & -7528 - 459 & = & -7987 + 56 = -7933 & = -1 \\
 -1.9042 + 11334 & = & -7708 - 303 & = & -8011 + 79 = -7932 & = 0 \\
 19.9812 + 9991 & & -348 & & +70 & = 217457
 \end{array}$$

$$\begin{array}{rclcl}
 u-v & +100u & +1153x & +35u & -4924 \\
 -1.588 + 6339 & = & +4751 + 129 & = & +4880 + 44 = +4924 & = 0 \\
 -8467 + 13053 & = & +4586 - 247 & = & +4838 + 91 = +4929 & = 0 \\
 -4079 + 8597 & = & +4518 + 347 & = & +4865 + 100 = +4965 & = +1 \\
 19.7552 + 9878 & & +306 & & -1 & = 20.2881
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables } a & -0.5 & a & -0.5 & a-c & 0.0 & b+a & +1.0 \\
 \text{Obs } a & -503.5 & a & -503.5 & a-c & 0.0 & b+a & +2.3 \\
 c-c & -3.0 & & -3.0 & & 0.0 & & +1.3
 \end{array}$$

4456

Innovis Center.

	y	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$o - c$
1	19.0000	-0.9850	+2	0.9698	3.6052	+108
2	18.2394	-1.7456	+1	3.0468	3.6168	+224
3	18.0860	-1.8990	0	3.6062	3.6062	+118
4	18.1008	-1.8842	0	3.5502	3.6102	+158
5	18.5540	-1.4310	-1	2.0481	3.5981	+37
6	19.0000	-0.9850	-2	0.9706	3.5969	+25
7	20.0000	+0.0150	-2	0.0002	3.6094	+150
8	20.2198	+0.2348	-2	0.0550	3.5954	+10

3.5944

	y	$y - y_0$	$(y - y_0)^2$	
1	18.1316	-1.6234	2.6354	211 ✓
2	19.0000	-0.7550	0.5700	247 ✓
3	19.7550	0.0000	0.0000	270 ✓
4	20.0000	+0.2450	0.0600	277 ✓
5	21.0000	+1.2450	1.5500	311 ✓
6	21.3756	+1.6206	2.6263	328 329
7	21.6548	+1.8998	3.6092	3 1
8	21.6366	+1.8816	3.5404	7 ✓

Range 15 x 6

Approx Center.

$$x = 19.0 \quad y = 18.1316$$

$$21.3756$$

$$39.5072$$

$$y_0 = 19.7536$$

$$y_{\text{max}} = 21.6548$$

$$R = 1.9012$$

$$x_{\text{min}} = 18.0860$$

$$x_0 = 19.9872$$

$$\text{Center} \left\{ \begin{array}{l} x_0 = 19.9850 \\ y_0 = 19.7550 \end{array} \right.$$

4456

Innovative Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0) - (y - y_0)$	$0 - 6$
1	19.0000	-0.9850	+2	0.9698	3.6052	+108
2	18.2394	-1.7456	+1	3.0468	3.6168	+224
3	18.0860	-1.8990	0	3.6062	3.6062	+118
4	18.1008	-1.8842	0	3.5502	3.6102	+158
5	18.5540	-1.4310	-1	2.0481	3.5981	+37
6	19.0000	-0.9850	-2	0.9706	3.5969	+25
7	20.0000	+0.0150	-2	0.0002	3.6094	+150
8	20.2198	+0.2348	-2	0.0550	3.5954	+10

3.5944

	y	$y - y_0$	$(y - y_0)^2$
1	18.1316	-1.6234	2.6354
2	19.0000	-0.7550	0.5700
3	19.7550	0.0000	0.0000
4	20.0000	+0.2450	0.0600
5	21.0000	+1.2450	1.5500
6	21.3756	+1.6206	2.6263
7	21.6548	+1.8998	3.6092
8	21.6366	+1.8816	3.5404

211

249

270

277

311

328

31

7

Range 157

Approximate Center

$$x = 19.0 \quad y = 18.1316$$

$$21.3756$$

$$39.5072$$

$$y_0 = 19.7536$$

$$y_{\text{max}} = 21.6548$$

$$R = 1.9012$$

$$x_{\text{min}} = 18.0860$$

$$X_0 = 19.9872$$

$$\text{Center} \left\{ \begin{array}{l} x_0 = 19.9850 \\ y_0 = 19.7550 \end{array} \right.$$

Formation of Normals

	ab	an	bn
1	+ 1.59	- 105.8	- 175.0
2	+ 1.33	- 392.0	- 170.3
3	- 0.00	- 224.0	+ 0.0
4	- 0.45	- 297.0	+ 37.9
5	- 1.77	- 52.9	+ 45.9
6	- 1.59	- 24.5	+ 40.5
7	+ 0.04	+ 3.0	+ 285.0
8	+ 0.43	+ 2.3	+ 18.8
	- 0.42	- 1090.9	+ 87.8

- a	- b	- 38
		+ ΔC
+ 23	- 18	- 33 ^v
+ 40	- 8	- 6 ^v
+ 44	+ 0	+ 6 ^v
+ 43	+ 3	+ 8 ^v
+ 33	+ 14	+ 9 ^v
+ 23	+ 18	+ 3 ^v
- 0	+ 21	- 17 ^v
- 5	+ 21	- 22 ^v

4456

Moon's Center
conditional equations.

	a	b	0	c	0-c	Corr
1	-0.98	-1.62	= +108	+75 - 6 = +69	+39	+6
2	-1.75	-0.76	= +224	+134 - 3 = +131	+93	+87
3	-1.90	+0.00	= +118	+145 + 0 = +145	-27	-21
4	-1.88	+0.24	= +108	+144 + 1 = +145	+13	+21
5	-1.43	+1.24	= +37	+110 + 4 = +114	-77	-68
6	-0.98	+1.62	= +25	+75 + 6 = +81	-56	-53
7	+0.02	+1.90	= +150	-2 + 7 = +5	+145	+128
8	+0.23	+1.88	= +10	-18 + 7 = -11	+21	-1
					+311	-160

Average: 59.

Normal Equations

$$\begin{aligned}
 +14.25 - 0.42 &= -1091 & -8.67 \\
 -0.42 + 14.59 &= +83 & +4.50 \\
 +0.42 - 0.01 &= -32 & -0.25 \\
 +14.58 &= +51 & +4.25b = +3.5 & +0.29 \\
 +14.25 &= -1091 & +1 = -1090 & a = -76.5 - 0.60
 \end{aligned}$$

Arc measured: 156°

Average(0-c) = +18.9

$$\frac{pc}{m} = 18$$

$$+ \frac{18.9}{18} = +1.05 \quad \Delta z = +1.2$$

$$-2RC = -1.90 \quad -38$$

$$\text{Corr} = +0.5$$

$$\Delta b = -0.55 \quad -11 \quad \Delta \delta = -0.3$$

$$\Delta R = +0.7$$

$$\Delta a = +1.14 \quad +23 \quad \Delta \alpha = +0.04$$

4456

Linear Center
Condensed Equations

	a	b	c	d	e	f
1	-0.98	-1.62	+1.08	-7.5	-6	+6.9
2	-1.75	-0.76	+1.24	+13.4	-3	+13.1
3	-1.90	+0.00	+1.18	-14.5	-0	+14.5
4	-1.88	+0.24	+1.58	+14.4	-1	+14.5
5	-1.43	+1.24	+1.37	+11.0	-4	+11.4
6	-0.98	+1.62	+1.25	-7.5	-6	+8.1
7	+0.02	+1.90	+1.50	-2	-7	+5
8	+0.23	+1.88	+1.0	-1.8	-7	-1.1
						+21
						+211 - 160
						Average: 59

Normal Equations

$$+14.25 - 0.42 = -109.1$$

$$- 0.42 + 14.59 = +83$$

$$+ 0.42 - 0.01 = -32$$

$$+ 14.58 = +51$$

$$b = -3.5$$

$$+14.25 = -109.1 + 1 = -109.0$$

$$a = -76.5$$

Plate Center

$\begin{cases} 3^{\text{h}} 48^{\text{m}} 30^{\text{s}} \\ +24^{\circ} 47' 00'' \end{cases}$

$\text{Rad} = +4.81$
 $+22.4$

$0 - c = +4.1 + 0.42$

4456 Moon's Mean Position (1913.0)

$$\begin{array}{r} X_0 = 19.9850^\circ \\ \text{2a:} \quad - 38^\circ \\ \hline 19.9812^\circ \end{array} \quad \begin{array}{r} Y_0 = 19.7550^\circ \\ \text{2b:} \quad + 2^\circ \\ \hline 19.7552^\circ \end{array}$$

