

KG

11366

v. 1034

C LXXXVII

182



Plate No.	Date	Page
12775	Apr. 4, 1917	1
13018	Jul. 7. "	11
13019	" " "	21

12775

Star Measures.

1	16265	19427	16442	18000
156	994543	1575761	1312220	11320
53	43	65	18	20
	65	27	42	00
	<u>15.6322</u>	<u>15.6334</u>	<u>5.3322</u>	<u>5.3320</u>
2	16980	17000	16110	17672
187	1032429	1365051	968082	14090
237	34	52	84	90
	80	00	10	72
	<u>18.6651</u>	<u>18.6651</u>	<u>23.6428</u>	<u>23.6418</u>
3	19620	16480	16990	18350
329	10370	1573532	1365756	1167276
143	70	29	55	80
	20	80	90	50
	<u>32.9250</u>	<u>32.9252</u>	<u>14.3334</u>	<u>14.3326</u>

Moon

1		17895	17160
23		9685	1536062
39		85	64
		95	00
		<u>13.8210</u>	<u>13.8202</u>
2	16695	16791	
229	8480	1501006	
14	80	02	
	95	91	
	<u>22.8215</u>	<u>22.8215</u>	
3	16652	16152	
225	12818	998878	
5	18	68	
	52	58	
	<u>22.3834</u>	<u>22.3820</u>	

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Star Measures.

L	16265	19427	16443	18000
156	9945 ⁴³	1575 ⁷⁶¹	73122 ²⁰	11320
53	48	65	18	20
	65	27	42	00
	<u>15.6322</u>	<u>15.6339</u>	<u>5.3322</u>	<u>5.3320</u>
2	16980	17000	16130	17672
187	10324 ²⁹	1365 ⁰	9680 ⁸²	14090
237	34	52	84	90
	80	00	10	72
	<u>18.6651</u>	<u>18.6651</u>	<u>23.6422</u>	<u>23.6418</u>
3	19620	16480	16990	18350
329	10370	15735 ³²	136575 ⁶	1167276
143	70	29	55	80
	20	80	90	50
	<u>32.9250</u>	<u>32.9252</u>	<u>14.3334</u>	<u>14.3326</u>

Moon

L			17895	17160
23			9685	15360 ⁶²
139			85	64
			95	00
			<u>13.8210</u>	<u>13.8202</u>
2	16695	16791		
29	8980	15010 ⁰⁶		
14	80	02		
	95	91		
	<u>22.8115</u>	<u>22.8215</u>		
2	16652	16155		
275	12818	9988 ⁷⁸		
15	18	68		
	52	58		
	<u>22.3834</u>	<u>22.3820</u>		

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Moon

2

4	16650	16160
225	12920	990297
152	20	92
4	50	60
	<u>22.3730</u>	<u>22.3737</u>

5	16905	16157
227	1135754	1169702
16	51	07
	05	57
	<u>22.5551</u>	<u>22.5545</u>

6	16502	17750
23	10467	13792
16.6	57	92
	02	50
	<u>16.6040</u>	<u>16.6042</u>

1	16065	17130
24	15612	7570
17	22	74
	65	30
	<u>17.0448</u>	<u>17.0442</u>

8	16048	16422
242	15428	70323
17	22	30
	48	22
0	<u>17.0623</u>	<u>17.0609</u>

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Moon

2

4	16650	16160
325	12920	990297
152	20	92
V	50	60
	<u>22.3730</u>	<u>22.3797</u>

5	16905	16157
227	1135754	1169702
16	51	07
	05	57
	<u>22.5551</u>	<u>22.5545</u>

6
23
16.6

16502	17750
10467	13792
57	92
02	50
<u>16.6040</u>	<u>16.6042</u>

1
24
17

16065	17130
15612	7570
22	74
65	30
<u>17.0448</u>	<u>17.0442</u>

8
242
17
8

16048	16422
15428	70323
22	30
48	22
<u>17.0623</u>	<u>17.0609</u>

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Juno. Etc

3

Date Apr. 4. 1917

Exp to Stars	11	35		11	47
" moon	11	40	56.2 ✓	11	40 56.4 ✓
Clock fast		14	58.0 ✓		

H Sid. Time	11	25	58.35	8 - +0 ^h 21 ^m
" Gang	04	44	31.05	
G Sid. Time	16	10	29.35	
" " M.V.	0	48	55.26 ✓	
Interval	15	21	34.09 ✓	
Red		02	30.98 ✓	
G. M. T	15	19	03.11	15 ^h 31 753 ✓

From Naut. Alman

R.A.

Dec

moon 15 ^h	11	04	28.74 ✓	+ 01 10	38.1 ✓
motion 1 ^m			1.829 ✓		12.913 ✓
" 19.0518 ✓			34.84 ✓	- 04	06.0 ✓
Saturn Place.	11	05	03.58 ✓	+ 01 06	32.1 ✓

Moon's age 13^d

934" = 11.7 ✓

$a = -500.9$
 $+ 24$
 $- 476.9$

Parallax	54	40.4 ✓
Semi-diam.	14	55.5 ✓
" R		895.5 ✓
Ang		10.8 ✓
g _h 5		-0.3 ✓
" R		906.0 ✓
" R		1942.1 ✓
a R		-926 ✓
(1+a) R		1.849.5 ✓
R ₂		3420.6 ✓

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Juno. Etc

Date Apr 4 1917

Exp h Stars	11	35		11	47
" moon	11	40	56.2	11	40 56.4
Clock fast		14	58.0		

H Sed. June	11	25	58.3	$\phi - + 0^h 21^m$
" Song	04	44	31.05	
G Sed June	16	10	29.35	
" " " " " " " "	0	48	55.26	
Interval	15	21	54.09	
Red		02	30.98	
G M. T	15	19	03.11	15 ^h 31 753

From Naut. Alman		RA		Dec
Moon 15 ^h	11	04	28.74	+ 01 10 38.1
Motion 1 ^m			1829	12.913
" 19.0518			39.84	- 04 06.0
Saturn Place	11	05	03.58	+ 01 06 32.1

Moon age 13^d

939' = 11.7

$a = -500.9$
 $+ 24$
 $- 476.9$

Parallax	54	40.4
Semi diam	14	55.5
R		895.5
Ang		10.8
3 rd 5		-0.3
R		906.0
R		1942.1
a R		-926
1 + a R		1849.5
R2		3420.6

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Plate Constants

4

X	15.6328	18.6651	32.9251
$\bar{X}$	15.5313	18.8123	33.7373
$X - \bar{X}$	+1015	-1472	-.8122

y	5.3321	23.6423	14.3330
$\bar{y}$	4.4077	23.6287	13.7725
$y - \bar{y}$	+.9244	+.0136	+.5605

$X - \bar{X} + 500 X$	+52.94	+9X - 9129
+1015 + 7816 =	8831 + 283 =	9114 + 15 = 9129
-1472 + 9333 =	7861 + 1251 =	9112 + 17 = 9129
-8122 + 16463 =	8341 + 758 =	9099 + 30 = 9129
242216 + 12111	+ 805	+ 22 = 246025

$y - \bar{y} + 500 y$	-53.1X	+63y - 11115
+9244 + 2666 =	11910 - 829 =	11081 + 33 = 11114
+0136 + 11821 =	11957 - 991 =	10966 + 149 = 11115
+3605 + 7167 =	12772 - 1747 =	11025 + 90 = 11115
152107 + 7605	-1286	+96 = 147407

Table, $a = +0.4$	$b = -2.2$	$a - b = +2.6$	$b + d = 0.0$
Cts. - 500.9	-506.3	+5.4	+0.2
-5013	-504.1	+2.8	+0.2

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Plate Constants

4

$$\begin{array}{r} X \\ \bar{X} \\ X - \bar{X} \end{array} \quad \begin{array}{r} 15.6328 \\ 15.5313 \\ +1015 \end{array}$$

$$\begin{array}{r} 18.6651 \\ 18.8123 \\ -1472 \end{array}$$

$$\begin{array}{r} 32.9251 \\ 33.7373 \\ -8122 \end{array}$$

$$\begin{array}{r} y \\ \bar{y} \\ y - \bar{y} \end{array} \quad \begin{array}{r} 5.3321 \\ 4.4077 \\ +.9244 \end{array}$$

$$\begin{array}{r} 23.6423 \\ 23.6282 \\ +.0136 \end{array}$$

$$\begin{array}{r} 14.3330 \\ 13.7725 \\ +.5605 \end{array}$$

$$\begin{array}{l} X - \bar{X} + 500X \\ +1015 + 7816 = \\ -1472 + 9333 = \\ -8122 + 16463 = \\ 242216 + 12111 \end{array}$$

$$\begin{array}{l} +5294 \\ 8831 + 283 = 9114 + 15.9129 \\ 7861 + 1251 = 9112 + 17.9129 \\ 8341 + 758 = 9099 + 30.9129 \\ +805 + 22 = 246 \end{array}$$

$$\begin{array}{l} y - \bar{y} + 500y \\ +9244 + 2666 = 11910 - 829 = 11081 + 33 = 11114 \\ +0136 + 11821 = 11957 - 991 = 10966 + 149 = 11115 \\ +3605 + 7167 = 12772 - 1747 = 11025 + 90 = 11115 \\ 152107 + 7605 = -1286 + 96 = 1474 \end{array}$$

$$\begin{array}{l} \text{Table } a = +0.4 \quad b = -2.2 \quad c = +2.6 \quad d = 0.0 \\ \text{Obs.} - 500.9 \quad -506.3 \quad +54 \quad +0.2 \end{array}$$

