

KG

11366

v. 978

CXXV

125

8640

8904

8905











8640

Star measures

1916 June 8.

d	x	N	d	x	N
1/ 16251 6250 85 13724		17818 15279 7570 28	20650 14940 3039 50		18331 14039 3840 49
<u>8.7470</u>		<u>7450</u>	<u>8.5714</u>		<u>.5701</u>
2/ 24218940 29.917321 2023 50		20600 12228 2432 00	20409 11197 8981 41		17638 16865 8078
<u>24.1620</u>		<u>1628</u>	<u>29.9248</u>		<u>.5238</u>
3/ 31.219232 9.116902 95-05 45		18614 10960 5968 30	16730 15622 2322		14164 5269 13060
<u>31.2334</u>		<u>.2344</u>	<u>9.1108</u>		<u>.1102</u>

Moon's measures

1/ 24.0 14.5		19130 14203 05-01 48		19572 14530 4880 87
		<u>14.4936</u>		<u>.4956</u>
2/ 246 15.0	19343 11428 3950 58	18209 15050 3250 00		
<u>24.6915</u>		<u>.6938</u>		
3/ 25.2 16.0	19697 18022 4040 94	18912 10570 6370 26		
<u>25.1662</u>		<u>.1645</u>		







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Stars measures

1916 June 8

$\alpha$	$\delta$	$\alpha$	$\delta$	$\alpha$	$\delta$	$\alpha$	$\delta$
$\frac{1}{8.7}$ 16251	6250	17818		20650		18331	
85 13724		15279	7970	14940	3039	14039	40
		28		50		38	
<u>8.7470</u>		<u>74150</u>		<u>8.5714</u>		<u>1701</u>	
$\frac{2}{42}$ 18940		20600		20409		17638	
299 17321	2023	12228	2432	11197	8981	16869	78
	50	00		41		80	
<u>24.1622</u>		<u>1628</u>		<u>29.9248</u>		<u>9238</u>	
$\frac{3}{312}$ 19232		18617		16730		14164	69
51 16902	05	10960	5968	15622	2322	529	
	95	30				13060	
	45						
<u>31.2334</u>		<u>.2344</u>		<u>9.1108</u>		<u>1102</u>	

Mars measures

$\frac{1}{240}$		19130		19572	
145		14203	01	14530	30
		05		48	
		48		87	
		<u>14.4936</u>		<u>4956</u>	
$\frac{2}{246}$ 18343		18209			
150 11428	50	15050	3250		
	39	60			
<u>246915</u>		<u>6938</u>			
$\frac{3}{252}$ 19697		18912			
160 18022	40	10570	70		
	94	63			
<u>25.1662</u>		<u>645</u>			







8640 *Lyovis measures* 1916 June 8.  
*d* *h* *m*

4 197 03  
 252 177 26  
 16.5 2238  
 max 10  
 25.1975

19951  
 1191910  
 15  
 66  
 1960

5 15123  
 25.1 1433432  
 17.0 35  
 25.0789

1326068  
 6568  
 11444  
 .0820

6 18004  
 24.4 1479190  
 15.0 7490  
 18  
 24.3220

17621  
 1087574  
 8874  
 39  
 3247

7 24.0 + -  
 15.3

19856  
 1804025  
 30  
 68  
 18.1826

17216  
 906165  
 6065  
 35  
 1831

18869  
 1524055  
 3955  
 80  
 18.3627

18949  
 12588  
 9178  
 81  
 3677

Density 3







8640 *Lyons measure* 1916 June 8  
*d* *x* *cl* *8* *N*

$$\begin{array}{r} 4 \quad 19703 \\ 252 \quad 17726 \\ 165 \quad 2238 \\ \text{max} \quad 10 \\ \hline 251975 \end{array}$$

$$\begin{array}{r} 19951 \\ 11919 \\ 10 \\ 66 \\ \hline 1960 \end{array}$$

$$\begin{array}{r} 5 \quad 15123 \\ 251 \quad 14334 \\ 170 \quad 3532 \\ \hline 250789 \end{array}$$

$$\begin{array}{r} 1226068 \\ 6568 \\ 11444 \\ \hline 0820 \end{array}$$

$$\begin{array}{r} 6 \quad 18004 \\ 244 \quad 1479190 \\ 180 \quad 7490 \\ 18 \\ \hline 243220 \end{array}$$

$$\begin{array}{r} 17621 \\ 1087574 \\ 8874 \\ 39 \\ \hline 3247 \end{array}$$

$$\begin{array}{r} 7 \quad 1 \\ 240 \\ 183 \end{array}$$

$$\begin{array}{r} 8 \\ 235 \\ 184 \\ \text{min} \\ 8 \end{array}$$

$$\begin{array}{r} 19856 \\ 1804025 \\ 30 \\ 68 \\ \hline 181826 \end{array}$$

$$\begin{array}{r} 17216 \\ 906165 \\ 6065 \\ 35 \\ \hline 1831 \end{array}$$

$$\begin{array}{r} 18869 \\ 1524055 \\ 39 \\ 80 \\ \hline 183627 \end{array}$$

$$\begin{array}{r} 18949 \\ 12588 \\ 9178 \\ 81 \\ \hline 3677 \end{array}$$

*Density 3*



78  
178  
139



8640 Times etc.  
 Expt. Jan 1915 May 30, 18<sup>h</sup> 54<sup>m</sup> - 19<sup>h</sup> 06<sup>m</sup>  
 ... Moon 18 59 51.3 - 18 59 51.4  
 Clock fast 1 12.7

H. Sid. T. 18 58 38.65  $\theta - \alpha = +0^h 2^m$   
 H. long 4 44 31.05  
 S. Sid. T. 23 43 09.70  
 Sid. T. Moon 4 27 40.01  
 Interval 19 15 29.69  
 Red 3 09.22  
 G.M.T. 19 12 20.47

From Kant Alm. R.A. Decl.  
 Moon 19 18 56 11.23 - 25 54 03.5  
 Motion 2 6936 6.139  
 ... 12.341 + 33.24 + 1 15.8  
 Tabular place 18 56 44.47 - 25 52 47.7

Moon's age 17 days.  
 Parallax 60' 22.68

934 = 5.8  
 988.6 = 6.5

Semidiameter 16 28.6

R 988.6

Augmentation + 6.5

Irradiation (3) - 0.3

R 994.8

R 27325

AR - 1019

(+a)R 2.0306

R2 4.1234

a = -501.8  
 + 24  
 477.8







8640  
 Expt. 1915 May 30 18<sup>h</sup> 54<sup>m</sup> -19<sup>h</sup> 06<sup>m</sup>  
 Moon 18 59 513 -18 59 514  
 Clock fast 1 127

H. Sid T. 18 58 38.65  $\Theta$  - 2<sup>h</sup> + 0<sup>h</sup> 2<sup>m</sup>  
 H. long 4 44 31.05  
 S. Sid T. 23 43 09.70  
 Sid. Th. know 4 27 40.01  
 Internal 19 15 29.69  
 Red 3 07.22  
 G. Sid T. 19 12 20.47

From Kant Allen R. H. Recl.  
 Moon. 19<sup>h</sup> 18 56 11.23 - 25<sup>h</sup> 54 03.5  
 Motion 2 6936 6159  
 17341 + 33.24 + 1 158  
 Tabular place 18 56 44.47 - 25<sup>h</sup> 52 47.7

Moon acc 17 days.

parallel 60' 22" 68

Meridian 16 28.6

R 988.6

Augmentation + 6.5

Irradiation - 0.3

R 994.8

R 21325

AR - 1019

G. Sid T. 20306

R 41234

a. -151.8

24  
 -77.8







8640

## Plate Constants

$$\begin{array}{rcl}
 x & 8.7460 & 24.1624 \quad 31.2339 \\
 - \quad \bar{x} & 8.5713 & 24.7843 \quad 32.1481 \\
 2-\bar{x} & +1.747 & -6219 \quad -9542
 \end{array}$$

$$\begin{array}{rcl}
 y & 8.5708 & 29.9243 \quad 9.1105 \\
 - \quad \bar{y} & 7.6059 & 30.0559 \quad 8.1502 \\
 y-\bar{y} & +9649 & -1316 \quad +9603
 \end{array}$$

$$\begin{array}{rcl}
 2-\bar{x} & +500x & +10.8y & +1.8y & -6229 \\
 +1.747 + 4373 = +6120 + 93 = +6213 + 16 = +6229 & = & 0 \\
 -6219 + 12081 = +5862 + 323 = +6185 + 43 = +6228 & = & -1 \\
 -9542 + 15617 = +6075 + 98 = +6173 + 56 = +6229 & = & 0 \\
 23.1633 + 11582 & +176 & +42 & = 23.9204
 \end{array}$$

$$\begin{array}{rcl}
 y-\bar{y} & +500y & -10.4y & +21.4y & -14023 \\
 +9649 + 4285 = +13934 - 91 = +13843 + 180 = +14023 & = & 0 \\
 -1316 + 14962 = +13646 - 251 = +13395 + 628 = +14023 & = & 0 \\
 +9603 + 4555 = +14158 - 321 = +13833 + 191 = +14024 & = & +1 \\
 16.3365 + 8168 & -241 & +343 & = 15.7612
 \end{array}$$

$$\text{Tables } a = -0.5 \quad c = -19.0 \quad a-c = +18.5 \quad b+a = -0.5$$

$$\text{Obs } a = -501.8 \quad c = -511.0 \quad a-c = +19.2 \quad b+di = -0.4$$

$$0-C = 501.3 \quad -502.0 \quad +0.1$$







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## Plate Constant

x	8 7 4 6 0	2 4 1 6 2 4	3 1 2 3 3 9
y	8 5 7 1 3	2 4 7 8 4 3	3 2 1 8 8 1
z	+ 1 7 4 7	- 6 2 1 9	- 9 5 4 2
$\gamma$	8 5 7 0 8	2 9 9 2 4 3	9 1 1 0 5
$\eta$	7 6 0 5 9	3 0 0 5 5 9	8 1 5 0 2
$\gamma - \eta$	+ 9 6 4 9	- 1 3 1 6	+ 9 6 0 3

$$\begin{array}{rcll}
 2 - \bar{z} & + 1000 & + 10.8\gamma & + 1.8\eta & - 6229 \\
 + 1747 + 4373 & = +6120 + 93 & + 6213 + 16 & = +6229 & = 0 \\
 - 6219 + 12081 & = +5862 + 323 & + 6185 + 43 & = +6228 & = -1 \\
 - 9542 + 15617 & + 6075 + 98 & + 6173 + 56 & = +6229 & = 0 \\
 231633 + 11582 & + 176 & + 42 & = 237204
 \end{array}$$

$$\begin{array}{rcll}
 \gamma - \eta & + 100\gamma & - 10.4\eta & + 21\gamma & - 14023 \\
 + 9649 + 4285 & = +13934 - 91 & + 13843 + 180 & = +14023 & = 0 \\
 - 1316 + 14962 & = +13646 - 251 & + 13395 + 628 & = +14023 & = 0 \\
 + 9603 + 4555 & + 14158 - 321 & + 13833 + 191 & = +14024 & = 1 \\
 163365 + 8168 & - 241 & + 343 & = 157612
 \end{array}$$

$$\text{Tables } a: -0.5 \quad c: -19.0 \quad a - c: +18.5 \quad b + a: -0.5$$

$$\text{Clbs } a: -501.8 \quad c: -521.0 \quad a - c: +19.2 \quad b + a: -0.4$$







8640

decoon's Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)(y - Y_0)$	$y - c$
1	24.0000	+0.8340	0.6956	4.1014	-2.20
2	24.6926	+1.5266	2.3305	4.1242	+ .98
3	25.1654	+1.9994	3.9976	4.1116	-1.18
4	+ 25.1968	+2.0308	4.1242	4.1242	+ .8
5	25.0805	+1.9145	3.6653	4.1063	-1.71
6	24.3230	+1.1570	1.3386	4.1135	- .99
7	24.0000	+0.8340	0.6956	4.1140	- .94
8	23.1660	+0.0000	0.0000	4.1144	- .90