From plate constants: $X = 21.7457^\circ$ $Y = 20.2881^\circ$

$$\begin{array}{r} z = +3.7457^\circ \\ \log z = 0.57353^\circ \\ \text{wgs} = 9.95881^\circ \\ \quad 8.50724^\circ \end{array}$$

$$(x-A) = 2.10748^\circ$$

$$x-A = + 2 \ 08 \ 08^\circ$$

$$A = 3 \ 48 \ 30^\circ$$

$$\alpha_0 = 3 \ 50 \ 38 \ 08^\circ$$

$$\text{Red} = - 4.81^\circ$$

$$\delta' = 3 \ 50 \ 42 \ 89^\circ$$

$$\eta = -1.7119^\circ$$

$$\begin{array}{r} \log \tan S = 9.6587^\circ \\ \quad 1.1471^\circ \\ \hline 7.0534 \\ \hline 7.8592^\circ \end{array}$$

$$\eta_1 = + 72^\circ$$

$$\begin{array}{r} \eta_0 = -1.7191^\circ \\ \log \eta_0 = 0.23530^\circ \\ \hline 7.33115^\circ \\ \hline 2.90415^\circ \end{array}$$

$$S-D = - 13 \ 22.0^\circ$$

$$D = +24 \ 47 \ 00^\circ$$

$$S_0 = +24 \ 33 \ 38.0^\circ$$

$$\text{Red} = + 22.4^\circ$$

$$\delta = +24 \ 34 \ 00.4^\circ$$

7+50 *Proxima Centauri* (19130)

$$\begin{array}{r} X = 199850 \\ - 38 \\ \hline 199812 \end{array}$$

$$\begin{array}{r} Y = 197550 \\ + 2 \\ \hline 197552 \end{array}$$

From plate constant: $X = 217457$ $Y = 202881$

$$\begin{array}{r} \alpha = +37457 \\ \log \alpha = 0.57353 \\ \log S = 995801 \\ 850724 \end{array}$$

$$(x-A) = 210748$$

$$x-A = + 20808$$

$$A = 34830$$

$$\alpha_0 = 3503808$$

$$\text{Red} = - 481$$

$$\alpha' = 3504289$$

$$\eta = -17119$$

$$\begin{array}{r} \log \tan S = 96587 \\ 1.1471 \\ \hline 70534 \\ 78592 \end{array}$$

$$\eta_1 = +72$$

$$\begin{array}{r} \eta_0 = -17191 \\ \log \eta_0 = 023530 \\ \hline 723115 \\ 290415 \end{array}$$

$$S-D = -13220$$

$$D = +244700$$

$$S_0 = +2433380$$

$$\text{Red} = +224$$

$$S = +2434004$$

4456 human Parallax.

9

$$\begin{array}{rcl}
 \alpha' & 3 & 50 \quad 42.89 \\
 \delta & 1 & 44 \quad 23.7 \\
 \delta - \alpha & -2 & 06 \quad 19.2 \\
 & - & 31^{\circ} \quad 34' \quad 48'' \\
 & - & 11 \quad 57'' \\
 & - & 31 \quad 22 \quad 51''
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.06868 \\
 \hline
 0.02595
 \end{array}$$

$$f = 46 \quad 42 \quad 40$$

$$24 \quad 34 \quad 00$$

$$22 \quad 08 \quad 40$$

$$\begin{array}{r}
 9.82640 \\
 8.21178 \\
 9.57628 \\
 0.13793 \\
 \hline
 7.75239
 \end{array}$$

$$\delta - \delta' = +19 \quad 26.3''$$

$$\delta = +21 \quad 53 \quad 26.7''$$

$$\text{Am Eph } \delta = +24 \quad 53 \quad 24.6''$$

$$\begin{array}{rcl}
 \delta - \alpha & & +2.1'' \\
 \text{Ind. ord. ref.} & & 0.0 \\
 \text{Lvr} & - & 0.3
 \end{array}$$

$$\delta = +34 \quad 53 \quad 26.4$$

$$\delta - \alpha = +1.8$$

$$\delta = +24 \quad 34 \quad 00.4''$$

$$\pi = 55 \quad 59.12''$$

$$\begin{array}{r}
 9.86913 \\
 8.21178 \\
 9.71907 \\
 0.04233 \\
 \hline
 7.84231
 \end{array}$$

$$\alpha - \alpha' = -23 \quad 54.63''$$

$$= -1'' \quad 35.64''$$

$$\alpha = 3 \quad 49 \quad 07.25''$$

$$\alpha = 3 \quad 49 \quad 06.36''$$

$$+0.89''$$

$$\text{Lvr} = +0.04$$

$$\alpha = 3 \quad 49 \quad 07.29$$

$$\delta - \alpha = +0.93$$

4456

Human Parallax

9

α 3 50 42 89
 δ 1 44 23 7
 $\theta - \lambda$ -2 06 19.2
 $-$ 31° 34' 48"
 $-$ 11 57
 $-$ 31 22 51

9.957 27
 000000
 006868
 002595

θ 46 42 40
 24 34 00
 22 08 40

9 82640
 8 21178
 9 57628
 013793
 7.75239

S-S + 19 26.3

S: + 27 53 26.7

Ann Eph S + 24 53 23.6

O-C + 3.1
 Int. obs. ref. 0.0
 Int. - 0.3

S + 24 53 26.4

O-C + 1.8

S + 24 34 00.4

Π 55 59.12

9 86913
 8 21178
 9 71907
 004233
 7.84231

$\alpha - \lambda$ - 23 54.63

- 1 35.64

α 3 49 07.25

λ 3 49 06.36

+ 0.89

Int. + 0.4

α 3 49 07.29

O-C + 0.93

4465 Times etc.
Exp. to star 1913 Dec. 13
" " horn
Clockfast.

$0^h 59^m$ $- 4^h 11^m$
1 04 55.3 - 1 04 55.6
0 129

H. Sid T. 1 04 42.55 $\theta - \alpha = -4^h 38^m$
H. long. 4 44 31.05
G. Sid T. 5 49 13.60
Sid T. in horn
+ interval 17 26 15.56
12 22 58.04
Red. 2 01.72
G. m. T. 12 20 56.32

From Naut Alman

Moon 12^h

Motion in 1^m 2.5103

20.939

Tabular place

R. A. Decal.
 $5^h 41^m 51^s 82$ $+ 28^\circ 21' 09.4$
0.680
+ 52.56 + 14.2
5 42 44.38 + 28 21 23.6

Moon's age 16 days (after full)
Moon's parallax $57' 06'' 39$
" semidiameter $15' 35.7$

934 = 8.65

935 = 8.7

R 935.2
Augmentation + 8.7
Irradiation (4) - 0.6

R 943.3

R 20221

a R - 978

(1+a) R 1.9243

R² 37029

a = 507.5

+ 24

-483.5

4465 Times etc.
 exp. Telam 1913 Dec. 13 0^h 59^m - 0^h 11^m
 horn 1 04 55.3 - 1 04 55.6
 clockfast. 0 129

H. Sid. T. 1 04 42.55 G - x = -4^h 28^m
 h. long. 4 44 31.05
 G. Sid. T. 5 49 13.60
 Sid. T. in horn 17 26 15.56
 + interval 12 22 58.04
 Red. 2 01.72
 G. m. T. 12 20 56.32

From Naut. Alman. R. H. Dec.
 Moon 12^h 5^h 41^m 51.82 + 28^m 21^s 09.4
 Moon 12^h 25103 0.680
 20.939 + 52.56 + 142
 Tabular place 5 42 44.38 + 28 21 23.6

lunar age 16 days (after (6))
 Moon's parallax 56' 32.51
 semidiameter 15' 25.7

934 = 8.65
 935 = 9.7

R 935.2
 Augmentation + 8.7
 Irradiation (4) - 0.6
 R 943.3
 R 202.21
 a R - 97.8
 (1+a) R 1924.3
 R² 3702.9

a = 5075
 24
 - 7825

4

 $\frac{1}{13}$
14 $\frac{2}{27}$
5 $\frac{3}{32}$
2

4465

Antei x=22. 4=78

Star measures

1915 Mar. 20

11

d

n

d

4

n

1 19660
 133 17109
 145 1719
 48
13.2542

16831
 936060
 5960
 25
2534

17290 17796
 12820 1214136
 20 30
 82 72
14.4370 4354

2 19644
 276 1337068
 52 78
 26
27.6261

15997
 1226971
 70
 10
16268

17881 17101
 16918 806252
 23 29 58
 80 00
5.0958 0956

3 18361
 329 9412
 236 1214
 53
32.8941

18729
 1771926
 20
 73
8944

19225 19750
 13660 1529189
 62 59 90
 10 38
23.5556 5546

Density 4.

4465

Anti x = 22. 4-18

Star measures

1915 Mar. 20

11

a		n		a		n	
1	19660	1	16831	1	17790	1	17796
133	17109	9	36060	1	12820	1	1214136
145	1719	5	5960	1	70	1	30
	48	2	23	1	82	1	72
	<u>132572</u>		<u>2534</u>		<u>144370</u>		<u>4354</u>
2	19644	1	15997	1	17881	1	17101
276	1337068	1	226771	1	16918	1	806252
52	78		70	1	2379	1	88
	26		10	1	89	1	00
	<u>27.6261</u>		<u>6268</u>		<u>5.0958</u>		<u>0956</u>
3	18361	1	18779	1	19225	1	19750
329	9412	1	1771926	1	1866059	1	1529189
236	1214		20	1	62	1	90
	53		73	1	10	1	38
	<u>32.8941</u>		<u>8944</u>		<u>23.5556</u>		<u>5546</u>

Sensitivity 4.