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Moon's Center

 Δx 5
0-0

1	23.0000	-1.2230	0	1.4957	3.4326	+120
2	22.8215	-1.4015	0	1.9642	3.4336	+130
3	22.3827	-1.8403	0	3.3867	3.4316	+110
4	22.3733	-1.8497	0	3.4214	3.4214	+8
5	22.5548	-1.6682	0	2.7829	3.4040	-166
6	23.0000	-1.2230	0	1.4957	3.4343	+139
7	24.0000	+0.2230	0	0.0497	3.4092	-114
8	24.2230	-0.0000	0	0.0000	3.4225	+19
					3.4206	

 Δy

Arc.

1	13.8206	-1.3914	-3	1.9369	2.21
2	14.0000	-1.2120	-2	1.4694	2.29
3	15.0000	-0.2120	-0	0.0449	2.64
4	15.2120	-0.0000	-0	0.0000	2.70
5	16.0000	+0.7880	+1	0.6211	2.95
6	16.6041	+1.3921	+3	1.9388	3.19
7	17.0445	+1.8325	+4	3.3595	3.53
8	17.0616	+1.8496	+4	3.4225	3.60

Range

139

Approx. Center

X = 23 y = 13.8206

16.6041

30.4247

y = 15.2120

y max 17.0616

R 1.8492

Com R 1.8495

X min 22.3733

X0 24.2230

Y0 15.2120

Moon
center

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Moon's Center

AT

5
0.2

1	23 00 00	- 1 2 2 30	0	1.4957	3.4 3 2 6 +1
2	22 22 15	- 1 4 0 15	0	1.9642	3.4 3 3 6 -1
3	22 38 27	- 1 8 4 03	0	3.3867	3.4 3 1 6 +1
4	22 37 33	- 1 8 4 97	0	3.4214	3.4 2 1 4 +
5	22 55 48	- 1.66 8 2	0	2.7829	3.4 0 4 0 -1
6	23 00 00	- 1 2 2 30	0	1.4957	3.4 3 4 0 +1
7	24 00 00	+ 0 2 2 30	0	0.0497	3.4 0 9 2 -1
8	24 22 30	- 0 0 0 0	0	0.0000	3.4 2 2 5 +
					3.4 2 0 6

dy

arc.

1	13 82 06	- 1.39 1 4 - 3	1.9369	2 21
2	14 00 00	- 1.2 1 2 0 - 2	1.4694	2 29
3	15 00 00	- 0.2 1 2 0 - 0	0.0449	2 64
4	15 21 20	- 1.0 0 0 0 - 0	0.0000	2 70
5	16 00 00	+ 0.1 8 8 0 + 1	0.6211	2 95
6	16 60 41	+ 1.39 2 1 + 3	1.9388	3 19
7	17 04 45	+ 1.8 3 2 5 + 4	3.3595	3 53
8	17 06 16	+ 1.8 4 9 6 + 4	3.4225	3 60

Range

139

approx Center

X - 23 y. 13 82 06

16 60 41

30 42 47

y₀ 15 21 24

y max 17 06 16

R 1.84 92

Com R 1.84 95

X min 22. 37 33

X₀ 24. 22 30y₀ 15 21 20Moon
Center

Formation of Normals

1	+ 1.70	- 14.65	- 167.0
2	+ 1.69	- 182.1	- 157.7
3	+ 0.39	- 202.2	- 22.0
4	+ 0.00	- 14.8	- 0.0
5	- 1.32	+ 278.0	- 13.0
6	- 1.70	- 170.0	+ 193.2
7	- 0.40	+ 25.0	- 208.0
8	- 0.00	- 2.0	+ 35.2
	+ 3.78	+ 303.0	+ 228.4
	- 34.2	- 715.6	- 567.7
	+ 03.6	- 412.6	- 339.3

	a	b	c	Cor 0-c
a = - 5	+ 6	- 3	- 4	+ 46 ✓
	+ 7	- 2	- 2	+ 58 ✓
	+ 9	- 1	+ 1	+ 55 ✓
b = + 2	+ 9	- 0	+ 2	- 41 ✓
	+ 8	+ 1	+ 2	- 190 ✓
c = - 7	+ 6	+ 3	+ 2	+ 143 ✓
	+ 1	+ 4	- 2	- 80 ✓
	+ 0	+ 4	- 3	+ 58 ✓

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Conditional Equations

0-6

1	-1.22	-1.39	= +120	+34	+36	= +70	+50
2	-1.40	-1.27	= +130	+39	+31	= +70	+60
3	-1.84	-0.21	= +110	+51	+3	= +56	+54
4	-1.85	-0.00	= +8	+51	+0	= +51	+43
5	-1.67	+0.79	= -166	+46	-20	= +26	-192
6	-1.22	+1.39	= +139	+34	-36	= -2	+141
7	-0.22	+1.83	= -114	+6	-42	= -36	-78
8	-0.00	+1.85	= +19	+0	-42	= -42	+61

+366-313

ar85

$$+14.60 + 0.36 = -412.6 - 9.42$$

$$+ 0.36 + 12.79 = -339.3 + 3.05$$

$$(-) - 0.0 = +10.2$$

$$+0.26 \Delta$$

$$+12.79 = -329.1$$

$$b = -25.7^{\circ}$$

$$+14.60 = -412.6 + 93 = -403.3$$

$$a = -27.6$$

$$-0.65 \Delta$$

arc 139

$$R = 1.85$$

$$\frac{P}{n} = .09^{\circ}$$

$$-2Rc = -0.37$$

$$\frac{\Sigma R}{n} = +6.6^{\circ}$$

$$\Delta h = -0.10 \quad \Delta S = -0.0$$

$$\frac{+6.6}{.09} = +73.3$$

$$\Delta a = +0.24 \quad \Delta \alpha = +0.01$$

$$\Delta R = +0.9^{\circ}$$

$$\text{corr } +0.1$$

$$\text{True } \Delta R = +0.8$$

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Conditional Equations

6

$$\begin{array}{rcl}
 +1.22 & -1.39 & = +1.20 \\
 -1.40 & -1.22 & = +1.30 \\
 -1.84 & -0.21 & = +1.10 \\
 -1.85 & -0.00 & = +0.8 \\
 -1.67 & +0.79 & = -1.66 \\
 -1.22 & +1.39 & = +1.39 \\
 -0.22 & +1.84 & = -1.14 \\
 -0.00 & +1.85 & = +1.9
 \end{array}$$

$$\begin{array}{rcl}
 +34 & +36 & = +70 \\
 +39 & +31 & = +70 \\
 +51 & +5 & = +56 \\
 +51 & +0 & = +51 \\
 +46 & -20 & = +26 \\
 +34 & -36 & = -2 \\
 +6 & -42 & = -36 \\
 +0 & -42 & = -42
 \end{array}$$

$$+366 - 313$$

arr 85

$$+1.460 + 0.36 = -412.6 - 9.42$$

$$+ 0.36 + 12.79 = -339.3 + 3.05$$

$$1 - 1 - 0.0 = +10.2$$

$$+0.26 \Delta$$

$$+12.79 = -329.1$$

$$b = -25.7^{\circ}$$

$$+1.460 = -412.6 + 93 = -403.3$$

$$a = -27.6$$

$$-0.65 \Delta$$

arc 139

$$\frac{p}{n} = .09^{\circ}$$

$$\frac{\Sigma p}{n} = +6.6^{\circ}$$

$$\frac{+6.6}{.09} = +73.3^{\circ}$$

$$\Delta R = +0.9^{\circ}$$

$$\text{corr } \delta = +0.1$$

$$\text{True } \Delta R = +0.8$$

$$R = 1.85^{\circ}$$

$$-2R_c = -0.37$$

$$\Delta L = -0.10 \quad \Delta S = -0.0$$

$$\Delta a = +0.24 \quad \Delta \alpha = +0.01$$

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Moon's Mean Position

7

 X_0 24.2230

- 14

24.2216 ✓

 Y_0 15.2120

- 13

15.2107

From Plate Constants.