4.1234

	y	$y - Y_0$	$\Delta y$	$(y - Y_0)^2$	$\Delta$
1	14.4946	-1.8424	-31	3.4058	156
2	15.0000	-1.3370	-23	1.7937	139
3	16.0000	-0.3370	-6	0.1140	100
4	16.3370	0.0000	0	0.0000	90
5	17.0000	+0.6630	+11	0.4410	71
6	18.0000	+1.6630	+28	2.7749	35
7	18.1828	+1.8458	+31	3.4184	29
8	18.3622	+2.0252	+34	4.1144	0

156

Approx. Center

$$x = 24.0 \quad y = 14.4946$$

$$18.1828$$

$$32.6774$$

$$Y = 16.3387$$

$$y_{\text{max}} = 18.3622$$

$$R = 2.0235$$

$$\text{Comp } R = 2.0305$$

$$x_{\text{max}} = 25.1968$$

$$X_0 = 23.1662$$

$$\text{Center } \left\{ \begin{array}{l} X_0 = 23.1660 \\ Y_0 = 16.3370 \end{array} \right.$$







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leucous Center

	$x$	$x - \bar{x}$	$(x - \bar{x})^2$	$y$	$y - \bar{y}$	$(y - \bar{y})^2$	$u = c$
1	24.0000	+0.8340	0.6956	4.1014	-2.20		
2	24.6926	+1.5266	2.3305	4.1242	+ .8		
3	25.1654	+1.9994	3.9976	4.1116	-1.18		
4	25.1968	+2.0308	4.1242	4.1242	+ .8		
5	25.0805	+1.9145	3.6653	4.1063	-1.71		
6	24.3230	+1.1570	1.3386	4.1135	- .94		
7	24.0000	+0.8340	0.6956	4.1140	- .94		
8	23.1660	+0.0000	0.0000	4.1144	- .90		

4.1234

	$x$	$x - \bar{x}$	$(x - \bar{x})^2$	$y$	$y - \bar{y}$	$(y - \bar{y})^2$	$u$
1	14.4946	-1.8424	3.4058	1.56			
2	15.0000	-1.3370	1.7937	1.38			
3	16.0000	-0.3370	0.1140	1.00			
4	16.3370	0.0000	0.0000	.90			
5	17.0000	+0.6630	0.4410	.71			
6	18.0000	+1.6630	2.7749	.35			
7	18.1828	+1.8458	3.4184	.29			
8	18.3622	+2.0252	4.1144	0			

Approx. Center

$$x = 24.0 \quad y = 14.4946$$

$$18.1828$$

$$32.6774$$

$$y = 16.3387$$

$$y_{\text{max}} = 18.3622$$

$$R = 2.0235$$

$$\text{Comp } R = 2.0300$$

$$x_{\text{max}} = 25.1968$$

$$x_0 = 23.1662$$

$$\text{Center } \begin{cases} X = 23.1660 \\ Y = 16.3370 \end{cases}$$



1	- 1.53	- 182.8	+ 405.0
2	- 20.5	+ 12.2	- 10.7
3	- 0.68	- 236.0	+ 40.1
4	+ 0.00	+ 16.2	+ 0.0
5	+ 1.26	- 326.5	- 112.8
6	+ 1.92	- 115.0	- 144.3
7	+ 1.53	- 78.0	- 172.9
8	+ 0.00	- 0.0	- 182.2
	+ 0.45	- 90.99	- 198.1

- a	- b	- 16 + ΔC
- 8	+ 4	+ 12
- 15	+ 3	+ 4
- 20	+ 1	- 3
- 20	- 0	- 4
- 19	- 1	- 4
- 12	- 3	+ 1
- 8	- 4	+ 4
- 0	- 4	+ 12



8640 Brown's Center

	0	1	0 - 1	Corr
1	$+0.83 - 1.84 = -220$	$-45 + 20 = -25$	$-195$	$-183$
2	$+1.43 - 1.34 = +8$	$-82 + 55 = -67$	$+75$	$+79$
3	$+2.00 - 0.34 = -118$	$-108 + 4 = -104$	$-14$	$-17$
4	$+2.03 + 0.00 = +8$	$-109 - 0 = -109$	$+117$	$+113$
5	$+1.91 + 0.66 = -171$	$-102 - 7 = -109$	$-62$	$-66$
6	$+1.16 + 1.66 = -99$	$-62 - 18 = -80$	$-19$	$-18$
7	$+0.83 + 1.84 = -94$	$-45 - 20 = -65$	$-29$	$-25$
8	$+0.00 + 2.03 = -90$	$-0 - 22 = -22$	$-68$	$-56$
9	$+10.29 + 2.67$		$+192$	$-387$

+ 192 - 387  
Average = 72

Normal Equations.

$$+16.85 + 0.45 = -91.0 + 10.29$$

$$+ 0.444 + 16.06 = -19.9 + 2.67$$

$$- 0.45 - 0.01 = + 24 - 0.27$$

$$+ 16.05 = -17.5 + 2.4 \quad b. -10.9 + 0.15$$

$$+ 16.85 = -910 + 15 = -905$$

$$a = -537 + 0.61$$

arc. 156

$$\frac{p}{n} = .17$$

Cover. - 0.2

$$\Delta b = +0.12$$

$$\Delta \delta = +0.1$$

$$D^2 u = +0.49 + 1.0$$

$$\Delta \alpha = \pm 0,02$$







8640 Luvous Center

		0		L	0-6
1	+0.83 - 1.84 =	-220	-45 + 20 =	-25	-195
2	+1.53 - 1.34 =	+8	-42 + 15 =	-67	+75
3	+2.00 - 0.34 =	-1.18	-108 + 4 =	-104	-14
4	+2.03 + 0.00 =	+8	-109 - 0 =	-109	+117
5	+1.91 + 0.66 =	-1.77	-102 - 7 =	-109	-62
6	+1.16 + 1.66 =	-99	-62 - 18 =	-80	-19
7	+0.83 + 1.84 =	-94	-45 - 20 =	-65	-29
8	+0.00 + 2.03 =	-90	-0 - 22 =	-22	-68
9					+192 - 387
					Average = 72

Normal Equations.

$$+16.85 + 0.45 = -91.0$$

$$+0.45 + 16.062 = -19.9$$

$$-0.45 - 0.01 = +24$$

$$+16.05 = -17.5$$

$$b = -10.9$$

$$+16.85 = -91.0 + 1 = -90.5$$

$$a = -53.7$$

Arc 156

$$\frac{p}{m} = .17$$

$$\frac{\sum K}{n} = -24.4 - \frac{244}{17} = -14.4 \quad \Delta R = -1.8$$







8640 Moon's mean Position (1955.1).

$$\begin{array}{r} X_0 = 23.1660 \\ \text{sec} = 27 \\ \hline 23.1633 \end{array} \quad \begin{array}{r} Y_0 = 16.3370 \\ \text{sec} = 5 \\ \hline 16.3365 \end{array}$$

From plate Constant  $X = 23.7204$   $Y = 15.7612$

$$Z = +1.7204$$

$$\eta = -22388$$

$$\begin{array}{l} \log Z = 0.23563 \\ \log 5 = 9.95059 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{l} \log \tan S = 9.70400 \\ \hline 0.4713 \\ \hline 7.0534 \\ \hline 7.2287 \end{array}$$

$$(H-A) = 1.77780$$

$$\eta_0 = -17$$

$$\alpha - A = + 59.95$$

$$\eta_1 = -2.2371$$

$$A = 18 \quad 55 \quad 40.$$

$$\begin{array}{l} \log \eta_1 = 0.34969 \\ \hline 7.33115 \end{array}$$

$$\alpha = 18 \quad 56 \quad 39.95$$

$$\mu - D = 3.01854$$

$$\text{Red.} \quad + \quad 3.57$$

$$\delta - D = -17 \quad 23.6$$

$$\alpha = 18 \quad 56 \quad 43.52$$

$$D = -26 \quad 31 \quad 40$$

$$S = -26 \quad 49 \quad 03.6$$

$$\text{Red.} = -1.0$$

$$\delta = -26 \quad 49 \quad 04.6$$







8640 moons mean Position (1950)

$$\begin{array}{r} X = 23.1660 \\ - 27 \\ \hline 23.1633 \end{array} \quad \begin{array}{r} Y_0 = 16.3370 \\ - 15 \\ \hline 16.3365 \end{array}$$

Transit Constant  $X = 23.7204 \quad Y = 15.7612$

$$Z = +1.7204$$

$$\eta = -22388$$

$$\log Z = 0.23563$$

$$\log \tan S = 9.7040$$

$$\cos = 9.95059$$

$$0.4713$$

$$8.50724$$

$$7.0534$$

$$7.2287$$

$$(A-A) = 1.77780$$

$$\eta = -17$$

$$a-A = + 59.95$$

$$\eta_1 = -2.2371$$

$$A = 18 \quad 55 \quad 40$$

$$\log \eta_1 = 0.34969$$

$$7.33115$$

$$X = 18 \quad 56 \quad 39.95$$

$$J-D = 3018.54$$

$$Rev. = + 357$$

$$S-D = -17 \quad 23.6$$

$$X = 18 \quad 56 \quad 43.52$$

$$D = -26 \quad 31 \quad 40$$

$$S = -26 \quad 49 \quad 03.6$$

$$Rad = -1.0$$

$$S = -26 \quad 49 \quad 04.6$$







86 40

Red. ad lower app.

S:  $-26^{\circ} 49'$ 

$$H + \alpha \quad 8^{\text{h}} 15.1^{\text{m}} = 123^{\circ} 46'$$

$$H \quad 13 \quad 18.4$$

$$\alpha \quad 18 \quad 56.7$$

$$G \quad 22 \quad 05.5$$

$$G + \alpha \quad 17 \quad 02.2 = 255^{\circ} 33'$$

$$L \cos(G + \alpha) 9.3971 \text{ m}$$

$$8 \quad 1.1432$$

$$\sin \quad 9.9860 \text{ m}$$

$$\tan S \quad 9.7037 \text{ m}$$

$$8.8239$$

$$9 \quad 0.5403 \text{ m}$$

$$9.6568$$

$$f \quad +1.862$$

$$8 \quad +0.454$$

$$h \quad +1.258$$

$$+3.574$$

$$L \cos S \quad 9.9506$$

$$i \quad 5.4691 \text{ m}$$

$$(i) \quad 0.4197 \text{ m}$$

$$L \sin S \quad 9.8543 \text{ m}$$

$$L \cos(H + \alpha) \quad 9.7449 \text{ m}$$

$$h \quad 1.3066$$

$$\sin \quad 9.9198$$

$$\tan S \quad 0.0494$$

$$8.8239$$

$$9 \quad 0.7052$$

$$h \quad 0.0997$$

$$8 \quad -3.47$$

$$h \quad +5.08$$

$$i \quad -2.63$$

$$-1.02$$







86 + 0

Red. ad locum aph.