1
2
142
2
513
26
154
26
16
mm
15
26
166
25
17

4465 d * Moon - measured 1915 Mar 20
N N

1 scratch

25.4 19238

143 1531012

08

40

25.3929

18802

12730

4942

00

3939

19743

16795

9900

43

14.3543

17286

10841

2927

76

3553

2 1361320

25.9 13

15.0 13435

25.9820

15250

1506965

57

9814

3

26.0

15.1

13748

1342922

20

15.0324

1532020

22

14980

0341

4

26.2

16.0

max

in

A

17246

1496968

57

57

26.2283

19578

1186557

61

78

2283

max may be
butte bigger

5

26.0

16.8

16372

7885

93

68

16.8482

16429

14876

95-80

20

8449

6

25.9

17.0

16854

275046

55

54

25.9104

16362

1544551

29

60

9083

4465 * Moon - measured 1915 Mar 20
d n d 7 n

1.3 scale

254 19238	18802	19743	17286
193 15310	12730	16499	10841
08	4942	9900	2927
40	00	43	76
<u>253929</u>	<u>3939</u>	<u>143543</u>	<u>3513</u>

2	1361320	15250
8.9	13	1506965
150	13435	57
<u>259820</u>	<u>9814</u>	

3		13748	1532020
260		1342922	22
15.1		20	14980
		<u>150324</u>	<u>0341</u>

4	17246	19578
262	1496968	1186557
160	57	61
non	57	78
A	<u>262283</u>	<u>2283</u>

max may be
bubble bigger

5	16372	16429
260	7885	14876
168	93	71-80
	68	20
	<u>168482</u>	<u>8449</u>

6	16854	16362
59	7750	1544551
7.0	5546	39
	54	60
	<u>259104</u>	<u>9083</u>

4465

d

Moon-Measures 1915 Mar 20

7
250
17.7

16110
875551
50
91
17.7344

17555
1491220
10
60
17.355

8
242
17.8
max
in
8

19961
1131810
08
41
17.8633

17310
1594040
32
90
17.8630

9
24.0
17.7

19080
1067189
76
80
17.8400

18283
1670312
09
90
17.8424

10
23.0
17.4

18150
1458909
0111
42
17.8544

18210
1175050
40
85
17.8553

4465

d

Moon - measures 1915 mar 20

13

2
250
177

16110
875551
50
91
17.7344

17559
1491220
10
60
7355

8
242
17.8
moon
-
8

19961
1131810
0810
41

17310
1594040
3240
90

17.86338620

9
240
17.7

19080
1067159
7659
80
17.8400

18283
1670312
09
90
8424

10
230
17.4

18150
1458909
0111
42
17.3544

18210
1175050
40
85
3553

Curvature of Plate

	ξ	η	$\Delta \xi$	$+3.45$	$0 - 0 + 0.24$	$-$	-5
1.	-9.60	-3.55	-25	+33	+5	+1	+4 -1
2	+5.50	-13.33	+28	+19	+9	-3	+6 +1
3	+11.03	+6.00	+43	+36	+5	+1	+6 -1
Mean	+2.01	-1.92	0	+7	-7	0	-7 <u>-12</u>
			$\Delta \eta$	$+9.59$	$0 - 0 + 0.55$	-0.39	0.1
			-9	+46	+7	+5	-12 +1 +2 -1 +2
			-67	+60	-7	+3	-4 +4 0 +1 +1
			+23	-27	-9	+6	+2 -2 0 +1 +1
			0	-9	+9	-1	+5 +1 -9 -9
							<u>+8</u>

Corrections to Mean

 $-0^s.04$ $+0''.4$

Standard Coordinates

4465				Standard Coordinates				14			
Case No.	815	mag	7.8	Case No.	837	mag	8.1	Case No.	846	mag	6.4
C	5	38	03.91	5	46	52.44	5	50	12.63		
L			.92			.50			.64		
E			.90			.41			.59		
mean	5	38	03.91	5	46	52.45	5	50	12.62		
Proc		+	49.02		+	48.56		+	49.54		
δ	5	38	52.93	5	47	41.01	5	51	02.16		
A	5	44	30.	5	44	30	5	44	30		
$\alpha-A$	-	5	37.07	+	3	11.01	+	6	32.16		
$\sin(\delta-A)$		-	337.04	+		191.00	+		392.11		
$\log \mu$			2.52768			2.28103			2.59341		
$\cos$			9.94717			9.95209			9.94212		
γ_0			0.98209			0.74034			1.04277		
γ_1			-9.5960	+		54998	+		11.0349		
γ_2			-	+		28	+		43		
γ_3			12.4015			27.5026			33.0392		
γ_4			13.2538			27.6264			32.8942		
γ_5	+		8523	+		1238			-1450		
C	+27	41	09.2	+26	25	16.5	+28	55	34.8		
L			09.4			15.7			34.6		
E			09.4			16.6			33.8		
mean	+27	41	09.3	+26	25	16.3	+28	55	34.4		
Proc		+	24.4		+	14.5		+	10.6		
δ	+27	41	33.7	+26	25	30.8	+28	55	45.0		
D	+28	09	10.	+28	09	10	+28	09	10		
$\delta-D$	-	27	36.3	-	1	43	39.2	+	46	35.0	
$\tan(\delta-D)$		-	1656.3		-	6221.1		+	2795.2		
$\log \mu$			3.21914			5.79387			3.44641		
γ_0			0.55029			1.12502			0.77756		
γ_1			9.7200			9.6963			9.7425		
γ_2			1.9642			1.4807			2.0855		
γ_3			87376			82304			8.8814		
γ_4			-3.5505	-		13.3358	+		5.9919		
γ_5	+		547	+		170	+		761		
γ_6			145042			4.6812			24.0680		
γ_7			144362			50957			23.5551		
γ_8	-		680	+		4145			-5129		

7461				Standard Coordinates				14			
Ceph. W.	815	~ 9.78		Ceph. W.	837	~ 9.81		Ceph. W.	846	~ 9.84	
C	5	38	0391	5	46	5244		5	50	1263	
L			.92			50				64	
E			.90			41				59	
mean	5	38	0391	5	46	5245		5	50	1262	
Par		+	4902		+	4856			-	4954	
A	5	38	5293	5	47	4101		5	51	0216	
A	5	44	30.	5	44	30		5	44	30	
A-A	-	5	37.07	+	3	1101		+	6	3216	
Sub-A		-	337.04	+	19	1.00		+	39	2.11	
log			252768~			228103				259341	
W.S.			994717			995209				994212	
B ₁			098209~			074034				104277	
B ₂			-95960			+54998				+11.0349	
B ₃			-			28				43	
B ₄			12.4015			27.5026				33.0392	
B ₅			132538			276264				328942	
B ₆			+			1238				-1450	
C + 27 41 09.2				+ 26 25 16.5				+ 28 55 34.8			
L				15.7				34.6			
E				16.6				33.8			
mean + 27 41 09.7				+ 26 25 16.3				+ 28 55 34			
Par				+				+			
S - 27 41 33.7				+ 26 25 30.8				+ 28 55 45			
D - 28 09 10.				- 28 09 10				+ 28 09 10			
S-D				- 1 43 39.2				+ 46 35			
Sub-D				- 6 227.1				+ 27 95			
log				3.21914~				3.44641			
W.S.				055029~				0.77756			
B ₁				9.7260				9.7425			
B ₂				19642				20855			
B ₃				87376				88814			
B ₄				- 3.5505				+ 59919			
B ₅				+				+			
B ₆				145042				24.0680			
B ₇				144362				235551			
B ₈				- 680				- 5129			

4465

Platu Centu

15

x	y	R. A	Decl.
13.2538	14.4362	5 ^h 38 ^m 53 ^s	+27° 41' 34"
27.6264	5.0957	5 47 41	+26 25 31
32.8942	23.5551	5 51 02	+28 55 45
3 73.77	43.09	3 136 96	121 110
24.59	14.36	5 45 52	+27 40 57
-22	-18	-1 20	+ 28 17
259	3.64	5 44 32	+28 09 14
31	466.5		
80 ³ 4	1697"		
	= 28' 17"		

Center } $A = 5^h 44^m 30^s$
 $D = +28^\circ 09' 10''$

$$\begin{array}{rclclcl}
 x-3 & +500x & +0.84 & +7.5x & -15262 & \\
 +8523 & +6627 & = +15150 & +12 & = +15162 & +100 = +15262 = 0 \\
 +1238 & +13813 & = +15051 & +4 & = +15055 & +207 = +15262 = 0 \\
 -1450 & +16447 & = +14997 & +19 & = +15016 & +247 = +15263 = +1 \\
 24.2033 & +12152 & +18 & +182 & = 24.0118 &
 \end{array}$$

$$\begin{array}{rclclcl}
 y-m & +1704 & -7.9x & +4.74 & -6500 & \\
 -680 & +7218 & = +6538 & -105 & = +6433 & +68 = +6501 = +1 \\
 +4145 & +2548 & = +6693 & -218 & = +6475 & +24 = +6499 = -1 \\
 -5129 & +11778 & = +6649 & -260 & = +6389 & +111 = +6500 = 0 \\
 15,9398 & +7970 & -192 & +75 & = 16.075-1 &
 \end{array}$$