24.6025 ✓

22.

 $S_0 + 2.6025$ ✓

14.7407

18

- 3.2593 ✓

 $\log S_0$ 0.41539 ✓ $\log \cos \delta$ 9.99998 ✓

8.50724

 $\log \sin(\alpha - H)$ 1.90817 ✓ $\log \tan \delta$

3.2

7.9476

0.8308 ✓

7.0534

 $\log \eta_1$

5.8318

 $\alpha - A$ 01 20.94 ✓ $\eta_1 = -0.0$ $\eta_1 = -3.2593$ A 11 03 25.71 $\log \eta_0$ 0.51312 ✓ δ_0 11 04 46.65 ✓

7.33115

 Red. + 2.87 ✓ $\log \cos \delta - D$ 3.18197 ✓ α' 11 04 49.52 ✓ $\delta - D$ -15.20.4 ✓

- 25.20.4 ✓

 D 0 55 48.6 ✓ δ_0 0 30 28.2 ✓ Red. -18.3 δ' 0 30 09.9 ✓

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Mean Mean Position

7

$$\begin{array}{r} X_0 \quad 24 \ 22 \ 30 \\ \quad \quad -14 \\ \hline 24 \ 22 \ 16 \end{array}$$

$$\begin{array}{r} y_0 \quad 15 \ 21 \ 20 \\ \quad \quad -13 \\ \hline 15 \ 20 \ 07 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 24 \ 60 \ 25 \\ 22 \\ \hline S_0 + 2 \ 60 \ 25 \end{array}$$

$$\begin{array}{r} 14 \ 74 \ 17 \\ 18 \\ \hline -3 \ 25 \ 93 \end{array}$$

$$\begin{array}{l} \log S_0 \quad 0.41539 \\ \log \cos \delta \quad 9999998 \\ \hline 8.50724 \\ \log \mu - H \quad 490817 \end{array}$$

$$\begin{array}{l} \log \tan \delta \\ S_0 \quad 2 \\ \hline \log n_1 \end{array} \quad \begin{array}{r} 79 \ 476 \\ 0.8308 \\ 7.1534 \\ 5.8318 \end{array}$$

$$\alpha \cdot A \quad 01 \quad 80.94$$

$$\begin{array}{r} n_1 \quad -3.2593 \\ n_0 \quad -3.2593 \end{array}$$

$$A \quad 11 \quad 03 \quad 2571$$

$$\alpha_0 \quad 11 \quad 04 \quad 4665$$

$$\log n_0 \quad 0.51312$$

$$\text{Red.} \quad +2.87$$

$$\log \cos \delta - 2 \quad 7.33115$$

$$\alpha' \quad 11 \quad 04 \quad 4952$$

$$\begin{array}{r} S \ D \quad -15 \ 20.4 \\ \quad \quad -25 \ 20.4 \\ D \quad 0 \ 55 \ 48.6 \end{array}$$

$$D_0 \quad 0 \ 30 \ 28.2$$

$$\text{Red} \quad -18.3$$

$$S' \quad 0 \ 30 \ 09.9$$

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Lunar Parallax

8

α'	11	0.4	49.52 $^{\circ}$	$\checkmark$					
θ	11	25	58.30 $^{\circ}$	$\checkmark$		π	54	40.4	$\checkmark$
$\theta - \alpha'$	+	21	08.78						
$=$	+	50	17	11.70 $^{\circ}$					
$\frac{1}{2}\alpha - \alpha'$	+	01	51.82 $^{\circ}$	$\checkmark$		$\log \sin \pi$		9.86913	
$\theta - \alpha - \frac{1}{2}\alpha - \alpha'$	+	50	15	19.88 $^{\circ}$	$\checkmark$	" $\sin \alpha'$		8.20148 $^{\circ}$	$\checkmark$
						" $\sec \theta$		8.96444 $^{\circ}$	$\checkmark$
						$\sin \alpha - \alpha'$		0.00008 $^{\circ}$	$\checkmark$
								7.03513	

	995727
$\log \cos \frac{1}{2}\alpha - \alpha'$	0.00000
$\sec \theta - \alpha - \frac{1}{2}(\alpha - \alpha')$	0.00183 $^{\circ}$
$\tan \gamma$	9.95910

$\alpha - \alpha'$	+ 223.64 $^{\circ}$
$=$	
$=$	+ 14.91 $^{\circ}$

$$\gamma + 42 \quad 18 \quad 21.6^{\circ}$$

$$\delta' + 0 \quad 30 \quad 09.9^{\circ}$$

$$\gamma - \delta' + 41 \quad 48 \quad 11.7^{\circ}$$

	982648
$\log \sin \pi$	8.20148 $^{\circ}$
" $\gamma - \delta'$	0.17193 $^{\circ}$
$\cos \gamma$	9.82383 $^{\circ}$
$\sin \delta - \delta'$	8.02366

$$\delta - \delta' \quad + 36 \quad 18.2^{\circ}$$

$$\delta \quad 01 \quad 06 \quad 28.1^{\circ}$$

$$\gamma - \delta \quad 01 \quad 06 \quad 32.1^{\circ}$$

$$\theta - \alpha \quad - 4.0^{\circ}$$

$$\text{curr.} \quad + 0.9^{\circ}$$

$$\text{2nd Ord. Ref.} \quad 0.0$$

$$\delta - \quad 01 \quad 06 \quad 29.0$$

$$\theta - \alpha \quad - 3.1$$

$$\alpha \quad 11 \quad 05 \quad 04.43^{\circ}$$

$$\gamma - \alpha \quad 11 \quad 05 \quad 03.58^{\circ}$$

$$\theta - \alpha \quad + 0.85^{\circ}$$

$$\text{curr.} \quad - 0.02^{\circ}$$

$$\alpha - 11 \quad 05 \quad 04.41$$

$$\theta - \alpha \quad + 0.83$$

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Lunar Parallax

α'	11	04	49.52
θ	11	25	58.30
$\phi - \alpha'$	+	21	08.78
$=$	+	50	17
$\frac{1}{2} \alpha' \cdot \alpha'$	+	01	51.82
$\phi - \alpha' - \frac{1}{2} \alpha' \cdot \alpha' + 50$	15	19.88	

 π " 54 404

	9.86913
$\log \sin \pi$	8.20148
" $\sin \gamma$	8.96444
sec	0.00008
$\sin \alpha \cdot \alpha'$	7.03513

	9.95727
$\log \cos \frac{1}{2} \alpha \cdot \alpha'$	9.90000
$\sin \theta - \alpha' - \frac{1}{2} (\alpha \cdot \alpha')$	0.00183
" $\sin \alpha \cdot \alpha'$	9.95910
$\log \sin \gamma$	

 $\alpha - \alpha' + 223.64$ $=$ $= + 14.91$ $\gamma + 42$ 18 1.6 $\delta + 0$ 30 09.9 $\gamma - \delta + 41$ 48 11.7

	9.82648
$\log \sin \pi$	8.20148
" $\sin \gamma - \delta'$	0.17493
$\cos \gamma$	9.82323
$\sin \delta - \gamma$	8.02366

 $\delta - \delta'$ 36 18.2 δ 01 06 28.1 $\gamma - \delta$ 01 06 32.1 $\phi - \alpha$ - 4.0

corr. + 0.9

2nd Ord. Ref. 0.0

 $\delta -$ 01 06 29.0 $\phi - \alpha$ - 3.1 α 11 05 04.43 $\gamma - \alpha$ 11 05 03.58 $\phi - \alpha$ + 0.85

corr. - 0.02

 $\alpha - 11$ 05 04.41 $\phi - \alpha$ + 1.83

1
15
19

2
23
27

3
29
9.4

4
23.3
9.6

1
26
14.0

2
26
15

13018

Star Measures

11

1	195.23	164.50	189.52	160.44
15.7	117.60 ⁵⁷	142.10	152.20 ²⁴	97.64
19.3	5.4	1.0	2.8	6.4
	2.3	4.6	5.2	4.4
	<u>1577.66</u>	<u>1577.62</u>	<u>1937.28</u>	<u>1937.20</u>
2	177.33	162.58	163.02	162.20
23.8	92.82	147.15	132.70 ⁷²	92.20
27.3	8.4 ⁸³	1.7 ¹⁶	7.4	2.0
	3.3	5.0	9.2	1.0
	<u>2384.60</u>	<u>2384.60</u>	<u>2730.27</u>	<u>2730.07</u>
3	165.20	161.73	188.32	168.60
29.4	125.10 ¹⁴	101.82 ⁷⁷	148.22 ²⁶	108.40 ⁴⁵
9.4	1.8	7.2	3.0	5.0
	1.0	6.3	2.0	5.0
	<u>2940.02</u>	<u>2940.10</u>	<u>940.01</u>	<u>939.91</u>
4	168.80	164.80	165.67	169.18
23.3	142.72 ⁷⁴	90.72 ⁷⁸	94.80	139.70 ⁷⁴
9.6	7.6	8.4	8.0	7.8
	8.0	8.0	6.7	0.8
	<u>2326.06</u>	<u>2325.98</u>	<u>970.87</u>	<u>970.66</u>

Moon

1		169.60	174.65 ⁺
26		120.50	123.60
14.5		5.0	6.0
		6.0	6.5
		<u>1449.10</u>	<u>1448.95</u>
2	178.22	171.72	
26.7	155.26 ²⁹	94.68 ⁶⁹	
15.0	3.2	7.0	
	2.2	7.2	
	<u>2622.93</u>	<u>2622.97</u>	

1
15
19

2
23
27

3
29
9.4

4
23.3
1.6
1

1
26
2
24

1
26
25

13018

Star Measures.