S. - 26° 49'

H + X 8 15.1 123° 46'

H 13 18.4

X 18 56.7

G 22 05.5

G + X 17 02.2 255° 33'

L cos S 99.106

L 6469.1

L 04197

L cos(G+X) 9.13971

L 11432

sin 9.9860

tan S 9.7037

88239

f 05403

g 96568

f + 1862

g + 0.454

h + 1.258

+ 3574

L sin S 98.543

L sin(H+X) 97.449

L 13066

sin 9.9198

tan S 00494

88239

h' 0.7058

h 0.0997

S - 347

h' + 508

i - 263

- 1.02







8140

## Lunar parallax.

$$\begin{array}{r}
 \alpha = 18^h 56^m 43.52 \\
 \delta = 18 \quad 58 \quad 38.65 \\
 + \quad 1 \quad 55.13 \\
 + \quad 0^{\circ} 28' 47'' \\
 + \quad \quad \quad 12 \\
 \hline
 0 \quad 28 \quad 35
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 0.00000 \\
 0.00002 \\
 \hline
 995729
 \end{array}$$

$$\begin{array}{r}
 \gamma = +42 \quad 11 \quad 14 \\
 26 \quad 49 \quad 05 \\
 69 \quad 00 \quad 19
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.24458 \\
 9.97017 \\
 0.17292 \\
 \hline
 8.21407
 \end{array}$$

$$S - S' = +56 \quad 16.9$$

$$S = -25 \quad 52 \quad 47.7$$

$$\text{Cur. Shk } S = -25 \quad 52 \quad 47.7$$

$$O - C = 0.0$$

$$\begin{array}{r}
 \text{Cur. of Plate} \quad +1.1 \\
 \text{Dir. Corr} \quad +0.1 \\
 \text{2nd Ord. Ref.} \quad +0.7 \\
 S = -25 \quad 52 \quad 46.9 \\
 \hline
 \quad \quad \quad +0.8
 \end{array}$$

$$S = -26^{\circ} 49' 04.6''$$

$$\pi = 60' 22.68''$$

$$\begin{array}{r}
 9.86913 \\
 8.24458 \\
 7.92286 \\
 0.04590 \\
 \hline
 6.08247
 \end{array}$$

$$\alpha - \alpha' = +0' 24.94$$

$$= +1.66$$

$$K \quad 18 \quad 56 \quad 45.18$$

$$\alpha = 18 \quad 56 \quad 44.47$$

$$+0.71$$

$$\text{Cur.} \quad +0.02$$

$$\text{Dir. Corr.} \quad +0.02$$

$$\alpha \quad 18 \quad 56 \quad 45.20$$

$$O - C \quad +0.73$$







8240

Lunar parallax

$$\begin{array}{r}
 \alpha = 18^{\circ} 56' 43.52'' \\
 \delta = 18^{\circ} 58' 38.65'' \\
 + 1' 55.13'' \\
 + 0^{\circ} 28' 47'' \\
 + \phantom{00} 12''
 \end{array}$$

$$0^{\circ} 28' 35''$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 000002 \\
 \hline
 995729
 \end{array}$$

$$\gamma = +42^{\circ} 11' 14''$$

$$26^{\circ} 49' 05''$$

$$69^{\circ} 00' 15''$$

$$\begin{array}{r}
 982640 \\
 824458 \\
 997017 \\
 017292 \\
 \hline
 821407
 \end{array}$$

$$\delta - \delta' = +56' 16.9''$$

$$\delta = 25^{\circ} 52' 47.7''$$

$$\text{Cur. Error } \delta = 25^{\circ} 52' 47.7''$$

$$0 - 0 = 00$$

$$\begin{array}{r}
 \text{Curv of Plate} + 1.1 \\
 \text{2nd Cor} + 0.1 \\
 \text{2nd Ord. Ref.} + 0.7 \\
 \hline
 46.9
 \end{array}$$

$$S = -26^{\circ} 49' 04.6''$$

$$\pi = 60' 22.68''$$

$$\begin{array}{r}
 9.86913 \\
 824458 \\
 792286 \\
 004590 \\
 \hline
 608247
 \end{array}$$

$$\alpha - \alpha' = +0' 24.94''$$

$$+ 1.66$$

$$\alpha = 18^{\circ} 56' 45.18''$$

$$\alpha = 18^{\circ} 56' 44.47''$$

$$+0.71$$

$$\begin{array}{r}
 \text{Curv} + 0.02 \\
 \text{2nd Cor} + 0.02 \\
 \hline
 \alpha = 18^{\circ} 56' 45.20'' \\
 0 - C + 0.73
 \end{array}$$



$\frac{1}{18}$   
20 $\frac{2}{21}$  $\frac{3}{11}$  $\frac{1}{23}$   
11 $\frac{2}{21}$   
11 $\frac{2}{21}$   
11

m



8904

Stars - measures

1916 June 10.

d	x	v	d	x	v
1/	17288	17299	18530	16841	
18.2	1558861	90329	11265	1410603	
266	60	23	7468	66	
	90	90	30	44	
	<u>18.1728</u>	<u>.1736</u>	<u>26.7261</u>	<u>.7263</u>	

2/	17465	15756	17339	19740	
20.5	1196666	1.123040	9384	1765188	
68	69	3040	8089	9488	
	60	50	29	59	
	<u>20.5495</u>	<u>.5480</u>	<u>6.7953</u>	<u>.7947</u>	

3/	10439	15050	17169	19790	
34.0	1013226	5366	1621820	1075150	
17.2	2526	14750	20	5550	
			85	85	
	<u>64.0311</u>	<u>.0306</u>	<u>82.0952</u>	<u>.0966</u>	

known measures.

1/	1149577	14045	
23.0	8277	1359500	
139	11020	9500	

13.9542.9552

2/	961099	12111	
239	0999	12025	
15.0	9495	1822	

23.9889.9911

3/	20011	19059	
241	1872630	1033131	
156	20	30	
max	05	47	
=x	<u>24.1285</u>	<u>.1283</u>	







8904

Stars - Measures

1916 June 10.

1/	17288	17299	18530	16841
182	1555861	90329	11265	1410603
266	60	23	7468	66
	90	90	30	44
	<u>18.1728</u>	<u>.1736</u>	<u>26.7261</u>	<u>7263</u>

2/	17465	15756	17339	19740
205	1196666	1123040	9384	1769188
68	69	30	8089	94
	60	50	29	59
	<u>20.5495</u>	<u>5480</u>	<u>67953</u>	<u>7947</u>

3/	10439	15050	17169	19750
340	1013226	5366	1621820	1075150
172	25	14750	20	55
			85	85
	<u>340311</u>	<u>0306</u>	<u>87.0952</u>	<u>0966</u>

1/	230	1149577	14045
	139	8277	1359500
		11020	9500

<u>139572</u>	<u>9152</u>
---------------	-------------

2/	961099	12111
279	099	12025
150	9495	1822

3/	3.9889	9911
241	20011	19059
156	1872630	1033131
	20	30
	05	47
	<u>24.1285</u>	<u>1283</u>



4  
24  
10

5  
23  
1

6  
23  
17

7  
23  
1

8  
23  
1

9  
23  
1



8904

Moon's measures 1916 June 10.

$$\begin{array}{r}
 20019 \\
 1891320 \\
 12 \\
 14 \\
 \hline
 24.1103
 \end{array}$$

$$\begin{array}{r}
 23.6 \\
 17.0 \\
 19120 \\
 1246168 \\
 61 \\
 62 \\
 \hline
 23.6701
 \end{array}$$

$$\begin{array}{r}
 23.0 \\
 17.5
 \end{array}$$

$$\begin{array}{r}
 22.2 \\
 17.6 \\
 \hline
 \text{have} \\
 8
 \end{array}$$

$$\begin{array}{r}
 22.0 \\
 17.6
 \end{array}$$

9 Scratch.

$$\begin{array}{r}
 21.4 \\
 17.5 \\
 16994 \\
 12631 \\
 22 \\
 92 \\
 \hline
 21.4867
 \end{array}$$

$$\begin{array}{r}
 20075 \\
 15051 \\
 50 \\
 71 \\
 \hline
 4978
 \end{array}$$

Density

$$\begin{array}{r}
 19049 \\
 1013940 \\
 40 \\
 40 \\
 \hline
 1099
 \end{array}$$

$$\begin{array}{r}
 18321 \\
 1505038 \\
 39 \\
 19 \\
 \hline
 6722
 \end{array}$$

$$\begin{array}{r}
 19441 \\
 1423642 \\
 38 \\
 40 \\
 \hline
 17.5201
 \end{array}$$

$$\begin{array}{r}
 18450 \\
 1134950 \\
 48 \\
 60 \\
 \hline
 17.7108
 \end{array}$$

$$\begin{array}{r}
 18402 \\
 1132951 \\
 50 \\
 08 \\
 \hline
 17.7063
 \end{array}$$

$$\begin{array}{r}
 17337 \\
 1135038 \\
 40 \\
 50 \\
 \hline
 17.6002
 \end{array}$$

$$\begin{array}{r}
 19744 \\
 1491716 \\
 18 \\
 16 \\
 \hline
 .5200
 \end{array}$$

$$\begin{array}{r}
 19680 \\
 1681920 \\
 18 \\
 80 \\
 \hline
 .7135
 \end{array}$$

$$\begin{array}{r}
 18869 \\
 1594950 \\
 30 \\
 50 \\
 \hline
 .7080
 \end{array}$$

$$\begin{array}{r}
 16898 \\
 1290000 \\
 97 \\
 02 \\
 \hline
 .6000
 \end{array}$$







8904

Lunar's measure

1916 June 10

$$\begin{array}{r}
 20019 \\
 1891320 \\
 12 \\
 14 \\
 \hline
 241103
 \end{array}$$

$$\begin{array}{r}
 236 \\
 170 \\
 19170 \\
 1246168 \\
 61 \\
 62 \\
 \hline
 236701
 \end{array}$$

$$\begin{array}{r}
 236 \\
 170 \\
 \hline
 6
 \end{array}$$

$$\begin{array}{r}
 222 \\
 176 \\
 \hline
 446
 \end{array}$$

$$\begin{array}{r}
 220 \\
 176 \\
 \hline
 44
 \end{array}$$

$$\begin{array}{r}
 214 \\
 175 \\
 16994 \\
 1203125 \\
 22 \\
 92 \\
 \hline
 214967
 \end{array}$$

$$\begin{array}{r}
 19049 \\
 1013940 \\
 40 \\
 40 \\
 \hline
 1099
 \end{array}$$

$$\begin{array}{r}
 18321 \\
 1501038 \\
 39 \\
 19 \\
 \hline
 1722
 \end{array}$$

$$\begin{array}{r}
 19441 \\
 1423642 \\
 38 \\
 40 \\
 \hline
 17.5201
 \end{array}$$

$$\begin{array}{r}
 18450 \\
 1134950 \\
 48 \\
 60 \\
 \hline
 177108
 \end{array}$$

$$\begin{array}{r}
 18402 \\
 1132051 \\
 10 \\
 08 \\
 \hline
 17.7063
 \end{array}$$

$$\begin{array}{r}
 17337 \\
 1135038 \\
 40 \\
 50 \\
 \hline
 17.6002
 \end{array}$$

$$\begin{array}{r}
 19744 \\
 149116 \\
 16 \\
 16 \\
 \hline
 5200
 \end{array}$$

$$\begin{array}{r}
 19680 \\
 1681920 \\
 18 \\
 80 \\
 \hline
 7135
 \end{array}$$

$$\begin{array}{r}
 18869 \\
 1594950 \\
 30 \\
 50 \\
 \hline
 7080
 \end{array}$$

$$\begin{array}{r}
 16898 \\
 1290000 \\
 97 \\
 02 \\
 \hline
 6000
 \end{array}$$