Tables $a = -4.5$ $a = -2.5$ $a-e = -2.0$ $b+a = +6.1$
Obs $a = 507.5$ $e = -504.7$ -2.8 $b+a = +7.1$
 $O-e = -503.0$ -502.2 -0.8 $+1.0$

4465

Plante Center

15

x	y	R.A	Decl.
13.2538	14.4362	5 ^h 38 ^m 53 ^s	+27° 41' 34"
27.6264	5.0957	5 ^h 40 ^m 41 ^s	+26 25 31
32.8942	23.5551	5 ^h 51 ^m 02 ^s	+28 55 45
173.77	43.09	13 6 96	121 110
24.59	14.36	5 ^h 45 ^m 52 ^s	+27 40 57
		-1 20	28 17
25.9	3.64	5 ^h 44 ^m 32 ^s	+28 09 14
31	40.4		
	1697		
	28' 17"		

$$\text{Center } \left\{ \begin{array}{l} A = 5^h 44^m 30^s \\ D = +28^\circ 09' 10'' \end{array} \right.$$

$$\begin{array}{rclcl} x-3 & +500x & +089 & +75x & -15262 \\ +8523 & +66272 & +15150 & +12 & +15162 \\ +1238 & +13813 & +15051 & +4 & +15055 \\ -1450 & +16447 & +19997 & +19 & +15016 \\ -42033 & +12152 & +13 & +182 & +15262 \\ & & & & = 0 \\ & & & & = 0 \\ & & & & = +1 \\ & & & & = 24.0118 \end{array}$$

$$\begin{array}{rclcl} y-m & +1704 & -79x & +474 & -6500 \\ -680 & +7218 & +6538 & -105 & +6433 \\ +4145 & +2598 & +6693 & -218 & +6475 \\ -1129 & +11778 & +6649 & -260 & +6368 \\ 59798 & +7970 & -192 & +75 & +6500 \\ & & & & = 16.075-1 \end{array}$$

$$\begin{array}{lclcl} \text{Tables } a = -4.5 & c = -2.5 & a-c = -2.0 & b+a = +6.1 \\ \text{Obs } a = -507.5 & & -504.7 & -2.5 & b+a = +7.1 \\ 0-c & -3.0 & -2.2 & -0.8 & +1.0 \end{array}$$

4465

moving center

	x	x - x ₀	Δx	(x - x ₀) ²	(x - x ₀) ² + (y - y ₀) ²	o - c
1	25.3934	+1.0884	+9	1.18466	3.6985	-44
2	25.9817	+1.6767	+6	2.8133	3.6965	-64
3	26.0000	+1.6950	+5	2.8747	3.6966	-63
4	26.2283	+1.9233	0	3.6991	3.7027	-2
5	26.0000	+1.6950	-5	2.8713	3.6928	-101
6	25.9094	+1.6044	+6	2.5722	3.6954	-75
7	25.0000	+0.6950	-11	0.4815	3.7021	-8
8	24.3050	0.0000	-12	0.0000	3.6971	-58
9	24.0000	-0.3050	-11	0.0937	3.7067	+42
10	23.0000	-1.3050	-8	1.7051	3.7059	+30

$$R^2 = 3.7029$$

	y	y - y ₀	Δy	(y - y ₀) ²	
1	14.3548	-1.5852	+3	2.5119	146
2	15.0000	-0.9400	+2	0.8832	119
3	15.0332	-0.9068	+2	0.8219	118
4	16.0000	+0.0600	0	0.0036	88
5	16.8466	+0.9066	-2	0.8215	62
6	17.0000	+1.0600	-2	1.1232	57
7	17.7350	+1.7950	-4	3.2206	21
8	17.8632	+1.9232	-4	3.6971	0
9	17.8412	+1.9012	-4	3.6130	351
10	17.3048	+1.4148	-3	2.0008	317

Range 189

$$x = 26.0 \quad y = 15.0332$$

$$16.8466$$

$$31.8798$$

$$y_0 = 15.9399$$

$$y_{\text{max}} = 17.8632$$

$$R = 1.9233$$

$$x_{\text{max}} = 26.2283$$

$$x_0 = 24.3050$$

$$\text{Center} \begin{cases} x_0 = 24.3050 \\ y_0 = 15.9400 \end{cases}$$

4465

Mirror Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0) + (y - y_0)$	$0 - c$
1	25 39 34	+1 0884	+9	1.8866	3.6985	-44
2	25 9817	+1 6767	+6	2.8133	3.6965	-64
3	26 0000	+1 6950	+5	2.8747	3.6966	-63
4	26 2283	+1 9233	0	3.6991	3.7027	-2
5	26 0000	+1 6950	-5	2.8713	3.6928	-101
6	25 9094	+1 6044	+6	2.5722	3.6954	-75
7	25 0000	+0 6950	-11	0.4815	3.7021	-8
8	24 3050	0 0000	-12	0.0000	3.6971	-58
9	24 0000	-0 3050	-11	0.0937	3.7067	+42
10	23 0000	-1 3050	-8	1.7051	3.7054	+30

 $R = 3.7029$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	14 3548	-1 5852	+3	2.5119	146
2	15 0000	-0 9400	+2	0.8832	119
3	15 0332	-0 9068	+2	0.8219	118
4	16 0000	+0 0600	0	0.0036	88
5	16 8466	+0 9066	-2	0.8215	62
6	17 0000	+1 0600	-2	1.1232	97
7	17 7350	+1 7950	-4	3.2206	21
8	17 8632	+1 9232	-4	3.6971	0
9	17 8412	+1 9012	-4	3.6130	351
10	17 3548	+1 4148	-3	2.0008	317

Range 188

$$x = 26.0 \quad y = 15.0332$$

$$16.8466$$

$$31.8798$$

$$y = 15.9399$$

$$y - \text{max} = 17.8632$$

$$R = 1.9233$$

$$x - \text{max} = 26.2283$$

$$x = 24.3050$$

Center $\{ x_0 = 24.3050$

Formation of Normals

1	- 1.73	- 48.0	+ 70.0
2	- 1.58	- 107.5	+ 60.1
3	- 1.55	- 107.0	+ 57.4
4	+ 0.12	- 3.8	- 0.0
5	+ 1.55	- 171.9	- 92.0
6	+ 1.70	- 120.0	- 79.5
7	+ 1.26	- 5.6	- 14.4
8	+ 0.00	- 0.0	- 111.3
9	- 0.57	- 12.6	+ 79.8
10	- 1.83	- 39.0	+ 42.3
	- 2.63	- 615.4	+ 12.4

- a	- b	-15 + ΔC
+ 9	- 9	- 15 [✓]
+ 13	- 7	- 9 [✓]
+ 14	- 7	- 8 [✓]
+ 15	+ 0	0 [✓]
+ 14	+ 7	+ 6 [✓]
+ 13	+ 8	+ 6 [✓]
+ 6	+ 14	+ 5 [✓]
+ 0	+ 15	0 [✓]
- 2	+ 15	- 2 [✓]
- 10	+ 11	- 14 [✓]

4465

Moon's Center -

17

	a	b	c	o-c	Corr
1	+1.09	-1.59	= -44	-37 + 7 = -30	-14 -29
2	+1.68	-0.94	= -64	-58 + 4 = -54	-10 -19
3	+1.70	-0.91	= -63	-58 + 4 = -54	-9 -17
4	+1.92	+0.06	= -2	-66 - 0 = -66	+64 +64
5	+1.70	+0.91	= -101	-58 - 4 = -62	-39 -33
6	+1.60	+1.06	= -75	-55 - 4 = -59	-16 -10
7	+0.70	+1.80	= -8	-24 - 7 = -31	+23 +28
8	+0.00	+1.92	= -58	0 - 8 = -8	-50 -50
9	-0.30	+1.90	= +42	+10 - 8 = +2	+40 +38
10	-1.30	+1.41	= +30	+44 - 6 = +38	-8 -22

+127 - 146

Average = 27

Normal Equations

$$+18.30 - 2.63 = -61.5 + 8.79$$

$$-2.63 + 18.70 = +12 + 5.62$$

$$+2.63 - 0.38 = -88 + 1.26$$

$$+18.32 = -76 + 6.88$$

$$b = -4.1 + 0.38$$

$$+18.30 = -61.5 - 11 = -62.6$$

$$a = -34.2 + 0.53$$

Arc measured = 189° Average o-c = -2

$$\frac{RC}{m} = 40$$

$$\frac{-2.0}{40} = -0.05$$

$$\Delta n = 0.0$$

$$-2RC = -0.77 - 15$$

$$\text{Corr} + 0.2$$

$$\Delta b = -0.29 - 6 \quad \Delta \delta = -0.1$$

$$\Delta a = -0.41 - 8 \quad \Delta \alpha = -0.02$$

$$\Delta R = -0.2$$

4765

Normal Equations

	a	b	c						
1	+109	-159	= -44	-37	+7	= -30	-14		
2	+168	-094	= -64	-58	+4	= -54	-10		
3	+170	-091	= -63	-58	+4	= -54	-9		
4	+192	+006	= -2	-66	-0	= -66	+24		
5	+170	+091	= -101	-58	-4	= -62	-39		
6	+160	+106	= -75	-55	-4	= -59	-16		
7	+070	+180	= -8	-24	-7	= -31	+23		
8	+000	+192	= -58	-0	-8	= -8	-50		
9	-030	+190	= +42	-10	-8	= +2	+40		
10	-130	+141	= +30	+4	-6	= +38	-8		

$$+127 = 146$$

$$\text{Average} = 27$$

Normal Equations

$$+18.30 - 2.63 = -61.5$$

$$- 2.63 + 18.70 = +12$$

$$+ 2.63 = 0.38 = 88$$

$$+ 18.32 = 76$$

$$b = 4.1$$

$$+18.30 - 61.5 = -43.2$$

$$a = -34.2$$

Reduction to apparent place.