11

1 195.23 164.50
 15.7 117.60⁵⁷ 142.10
 19.3 5.4 1.0
 23 46
1577.66 1577.12

189.52 160.44
 152.20²⁴ 97.64
 28 64
 52 44
1937.28 1937.20

2 177.33 162.58
 23.8 92.82 147.15
 27.3 84⁸³ 18.16
 33 50
2384.50 2384.60

163.02 162.20
 132.70⁷² 92.20
 74 20
 92 20
2730.27 2730.07

3 165.20 161.73
 29.4 125.10 101.82⁷⁷
 9.4 18¹⁴ 72
 10 63
2940.02 2940.10

188.32 168.60
 148.22²⁶ 108.40
 30 50
 20 56
940.01 939.91

4 168.80 164.80
 23.3 142.72 90.72⁷⁴
 16 76⁷⁴ 84⁷⁴
 80 80
2326.06 2325.98

165.67 169.18
 94.80 139.70
 50 78
 67 08
970.87 970.66

Moon.

↓
 26
 2
 14.5
 169.60 174.65
 120.50 123.60
 50 60
 60 60
1449.10 1448.92

178.22 171.72
 26.3 155.26²⁹ 94.68⁶⁹
 35.5 32 70
 22 72
2622.93 2622.97

3
26
15
4
26
16
5
26
16
6
26
17
7
24
17
8
2
1

Mean Measures

12

3 1 6 5 7 8 1 6 4 5 4
 1 3 5 8 2 9 4 6 0
 26.3 8 2 6 0
 15.5 7 8 5 4
 x 26.3004 26.3006

4 1 6 0 1 5 1 6 4 2 2
 26.2 1 3 5 1 4,3 8 9 3 4
 16.0 1 2 3 4
 1 5 2 2
 26.2502 26.2512

5
 26.
 16.6
 1 6 5 2 0 1 6 9 1 5
 1 0 4 1 0 1 3 0 4 0
 1 0 4 0
 2 0 1 5
 16.6110 16.6120

6
 25.0
 17.4
 1 8 1 3 0 1 7 6 2 8
 1 3 6 5 2 1 2 1 6 2
 5 2 0 2
 3 0 2 8
 17.4478 17.4474

7
 24.4
 17.5
 1 8 4 4 4 1 7 3 4 0
 1 2 5 7 2 1 3 2 1 6
 7 2 1 6
 4 4 4 0
 17.5872 17.5876

8
 24
 17.5
 1 8 6 7 0 1 7 0 8 4
 1 2 9 7 6 1 2 7 7 6
 7 6 7 6
 7 0 8 4
 17.5694 17.5692

3
26
15
7
4
26
16

5
26
6

6
25
7

7
24
7

8
2
1

Moon Measures

12

3	16578	16454
	13582	9460
26.3	82	60
15.5	78	54
X	<u>263004</u>	<u>263000</u>

4	16015	16422
26.6	13514.3	8934
16.0	12	34
	15	22
	<u>262502</u>	<u>202512</u>

5	16520	16915
26.	10410	13040
6.6	10	40
	20	15
	<u>166110</u>	<u>166120</u>

6	18130	17628
25.0	13652	12102
7.4	52	02
	30	28
	<u>179478</u>	<u>174474</u>

7	18444	17340
24.4	12572	13216
7.5	72	16
	44	40
	<u>175872</u>	<u>175876</u>

8	18670	17084
24	12976	12776
17.5	76	76
	70	84
	<u>175694</u>	<u>175692</u>

13018

Times Etc.

13

Date July 7, 1917

Exp to Stars.	21 ^h	27 ^m	✓	21	39 ^m	✓
moon	21	32	48.2	✓	21	32 48.4
clock fast		0	18.0	✓		

H. Sid. Time.	21	32	30.3	✓	$\theta = -40^m$
H. Long.	04	44	31.05	✓	"
G. Sid. Time	02 ^h	17	01.35	✓	
" " " M.M.	06	59	31.55	✓	
Quintal	19	17	29.80	✓	
Red.		03	09.63	✓	
G. M. T.	19	14	20.17	✓	19 ^h 2389

From Naut. Alman.	R.A.	Dec.
moon 19 ^h	22 11 59.41	-06 41 38.8
moon 1 ^m	2.2551	+15.126
" 14 ^m 33617	32.33	+3 35.4
Tabular Place	22 12 31.74	-06 38 03.4

934" = 10.2"

Moon's age 18^d 5^h

$$\begin{array}{r} a = -507.1 \\ + 24 \\ \hline 483.1 \end{array}$$

Parallax	60	20.9
Semi-dia	16	28.1
R		988.1
Cur		11.4
Sub 5		-0.3
R		999.2
R		2.1419
a R		-1035
(1+a) R		2.0384
R ²		4.1550

13018

Times etc.

13

Date July 7, 1917

Exp to Stars.	21 ^h	27 ^m		21	39
Moon	21	32	48.2	21	32 48.4
clock fast		0	18.0		

H. Sid Time	21	32	30.3	$\theta - - 40^m$
H. Young	04	44	31.05	"
S. Sid. Time	02 ^h	17	01.35	
" " " M.N.	06	59	31.55	
Quintant	19	17	29.80	
Red.		03	09.63	
C. M. T.	19	14	20.17	19 ^h 2389

From Naut Alman.	RA.	Dec.
Moon 19 ^h	22 11 59.41	-06 41 38.8
Motion 1 ^m	2.2551	+15.026
" 14 ^m 33617	32.33	3 35.4
Tabular Place	22 12 31.74	-06 38 03.4

934" = 10.2

Moon's age 18.5

$$\begin{array}{r}
 a = -507.1 \\
 + 24 \\
 \hline
 483.1
 \end{array}$$

Parallax	60	20.9
Semi-diam	16	28.1
R		988.1
Aug		11.4
Sub 5-		-0.3
R		999.2
R		2141.9
a R		1035-
1+a) R		2.0384
R ²		4.1550

Cape No. 3092 mag 4.3

22 11 33.49

33.49

33.47

22 11 33.48

53.83

22 12 27.31

22 11 45.66

+ 41.65

Sine A 41.65

1.61963

9.99555

0.12241

S₀ + 1.3256

+ 3

S 23.3259

X 23.2602

- 10.657 10973

- 0.8 16 52.5

52.8

52.6

- 0.8 16 52.6

+ 0.5 03.4

- 0.8 11 49.2

- 0.7 04 05.0

- 1 07 44.2

- 4064.7

3.60903m

log γ_0 0.94018m

9.1585m

0.2448

6.4567m

18

 γ_0 - 8.7132

- 3

 γ 9.2865 γ 9.7076

+ 4211 9065

13018

Standard Coordinates

14

Cape M'	3081 mag 7.4	3094 mag 5.7	3102 mag 5.3
C	22 07 27.40	22 11 53.29	22 14 56.25
Q		53.31	56.20
E	22 07 27.44	53.31	56.25
m	22 07 27.43	22 11 53.30	22 14 56.23
Proc.	53.53	53.26	53.78
α	22 0.8 20.96	22 12 46.56	22 15 49.93
A	22 11 45.66	22 11 45.66	22 11 45.66
$\alpha-A$	- 03 24.70	+ 01 00.90	+ 04 04.27
Sh	- 204.69	+ 60.90	+ 244.26
log	2.31110	1.78462	2.38785
mod	999686	999777	999550
SE	0.815202	0.28963	0.89059
S ₀	-6.5343	+1.9482	7.7730
S ₁	- 6	+ 5	27
S	15.4651	23.9487	29.7757
X	15.7764	23.8455	29.4006
X-S	+ 8113	- 1032	- 3751
C	- 06 57 48.6	- 05 53 11.6	- 8 19 23.8
Q		48.6	11.5
E		48.3	11.7
m	- 06 57 48.5	- 05 53 11.6	- 8 19 24.0
Proc	+ 05 0.8	+ 05 04.4	+ 05 05.8
S	- 06 52 47.7	- 05 48 07.2	- 8 14 18.2
D	- 07 04 05.0	- 07 04 05.0	- 7 04 05.0
S-D	+ 11 17.3	+ 1 15 57.8	- 1 10 13.2
Sh	+ 677.3	+ 4558.5	- 4213.8
log	2.83078	3.65882	3.62467
log m	0.16193	0.98997	0.95582
log tan δ	9.0815	9.0069	9.1607
S ₂	1.6303	0.5793	1.7811
m	7.7652	6.6396	7.9952
m ₀	+1.4519	+0.7718	-9.0328
m ₁	- 58	- 4	- 99
m	19.4461	27.7714	8.9573
y	19.3724	27.3017	9.3996
y-m	- 0737	- 4697	+ 4423