Density







8898	Times etc.						
Exhaustion	1915 Truly 25, 20 <sup>h</sup>	17 <sup>m</sup>		- 20 <sup>h</sup>	25 <sup>m</sup>		
moon	20	23	11.6	- 20	23	11.8	
Clockfast		2	36.5 <sup>v</sup>				
H. Sid T.	20	20	35.2 <sup>v</sup>				
H. ring	4	44	31.05 <sup>v</sup>				
G. Sid T.	21	05	06.21 <sup>v</sup>				
Sid T. moon	8	08	27.26 <sup>v</sup>				
Turtuwal	16	56	38.99				
Red		2	46.55 <sup>v</sup>				
G. Sid T.	16	53	52.44				
From Kakt. Alm.		R. K.			Red.		
moon 17 <sup>h</sup>	20	02	14.47	- 22	15	24.9	







8898 Tennessee  
 Exhibition 1915 Truly 25, 20<sup>h</sup> 17<sup>m</sup> - 20<sup>h</sup> 29<sup>m</sup>  
 known 20 23 11.6 - 20 23 11.8  
 Clock part 2 36.5

H Sid T.	20	20	35.2
H King	4	44	31.05
G Sid T.	21	05	06.21
width known	8	08	27.26
Interval	16	56	38.99
Red		2	46.55
G Sid T.	16	53	52.44

From Watt. Allen R A Red.  
 known 17<sup>m</sup> 20 02 14.47 - 22 15 27.9







8904

Times etc

Expt. Stars 1915 July 27  $22^h 27^m$  -  $22^h 39^m$   
 ... hours 22 32 32.5 - 22 32 32.7  
 Clock fast 2 40.2

H. Sid. T. 22 29 52.4 0-9: +0' 32'  
 H. hour 4 44 31.05  
 Q. Sid. T. 27 14 23.45  
 Sid. T. in hour 8 16 20.37  
 Interval 18 58 03.08  
 Red 3 06.44  
 Q. H. T. 14 54 56.64

From Naut. Alman. R. A. Decl.  
 Moon 19<sup>h</sup> 21<sup>m</sup> 58<sup>s</sup> 03.74 - 11<sup>h</sup> 24<sup>m</sup> 03.9'  
 Motion in 1<sup>m</sup> 2.136 14.804  
 " " -5.056 - 10.80 - 1 14.8'  
 Tabular place 21 57 52.94 - 11 25 18.7

Moon's age 16 days

" parallax 58' 32.19  
 " semidiam 15 58.5  
 R 958.5  
 Augmentation + 9.7  
 Irradiation (2) - 0.1  
 R 968.1  
 R 2.0752  
 aR - 992  
 (1+2)R 1.9760  
 R2 39046

a = -5020  
 + 24  
 478.0







8904

Times etc

Exh to Mass 1915 July 27 22° 27" - 22° 39"  
 Clock fast 22 32 32.5 - 22 32 32.7  
 2 402

H. L. T. 22 29 524 0-9: +0' 32"  
 H. L. T. 4 44 3105  
 G. L. T. 27 14 2345  
 S. L. T. 8 16 2037  
 Interval 18 58 0208  
 Red 3 0644  
 O. L. T. 18 54 5664

From Kant Alm R. A. decl.  
 1915 21° 58" 0374 - 11 24 039  
 Motion 1" 2.136 14.770  
 -5.056 - 10.80 - 1 148  
 Tabula plac 21 57 52.94 - 11 25 187

Lunar age 16 days

934 = 92

9585 = 97

a2 = 5020

- 21

478.0

parallax 58' 32" 19

secular 15 58.5

R 958.5

Augmentation + 97

Irradiation (2) - 0.1

R 968.1

R 20752

4R - 992

(1+2)R 1.9760

R2 39046







8904 Plate Center &amp; Plate Constant

x	y								
18.1732	26.7262	21	55	1.3	-10	43	08		
20.5488	6.7950	21	56	30	-13	26	00		
34.0308	17.0959	22	04	01	-12	01	45		
5/7275	50.62	4	115	44	35	70	53		
24.25	16.87	21	58	35	-12	03	38		
-22	-18	-	1	10	-	8	47		
225	1.13	21	57	25	-11	54	51		
31	4665								
70	527"	Center							
= 1" 108	= 8' 47"	A =	21"	57"	25"				
		B =	-11"	54'	50"				

$$\begin{aligned}
 &20 - 8 + 500x + 20.3y + 2.2x - 7x - 13064 \\
 &+ 3399 + 9087 + 12486 + 543 = +13029 + 40 = +13069 - 4 = +13065 = +1 \\
 &+ 2611 + 10274 = +12885 + 138 = +13023 + 45 = +13068 - 4 = +13064 = 0 \\
 &- 4366 + 17015 + 12649 + 347 = +12996 + 75 = +13071 - 7 = +13064 = 0 \\
 &22.1528 + 11076 + 319 + 49 - 4 = 21.9904
 \end{aligned}$$

$$\begin{aligned}
 &y - 4 + 500y - 17.4x + 8.7y - 8343 \\
 &- 4936 + 13363 = +8427 - 316 = +8111 + 232 = +8343 = 0 \\
 &+ 5245 + 3398 = +8643 - 358 = +8285 + 59 = +8344 = 71 \\
 &+ 238 + 8548 = +8786 - 592 = +8194 + 149 = +8343 = 0 \\
 &15.7370 + 7869 - 385 + 137 = 15.6648
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= -0.2 & e &= -5.8 & a - e &= +5.6 & b + a &= -1.3 \\
 \text{Obs } a &= -502.0 & e &= -508.7 & a - e &= +6.7 & b + a &= -2.9 \\
 & & & & & & & \\
 &-501.8 & &-502.9 & & & &-1.6
 \end{aligned}$$







8904 Plate Center &amp; Plate Constant

X	Y	X	Y	X	Y	X	Y
181732	267262	2155	13	-10	43	08	
205488	67950	2156	30	-13	26	00	
340308	170959	2204	01	-12	01	45	
<u>57275</u>	<u>5062</u>	<u>4115</u>	<u>44</u>	<u>35</u>	<u>70</u>	<u>53</u>	
2425	1687	2158	35	-12	03	38	
<u>22</u>	<u>-18</u>	<u>-110</u>	<u>+8</u>	<u>47</u>			
225	113	2157	25	-11	54	51	
<u>35</u>	<u>+661</u>						
70	527	Center {	A: 21° 57' 25"				
1° 10S	= 8' 47"		D: -11° 54' 50"				

$$\begin{aligned}
 x - 5 + 1500 & \quad + 2038 \quad + 222 \quad - 26 \quad - 13064 \\
 + 3399 + 9087 & + 12486 + 543 = +13029 + 40 + 13069 - 4 + 13065 = +1 \\
 + 2611 + 1027 & + 12885 + 138 = +13023 + 45 = +13068 - 4 + 13069 = 0 \\
 - 4366 + 17015 & + 12649 + 347 + 12996 + 75 + 13071 - 7 + 13064 = 0 \\
 221528 + 11076 & + 319 + 49 - 4 = 219907
 \end{aligned}$$

$$\begin{aligned}
 y - 4 + 1500 & \quad - 17.48 \quad + 874 \quad - 8343 \\
 - 4936 + 13363 & + 8427 - 316 = +8111 + 232 + 8343 = 0 \\
 + 1245 + 3398 & + 8643 - 358 = +8285 + 59 + 8347 = 71 \\
 + 238 + 8548 & + 8786 - 592 + 8194 + 149 + 8343 = 0 \\
 157370 + 7869 & - 385 + 137 = 156648
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= -0.2 \quad e = -5.8 \quad a - c = +5.6 \quad b + a = -1.3 \\
 \text{Obs } a &= -502.0 \quad x = -508.7 \quad a - c = +6.7 \quad b + a = -29
 \end{aligned}$$



$\xi$	$\eta$	$\Delta\xi$	$-3.7\xi$	$-1.2\eta$	$-2$
1	-7.17	+9.22	-11	+13	+4 - 2 = +2 0
2	-1.71	-11.73	-6	+6	0 + 2 = +2 0
3	+12.76	-0.89	+48	+46	+2 0 = +2 0
M	-0	-2.39	0	0	<u>-2</u>

$\Delta\eta$	$-3.1\eta$	$-3\xi$	$+5$
+23	-28	-16	+12 -5 = 0
-72	+36	-163	0 = -6 -1
-3	+3	0	-4 = -4 +1
0	+7	0	<u>+12</u>



## 8904 Standard Coordinates.

Cape W 3049 mag 7.6				Cape W 3050 mag 7.1				Cape W 3069 mag 7.8			
C	21	54	25.05	21	55	41.77	22	03	13.12		
L			25.11			78			13.19		
E			10			73			13.20		
Mean	21	54	25.09	21	55	41.76	22	03	13.17		
Prece	+		48.06	+		48.51	+		48.17		
X	21	55	13.15	21	56	30.27	22	04	01.34		
A	21	57	25	21	57	25	21	57	25		
a-A	-	2	11.85	-	0	54.73	+	06	36.34		
tan(A)	-		131.85	-		54.73	+		396.29		
log <sub>10</sub>			2.12008m			1.73823m			2.59801		
"m <sub>0</sub>			9.95236			9.98795			9.99036		
3 <sub>0</sub>			0.61968m			0.23342m			1.09561		
3 <sub>0</sub>	-		4.1656	-		1.7717	+		12.4626		
3 <sub>1</sub>	-		11	-		6	+		48		
3 <sub>2</sub>			17.8333			20.2877			34.4674		
2 <sub>2</sub>			18.1732			20.5488			34.0308		
2-3	+		3399	+		2617	-		4366		
C	-10	47	24.9	-13	30	16.1	-12	06	08.1		
L			24.6			16.4			08.5		
E			25.2			16.2			07.8		
Mean	-10	47	24.9	-13	30	16.2	-12	06	08.1		
Prece	+	4	17.1	+	4	16.1	+	4	22.7		
S	-10	43	07.8	-13	26	00.1	-12	01	45.4		
D	-11	54	50	-11	54	50	-11	54	50		
S-D	+	10	42.2	-	1	31	10.1	-	06	55.4	
tan(S-D)			4302.8			5471.4			415.4		
log <sub>10</sub>			3.63375			3.73810m			2.61847m		
"m <sub>0</sub>			0.96490			1.06925m			9.94962m		
tan <sub>1</sub>			9.2771m			9.3781m			9.3286m		
-S <sup>2</sup>			1239.4			0.4668			2.1912		
m <sub>1</sub>			7.5699m			6.8983m			8.5732m		
m <sub>0</sub>	+		9.2235	-		11.7287	-		0.8905		
m <sub>1</sub>	-		37	-		8	-		374		
m			27.2198			6.2705			17.0721		
y			26.7262			6.7950			17.0959		
y-m	-		4936	+		5245	+		238		