$$S = +27^{\circ} 54' 11''$$

$$\begin{aligned} H + \alpha &= 6 \quad 17.0 = 94^{\circ} 15' \\ H &= 0 \quad 31.3 \\ \alpha &= 5 \quad 45.7 \\ \delta &= 22 \quad 30.0 \\ G + \alpha &= 4 \quad 15.7 = 63^{\circ} 56' \end{aligned}$$

$$\begin{aligned} \log \cos S & 99463 \\ i & 00822 \\ (L) & 0.0285 \end{aligned}$$

$$\begin{aligned} 2 \cos (G + \alpha) & 9.6429 \\ \dots \delta & 1.3375 \\ \sin & 9.9534 \\ \tan S & 9.7239 \\ & 88239 \end{aligned}$$

$$\begin{aligned} \delta' & 0.9804 \\ \delta & 9.8387 \end{aligned}$$

$$\begin{aligned} \delta & +3.08 \\ \delta & +0.69 \\ h & +1.54 \\ & +5.31 \end{aligned}$$

$$\begin{aligned} 2 \sin S & 9.6702 \\ \cos (H + \alpha) & 8.8699m \\ h & 1.3104 \\ \sin & 9.9985 \\ \sec S & 0.0537 \\ & 88239 \end{aligned}$$

$$\begin{aligned} h' & 9.8505m \\ h & 0.1868 \end{aligned}$$

$$\begin{aligned} \delta' & +9.56 \\ h & -0.71 \\ i & +1.07 \\ & +9.92 \end{aligned}$$

$$\begin{array}{r} 5 \quad 32 \quad 31.71 \quad +21 \quad 05 \quad 36.7 \\ \underline{26.68} \\ +503 \end{array}$$

$$\begin{array}{r} 5 \quad 45 \quad 33.46 \quad T39 \quad 07 \quad 36.3 \\ \underline{27.57} \\ 589 \end{array}$$

$$\begin{array}{r} 5 \quad 58 \quad 55.04 \quad +23 \quad 16 \quad 16.4 \\ \underline{49.92} \\ 5.12 \end{array}$$

4465 Moon's mean Position (1913.0)

$$\begin{array}{r} X_0 = 24.3050 \\ \text{ha} = -17 \\ \hline 243033 \end{array}$$

$$\begin{array}{r} Y_0 = 15.9400 \\ \text{db} = -2 \\ \hline 15.9398 \end{array}$$

From plate constants $X = 24.0118$ $Y_0 = 16.0751$

$$\begin{array}{r} \xi = +2.0118 \\ \log \xi = 0.30359 \\ \cos \xi = 9.94633 \\ \quad \quad 8.50724 \end{array}$$

$$\therefore (X-A) = 1.85002$$

$$X-A \quad +1 \quad 10.80$$

$$A = 5 \quad 44 \quad 30$$

$$Y_0 = 5 \quad 45 \quad 40.80$$

$$\text{Red.} \quad +5.31$$

$$Y' = 5 \quad 45 \quad 46.11$$

$$\eta = -1.9249$$

$$\begin{array}{r} \log \tan \delta = 9.7257 \\ \quad \quad 0.6072 \\ \quad \quad 7.0534 \\ \hline 7.3863 \end{array}$$

$$\eta_1 = +24$$

$$\eta_0 = -1.9273$$

$$\begin{array}{r} \log \eta_0 = 0.28495 \\ \quad \quad 7.33115 \\ \hline 2.95380 \end{array}$$

$$S-D = -14 \quad 59.1$$

$$D \quad 28 \quad 09 \quad 10$$

$$S_0 = 127 \quad 54 \quad 10.9$$

$$\text{Red} \quad +9.9$$

$$S' = 127 \quad 54 \quad 20.8$$

4465 Moon's mean Position (19130)

$$\begin{array}{r} X_0 = 243050 \\ - 17 \\ \hline 243033 \end{array}$$

$$\begin{array}{r} Y_0 = 159400 \\ - 2 \\ \hline 159398 \end{array}$$

True plate constant $X = 24.0118$ $Y_0 = 16.0751$

$$\begin{array}{r} T = 720118 \\ \log c = 0.30359 \\ \log s = 994633 \\ 850724 \end{array}$$

$$(X-A) = 1.85002$$

$$A-A = 1 \quad 1080$$

$$A = 5 \quad 44 \quad 30$$

$$Y_0 = 5 \quad 45 \quad 4080$$

$$\text{Red.} = 1531$$

$$X' = 1 \quad 45 \quad 46.11$$

$$\eta = -19249$$

$$\begin{array}{r} \log \eta = 99257 \\ 00072 \\ \hline 70534 \\ 73863 \end{array}$$

$$\eta_1 = +24$$

$$\eta_2 = -19273$$

$$\begin{array}{r} \log \eta_2 = 028495 \\ 733115 \\ \hline 295380 \end{array}$$

$$S-D = 14 \quad 59.1$$

$$D = 28 \quad 09 \quad 10$$

$$S_0 = 27 \quad 54 \quad 10.9$$

$$\text{Red.} = 9.9$$

$$S = 27 \quad 54 \quad 20.8$$

+465

Lunar parallax.

19

$$\begin{array}{r}
 \alpha' \quad 5^h \quad 45^m \quad 46.11 \\
 \odot \quad 1 \quad 04 \quad 42.55 \\
 \alpha - \odot \quad -4 \quad 41 \quad 03.56 \\
 \quad \quad \quad -70^\circ \quad 15' \quad 53''
 \end{array}$$

$$- \quad \quad \quad 22 \quad 36$$

$$-69 \quad 53 \quad 17$$

$$9.95727$$

$$9.99999$$

$$0.46363$$

$$0.42089$$

$$\delta = 69 \quad 13 \quad 22$$

$$27 \quad 54 \quad 21$$

$$41 \quad 19 \quad 00$$

$$9.82640$$

$$8.22039$$

$$9.81969$$

$$0.02920$$

$$7.89568$$

$$\delta - \delta' = +27 \quad 02.2$$

$$\delta = 728 \quad 21 \quad 23.0$$

$$\alpha \quad 5 \quad 42 \quad 45.36$$

$$\text{Am Eph } \delta = +28 \quad 21 \quad 23.6$$

$$\alpha \quad 5 \quad 42 \quad 44.38$$

$$0 - \odot \quad \quad \quad -0.6$$

$$+0.98$$

$$\text{Curvature} \quad +0.4$$

$$\text{Curv} \quad -0.04$$

$$\text{Irr.} \quad -0.1$$

$$\text{Irr} \quad -0.02$$

$$\delta - \quad +28 \quad 21 \quad 22.9$$

$$\alpha \quad 5 \quad 42 \quad 45.34$$

$$0 - \odot \quad -0.7$$

$$0 - \odot \quad +0.96$$

4465

Linear parallel.

19

α 5 45 46.11
 δ 1 04 42.55
 $\alpha - \delta$ -4 41 03.56
 $-70^\circ 15' 53''$

- 22 06

- 69 53 17

995727

999999

0.46363

0.42089

δ 69 13 22

27 54 21

41 19 00

9.82640

8.22039

9.81969

0.02920

7.89568

-5 + 27 02.2

δ 5 42 21 23.0

Ann Eph 5 42 21 23.6

0-6

- 0.6

δ +27 54 20.8

π 57 06.39

9.86913

8.22039

9.97371

0.05551

8.11874

$\alpha - \delta$ = -45 10.31

- 3 00.75

α 5 42 45.36

α 5 42 44.38

+0.98

Cur

δ 5 42 21 22.9
 0-C -0.7

α 5 42 45.34
 0-C +0.96

4466

Star Measures

1915 Mar. 42.

20

$$\begin{array}{r}
 \alpha \\
 \hline
 17579 \\
 119 \quad 842929 \\
 145 \quad 36 \\
 \quad 82 \\
 \hline
 11.9151
 \end{array}$$

$$\begin{array}{r}
 \alpha \\
 \hline
 17161 \\
 16305 \\
 \quad 1008 \\
 \quad 78 \\
 \hline
 .9145
 \end{array}$$

$$\begin{array}{r}
 \alpha \quad 4 \\
 \hline
 17444 \\
 1305139 \\
 \quad 46 \\
 \quad 50 \\
 \hline
 14.4402
 \end{array}$$

$$\begin{array}{r}
 \alpha \\
 \hline
 17410 \\
 11786 \\
 \quad 8988 \\
 \quad 10 \\
 \hline
 4378
 \end{array}$$

$$\begin{array}{r}
 \hline
 17820 \\
 26.3 \quad 14955 \\
 5.1 \quad 5961 \\
 \quad 10 \\
 \hline
 26.2859
 \end{array}$$

$$\begin{array}{r}
 \hline
 16410 \\
 9277 \\
 \quad 7981 \\
 \quad 10 \\
 \hline
 .2869
 \end{array}$$

$$\begin{array}{r}
 \hline
 19548 \\
 1861911 \\
 \quad 02 \\
 \quad 31 \\
 \hline
 5.0932
 \end{array}$$

$$\begin{array}{r}
 \hline
 16946 \\
 7862 \\
 \quad 6856 \\
 \quad 58 \\
 \hline
 .0905
 \end{array}$$

$$\begin{array}{r}
 \hline
 17852 \\
 31.6 \quad 12273 \\
 23.5 \quad 6865 \\
 \quad 56 \\
 \hline
 31.5585
 \end{array}$$

$$\begin{array}{r}
 \hline
 19530 \\
 1512928 \\
 \quad 29 \\
 \quad 18 \\
 \hline
 .5605
 \end{array}$$

$$\begin{array}{r}
 \hline
 17901 \\
 12411 \\
 \quad 0412 \\
 \quad 91 \\
 \hline
 23.5487
 \end{array}$$

$$\begin{array}{r}
 \hline
 15540 \\
 1400899 \\
 \quad 0099 \\
 \quad 31 \\
 \hline
 .5467
 \end{array}$$

Density 4.