13018

Standard Coordinates

19

Cafe	m'	3081	mg 74	3094	mg 57	3102	mg 53			
C	22	07	27.40	22	11	53.29	22	14	56.25	
Q			27.46			53.31			56.20	
E	22	07	27.44			53.31			56.25	
m	22	07	27.43	22	11	53.30	22	14	56.23	
Prec.			53.53			53.26			53.70	
α	22	08	20.96	22	12	46.56	22	15	49.93	
A	22	11	45.66	22	11	45.66	22	11	45.66	
$\alpha - A$	-	03	24.70	+	01	00.90	+	04	04.27	
Sum			-244.69			+6090			+244.26	
log	2.31	11.0		1.78	46.2		2.38	78.5		
cos δ	999	686		999	777		999	550		
$\sin \delta$	0.81	520		0.28	963		0.89	059		
S_0	-6.53	43		-19.48	2		7.77	30		
S_1	-	6		-	5		-	27		
S	15.46	51		23.94	87		29.77	57		
I	15.77	64		23.84	55		29.40	06		
$A-S$	+	31.13		-	10.32		-	37.51		
C	-0.6	57	48.6	-0.5	53	11.6	-8	19	28.8	
Q			48.6			11.5			23.7	
E			48.3			11.7			24.6	
m	-0.6	57	48.5	-0.5	53	11.6	-8	19	28.0	
Prec		+0.5	0.8		+0.5	04.4		+0.5	05.8	
S	-0.6	52	47.7	-0.5	48	07.2	-8	14	18.2	
Θ	-0.7	04	05.0	-0.7	04	05.0	-7	04	05.0	
S_0	+	1.1	17.3	+	1	15	57.8	-1	10	13.2
tan			+677.3			+4558.5			-4213.8	
log	2.83	078		3.65	882		3.62	467		
log m_0	0.16	193		0.98	997		0.95	582		
log $\tan \delta$	9.08	15		9.00	69		9.16	07		
S_0	1.63	03		0.57	93		1.78	11		
η_1	7.76	52		6.63	96		7.99	52		
m_0	+1.45	197		+	9.77	18		-9.03	28	
η_1	-	58		-	4		-	99		
η	19.44	66		27.77	14		8.95	73		
η	19.37	24		27.50	17		9.39	46		
$\eta - \eta_1$	-	0757		-	4697		+	4423		

S	η	α	-2.55	-4
-6.53	+1.45	-7	+16 =	+9
+1.32	-8.71	+3	-3 =	0
+1.95	+9.78	+5	-5 =	0
+7.78	-9.03	+28	-19 =	+9

$$M + 2.38 \quad -2.58 \quad -6 = -10^{\checkmark} = -0.03$$

$\Delta\eta$	-2.2 η	+85	+1
+2	+3 = -1	-5 =	-6
-17	+19 = +2	+1 =	+3
+24	-21 = +3	+1 =	+4
-32	+20 = -12	+6 =	-6
	+6	+2 =	+9 = +0.4

X

S

1 15.7764

19.3724

11001

8949

2 23.2602

9.7076

10973

9065

3 23.8455

27.3017

10891

8954

4 29.4006

9.3996

10949

9123

39.04

29.08

21974

18014

58.25

36.70

21840

18077

39.62

46.67

21892

17903

52.66

19.10

21922

18188

- 14.21

- 7.62

+ 134

=

63

- 13.04

+ 27.57

=

30

=

285

+

+ 7.00

=

122

=

58.8

+ 34.57 - 15.2 = - 226.2

4 - 4.4

- 6.55

- 14.21

+ 134 - 335 = + 100.5

- 63 - 49.8 = 112.8

x - 7.07 + 7.92

+ 4.48
- 7.92 x+ 7.1 x
+ 6.557

13018

Plate Center & Constants

15

23.84.55	27.30.17	22.12	46.56	-5	48	0.72
22	18	-01	0.90	1	15	57.8
-1.84.55	-9.30.17					
33	490					
-60.90						

Plate Center { A 22^k 1.1 45.66 -

B - 7 04 05.00

x-3	+4.44	+7.1X	-11189
+3.113 + 7888 = 11001 + 85 = 11086 + 110 = 11196 + 7			
-0657 + 11630 = 10973 + 43 = 11016 + 165 = 11181 - 8			
-1032 + 11923 = 10891 + 120 = 11011 + 169 = 11180 - 9			
-3751 + 14710 = 10949 + 41 = 10990 + 208 = 11198 + 9			
24.2623 + 12131	+68	+172 =	24.3805

y-7	-79.2X	+6.55y	-8948
-0737 + 9686 = 8949 - 125 = 8824 + 127 = 8951 + 3			
+4211 + 4854 = 9065 - 184 = 8881 + 64 = 8945 - 3			
-4697 + 13651 = 8954 - 189 = 8765 + 179 = 8944 - 4			
+4423 + 4700 = 9123 - 233 = 8890 + 61 = 8951 + 3			
15.5488 + 7774	-192	+102 =	15.4224

Tables a = -0.8

-507.1

-506.3

l = -4.5

-506.6

-502.1

g-l = +3.7

-0.5

-4.2

h+d = +1.6

+3.5

+1.9

130118?

Plate Center + Constants.

15

$$\begin{array}{r}
 23.84.55 \\
 \underline{22} \\
 -1.84.55 \\
 \hline
 2.33 \\
 -60.90
 \end{array}
 \quad
 \begin{array}{r}
 27.30.17 \\
 \underline{18.} \\
 -9.30.17 \\
 \hline
 490
 \end{array}
 \quad
 \begin{array}{r}
 22.12.46.56 \\
 -01.090 \\
 \hline
 22.11.45.66
 \end{array}
 \quad
 \begin{array}{r}
 5.48.07.2 \\
 1.15.57.8
 \end{array}$$

$$\begin{array}{l}
 \text{Plate Center} \left\{ \begin{array}{l} 22.11.45.66 \\ \oplus = -7.04.05.0 \end{array} \right.
 \end{array}$$

$$\begin{array}{r}
 -3 \quad +4.44 \quad +7.17 \quad -11189 \\
 3199 + 7848 = 10001 + 85 = 11086 + 110 = 11196 + 7 \\
 6657 + 11630 = 10973 + 43 = 11016 + 165 = 11181 - 5 \\
 1032 + 11923 = 10891 + 120 = 11011 + 169 = 11180 - 9 \\
 3751 + 14700 = 10949 + 41 = 10990 + 208 = 11198 - 9 \\
 24.26.23 + 12.131 \quad +68 \quad +172 = 24.38.05
 \end{array}$$

$$\begin{array}{r}
 -7 \quad -79.24 \quad +6.55.8 \quad -8948 \\
 2737 + 9686 = 8949 - 1.25 = 8824 + 127 = 8951 + 3 \\
 4211 + 4854 = 9065 - 1.84 = 8881 + 64 = 8945 - 3 \\
 4697 + 13651 = 8954 - 1.89 = 8765 + 179 = 8944 - 4 \\
 4423 + 4700 = 9123 - 233 = 8890 + 61 = 8951 + 3 \\
 15.54.88 + 7.774 \quad -192 \quad +102 = 15.42.24
 \end{array}$$

$$\begin{array}{r}
 \text{akhs } a = -0.8 \quad l = -4.5 \quad G-l = +3.7 \quad t+d = +1.6 \\
 -50.71 \quad -50.66 \quad -0.5 \quad +3.5
 \end{array}$$