## 3904 Standard Coordinates

Cape W 3049 mag 7.6	Cape W 3050 mag 7.1	Cape W 3069 mag 7.8
C 21 54 21.05	21 55 41.77	22 03 13.12
L 25.11	78	13.19
E 10	73	13.20
Mean 21 54 25.09	21 55 41.76	22 03 13.17
Par + 48.06	+ 48.51	+ 48.12
S 21 55 13.15	21 56 30.27	22 04 01.34
A 21 57 25	21 57 25	21 57 25
$\alpha - A$ - 2 11.85	- 0 54.73	+ 06 36.34
$\Delta \alpha (G-H)$ - 131.85	- 54.73	+ 396.29
$\log \mu$ 2 12 00.8	1.73823	2.59801
$\log \mu$ 9 95 236	9 98 791	9 99 036
$\log \mu$ 0 61 968	0.23342	1.09561
$\log \mu$ - 4.1656	- 1.7117	+ 12.4626
$\log \mu$ - 11	- 6	- 48
$\log \mu$ 17.8333	20.2877	34.4674
$\log \mu$ 18.1732	20.5488	34.0308
$\log \mu$ + 3399	+ 1.2611	- 4366
C -10 47 24.9	-13 30 16.1	-12 06 08.1
L 24.6	16.4	08.5
E 25.2	16.2	07.8
Mean -10 47 24.9	-13 30 16.2	-12 06 08
Par + 4 17.1	+ 4 16.1	+ 4 22.7
S -10 43 07.8	-13 26 00.1	-12 01 45.1
$\alpha - D$ -11 54 50	-11 54 50	-11 54 50
$\alpha - D$ +1 10 42.2	- 1 31 10.1	- 06 55.4
$\Delta \alpha (G-H)$ + 430.28	- 54.714	- 41.54
$\log \mu$ 3 63 375	3.73810	2.61847
$\log \mu$ 0 96 490	1.06925	9 94 962
$\log \mu$ 9.2771	9.3781	9.3286
$\log \mu$ 12394	04668	21912
$\log \mu$ 7.5699	6.8968	8.5732
$\log \mu$ + 9.2235	- 11.7287	- 0.8905
$\log \mu$ - 37	- 8	- 374
$\log \mu$ 27.2198	6.2705	17.0721
$\log \mu$ 26.7262	6.7950	17.0915
$\log \mu$ - 4936	+ 5245	+ 238







8904 Moon's Center.

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$
1	23.0000	+0.8470	-2	0.7171	3.8969	-77
2	23.9900	+1.8370	-1	3.3742	3.9180	+134
3	+ 24.1284	+1.9754	0	3.9022	3.9022	-24
4	24.1101	+1.9571	+0	3.8302	3.8994	-52
5	23.6712	+1.5182	+2	2.3055	3.9022	-24
6	23.0000	+0.8470	+2	0.7177	3.9000	-46
7	22.4530	00000	-2	0.0000	3.9062	+16
8	22.0000	-0.1530	+2	0.0233	3.9089	+43
9	21.4978	-0.6552	+2	0.4290	3.9039	-7

 $R = 39046$ 

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$	
1	13.9547	-1.7823	-9	3.1798	155
2	15.0000	-0.7370	-4	0.5438	112
3	15.7370	0.0000	0	0.0000	90
4	16.0000	+0.2630	+1	0.0692	82
5	17.0000	+1.2630	+6	1.5967	50
6	17.5200	+1.7830	+9	3.1823	25
7	+ 17.7124	+1.9754	+10	3.9062	0
8	17.7072	+1.9702	+10	3.8856	4
9	17.6001	+1.8631	+10	3.4749	19

Moon's Center.

$$x = 23.0 \quad y = 13.9547$$

$$17.5200$$

$$31.4747$$

$$y_0 = 15.7374$$

$$y_{\text{max}} = 17.7124$$

$$R = 1.9750$$

$$x_{\text{max}} = 24.1284$$

$$x_0 = 22.1534$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 22.1530 \\ y_0 = 15.7370 \end{array} \right.$$







8904 known center

	x	$x - X_0$	$\Delta x$	$(x - X_0)^2$	$(x - X_0)(y - Y_0)$	$O - L$
1	13 0000	+0.8470	-2	0.7171	3.8969	-77
2	23 9900	+1.8370	-1	3.3742	3.9180	+134
3	24 1284	+1.9754	0	3.9022	3.9022	-24
4	24 1101	+1.9571	+0	3.8302	3.8994	-52
5	23 6712	+1.5182	-2	2.3055	3.9022	-24
6	23 0000	+0.8470	-2	0.7177	3.9000	-46
7	22 4530	00000	-2	0.0000	3.9062	+16
8	22 0000	-0.1530	-2	0.0233	3.9089	+43
9	21 4978	-0.6552	+2	0.4290	3.9039	-7

 $K = 39046$ 

	y	$y - Y_0$	$\Delta y$	$(y - Y_0)^2$	
1	13.9547	-1.7823	-9	3.1798	155
2	15.0000	-0.7370	-4	0.5438	112
3	15.7370	0.0000	0	0.0000	90
4	16.0000	+0.2630	+1	0.0692	82
5	17.0000	+1.2630	+6	1.5967	50
6	17.5200	+1.7830	+9	3.1823	25
7	17.7124	+1.9754	+10	3.9062	0
8	17.7072	+1.9702	+10	3.8856	4
9	17.6001	+1.8631	+10	3.4749	19

known center

 $x = 23.0$   $y = 13.9547$  $17.5200$  $31.4747$  $y = 15.7370$  $y = 17.7124$  $R = 1.9750$  $x = 24.1284$  $X = 22.1534$ Center  $X = 22.1530$  $Y = 15.7370$



~~8904~~

## formation of normals

1	- 1.51	- 65.5	+ 137.0
2	- 1.36	+ 246.5	- 99.2
3	+ 0.00	- 47.5	- 0.0
4	+ 0.51	- 102.0	- 13.5
5	+ 1.92	- 36.5	- 30.2
6	+ 1.51	- 39.1	- 82.0
7	+ 0.00	+ 0.0	+ 31.7
8	- 0.30	- 6.5	+ 84.8
9	- 1.23	+ 4.6	- 13.0
	- 0.46	- 46.0	+ 15.6

- a	- b	+ 50 + ΔC
- 23	+ 30	+ 57
- 50	+ 13	+ 13
- 53	- 0	- 3
- 53	- 4	- 7
- 41	- 21	- 13
- 23	- 30	- 3
- 0	- 34	+ 16
+ 3	- 34	+ 19
+ 18	- 32	+ 36



89.04

Inveris Center

	O	C	O-C	Corr.
1	+0.85 -1.78 = -77	-3 -1 = -4	-73	-16
2	+1.84 -0.74 = +134	-6 -1 = -7	+141	+154
3	+1.98 +0.00 = -24	-6 +0 = -6	-18	-21
4	+1.96 +0.26 = -52	-6 +0 = -6	-46	-53
5	+1.52 +1.26 = -24	-5 +1 = -4	-20	-33
6	+0.85 +1.78 = -46	-3 +1 = -2	-44	-47
7	+0.00 +1.98 = +16	-0 +2 = +2	+14	+30
8	-0.15 +1.97 = +43	+0 +2 = +2	+43	+62
9	-0.66 +1.56 = -7	+2 +2 = +4	-11	+25
	+8.19 +6.59		+198 -212	

Normal Equations

Average 46

$$+15.30 - 0.46 = -46 \quad +8.19$$

$$- 0.46 + 19.84 = +16 \quad +6.59$$

$$+ 0.46 - 0.01 = -1 \quad +0.25$$

$$+ 19.83 = +15 \quad +6.84$$

$$b = +0.8 + 0.34$$

$$+ 15.30 = -46$$

$$a = -3.0 + 0.55$$

are meas 174

$$\frac{p}{m} = .29$$

$$\frac{\Sigma v}{n} = -1.6 \quad \frac{-1.6}{.29} = -5.5 \quad \Delta R = -0.07$$

$$\text{Corr.} = -0.6$$

$$\text{True } \Delta R = +0.53$$

$$-2R = -4.15 \quad -2R \text{ Corr} + 2.49 + 50$$

$$\Delta b = +0.85$$

$$\Delta \delta = +0.4$$

$$\Delta a = +1.37$$

$$\Delta \alpha = +0.5$$

$$+27$$







8904

Invers Center

		0		C	0-C	
1	+085	-178	= -77	-3-1	-4	-73
2	+184	-074	= +134	-6-1	-7	+141
3	+198	+000	= -24	-6-0	-6	-18
4	+196	+026	= -52	-6-0	-6	-46
5	+152	+126	= -24	-5+1	-4	-20
6	+085	+178	= -46	-3+1	-2	-44
7	+000	+198	= +16	-0+2	+2	+14
8	-015	+197	= +43	-0+2	+2	+43
9	-066	+186	= -7	+2+2	-4	-11
						<hr/>
						+198 = 212
						Average = 46

Normal Equation.

Normal Equations

$$+1530 = 0.46 = -46$$

$$-046 + 1984 = +16$$

$$+046 = 0.01 = -1$$

$$+1983 = +15$$

$$+1530 = -46$$

$$b = +0.8$$

$$a = -34$$

are meas. 274

$$\frac{p}{n} = 29$$

$$\frac{\Sigma V}{n} = -17 \quad \frac{-16}{29} = -0.55 \quad \Delta R = -0.01$$







8904 known mean Position (1915.0)

$$X_0 = 22.1530 \quad Y = 15.7370$$

$$\begin{array}{r} \Sigma u = -2 \\ 22.1528 \end{array} \quad \begin{array}{r} \Sigma v = 0 \\ 15.7370 \end{array}$$

From plate constant  $X = 21.9904 \quad Y = 15.6648$ 

$$z = -0.0096$$

$$\eta = -2.3352$$

$$\begin{array}{r} \log K_0 = 7.98227 \\ \text{mass} \quad 9.99005 \\ 8.50724 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.3306 \\ 5.9645 \\ 7.0534 \\ 8.3485 \end{array}$$

$$(x-A) \quad 9.48498$$

$$\begin{array}{r} \log \eta_0 = 0.36833 \\ 7.33115 \end{array}$$

$$x-A \quad - \quad 0.31$$

$$A \quad 21 \quad 57 \quad 25$$

$$(d-D) = 3.03718$$

$$x = 21 \quad 57 \quad 24.69$$

$$S-D = - \quad 18 \quad 09.4$$

$$Rad \quad + \quad 392$$

$$D = -11 \quad 54 \quad 50$$

$$x' = 21 \quad 57 \quad 28.61$$

$$S = -12 \quad 12 \quad 59.4$$

$$Rad \quad + \quad 17.2$$

$$S = -12 \quad 12 \quad 42.2$$







8904 Woods Hole Position (1915.0)

$$X = 22.1530 \quad Y = 1.57370$$

$$\begin{array}{r} 22.1530 \\ - 2 \\ \hline 22.1528 \end{array} \quad \begin{array}{r} 1.57370 \\ - 0 \\ \hline 1.57370 \end{array}$$

From plate constant  $X = 21.9904 \quad Y = 1.56648$ 

$$Z = -0.0096$$

$$\eta = -2.3352$$

$$\begin{array}{r} \log E: 7.98227 \\ \log S: 9.99005 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log T: 9.3306 \\ \log S: 5.9645 \\ \hline 7.0534 \\ \hline 2.3485 \end{array}$$

$$(A-M) 9.48498$$

$$\log \eta_0 = 0.36853$$

$$X-M = 0.31$$

$$7.33115$$

$$A \quad 21 \quad 57 \quad 21$$

$$(D-I) = 3.03718$$

$$\alpha = 21 \quad 57 \quad 24.69$$

$$S-D = 18 \quad 09.4$$

$$Red + 392$$

$$D = 11 \quad 54 \quad 50$$

$$\alpha = 21 \quad 57 \quad 28.61$$

$$S = 12 \quad 12 \quad 59.4$$

$$Red + 17.2$$

$$S = 12 \quad 12 \quad 42.2$$



$$\begin{array}{r} 21 \quad 48 \quad 43.79 \\ \underline{39.80} \\ + 3.99 \end{array}$$

$$\begin{array}{r} -13 \quad 56 \quad 52.5 \\ \underline{69.1} \\ + 16.6 \end{array}$$