4466

Star Measures

1915 Mar 23.

a	~	d	4
1 17579	17161	17444	17410
119 842929	16305	1305139	11786
145 36	1008	46	8988
82	78	50	10
<u>11.9151</u>	<u>.9145</u>	<u>14.4402</u>	<u>4378</u>
2 17820	16410	19548	16946
263 14955	9277	18619.1	7862
51 5961	7981	02	6856
10	10	31	58
<u>26.2859</u>	<u>.2869</u>	<u>5.0932</u>	<u>.0905</u>
3 17852	19530	17901	15540
516 12273	1512928	12411	1400899
185 6865	29	0412	0099
56	18	91	31
<u>31.5585</u>	<u>.5605</u>	<u>23.5487</u>	<u>.5467</u>

Density 4.

4466 $\times$ Moon - Measures 1915 Mar 22. 21

19943	19585	16411	18208
1788380	11652	10122	1451509
1467880	4048	2130	0909
49	81	21	08
<u>25.2064</u>	<u>2065</u>	<u>14.6293</u>	<u>6303</u>

19973	19555
1438590	15120
1508190	1915
81	53
<u>25.5592</u>	<u>5564</u>

19056	16486
988568	1567179
68	7979
62	90
<u>25.9187</u>	<u>9190</u>

19066	16473
984037	15727
3637	1930
80	80
<u>25.9241</u>	<u>9251</u>

18144	16933
18026	1405641
2930	4041
52	43
<u>25.7122</u>	<u>7110</u>

18803	17489
1111110	1517989
09	9089
02	90
<u>17.7692</u>	<u>7696</u>

4466

Moon - measured

1911 Mar 22

21

$$\begin{array}{r}
 19943 \\
 252 \quad 1788380 \\
 146 \quad 78 \\
 49 \\
 \hline
 252064
 \end{array}$$

$$\begin{array}{r}
 19585 \\
 11652 \\
 4048 \\
 81 \\
 \hline
 2065
 \end{array}$$

$$\begin{array}{r}
 16411 \\
 10122 \\
 2130 \\
 21 \\
 \hline
 146293
 \end{array}$$

$$\begin{array}{r}
 18208 \\
 1411509 \\
 08 \\
 \hline
 6303
 \end{array}$$

$$\begin{array}{r}
 19973 \\
 255 \quad 1438590 \\
 150 \quad 81 \\
 81 \\
 \hline
 255592
 \end{array}$$

$$\begin{array}{r}
 19555 \\
 1512015 \\
 1915 \\
 53 \\
 \hline
 5564
 \end{array}$$

$$\begin{array}{r}
 19056 \\
 259 \quad 988568 \\
 110 \quad 68 \\
 62 \\
 \hline
 259187
 \end{array}$$

$$\begin{array}{r}
 16486 \\
 1567179 \\
 7979 \\
 90 \\
 \hline
 9190
 \end{array}$$

$$\begin{array}{r}
 19066 \\
 259 \quad 9840 \\
 162 \quad 3637 \\
 80 \\
 \hline
 259241
 \end{array}$$

$$\begin{array}{r}
 16473 \\
 1572730 \\
 19 \\
 80 \\
 \hline
 9251
 \end{array}$$

$$\begin{array}{r}
 18144 \\
 257 \quad 1802630 \\
 170 \quad 29 \\
 52 \\
 \hline
 257122
 \end{array}$$

$$\begin{array}{r}
 16933 \\
 1405641 \\
 4041 \\
 43 \\
 \hline
 7110
 \end{array}$$

$$\begin{array}{r}
 250 \\
 177
 \end{array}$$

$$\begin{array}{r}
 18803 \\
 111110 \\
 09 \\
 02 \\
 \hline
 177692
 \end{array}$$

$$\begin{array}{r}
 17489 \\
 1517989 \\
 907 \\
 90 \\
 \hline
 7696
 \end{array}$$

7
24
18

8
2
1

9
22
17

4466 common - measures 1915 Mar 22, 22

x

y

d

~

d

~

7

24.0

18.1

max

in

8

max little
larger

12820

12291

9088

18.0530

17800

10033

3940

05-

17.7767

12729

3331

12209

.0522

18360

16011

3630

60

.7764

8

23.0

17.7

9.5 ratio

22.5 19550

17.3 14939

3641

60

22.4616

18160

12780

7275-

70

4611

19280

16350

4045

61

17.2927

19416

12348

3949

09

.2934

4460 x ~ ~ ~ ~ ~ measures 1915th Mar 22, 22
 d ~ ~ ~ ~ ~ d y ~ ~ ~ ~ ~
 7 12820 12729
 240 12291 33³¹
 181 9088 12209
 max 18.0530 0522
 little 17800 18360
 larger 10033 16011
 39 40 3020
 05- 60
 17.7767 7764

8 17800 18360
 230 10033 16011
 177 39 40 3020
 05- 60
 17.7767 7764
 9 snail
 22.5 19550 18160 19280 19416
 17.3 14929 12780 16350 12348
 36 41 72 75- 40 45- 39 49
 60 70 61 09
 22.4616 4611 17.2927 2934

4466 Times etc.
 Expt to Stan 1913 Dec. 13 $1^h 16^m$ - $1^h 18^m$
 " " Moon 1 22 11.0 - 1 22 11.4
 clock fast 0 12.9

H. Sid T. 1 21 58.3 $G-a = -4^h 22^m$
 H long 4 44 31.05
 G Sid T. 6 06 29.35
 Sid T. in horn 17 26 15.56
 Interval 12 40 13.79
 Red. 2 04.55
 G.M.T. 12 38 09.24

From Kant. Alin R.A. Decl.
 Moon 12^h $5^h 41^m 51.82$ + 28 21 09.4
 Motion in $1^m = 2.5107$ 0.651
 " - 38.154 + 1 35.79 + 24.8
 Tabular place 5 43 27.61 + 28 21 34.2

Moon's age 16 days (after full)

parallax $57' 06.79$

semidiam 15 35.3

R 935.3

Augmentation 9.3

Irradiation (4) -0.6

R 944.0

R 2.0236

aR -97.6

$(1+a)R$ 1.9260

R^2 3.7095

$$934 = 9.3$$

$$935 = 9.3$$

$$a = -506.4$$

$$24$$

$$482.4$$

4466 Times etc.
 Expt. Alt. 1913 Dec. 13 1" 16" - 1" 28"
 Moon 1 22 11.0 - 1 22 11.4
 clock fast 0 12.9

H. Sid. T. 1 21 58.3 G. Sid. T. 1 22
 H. Long 4 44 31.05
 G. Sid. T. 6 06 29.35
 Sid. T. in hour 17 26 15.56
 Interval 12 40 13.79
 Recl. 2 04.55
 Grm. T. 12 38 09.24

From Kant. Alt. R. H. Recl.
 Moon 12" 5" 41" 51.83 + 28 21 094
 Motion - 1" 2.5107 0.651
 " 38.154 + 1 35.79 + 24
 Tabular place 5 43 27.61 + 28 21 34.3