13018

Mass Center

	X	X - X ₀	ΔX	(X - X ₀) ²	(Y - Y ₀) ²	O-C 16.
1	26.0000	+1.7370	+1	3.0175	4.1436	-1.14
2	26.2295	+1.9665	+1	3.8675	4.1713	+1.63
3	26.3005	+2.0375	0	4.1514	4.1514	-3.6
4	26.2567	+1.9877	-0	3.9503	4.1520	-3.0
5	26.0000	+1.7370	-1	3.0168	4.1427	-1.23
6	25.0000	+0.7370	-2	0.5429	4.1426	-1.24
7	24.2630	+0.0000	-2	0.0000	4.1498	-5.2
8	24.0000	-0.2630	-2	0.0693	4.1457	-9.3
Cum R ²					4.1550	

	Y	Y - Y ₀	ΔY		arc.
1	14.4902	-1.0608	-4	1.1261	122"
2	15.0000	-0.5510	-2	0.3038	106"
3	15.5510	0.0000	+0	0.0000	90"
4	16.0000	+0.4490	+1	0.2017	177"
5	16.6117	+1.0607	+4	1.1259	58"
6	17.4476	+1.8966	+7	3.5997	21"
7	17.5874	+2.1364	+7	4.1498	0"
8	17.5693	+2.0183	+7	4.0764	353 129"

$$X = 26 \quad Y = 14.4902$$

$$16.6117$$

$$31.1019$$

$$Y_0 = 15.5510$$

$$Y_{\max} = 17.5874$$

$$R = 2.0364$$

$$\text{Cum R} = 2.0384$$

$$X_{\max} = 26.3005$$

$$X_0 = 24.2630$$

$$\text{Mass Center} \begin{cases} X_0 & 24.2630 \\ Y_0 & 15.5510 \end{cases}$$

13118

Moon Center

	X	X - X ₀	AX	(X - X ₀) ²	(Y - Y ₀) ²	O-C 10.
1	26.0000	+1.7370	+1	3.0175	41436	-114
2	26.2295	+1.9665	+1	3.8675	41713	+163
3	26.3005	+2.0375	0	4.1519	41514	-36
4	26.2517	+1.9877	0	3.9503	41520	-30
5	26.0000	+1.7370	-1	3.0168	41427	-123
6	25.0000	+0.7370	-2	0.5429	41426	-124
7	24.2630	+0.0000	-2	0.0000	41498	-152
8	24.0000	-0.2630	-2	0.0693	41457	-93
Com R ²					41550	

	Y	Y - Y ₀	AY	arc.
1	14.4902	-1.0608	-4	1.1261
2	15.0000	-0.5510	-2	0.3038
3	15.5510	0.0000	0	0.0000
4	16.0000	+0.4490	+1	0.2017
5	16.6117	+1.0607	+4	1.1259
6	17.4476	+1.8966	+7	3.5997
7	17.5874	+2.1364	+7	4.1498
8	17.5693	+2.0183	+7	4.0764
				353 129

X = 26 Y = 14.4902

16.6117

31.1019

Y₀ 15.5510Y_{max} 17.5874

R 2.0364

Com R. 2.0384

X max 26.3005

X₀ 24.2630

Moon Center

$$\begin{cases} X_0 & 24.2630 \\ Y_0 & 15.5510 \end{cases}$$

Formation of Normals

1	- 1.84	- 198.0	+ 121.0
2	- 1.08	+ 321.0	- 89.7
3	0.00	- 73.5	0.0
4	+ 0.89	- 159.8	- 13.5
5	+ 1.85	- 214.0	- 130.0
6	+ 1.40	- 92.0	- 236.0
7	0.00	00.0	- 106.1
8	- 0.52	+ 24.2	- 188.0
	+ 4.14	+ 345.2	+ 121.0
	- 3.44	- 637.3	- 763.3
	+ 0.70	- 292.1	- 642.3

		a	b	c	Cor. 0-C
		+ 7	- 3	- 4	- 141
a	+ 4	+ 8	- 2	- 2	+ 165
		+ 8	0	0	- 7
b	+ 3	+ 8	+ 1	+ 1	+ 18
		+ 7	+ 3	+ 2	- 50
c	- 8	+ 3	+ 6	+ 1	- 31
		+ 0	+ 6	- 2	+ 35
		- 1	+ 6	- 3	- 12

13018

Conditional Equations.

17

$x-x_0$	$y-y_0$					$0-c$
1 + 1.74	- 1.06	= - 114	- 24	+ 47	= + 23	- 137
2 + 1.97	- 0.55	= + 163	- 28	+ 24	= - 4	+ 167
3 + 2.04	0.00	= - 36	- 29	0	= - 29	- 7
4 + 1.99	+ 0.45	= - 30	- 28	- 19	= - 47	+ 17
5 + 1.74	+ 1.06	= - 123	- 24	- 47	= - 71	- 52
6 + 0.74	+ 1.90	= - 124	- 10	- 82	= - 92	- 32
7 0.00	+ 2.14	= - 52	0	- 89	= - 89	+ 37
8 - 0.26	+ 2.02	= - 93	+ 4	- 88	= - 84	- 9

+ 221 - 227

ax = 56

$$+ 18.61 + 0.70 = - 292.1 + 9.96$$

$$+ 0.70 + 14.58 = - 642.3 + 5.86$$

$$- () - 0.03 = + 11.0 - 0.37$$

+ 0.384

$$+ 14.55 = - 631.3$$

$$L = - 43.4$$

$$+ 18.61 = - 292.1 + 30.3 - 261.7 \quad a = - 14.0$$

+ 0.524

arc 129

$$P_n = .03$$

$$\frac{E K}{n} = 0.8$$

$$\frac{-0.8}{0.3} = -26.6$$

$$\Delta R = - 0.3$$

$$\text{corr. } + 0.1$$

$$\text{True } \Delta R = - 0.4$$

$$R = 2.04 \quad - 2 R_c = - 0.41$$

$$\Delta t = - 0.16 \quad \Delta \delta = - 0.1$$

$$\Delta a = - 0.21 \quad \Delta \alpha = - 0.01$$

3018

Conditional Equations.

17

$x - x_0$	$y - y_0$					$0 - C$
+1.74	-1.06	= -114	-24	+47	= +23	-137
+1.97	-0.55	= +163	-28	+24	= -4	+167
+2.04	0.00	= -36	-29	0	= -29	-7
+1.99	+0.45	= -30	-28	-19	= -47	+17
+1.74	+1.06	= -123	-24	-47	= -71	-52
+0.74	+1.90	= -124	-10	-82	= -92	-32
0.00	+2.14	= -152	0	-89	= -89	+37
-0.26	+2.02	= -93	+4	-88	= -84	-9

$$+221 - 1027$$

$$\text{or } 56$$

$$18.61 + 0.70 = -292.1 + 9.96$$

$$+0.71 + 14.58 = -642.3 + 5.86$$

$$-1 - 0.03 = +11.0 + 0.37$$

$$+0.390$$

$$+14.55 = -631.3$$

$$A = -48.4$$

$$+18.61 = -292.1 + 30.3 - 265.7 \quad g = -14.0$$

$$+0.520$$

$$\text{arc } 129$$

$$p_n = .03$$

$$\frac{E}{n} = 0.8$$

$$\frac{-0.8}{.03} = -26.6$$

$$.03$$

$$\Delta R = -0.3$$

$$\text{corr. } +0.1$$

$$\text{True } \Delta R = -0.4$$

$$R = 2.04 - 2R_c = -0.41$$

$$\Delta R = -0.16 \quad \Delta S = -0.1$$

$$\Delta g = -0.21 \quad \Delta \alpha = -0.01$$

13018

Moon Mean Position

18

24.2630''

- 7''

24.2623''

15.55510''

- 22''

15.5488''

Frame Plate Constants.

24.3805''

22

 $S_0 + 2.3805''$

15.4224''

18

 $\eta_1 + \eta_0 - 2.5776''$ $\log S_0$ 0.37667'' $\log S_0$ 9.99637''

8.50724

 $\log S_0 - A$ 1.87306'' $\alpha - A$ + 74.65''

+ .01 14.65''

A 22 11 45.66''

 α_0 22 13 03.1''

Red + 3.63

 α' 22 13 03.94'' $\log \eta_1 S$ 9.1140'' $\log S_0$ 0.7533''

7.0534

 $\log \eta_1$ 6.9207'' $\eta_1 -$ 0.0008'' η_0 2.5768'' $\log \eta_0$ 0.41108''

7.33115

 $\log \eta_1 S - B$ 3.07993'' $S - B$ -1202.1

- 20 02.1''

 B -07 04 05.0'' S_0 -07 24 07.1''

Red + 19.1

 S' -07 23 48.0''

13018

Mean Mean Position

18

24.2630

- 7

24.2623

15.55510

- 22

15.5488

From Plate Constants.