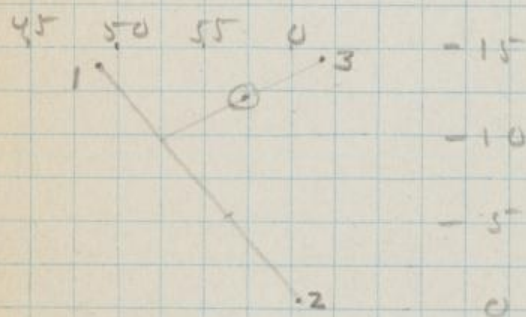
$$\begin{array}{r} 22 \quad 01 \quad 28.81 \\ \underline{25.13} \\ + 3.68 \end{array}$$

$$\begin{array}{r} -0 \quad 43 \quad 43.8 \\ \underline{59.5} \\ + 15.7 \end{array}$$

$$\begin{array}{r} 22 \quad 01 \quad 54.82 \\ \underline{50.88} \\ + 3.94 \end{array}$$

$$\begin{array}{r} -14 \quad 16 \quad 39.5 \\ \underline{57.2} \\ 17.7 \end{array}$$

177  
163





8904 Red. ad locum alt.

S - 12° 13'

$$H + \alpha \quad 7^h \quad 49.8 = 117^\circ 27'$$

$$H \quad 9 \quad 52.4$$

$$\alpha \quad 21 \quad 57.4$$

$$G \quad 22 \quad 31.5$$

$$G + \alpha \quad 20 \quad 28.9 = 307^\circ 13'$$

$$L \cos S \quad 9.9901$$

$$1 \quad 0.6601$$

$$(L) \quad 0.6502$$

$$L \cos(G + \alpha) \quad 9.7816$$

$$\delta \quad 1.2495$$

$$\sin \delta \quad 9.9011 m$$

$$\tan S \quad 9.3355 m$$

$$8.8239$$

$$L \sin S \quad 9.3255 m$$

$$\cos(H + \alpha) \quad 9.6637 m$$

$$L \quad 1.3000$$

$$\sin \delta \quad 9.9481$$

$$\sec S \quad 0.0099$$

$$8.8239$$

$$S' \quad 1.0311$$

$$S \quad 9.3100$$

$$h' \quad 0.2892$$

$$h \quad 0.0819$$

$$f \quad +2.508$$

$$S \quad +0.204$$

$$h \quad +1.208$$

$$+3.920$$

$$S' \quad +10.74$$

$$h' \quad +1.95$$

$$L \quad +4.47$$

$$+17.16$$







89.04 Red ad brown sph.

$S = 12^\circ 13'$

$H + X \quad 7^\circ 49.8' : 117^\circ 27'$

$H \quad 9 \quad 524$

$X \quad 21 \quad 574$

$G \quad 22 \quad 315$

$G + X \quad 20 \quad 28.9 : 307^\circ 13'$

$L \cos S \quad 9.9901$

$i \quad 0.6601$

$(i) \quad 0.6502$

$L \cos(G+X) \quad 9.7816$

$\gamma \quad 1.2495$

$\sin \dots \quad 9.9011$

$\tan S \quad 9.3355$

$88239$

$L \sin S \quad 9.3215$

$\cos(H+X) \quad 9.6637$

$L \quad 1.3000$

$\sin \dots \quad 9.9481$

$\sec S \quad 0.0099$

$88239$

$8' \quad 1.0311$

$8 \quad 93100$

$h' \quad 0.2892$

$h \quad 0.0819$

$b \quad +2.508$

$s \quad +0.204$

$h \quad +1.208$

$+3.920$

$8' \quad +10.74$

$h' \quad +1.95$

$L \quad +4.47$

$+17.16$







8904

## Lunar Parallax.

$$\begin{array}{r}
 \alpha = 21^{\circ} 57' 28.61'' \\
 0 \quad 22 \quad 29 \quad 52.4 \\
 + 32 \quad 23.8 \\
 + 8^{\circ} 05' 57''
 \end{array}$$

$$\begin{array}{r}
 + \quad \quad \quad 3 \quad 07 \\
 + \quad 8 \quad 02 \quad 50
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 0.00000 \\
 0.00430 \\
 \hline
 996157
 \end{array}$$

$$42 \quad 28 \quad 05$$

$$12 \quad 12 \quad 42$$

$$54 \quad 40 \quad 47$$

$$\begin{array}{r}
 9.82640 \\
 823113 \\
 9.91165 \\
 0.17058 \\
 \hline
 81.3976
 \end{array}$$

$$S-S' \quad +47 \quad 25.8$$

$$S \quad -11 \quad 25 \quad 16.4$$

$$\text{am Eph S} \quad -11 \quad 25 \quad 18.6$$

$$O-C \quad +2.2$$

$$\text{Curv. of Plate} \quad +0.6$$

$$2^{\text{nd}} \text{ Ord. Regr.} \quad +0.1$$

$$\text{3rd Cor.} \quad +0.4$$

$$S \quad -11 \quad 25 \quad 15.9$$

$$O-C \quad +2.7$$

$$S = -12^{\circ} 12' 42.2''$$

$$\overline{S} = 58' 32.19$$

$$9.86913$$

$$823113$$

$$9.14847$$

$$0.00869$$

$$7.25782$$

$$\alpha - \alpha' = +6 \quad 13.46$$

$$+ \quad 24.90$$

$$A \quad 21 \quad 57 \quad 53.51$$

$$\alpha = 21 \quad 57 \quad 52.94$$

$$O-C \quad +0.57$$

$$\text{Curv} \quad -0.01$$

$$\text{2nd Cor.} \quad +0.05$$

$$\alpha = 21 \quad 57 \quad 53.56$$

$$O-C \quad +0.62$$







8904

Lunar Parallax

$$\begin{array}{r}
 \alpha: 21^{\circ} 57' 28.61 \\
 0 \quad 22 \quad 29 \quad 52.4 \\
 + 32 \quad 23.8 \\
 + 8^{\circ} 05' 57'' \\
 + \quad \quad 3 \quad 07 \\
 + 8 \quad 02 \quad 50
 \end{array}$$

$$\begin{array}{r}
 9915727 \\
 000000 \\
 000430 \\
 \hline
 996757
 \end{array}$$

$$42 \quad 28 \quad 05$$

$$12 \quad 12 \quad 12$$

$$54 \quad 40 \quad 45$$

$$\begin{array}{r}
 982640 \\
 823113 \\
 991165 \\
 017058 \\
 \hline
 913976
 \end{array}$$

$$S-S \quad +47 \quad 125.8$$

$$S \quad -11 \quad 25 \quad 16.4$$

$$\text{Circ Eph S} \quad -11 \quad 25 \quad 18.6$$

$$O-C \quad +2.2$$

$$\text{Curv of Plate} \quad +0.6$$

$$2^{\text{nd}} \text{ Ord. Refrac} \quad +0.1$$

$$S \text{ 2nd Cor} \quad +0.4$$

$$S \quad - \quad 1.9$$

$$S: -12^{\circ} 12' 42.2$$

$$\overline{11} \quad 58' 32.19$$

$$9.86913$$

$$823113$$

$$914887$$

$$000269$$

$$725782$$

$$\alpha - \lambda \quad +6 \quad 1346$$

$$+ \quad 249.0$$

$$\alpha \quad 21 \quad 57 \quad 53.51$$

$$\alpha \quad 21 \quad 57 \quad 52.94$$

$$O-C \quad +0.57$$

$$\text{Curv} \quad -0.01$$

$$2^{\text{nd}} \text{ Cor} \quad +0.05$$

$$\alpha \quad 21 \quad 57 \quad 53.56$$

$$O-C \quad +0.62$$



1  
2  
2  
2  
19  
6  
9  
8  
1  
1  
2  
1  
7  
2  
1  
3  
2  
15  
m



8905 Stars - measures

1916 June 12.

$\frac{d}{x}$	$\frac{d}{x}$	$\frac{d}{x}$	$\frac{d}{x}$
19012	17400	13238	10610
16.6 11714	14656	13010	0805
260 20	10390	1008	10390
02	07		
<u>1.67287</u>	<u>.7292</u>	<u>26.0229</u>	<u>0219</u>
$\frac{2}{19.1}$ 18481	11460	17551	10011
61 17400	5951	16640	1012
00 08	10398	39 38	9805
62		51	
<u>19.1077</u>	<u>.1059</u>	<u>6.0912</u>	<u>.0506</u>
$\frac{3}{82.6}$ 17530	19530	17959	16398
16.4 11641	15419	14012	10350
40 41	1018	10	3740
19	25	20	95
<u>32.5882</u>	<u>.5884</u>	<u>16.3951</u>	<u>.3943</u>

Moon measures.

230	16110	18889
14.4	13202	10780
	10 01	8582
	98	70
	<u>14.2902</u>	<u>2.908</u>
$\frac{2}{23.5}$ 19857	18900	
15.0 14000	14720	
99 95	0822	
40	85	
<u>23.5849</u>	<u>.5823</u>	
$\frac{3}{23.7}$ 19583	18779	
15.8 12086	16575	
92 98	6571	
20	69	
<u>23.7782</u>	<u>.7793</u>	







8905 Stars - measures

1916 June 12.

$\alpha$	$\delta$	$\alpha$	$\delta$	$\alpha$	$\delta$	$\alpha$	$\delta$
19012		17400		13238		10610	
166	11714	14658		13010	08	0809	
200	20	10390	96	10	08	10390	
	02	07					
	<u>16.7287</u>	<u>7292</u>		<u>6.0229</u>		<u>0419</u>	
191	18481	11460		17551		10011	12
61	17400	5957		16640	38	10	
	00	10398		39		9805	
	62			51			
	<u>19.1077</u>	<u>1059</u>		<u>60912</u>		<u>0906</u>	
3							
126	17530	19538		17959		16398	
164	11641	15419	18	14012	11	10350	40
	40	10		10		37	
	19	25		70		99	
	<u>32.5882</u>	<u>5884</u>		<u>16.3951</u>		<u>3943</u>	

lincoln measures

230		16110		19889	
144		13202	01	10780	
		10		8982	
		98		70	
		<u>14.2902</u>		<u>2908</u>	
235	19857	18900			
150	14000	14720	22		
	99	08			
	40	85			
	<u>23.5849</u>	<u>5823</u>			
3					
237	19883	18779			
158	12086	16575			
	92	65	71		
	70	69			
	<u>23.7782</u>	<u>7793</u>			







8905 Moon's measures

1913 June 12

$\frac{4}{23.7}$  18900 19781  
 16.0 1113039 1754032  
       31  
       70  
23.7743      7762

$\frac{5}{23.5}$  18932 19744  
 17.0 14759 1394539  
       5374  
       20  
23.4165      4209

$\frac{6}{23.0}$   
 17.4

$\frac{7}{22.0}$   
 17.7

$\frac{8}{21.7}$   
 17.8  
 max  
 mag

$\frac{9}{21.0}$   
 17.6

18259  
 1396065  
       70  
       55  
17.4292

18230  
 1002324  
       2924  
       50  
17.8221

17220  
 8897  
       8481  
       37  
17.8345

17231  
 1062211  
       11  
       40  
17.6622

15848  
 1015041  
       3041  
       60  
4285

15828  
 14039  
       5040  
       25  
8215

16820  
 15170  
       6170  
       39  
8347

16849  
 1350190  
       00  
       50  
6648

Density.  $2\frac{1}{2}$







2901 ~~lunars~~ ~~lunars~~

1913 June 12

$$\begin{array}{r}
 4 \quad 18900 \quad 19781 \\
 237 \quad 11130 \quad 17540 \\
 160 \quad 3139 \quad 4132 \\
 \quad 70 \quad 57 \\
 \hline
 237743 \quad 7762
 \end{array}$$

$$\begin{array}{r}
 5 \quad 18932 \quad 19744 \\
 235 \quad 14753 \quad 13945 \\
 170 \quad 5374 \quad 4939 \\
 \quad 20 \quad 25 \\
 \hline
 234165 \quad 4209
 \end{array}$$

$$\begin{array}{r}
 6 \\
 230 \\
 174
 \end{array}$$

$$\begin{array}{r}
 7 \\
 220 \\
 177
 \end{array}$$

$$\begin{array}{r}
 8 \\
 217 \\
 174 \\
 \hline
 4 \\
 178
 \end{array}$$

$$\begin{array}{r}
 9 \\
 210 \\
 176
 \end{array}$$

$$\begin{array}{r}
 182159 \quad 15848 \\
 1396065 \quad 101504 \\
 \quad 70 \quad 304 \\
 \quad 55 \quad 60 \\
 \hline
 174292 \quad 4285
 \end{array}$$

$$\begin{array}{r}
 18230 \quad 15828 \\
 10023 \quad 14039 \\
 \quad 2944 \quad 5040 \\
 \quad 50 \quad 29 \\
 \hline
 178221 \quad 8211
 \end{array}$$

$$\begin{array}{r}
 17220 \quad 16820 \\
 8897 \quad 15170 \\
 \quad 8081 \quad 617 \\
 \quad 37 \quad 39 \\
 \hline
 178345 \quad 8347
 \end{array}$$

$$\begin{array}{r}
 17231 \quad 16849 \\
 1062211 \quad 135019 \\
 \quad 11 \quad 00 \\
 \quad 40 \quad 50 \\
 \hline
 176622 \quad 6648
 \end{array}$$

Curvature  $2\frac{1}{2}$







8905

Times etc.