Moon's age 16 days (after full)

parallax 57' 06" 79

Semidiameter 15 35.3

R 93.53

Augmentation 9.3

Irradiation (4) - 0.6

R 94.40

R 202.36

at 97.6

(1+a)R 192.60

R² 3.7095

934.93

935.93

22.5064

24

452.4

4466

Plate Constants

24

x	11.9148	26.2864	31.5595
y	12.4015	27.5026	33.0392
x-y	-4867	-12162	-1.4797

q	14.4390	5.0918	23.5477
η	14.5042	4.6812	24.0680
q-η	-652	+4106	-5203

$$\begin{array}{rclcl}
 2-3 & +500x & -1.94 & +6.4x & -1139 \\
 -4867 + 5957 & = +1090 - 27 & = +1063 & +76 & = +1139 & = 0 \\
 -1.2162 + 13143 & = +11927 - 10 & = +11917 & +168 & = +12085 & = 0 \\
 -1.4297 + 15780 & = +14350 - 45 & = +14305 & +210 & = +14515 & = -1 \\
 23.9957 + 11998 & & -31 & +154 & & = 25.0939
 \end{array}$$

$$\begin{array}{rclcl}
 q-\eta & +500y & -2.5 & +54 & -6610 \\
 -6152 + 7220 & = +1068 - 30 & = +1038 & +72 & = +1110 & = 0 \\
 +4106 + 2546 & = +6652 - 66 & = +6586 & +25 & = +6611 & = +1 \\
 -5203 + 11774 & = +6571 - 79 & = +6492 & +118 & = +6610 & = 0 \\
 16.1267 + 8063 & & -60 & +81 & & = 16.2741
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables } a & = -3.9 & e & = -2.5 & a-e & = -6.4 & b+a & = +4.8 \\
 \text{Obs } a & = -506.4 & e & = -505.0 & & -1.4 & & +0.6 \\
 b-e & = -502.7 & & -502.7 & & 0.0 & & -7.2
 \end{array}$$

4466

Plate Constants

24

x	11.9148	26.2864	31.5595
y	12.4015	27.5026	33.2392
z	-4887	-12162	-14797

q	144390	50918	235477
r	145042	46812	270680
s	-652	+4106	-5203

2-3	+1002	-194	+642	-1139			
-48677	+5957	+1090	-27	+1063	+76	+1139	= 0
-12162	+13143	-1981	-10	+971	+168	+1139	= 0
-14797	+15780	+983	-45	+928	+210	+1138	= -1
23.9917	+119966	-31		+1154			= 250939

q-r	+1004	-252	+54	-6610			
-6152	+7220	+6568	-308	+6538	+72	+6610	= 0
-4106	+2596	-6652	-66	+6586	+25	-6611	= +1
-1203	+11724	+6571	-79	+6992	+118	-6610	= 0
161267	+8063	-60		+81			= 162771

+466		Ononis Center						25
	x	x - x ₀	Δx	(x - x ₀) ²	(x - x ₀) ² + (y - y ₀) ²	o - c		
1	25.2064	+1.2064	+7	1.4570	3.6977	-118		
2	25.5578	+1.5578	+6	2.4286	3.6983	-112		
3	25.9188	+1.9188	+1	3.6791	3.6952	-143		
4	25.9246	+1.9246	0	3.7041	3.7041	-54		
5	25.7116	+1.7116	-4	2.9282	3.6900	-195		
6	25.0000	+1.0000	-8	0.9984	3.6949	-146		
7	24.0000	0.0000	-10	0.0000	3.7064	-31		
8	23.0000	-1.0000	-8	1.0016	3.7218	+123		
9	22.4614	-1.5386	-6	2.3691	3.7282	+187		

$$R^2 = 3.7095$$

	y	y - y ₀	Δy	(y - y ₀) ²		
1	14.6298	-1.4972	+3	2.2407	141	
2	15.0000	-1.1270	+2	1.2697	126	
3	16.0000	-0.1270	0	0.0161	86	94
4	16.1270	0.0000	0	0.0000	90	
5	17.0000	+0.8730	-2	0.7618	63	
6	17.7694	+1.6424	-3	2.6965	32	31
7	18.0526	+1.9256	-4	3.7064	0	
8	17.7766	+1.6496	-3	2.7202	329	
9	17.2930	+1.1660	-2	1.3591	307	

Range 194

Approx. Center

$$x = \text{max} = 25.9246$$

$$R = 1.9260$$

$$x_0 = 23.9986$$

$$y = \text{max} = 18.0530$$

$$R = 1.9260$$

$$y_0 = 16.1270$$

$$\text{Center} \left\{ \begin{array}{l} x_0 = 24.0000 \\ y_0 = 16.1270 \end{array} \right.$$

25

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$
1	25.20647	1.20647	+7	1.4570	3.6977	-1.18
2	25.5578	1.5578	+6	2.4286	3.6983	-1.12
3	25.9188	1.9188	+1	3.6791	3.6952	-1.43
4	25.9246	1.9246	0	3.7041	3.7041	-1.54
5	25.7116	1.7116	+4	2.9282	3.6900	-1.95
6	25.0000	1.0000	-8	0.9987	3.6949	-1.96
7	24.0000	0.0000	-10	0.0000	3.7064	-2.1
8	23.0000	-1.0000	-8	1.0016	1.8	+1.23
9	22.4614	-1.5386	-6	2.3691	1.82	+1.87

$$R^2 = 3.7095$$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	14.6298	-1.4972	+3	2.2407	1.41
2	15.0000	-1.1270	+2	1.2697	1.26
3	16.0000	-0.1270	0	0.0161	.86
4	16.1270	0.0000	0	0.0000	.90
5	17.0000	+0.8730	-2	0.7618	.63
6	17.7694	+1.6424	-3	2.6965	.32
7	18.0526	+1.9256	-4	3.7064	0
8	17.7766	+1.6496	-3	2.7202	3.29
9	17.2930	+1.1660	-2	1.3591	3.07

Range 1.94

Approx Center

$$x \text{ max} = 25.9246$$

$$R = 1.9260$$

$$x_0 = 23.9986$$

$$y \text{ max} = 18.0526$$

$$R = 1.9260$$

$$y_0 = 16.1270$$

Center $\left\{ \begin{array}{l} x_0 = 24.0000 \\ y_0 = 16.1270 \end{array} \right.$

Formation of Normals

	ab	an	bn
1	-1.81	-142.8	+177.0
2	-1.76	-174.7	+126.6
3	-0.25	-274.8	+18.6
4	+0.00	-103.8	= 0.0
5	+1.49	-333.5	-169.8
6	+1.64	-146.0	-239.5
7	+0.00	= 0.0	-59.8
8	-1.65	-123.0	+203.0
9	-1.80	-288.0	+218.8
	<u>-4.14</u>	<u>-1586.6</u>	<u>+274.9</u>

$\checkmark$ -a	$\checkmark$ -b	$\checkmark$ +ΔC
+10	-10	-15 $\checkmark$
+12	-8	-11 $\checkmark$
+15	-1	-1 $\checkmark$
+15	+0	0 $\checkmark$
+14	+6	+5 $\checkmark$
+8	+11	+4 $\checkmark$
+0	+13	-2 $\checkmark$
-8	+11	-12 $\checkmark$
-12	+8	-19 $\checkmark$

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Moon's Center - Conditional Equations

1	+1.21	-1.50	-118	-105	+8	= -97	-21	-36"	
2	+1.56	-1.13	-112	-135	+6	= -129	+17	+6"	
3	+1.92	-0.13	-143	-166	+1	= -165	+22	+21"	
4	+1.92	+0.00	-54	-166	-0	= -166	+112	+112"	
5	+1.71	+0.87	-195	-148	-5	= -153	-42	-37"	
6	+1.00	+1.64	-146	-87	-9	= -96	-50	-46"	
7	+0.00	+1.93	-31	-0	-11	= -11	-20	-22"	
8	-1.00	+1.65	+123	+87	+9	= +78	+45	+33"	
9	-1.54	+1.17	+187	+134	-7	= +127	+60	+41"	

+ 256 - 133

Average = 43

Normal Equations

$$+18.57 - 4.14 = -1587 + 7.78$$

$$-4.14 + 14.77 = +275 + 4.50$$

$$+4.14 - 0.92 = -353 + 1.74$$

$$+13.85 = -78 + 6.246 = -5.6 + 0.45$$

$$+18.57 = -1587 - 23 = -1610$$

$$a = -86.8 + 0.52$$

Arc measured = 194°

Average (o-c) = +13.7

$$\frac{pc}{n} = 47$$

$$+13.7$$

$$\frac{47}{47} = +0.28 \Delta \alpha + 0.3$$

$$-2RC = -0.77 - 15$$

$$\text{Corr} : +0.2$$

$$\Delta b = -0.35 \quad \Delta \delta = -0.2$$

$$\Delta R = +0.2$$

$$\Delta a = -0.40 \quad \Delta \alpha = -0.01$$

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Normal Center - Conditional Equations

		0		L	0 - L
1	$+1.21 - 1.50 = -118$		$-105 + 8 = -97$		-21
2	$+1.56 - 1.13 = -112$		$-135 + 6 = -129$		$+17$
3	$+1.92 - 0.13 = -143$		$-166 + 1 = -165$		$+22$
4	$+1.92 + 0.00 = -54$		$-166 - 0 = -166$		$+112$
5	$+1.71 + 0.87 = -195$		$-148 - 5 = -153$		-42
6	$+1.00 + 1.64 = -146$		$-87 - 9 = -96$		-50
7	$-0.00 + 1.93 = -31$		$-0 - 11 = -11$		-20
8	$-1.00 + 1.65 = -123$		$+87 + 9 = +96$		$+45$
9	$-1.14 + 1.17 = +187$		$+134 - 7 = +127$		$+60$
					$+256 - 133$
					average: 43