24.3805

22

 $S_0 + 2.3805$

15.4224

18

- 2.5776

15. 0.37667

45. 9.99637

8.56724

7.56 X-A 1.87306

 $\lambda - 2 + 74.65$

+ 01 14.65

A 22 11 45.66

 λ_0 22 13 0.31

Red + 3.63

 α' 2.22 13 03.94 $\log \tan \delta$ 9.1140 m $\log \delta_1$ 0.7533

7.1534

 $\log \eta_1$ 6.9207 m $\eta_1 - 0.0008$ η_0 2.5768 $\log \eta_0$ 0.41108 m

7.33115

 $\log \tan \delta_2$ 3.07993 m $\delta - \delta_2$ - 1.202.7

- 20 02.6

 δ - 07 04 05.0 δ_0 - 07 24 07.1

Red + 19.1

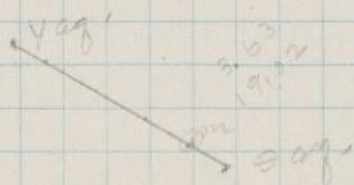
 δ' - 07 23 48.0

$$\begin{array}{r}
 Y \quad 22 \quad 17 \quad 25.734 \\
 \underline{22.185} \\
 + 3.549
 \end{array}$$

$$\begin{array}{r}
 -1 \quad 48 \quad 03.47 \\
 \underline{21.22} \\
 + 17.75
 \end{array}$$

$$\begin{array}{r}
 G \quad 22 \quad 12 \quad 30.948 \\
 \underline{27.295} \\
 + 3.653
 \end{array}$$

$$\begin{array}{r}
 -8 \quad 11 \quad 29.95 \\
 \underline{49.13} \\
 + 19.18
 \end{array}$$



0.00

+ 18

+ 3

- 0.2

- 0.7^D

- 1.2

- 1.7

- 2.2

21 19 17 15 13 11 9 7 5 3 1 22

13018.

Reduction to Apparent Place.

19

$H + \alpha_0$	9	15.8	$138^\circ 57''$	$\delta_0 - 0.7$	24.1
H	11	02.8			
α_0	22	13.0		$\log \cos \delta_0$	9.9964
G	23	42.3		$\log i$	0.3391
$\theta + \alpha_0$	21	55.3	$328^\circ 49.5''$	i	0.3355

$\log \cos \theta + \alpha_0$	9.9323
$\log g$	1.2414
$\sin \theta + \alpha_0$	9.7140 m
$\tan \delta_0$	9.1136 m
	8.8239

$\log g'$	1.7737
g	8.8929

q	+ 2.655
g	+ 0.078
h	+ 0.898
Red.	+ 3.631

$\log \sin \delta_0$	9.1100 m
$\cos H + \alpha_0$	9.8774 m
$\log h$	1.3086
$\sin \delta_0$	0.0036
	8.8239
$\sin H + \alpha_0$	9.8174

h'	0.2960
h	9.9535

g'	14.918
h'	1.977
i'	2.165
Red.	+ 19.060

13018.

Reduction to Apparent Place.

19

H+X ₀	9	15.8	132	57
H	11	02.8		
X ₀	22	13.0		
G	23	42.3		
G+X ₀	21	55.3	328°	49.5

δ_0	-0.7	24.1
$\log \cos \delta_0$		9.9964
$\log i$		0.3391
i		0.3355

$\log \cos (G+X_0)$	9.9323
$\log g$	1.2414
$\sin (G+X_0)$	9.7140 m
$\tan i$	9.1136 m
	8.8239

$\log g'$	1.1737
g	8.8929

g	+2.655
g	+0.078
g	+0.998
Red	+3.631

$\log \sin i$	9.1400 m
$\cos H+X_0$	9.8774 m
$\log h$	1.3086
$\sin S_0$	0.0036
	8.8239
$\sin H+X_0$	9.2174

$\log h'$	0.2960
h	9.9535

g'	14.928
g'	1.977
i'	2.165
Red	+19.060

13018

Lunar Parallax

20

α 22 13 03.94^{vv}
 θ 21 32 30.30^{vv}
 $\theta - \alpha$ - 40 33.64^v
 $= -10^\circ 08' 24.60''$
 $\frac{1}{2}\alpha - \alpha'$ - 3 57.38^v
 $\theta - \alpha' - \frac{1}{2}\alpha - \alpha' - 10$ 04 27.22^{vv}

Π 60' 20.9"
 $\log \sin \Pi$ 9.86913^v
 $\sin \theta - \alpha'$ 8.24437^v
 $\sin \theta - \alpha'$ 9.24564^{vv}
 $\sec \delta$ 00 02 92^v
 $\sin \alpha - \alpha'$ 7.36206^{vv}

$\cos \frac{1}{2}\alpha - \alpha'$ 9.93727
 $\sec \theta - \alpha' - \frac{1}{2}\alpha - \alpha'$ 0.00000
 $\log \tan \gamma$ 0.00675
 $\log \tan \gamma$ 9.96402^{vv}

$\alpha - \alpha' - 7' 54.77''$
 $= -31^s 6.5''$

γ 42 37 45.6^v

$\delta' - 07$ 23 48.0^{vv}

$\gamma - \delta'$ 50 01 33.6^v

$\log \sin \Pi$ 9.82640
 $\sin \gamma - \delta'$ 8.24437^{vv}
 $\cos \gamma$ 9.88442^{vv}
 $\csc \gamma$ 0.16925^{vv}
 $\sin \delta - \delta'$ 0.12444

$\delta - \delta'$ + 45 47.1^v

δ - 06 38 00.9^{vv}

$\phi \delta$ - 06 38 03.4^{vv}

$\theta - C$ + 2.5^{vv}

$\cos \gamma$ + 0.4^v

Ind. Rep. + 0.1

δ - 06 38 00.4

$\theta - C$ + 3.0

α 22 12 32.29^{vv}

$\phi \alpha$ 22 12 31.74^{vv}

$\theta - C$ + 0.55^{vv}

$\cos \gamma$ - 0.03^v

α 22 12 32.26

$\theta - C$ + 0.52

13018

Lunar Parallax

1.20

α'	22	13	03.94
δ	21	32	30.30
$\theta - \alpha'$	-	40	33.64
$=$	-10°	08	24.60
$\frac{1}{2} \alpha - \alpha'$	-	3	57.38
$\theta - \alpha' - \frac{1}{2} \alpha - \alpha'$	-10	04	27.22

	9.95727
$\cos \frac{1}{2} \alpha - \alpha'$	0.00000
$\sin \theta - \alpha' - \frac{1}{2} \alpha - \alpha'$	0.00675
$\log \tan \gamma$	9.96402

 γ 42 37 45.6 δ' -07 23 48.0 $\gamma - \delta'$ 50 01 33.6

	9.82640
$\log \sin \Pi$	8.24437
$\sin \gamma - \delta'$	9.88442
$\cos \gamma$	0.16925
$\sin \delta - \delta'$	8.12444

 $\delta - \delta'$ + 45 47.1 δ -06 38 00.9 $\gamma - \delta$ -06 38 03.4

O-C + 2.5

cum. + 0.4

2nd Rep. + 0.1

 δ -06 38 00.4

O-C + 3.0

 Π 60 20.9

	9.86913
$\log \sin \Pi$	8.24437
$\sin \theta - \alpha'$	9.24564
$\sin \delta$	0.00292
$\sin \theta - \alpha'$	7.36206

 $\alpha - \alpha'$ -7 54.77 $=$ -31.65 α 22 12 32.29 $\gamma - \alpha$ 22 12 31.74

O-C + 0.55

cum. - 0.03

 α 22 12 32.26

O-C + 0.52

1
1
15
19
2
23.6
9.8
3
23.6
27.3
4
29.2
9.5
1
26
142
2
26.4
15

10319

Star Measure.

21

1 18330 16888
 15.5 12917 12298
 19.4 17 0099
 30 88
15.5413 15.5411

18700 16594
 15.143 18150
 43 48
 00 94
19.3557 19.3555

2 17226 16434
 23.0 16648 7022
 9.8 48 22
 26 34
23.0578 23.0578

16332 16832
 9178 13980
 74 84
 32 32
9.7156 9.7150

3 16605 18578
 23.6 10764 14426
 27.3 72 25
 05 78
23.5837 23.5847

16295 17962
 13182 11065
 84 67
 95 62
27.3112 27.3104

4 16345 16788
 29.3 14358 8768
 9.5 58 69
 45 88
29.1987 29.1981

17822 16418
 13543 10686
 43 88
 22 18
9.4279 9.4269

mean

1 16400
 26 17515
 14.5 05
 08
26.4373

17820 16049
 13458 10402
 64 02
 20 49
14.4359 14.4353

2 16188 16570
 26.4 11812 10945
 15 35
 18 70
 88
26.4373 26.4370

10319

Star Measure.