Expt. 1st

1915 July 27, 22<sup>h</sup> 53<sup>m</sup>- 23<sup>h</sup> 05<sup>m</sup>

" " known

22 58

47.5 - 22 58 47.7

Clock fast

2 40.2

H. Sid T.

22

56

07.4

0-9 = + 0<sup>h</sup> 57<sup>m</sup>

H. long

4

44

31.05

G. Sid T.

27

40

38.45

Sid T. in horn

8

16

20.37

Futural

19

24

18.08

Reel

3

10.74

G. M. I.

19

21

07.34

Moon's hant. alum.

R.A.

Decl.

Moon 19<sup>h</sup>21<sup>h</sup> 58<sup>m</sup> 03.74

- 11° 24' 03.9

Moon in 1<sup>h</sup> 2.1348

14.813

" " 21<sup>h</sup> 22

+ 45.09

+ 5 12.9

Tabular place

21 58 48.83

- 11 18 51.0

Moon's age

16 days

parallax

58' 31.40

semidiameter

15 58.3

R

9 58.3

934 = 8.9

Augmentation

9.4

958 = 9.4

Irradiation (2<sup>1</sup>/<sub>2</sub>)

- 0.2

P

967.5

P

2.0740

all

- 990

a. - - 501.5

(1+a)P

1.9750

24

P<sup>2</sup>

3.9006

477.5







8905 Tanager etc  
 Eph Titar 1915 July 27 22° 53' - 23° 05'  
 horizon 22 58 47.5 - 22 58 47.7  
 clock fast 2 40.2

H Sid T 22 56 07.4 @ 1:40 57  
 H hour 4 44 31.05  
 G Sid T 27 40 28.45  
 Sid T horizon 8 16 20.37  
 Interval 19 24 18.08  
 Reel 3 10.74  
 @ 1. 19 21 07.34

Thomson hour Allen RA. Decl  
 horizon 19° 21' 58" 03.74 - 11° 24' 03.9  
 horizon 21 13.48 14.813  
 21.122 + 45.09 + 5 12.9  
 Tibular place 21 58 48.83 - 11 18 51.0

Leaves age 16 days  
 parallax 58" 31" 40  
 Sundrum 15 58.3  
 R 9 58.3  
 Augmentation 94  
 Irradiation (2) - 0.2  
 R 967.5  
 R 20740  
 all - 990  
 (1+a) R 19750  
 R<sup>2</sup> 39006

934 = 89  
 918 = 94

a. - 501.2  
 28  
 477.5







## 8905 Plate constants

$x$	16.7290	19.1068	32.5883
$y$	17.8333	20.2877	34.4674
$z$	-1.1043	-1.1809	-1.8791
$u$	26.0224	6.0909	16.3947
$v$	27.2198	6.2705	17.0721
$w$	-1.1974	-1.796	-6.774

$$\begin{array}{rclcl}
 x - \bar{x} & +500x & +21.5y & +1.5x & +2096 \\
 -1.1043 + 8364 & = -2679 + 559 & = -2120 + 25 & = -2095 & = +1 \\
 -1.1809 + 9553 & = -2256 + 131 & = -2125 + 29 & = -2096 & = 0 \\
 -1.8791 + 16294 & = -2497 + 352 & = -2145 + 49 & = -2096 & = 0 \\
 21.8045 + 10902 & & +341 & +33 & = 23.1417
 \end{array}$$

$$\begin{array}{rclcl}
 y - \bar{y} & +500y & -19.3x & +8.4y & -932 \\
 -1.1974 + 13011 & = +1037 - 323 & = +714 + 218 & = +932 & = 0 \\
 -1.796 + 3045 & = +1249 - 369 & = +880 + 51 & = +931 & = -1 \\
 -6.774 + 8197 & = +1423 - 629 & = +794 + 138 & = +932 & = 0 \\
 15.8599 + 7930 & & -421 & +133 & = 16.5309
 \end{array}$$

$$\begin{array}{llll}
 \text{Tabl } a = -0.2 & c = -6.4 & a - c = +6.2 & b + a = -2.8 \\
 \text{Obs } a = -501.5 & c = -508.4 & a - c = +6.9 & b + a = -2.2
 \end{array}$$

$$\begin{array}{rcl}
 a - c & -501.3 & -502.0 & +0.6
 \end{array}$$







## 8905 Plate Constants

$x$	167290	191068	325883
$y$	178333	202877	344674
$x - \bar{x}$	-11043	-11809	-18791
$y - \bar{y}$	260224	60909	163947
$x - \bar{x}$	272198	62705	170721
$y - \bar{y}$	-11974	-1796	-6774

$$\begin{array}{rclcl}
 2 - \bar{x} & +500x & +21.5y & +1.5x & +2096 \\
 -11043 + 8364 & = -2679 + 559 & = -2120 + 25 & = -2095 & = +1 \\
 -11809 + 9553 & = -2256 + 131 & = -2125 + 29 & = -2096 & = 0 \\
 -18791 + 16294 & = -2497 + 352 & = -2145 + 49 & = -2096 & = 0 \\
 2180 + 5410902 & & +341 & +33 & = 231417
 \end{array}$$

$$\begin{array}{rclcl}
 y - \bar{y} & +500y & -19.3x & +8.4y & -937 \\
 -11974 + 13011 & = +1037 - 323 & = +714 + 218 & = +932 & = 0 \\
 -1796 + 3045 & = +1249 - 369 & = +880 + 51 & = +931 & = -1 \\
 -6774 + 8197 & = +1423 - 625 & = +794 + 138 & = +932 & = 0 \\
 158599 & +7930 & -421 & +133 & = 165309
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Table } a = -0.2 & c = -64 & a - c = +62 & b + a = -2.8 \\
 \text{Obs } a = -5015 & c = -5084 & a - c = +69 & b + a = -2.2
 \end{array}$$







8905

Lunar Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - c$
1	23.0000	+1.1960	-4	1.4294	3.8955	-51
2	23.5836	+1.7796	-2	3.1662	3.9066	+60
3	23.7788	+1.9748	0	3.8998	3.8998	-8
4	23.7752	+1.9712	+0	3.8856	3.9052	+46
5	23.4187	+1.6147	+3	2.6082	3.9092	+86
6	23.0000	+1.1960	+4	1.4314	3.8954	-52
7	22.0000	+0.1960	+5	0.386	3.8916	-90
8	21.8040	+0.0000	+5	0.0000	3.9034	+28
9	21.0000	-0.8040	+5	0.6456	3.9018	+12
				$R^2 =$	3.9006	

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$	$L$
1	14.2905	-1.5695	-9	2.4661	143
2	15.0000	-0.8600	-5	0.7404	116
3	15.8600	0.0000	0	0.0000	90
4	16.0000	+0.1400	+1	0.0196	86
5	17.0000	+1.1400	+6	1.3010	35
6	17.4288	+1.5688	+9	2.4640	37
7	17.8218	+1.9618	+11	3.8530	6
8	17.8346	+1.9746	+11	3.9034	0
9	17.6635	+1.8035	+10	3.2562	25
					165

Approx. Center

$$x = 23.0 \quad y = 14.2905$$

$$17.4288$$

$$31.7193$$

$$y_0 = 15.8596$$

$$y_{\text{max}} = 17.8346$$

$$R = 1.9750$$

$$x_{\text{max}} = 23.7788$$

$$x_0 = 21.8038$$

$$\text{Center } \begin{cases} x_0 = 21.8040 \\ y_0 = 15.8600 \end{cases}$$







8905

Known Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)(y - y_0)^2$	$0 - c$
1	230000	+11960	-4	1.4294	3.8955	-51
2	235836	+17796	-2	3.1662	3.9066	+44
3	237788	+19748	0	3.8998	3.8998	-8
4	237752	-19712	+0	3.8856	3.9052	+46
5	234187	+16147	+3	2.6082	3.9092	+86
6	230000	-11960	+4	1.4314	3.8954	-52
7	220000	-01960	+5	0.0386	3.8916	-90
8	218040	-00000	+5	0.0000	3.9034	+28
9	210000	-08040	+5	0.6456	3.9018	+12
				$\Sigma$	39026	

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$	
1	142905	-15695	-9	2.4661	143
2	150000	-08600	-5	0.7404	116
3	158600	00000	0	0.0000	90
4	160000	+01400	-1	0.0196	86
5	170000	+11400	+6	1.3010	55
6	174288	+15688	+9	2.4640	37
7	178218	+19618	+11	3.8530	6
8	178346	+19746	+11	3.9034	0
9	176635	+18035	+10	3.2562	23
					145

Approx Center

$$\begin{aligned}
 x &= 230 & y &= 142905 \\
 & & & 174288 \\
 & & & \hline
 & & & 317193 \\
 y_0 &= 158596 \\
 y_{\text{mean}} &= 178346 \\
 x &= 19750 \\
 x_{\text{mean}} &= 237789 \\
 x_0 &= 218038
 \end{aligned}$$

$$\begin{aligned}
 \text{Center } \left\{ \begin{aligned} x_0 &= 218040 \\ y_0 &= 158600 \end{aligned} \right.
 \end{aligned}$$



# Formation of Normals

1	- 1.88	- 61.2	+ 80.0
2	- 1.53	+ 106.9	- 51.6
3	+ 0.00	- 15.8	- 0.0
4	+ 0.28	+ 90.6	+ 6.4
5	+ 1.83	+ 138.5	+ 98.0
6	+ 1.88	- 62.4	- 81.5
7	+ 0.39	- 18.0	- 176.4
8	+ 0.00	+ 10.0	+ 55.1
9	- 1.44	- 9.6	+ 21.6
	- 0.47	+ 169.0	- 38.9

-a	-b	+31
		+4C
- 20	+ 17	+ 28
- 30	+ 9	+ 10
- 33	- 0	- 2
- 33	- 1	- 3
- 27	- 12	- 8
- 20	- 17	- 6
- 3	- 21	+ 6
- 0	- 22	+ 9
+ 14	- 22	+ 23