Normal Equations

$$+18.57 - 414 = -1587$$

$$-414 + 1477 = +275$$

$$+414 - 092 = -353$$

$$+1385 = 78$$

$$b = -5.6$$

$$+18.57 = -1587 - 23 = -1610$$

$$a = -86.8$$

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Moonishman Position (1913.0)

$$\begin{array}{r} x_0 = 24.0000 \\ \frac{1}{2}a = -43 \\ \hline 23.9957 \end{array}$$

$$\begin{array}{r} y_0 = 16.1270 \\ \frac{1}{2}b = -3 \\ \hline 16.1267 \end{array}$$

From plate constants $x = 25.0939$ $y = 16.2741$

$$z = +3.0939$$

$$\eta = -1.7259$$

$$\begin{array}{r} \log z = 0.49051 \\ \cos S \quad 994622 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log \tan S \quad 9.7257 \\ \quad \quad \quad 0.9810 \\ \hline 7.0534 \\ 7.7601 \end{array}$$

$$-(x-A) \quad 203705$$

$$\eta_1 + 58$$

$$x-A \quad +1 \quad 48.91$$

$$\eta_0 = -1.7317$$

$$A \quad 5 \quad 44 \quad 30$$

$$\begin{array}{r} \log \eta_0 = 0.23845 \\ \hline 7.33115 \end{array}$$

$$x_0 \quad 5 \quad 46 \quad 18.91$$

$$(x-A) \quad 2.90733$$

$$\text{Red} \quad + \quad 5.31$$

$$(S-D) \quad - \quad 13 \quad 27.8$$

$$x' \quad 5 \quad 46 \quad 24.22$$

$$\Delta \quad +28 \quad 09 \quad 10$$

$$S_0 \quad +27 \quad 55 \quad 42.2$$

$$\text{Red} \quad + \quad 9.9$$

$$S_1 \quad +27 \quad 55 \quad 52.1$$

4466

Moon's Mean Position (1913.0)

$$\begin{array}{r} x = 24.0000 \\ - 43 \\ \hline 23.9957 \end{array}$$

$$\begin{array}{r} y = 16.1270 \\ - 3 \\ \hline 16.1267 \end{array}$$

From plate constants $x = 25.0939$ $y = 16.2741$

$$\bar{x} = +3.0939$$

$$\eta = -1.7259$$

$$\begin{array}{r} \log \bar{x} = 0.49051 \\ \cos \quad 9.94622 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.7257 \\ - \quad 0.9810 \\ \hline 7.0534 \\ 7.7601 \end{array}$$

$$(x - A) 2.03705$$

$$\eta_1 + 58$$

$$x - A \quad +1.4891$$

$$\eta_0 -1.7317$$

$$A \quad 5.44.30$$

$$\begin{array}{r} \log \eta_0 = 0.23848 \\ 7.33115 \end{array}$$

$$\alpha_0 \quad 5.46.18.91$$

$$(x - A) 2.90733$$

$$\text{Red} \quad + \quad 5.31$$

$$(y - B) - 13.278$$

$$\alpha' \quad 5.46.24.22$$

$$\Delta + 28.09.10$$

$$S_0 + 27.55 + 2.2$$

$$\text{Red} \quad + \quad 9.9$$

$$\delta' + 27.55.52.1$$

4466

Red ad - brown cph

S + 27° 55' 42"

$$H + \alpha \quad 6 \quad 17.6 = 94^\circ 24'$$

$$H \quad 0 \quad 31.3$$

$$\alpha \quad 5 \quad 46.3$$

$$\delta \quad 22 \quad 30.0$$

$$\delta + \alpha \quad 4 \quad 16.3 = 64^\circ 04'$$

$$h \cos(\delta + \alpha) \quad 9.6408$$

$$h \quad 1.3375$$

$$\sin \quad 9.9539$$

$$\tan S \quad 9.7244$$

$$8.8239$$

$$8' \quad 0.9783$$

$$8 \quad 9.8397$$

$$f \quad + 3.08$$

$$g \quad + 0.69$$

$$h \quad + 1.54$$

$$\hline + 5.31$$

$$h \cos S \quad 9.9462$$

$$L \quad 0.0820$$

$$(L) \quad 0.0282$$

$$h \sin S \quad 9.6706$$

$$\cos(H + \alpha) \quad 8.8849m$$

$$h \quad 1.3104$$

$$\sin \quad 9.9987$$

$$\sec S \quad 0.0538$$

$$8.8239$$

$$h' \quad 9.8659m$$

$$h \quad 0.1868$$

$$8' \quad + 9.51$$

$$h \quad - 0.73$$

$$Lj \quad + 1.07$$

$$\hline + 9.85$$

4466

Red - ad - brown - whp.

S + 27° 55' 72"

$$H + \alpha \quad 6^L \quad 17.6 = 94^\circ 24'$$

$$H \quad 0 \quad 31.3$$

$$\alpha \quad 5 \quad 46.3$$

$$\beta \quad 22 \quad 30.0$$

$$\beta + \alpha \quad 4 \quad 16.3 = 64^\circ 04'$$

$$L \cos(\beta + \alpha) \quad 9.6408$$

$$8 \quad 1.3375$$

$$\sin \quad 9.9129$$

$$\tan S \quad 9.7244$$

$$8.8239$$

$$8' \quad 0.9783$$

$$8 \quad 9.8397$$

$$f \quad + 3.08$$

$$8 \quad + 0.69$$

$$h \quad + 1.54$$

$$\hline + 5.31$$

$$L \cos S \quad 9.9462$$

$$6 \quad 0.0520$$

$$(6) \quad \hline 0.0282$$

$$L \sin S \quad 9.6706$$

$$\cos(H + \alpha) \quad 8.8849$$

$$h \quad 1.3104$$

$$\sin \quad 9.9987$$

$$\sec S \quad 0.0538$$

$$8.8239$$

$$h' \quad 9.8659$$

$$h \quad 0.1868$$

$$8' \quad + 9.51$$

$$h \quad - 0.73$$

$$(i) \quad \hline + 1.07$$

$$+ 9.85$$

4466

human parallax

$$\begin{array}{r} \alpha = 5^h 46^m 24.22 \\ \delta = 1 \quad 21 \quad 58.3 \\ \Delta \alpha = -4 \quad 24 \quad 25.92 \\ \quad - 66^\circ 06' 29'' \end{array}$$

$$- \quad \quad 21 \quad 57$$

$$65 \quad 44 \quad 32$$

$$9.95727$$

$$9.99999$$

$$0.38603$$

$$0.34329$$

$$f = 65 \quad 35 \quad 56.5$$

$$27 \quad 55 \quad 52.1$$

$$37 \quad 40 \quad 04.4$$

$$9.82640$$

$$8.22043$$

$$9.78460$$

$$0.04063$$

$$7.87356$$

$$\delta - \delta' = +25 \quad 41.7$$

$$S \quad +28 \quad 21 \quad 33.8$$

$$\text{Am Eph } S = +28 \quad 21 \quad 34.2$$

$$O-C = -0.4$$

$$-0.2$$

$$\delta = +28 \quad 21 \quad 33.6$$

$$O-C = -0.6$$

$$S = +27^\circ 55' 52.1''$$

$$\Pi \quad 57' 06.79$$

$$9.86913$$

$$8.22043$$

$$9.96109$$

$$0.05552$$

$$8.10617$$

$$\alpha - \alpha' = -43' 53.94$$

$$= -2'' 58.60$$

$$\alpha \quad 5 \quad 43 \quad 28.62$$

$$\alpha \quad 5 \quad 43 \quad 27.61$$

$$+1.01$$

$$\text{Env} - 0.01$$

$$\alpha \quad 5 \quad 43 \quad 28.61$$

$$O-C = +1.00$$

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lunar parallax

$$\begin{array}{r}
 \alpha - 5^{\circ} 46' 24.22 \\
 6 \quad 1 \quad 21 \quad 58.3 \\
 \alpha - x: -4 \quad 24 \quad 25.92 \\
 \quad - 66' \quad 06' \quad 29''
 \end{array}$$

$$- \quad \quad \quad 21 \quad 57$$

$$65 \quad 44 \quad 32$$

$$995727$$

$$999999$$

$$0.38603$$

$$034329$$

$$8 \quad 65 \quad 35 \quad 56.5$$

$$27 \quad 55 \quad 52.1$$

$$37 \quad 40 \quad 04.4$$

$$9.82640$$

$$822043$$

$$9784610$$

$$004063$$

$$787386$$

$$\alpha - \delta \quad + 25 \quad 45.7$$

$$S \quad + 28 \quad 21 \quad 33.8$$

$$\text{Ann Ephs } S \quad + 28 \quad 21 \quad 34.2$$

$$O-C \quad - 0.4$$

$$- 0.2$$

$$\delta \quad + 28 \quad 21 \quad 33.6$$

$$O-C \quad - 0.6$$

$$S = + 27^{\circ} 55' 52.1$$

$$\Pi \quad 57' 06.79$$

$$9.86913$$

$$822043$$

$$996109$$

$$005552$$

$$810617$$

$$\alpha - \alpha' = -43' 53.94$$

$$- \quad 2 \quad 45.60$$

$$x \quad 5^{\circ} 43' 28.62$$

$$y \quad 5^{\circ} 43' 27.61$$

$$+ 1.01$$

$$\text{Err} = 0.01$$

$$x \quad 5^{\circ} 43' 28.61$$

$$O-C \quad + 1.00$$