8905

Lunar's Center

	0 +	C	0 - C	Corr
1	+ 1.20 - 1.57 = -51	+ 12 + 3 = +15	- 66	-38
2	+ 1.78 - 0.86 = +60	+ 17 + 2 = +19	+ 41	+51
3	+ 1.97 + 0.00 = -8	+ 19 - 0 = +19	- 27	-29
4	+ 1.97 + 0.14 = +42	+ 19 - 0 = +19	+ 27	+24
5	+ 1.61 + 1.14 = +86	+ 16 - 2 = +14	+ 74	+66
6	+ 1.20 + 1.57 = -52	+ 12 - 3 = +9	- 61	-67
7	+ 0.20 + 1.96 = -90	+ 2 - 4 = -2	- 88	-82
8	+ 0.00 + 1.97 = +28	+ 0 - 4 = -4	+ 32	+41
9	- 0.80 + 1.80 = +12	- 8 - 3 = -11	+ 23	+46
	+9.13 +6.15		+197 - 242	

Normal Equations

Average = 49

$$+ 17.10 - 0.47 = +169$$

$$+ 9.13$$

$$- 0.47 + 18.00 = -38$$

$$+ 6.15$$

$$+ 0.47 - 0.01 = +5$$

$$+ 0.27$$

$$+ 17.99 = -33$$

$$+ 6.42 \text{ } \leftarrow = -1.84 + 0.36$$

$$+ 17.10 = +169 - 1 = +168$$

$$a = + 9.8 + 1.54$$

arc meas. 168

 $\frac{\Sigma r}{n}$ 

$$\frac{p}{n} = .24$$

$$- 5$$

$$\frac{-5}{.24} = -21$$

$$\Delta R = -0.3$$

$$\text{corr} = -0.4$$

$$\text{True } \Delta R = +0.1$$

$$- 2R = -3.95 \quad - 2R \text{ corr} = +1.58 \quad + 31$$

+11

$$\Delta b = +0.57$$

$$\Delta S = +0.3$$

$$\Delta a = +0.85$$

$$\Delta \alpha = +0.03$$

+17







8905

Linear Center

		0		C	0 - C
1	+120 - 157 =	-51	+12 + 3 =	+15	-66
2	+178 - 086 =	+60	+17 + 2 =	+19	+41
3	+197 + 000 =	-8	+19 - 0 =	+19	-27
4	+197 + 014 =	+46	+19 - 0 =	+19	+27
5	+161 + 114 =	+86	+16 - 2 =	+14	+74
6	+120 + 157 =	-152	+12 - 3 =	+9	-61
7	+020 + 196 =	-90	+2 - 4 =	-2	-88
8	+000 + 197 =	+78	+0 - 4 =	-4	+32
9	-080 + 180 =	+12	-8 - 3 =	-11	+23

+197-242

Average: 49

Normal Equations

$$+17.10 - 0.47 + 1.69$$

$$- 0.47 + 1.800 = -38$$

$$+ 0.47 - 0.01 = +5$$

$$+ 17.99 = -33$$

$$+17.10 = +1.69 - 1 + 1.68$$

$$b = -1.8$$

$$a = +9.8$$

arc meas. 168  $\frac{\Sigma v}{n}$ 

$$\frac{P}{n} = .24$$

$$-5$$

$$\frac{-5}{.24} = -21$$

$$AR = -0.3$$







8905 Moon's Mean Position (1915.0)

$$\begin{array}{r} X_0 = 21.8040 \quad Y_0 = 15.8660 \\ \hline \frac{1}{2}a = \quad + 5 \quad \frac{1}{2}b = \quad - 1 \\ \hline 21.8045 \quad 15.8599 \end{array}$$

From plate constant  $X = 23.1417 \quad Y = 16.5309$ 

$$\bar{x} = +1.1417$$

$$\eta = -1.4691$$

$$\begin{array}{r} \log 5 = 0.05756 \\ \log 5 = 9.99024 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log \tan 5 = 9.3355^m \\ 0.1151^m \\ \hline 7.0534 \\ \hline 6.5040^m \end{array}$$

$$\log(d-A) = 1.56008$$

$$\eta_1 = -$$

$$d-A \quad + \quad 36.31$$

$$\eta_0 = -1.4688$$

$$A \quad 21 \quad 57 \quad 25$$

$$\log \eta_0 = 0.16696^m \\ \hline 7.33115$$

$$a = 21 \quad 58 \quad 01.31$$

$$\log(s-D) = 2.83581^m$$

$$\text{Red} \quad + \quad 3.92$$

$$s-D = - \quad 11 \quad 25.2$$

$$x = 21 \quad 58 \quad 05.23$$

$$D = -11 \quad 54 \quad 50$$

$$s = -12 \quad 06 \quad 15.2$$

$$\text{Red} \quad + \quad 17.2$$

$$s' = -12 \quad 05 \quad 58.0$$







8905 Morris (Mean Position 1911.0)

$$\begin{array}{r}
 X = 218040 \quad Y_0 = 158600 \\
 \quad \quad \quad + \quad \quad \quad - \quad \quad \quad 1 \\
 \hline
 218045 \quad \quad \quad 158599
 \end{array}$$

Twinn plate constant  $X = 23.1417 \quad Y = 165309$ 

$$S = +1.1417$$

$$\eta = -1.4691$$

$$\begin{array}{r}
 \log S = 0.05756 \\
 \log 5 = 999024 \\
 \hline
 810724
 \end{array}$$

$$\begin{array}{r}
 \log 1000 = 9.3355 \\
 01151 \\
 \hline
 70534 \\
 65040 -
 \end{array}$$

$$(S-A) = 1.56008$$

$$\eta_1 = -3$$

$$S-A = +3631$$

$$\eta_0 = -1.4688$$

$$A = 215725$$

$$\begin{array}{r}
 \log \eta_1 = 0.16696 \\
 7.33115
 \end{array}$$

$$A = 215801.31$$

$$(S-D) = 2.83581$$

$$\text{Red} = +39.2$$

$$S-D = -11252$$

$$X = 215805.23$$

$$D = -115450$$

$$S = -1206152$$

$$\text{Red} = +172$$

$$S' = -120558.0$$







8905

Red ad Cocum aph.

S - 12° 06' 15"

$$H + \alpha \quad 7^{\circ} \quad 50.3 = 117^{\circ} 34'$$

$$H \quad 9 \quad 52.3$$

$$\alpha \quad 21 \quad 58.0$$

$$G \quad 22 \quad 31.5$$

$$G + \alpha \quad 20 \quad 29.5 = 307^{\circ} 22'$$

$$\log S \quad 9.9902$$

$$i \quad 0.6604$$

$$(i) \quad 0.6506$$

$$\log(F+X) \quad 9.7831$$

$$S \quad 1.2496$$

$$\sin \quad 9.9002m$$

$$\tan S \quad 9.3313m$$

$$8.8239$$

$$\log S \quad 9.3216m$$

$$\cos(H+\alpha) \quad 9.6654m$$

$$R \quad 1.3000$$

$$\sin \quad 9.9477$$

$$\sec S \quad 0.0098$$

$$8.8239$$

$$S' \quad 1.0327$$

$$S \quad 9.3050$$

$$h' \quad 0.2870$$

$$h \quad 0.0814$$

$$f \quad + 2.508$$

$$S \quad + 0.202$$

$$h \quad + 1.206$$

$$+ 3.916 \checkmark$$

$$S' \quad + 10.78$$

$$h' \quad + 1.94$$

$$i \quad + 4.47$$

$$17.19 \checkmark$$







8905 Red ad Ocean -  $\Delta \alpha = 12^{\circ} 06' 11''$

$$H + \lambda \quad 7 \quad 50.3 = 117^{\circ} 34'$$

$$H \quad 9 \quad 52.3$$

$$\lambda \quad 21 \quad 58.0$$

$$G \quad 22 \quad 31.5$$

$$G + \lambda \quad 20 \quad 29.5 = 307^{\circ} 22'$$

$$L_{\text{obs}}(H + \lambda) \quad 9.7831$$

$$S \quad 1.2496$$

$$L_{\text{obs}} \quad 9.9002$$

$$T_{\text{obs}} \quad 9.3313$$

$$8.8239$$

$$S' \quad 1.0327$$

$$S \quad 9.3050$$

$$H \quad + 2.508$$

$$S \quad + 0.202$$

$$H \quad + 1.206$$

$$+ 3.916$$

$$L_{\text{obs}} \quad 9.9902$$

$$L \quad 0.6604$$

$$L \quad 0.6506$$

$$L_{\text{obs}} \quad 9.3216$$

$$L_{\text{obs}}(H + \lambda) \quad 9.6654$$

$$L \quad 1.3000$$

$$L \quad 9.9477$$

$$L_{\text{obs}} \quad 0.0098$$

$$8.8239$$

$$L' \quad 0.2870$$

$$L \quad 0.0814$$

$$S' \quad + 1.078$$

$$L' \quad + 1.97$$

$$L \quad + 4.77$$

$$17.19$$







8905 Luman Parallax.

$$\alpha = 21^h 58^m 05^s 23$$

$$\delta = 22 \quad 56 \quad 07.4$$

$$+ 58 \quad 02.2$$

$$+ 14^0 30' 33''$$

$$+ \quad \quad \quad 5 \quad 32$$

$$14 \quad 25 \quad 00$$

$$9.95727^{\circ}$$

$$0.00000$$

$$001390^{\circ}$$

$$997117^{\circ}$$

$$\delta = 43 \quad 06 \quad 00^{\circ}$$

$$-12 \quad 05 \quad 58^{\circ}$$

$$55 \quad 11 \quad 58$$

$$982640^{\circ}$$

$$823103^{\circ}$$

$$991442^{\circ}$$

$$0.16541^{\circ}$$

$$8.13728$$

$$S-S' \quad + 47 \quad 09.4$$

$$S \quad - 11 \quad 18 \quad 48.6 \quad \alpha \quad 21 \quad 58 \quad 49.48$$

$$\text{Cur Eph S} \quad - 11 \quad 18 \quad 57.0 \quad \alpha = 21 \quad 58 \quad 48.83$$

$$O-C \quad + 2.4 \quad + 0.65$$

$$\text{Curv. of Plate} \quad + 0.6 \quad \text{Curv} \quad - 0.1$$

$$2^{\text{nd}} \text{ Ord. Refrac} \quad + 0.1 \quad \text{2nd Corr} \quad + 0.03$$

$$\text{2nd Corr} \quad + 0.3 \quad \alpha = 21 \quad 58 \quad 49.50$$

$$S \quad - 11 \quad 18 \quad 48.2 \quad O-C \quad + 0.67$$

$$O-C \quad + 2.8$$

$$S = -12^0 05' 58''.0$$

$$\Gamma \quad 58' 31''.40$$

$$9.86913$$

$$8.23103$$

$$9.39887$$

$$0.00853$$

$$7.50756$$

$$\alpha - \alpha' = + 11 \quad 03.72$$

$$+ 44.25$$







8905 Luman Parallax.

 $\alpha = 21^{\circ} 58' 05.23$  $\delta = 22^{\circ} 56' 07.4$  $+ 58' 02.2$  $+ 14^{\circ} 30' 33''$  $+ 5' 32''$  $14 25 00$ 

995727

000000

001390

997117

 $\delta = 43^{\circ} 06' 00''$  $- 12^{\circ} 05' 58''$  $55^{\circ} 11' 58''$ 

982640

823103

991000

0116541

813728

 $S-S' + 4T = 09.4$  $S = 11^{\circ} 18' 48.6$  $\alpha = 21^{\circ} 58' 49.48$ Cur Eph S  $- 11^{\circ} 18' 51.0$  $\alpha = 21^{\circ} 58' 48.83$  $O-C + 2.4$  $+ 0.65$ Cur. of Plate  $+ 0.6$ Cur  $- 0.1$ 2nd Cor  $+ 0.03$ 2nd Ord Refrac  $+ 0.1$  $\alpha = 21^{\circ} 58' 49.50$ 2nd Cor  $+ 0.3$  $S = 11^{\circ} 18' 48.2$  $O-C + 0.67$