21

1 18330 16888
 35 12917 12298
 94 17 00
 30 88
15.5413 15.5411

18700 16594
 15143 16150
 43 48
 00 94
19.3557 19.3555

2 17226 16434
 30 16648 7022
 18 48 22
 26 34
23.0578 23.0578

16332 16832
 9178 13980
 74 76 82
 32 32
9.9156 9.7156

2 16605 18578
 36 10764 68 14426 25
 173 72 24
 05 78
23.5837 23.5847

16295 17962
 13182 83 11065 61
 84 67
 95 62
27.3112 27.3100

4 16345 16788
 93 14358 8768 69
 95 58 70
 45 88
29.1987 29.1981

17822 16418
 13543 10686
 43 88
 22 18
9.4279 9.4269

mean

L 16408
 26A 11515
 156 05
 08
26.4133
 16188 16570
 24 11812 15 10980 40
 26A 18 35
 150 88 70
26.4373 26.4370

17822 16049
 13458 61 10402
 64 02
 22 49
1.44359 1.44353

13018

Moon

22

3 16228 16487
 26.7 941715 13310
 16.0 13 11
 28 87
 1 26.6813 26.6823

4 16280 16406
 26.4 1226065 10430
 17 70 30
 80 06
 26.4015 26.4024

5
 26
 17.4

16840 16954
 11940 45 11835
 50 55
 40 54
 17.4895 17.4901

6
 25
 17.9

16035 16532
 631817 16242
 16 42
 35 32
 17.9718 17.9710

7
 24.6
 18.

16303 16352
 1626265 637075
 68 80
 03 52
 18.0038 18.0023

8
 24
 17.9

18770 16156
 977074 15140
 78 40
 70 56
 17.8996 17.8984

3018

Mean

22

3	1 6 2 2 8	1 6 4 8 7
6.7	9 4 1 7 15	1 3 3 1 0
6.0	1 3	1 0
	2 8	8 7
	<u>2 6 6 8 1 3</u>	<u>2 6 6 8 2 3</u>

	1 6 2 8 0	1 6 4 0 6
64	1 2 2 6 0 65	1 0 4 3 0
7	7 0	3 0
	8 0	0 6
	<u>2 6 4 0 1 5</u>	<u>2 6 3 0 2 4</u>

5

26

17.9

1 6 8 4 0	1 6 9 5 4
1 1 9 4 0	1 1 8 5 5
50	55
4 0	5 4
<u>1 7 4 8 9 5</u>	<u>1 7 4 9 0 1</u>

2

25

17.9

1 6 0 3 5	1 6 5 3 2
6 3 1 8 17	1 6 2 4 2
1 6	4 2
3 5	3 2
<u>1 7 9 7 1 8</u>	<u>1 7 9 7 1 0</u>

1

24.6

18

1 6 3 0 3	1 6 3 5 2
1 6 2 6 2 65	6 3 1 0 75
6 8	8 0
2 3	5 2
<u>1 8 0 0 3 8</u>	<u>1 8 0 0 9 3</u>

8

24

17.9

1 8 7 7 0	1 6 1 5 6
9 7 7 0 74	1 5 8 4 0
7 8	4 0
7 0	5 6
<u>1 7 8 9 9 6</u>	<u>1 7 8 9 8 4</u>

13019

Times Etc.

23

Date July 7, 1917

Exp. to Stars	21	40	✓		21	52	✓
" " Moon	21	46		0.2.4	21	46	0.2.7
Clock fast		0		18.0			

H. Sid. Time	21	45	44.55	✓			
" " " "	04	44	31.05		Θ =	- 28	✓
G. Sid. Time	2	30	15.60	✓			
" " " " M.N.	6	59	31.55	✓			
Internal	19	30	44.05	✓			
Red		03	11.80	✓			
G. M. T	19	27	32.25	✓	19 ^h	45896	✓

Trans. Naut. Alman.		R. A.		Dec.	
Moon 19 ^h	22	11	59.41	- 06	41 38.8
Motion 1 ^m			2.2547		+ 15.03
" 27 ^m 5375		01	02.09	+ 06	53.9
Tabular Place.	22	13	01.50	- 06	34 44.9

934.1 = 10.3 ✓

Moon's Age 18.5

$$\begin{array}{r} a = -507.2 \\ + 24. \\ \hline -483.2 \end{array}$$

Parallax	60	20.7
Semi-diam	16	28.1
R		988.1
Aug		11.5
Dec 5		- 0.3
R		999.3
R		2,142.1
a R		- 1036
(1+a)/R		2.0386
R ²		4.1559

13019

Lunes Etc.

23

Date July 7. 1917

Exp. & Stars	21	40		21	52	
" " Moon	21	46	0.2.4	21	46	0.2.4
Clock fast		0	18.0			

71 Sid Line	21	45	44.55			
" Gang	04	44	31.05		- 28	
Sid Line	2	30	15.60			
" " " " M.M.	6	59	31.55			
Internal	19	30	44.05			
Exp. T		03	11.80			
C. M. T	19	27	32.25		45896	

From Naut Alman.		R. A		Dec.		
Moon 196	22	11	59.41	- 06	41	38.8
Motion 1~			2.2547			+ 15.73
" 27 5375		01	02.09	+ 06		53.9
Tabular Place.	22	13	01.50	- 06	34	44.9

934" = 10.3

Moon Age 18.5

$a = -507.2$
 $+ 24$
 $- 483.2$

Parallax	60	20.7
Semi-diam	16	28.1
R		988.1
Ang		11.5
Dir 5-		- 0.3
R		999.3
R		2.1421
a R		- 10.3
(1+a)/R		2.033
R ²		4.155

13019

Plate Constants

24

X	15.5412	23.0578	23.5842	29.1984
S	15.4651	23.3259	23.9487	29.7757

y	19.3556	9.7153	27.3108	9.4274
η	19.4461	9.2865	27.7714	8.9573

$$\begin{array}{rclcl}
 X-S & & +39.6y & +7.2x & -9.404 \\
 +.0761 +7.771 = & 8.532 & +7.66 = & 9.298 & +1.12 = 9.410 \\
 -26.81 +11.529 = & 88.48 & +3.85 = & 9.239 & +1.66 = 9.399 \\
 -36.45 +11.792 = & 81.47 & +1.082 = & 9.229 & +1.70 = 9.399 \\
 -57.73 +14.599 = & 88.26 & +3.73 = & 9.199 & +2.10 = 9.409 \\
 24.6450 +12.323 & & +6.32 & +1.77 = & 25.0178
 \end{array}$$

$$\begin{array}{rclcl}
 y-\eta & & -42.3x & +6.6y & -8.238 \\
 -.0905 +9.678 = & 87.73 & -6.57 = & 81.16 & +1.28 = 8.244 \\
 +4.288 +4.858 = & 91.46 & -9.75 = & 81.71 & +6.4 = 8.235 \\
 -4.606 +1.3655 = & 90.49 & -9.97 = & 80.52 & +1.80 = 8.232 \\
 +4.701 +4.714 = & 94.15 & -12.35 = & 81.80 & +6.2 = 8.242 \\
 15.7643 +7.982 & & -10.42 & +10.5 = & 15.8450
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables} & -0.8 & c & -4.5 & a-c & +3.7 & h+d & +1.0 \\
 \text{pts.} & -507.2 & & -506.6 & & -0.6 & & +2.7 \\
 & -506.4 & & -502.1 & & -4.3 & & +1.7
 \end{array}$$

13017

Plate Constants

24

X	15.5412	23.0578	23.5842	29.1989
S	15.4651	23.3259	23.9487	29.7757

Y	19.3556	9.7153	27.3108	9.4274
Y	19.4461	9.2865	27.7714	8.9573

1-S		+39.64	+7.2X	-9.409
07.61	+77.71 =	85.32 + 7.66 =	92.98 + 1.12 =	94.10
26.81	+115.29 =	88.48 + 3.85 =	92.33 + 1.66 =	93.99
36.45	+117.92 =	81.47 + 10.82 =	92.29 + 1.70 =	93.99
57.73	+145.99 =	88.26 + 3.72 =	91.99 + 2.10 =	94.09
24.6450	+123.23	+6.32	+1.77 =	25.0778

-Y		-42.3X	+6.64	-8.238
09.05	+96.78 =	87.73 - 6.57 =	81.16 + 1.28 =	82.44
42.88	+49.58 =	91.46 - 9.75 =	81.71 + 1.64 =	82.35
46.06	+136.55 =	90.49 - 9.97 =	80.52 + 1.80 =	82.32
47.01	+47.14 =	94.15 - 12.35 =	81.80 + 1.62 =	82.42
15.9643	+79.82	-10.92	+1.05 =	15.8450

Tables - -008

h -5.0 7.2

e -4.5

-5.0 6.6

c - c - + 3.7

-0.6

h+d: +1.0

+2.7

13019

35-

Mean Center

1	26.0000	+1.3570 +1	1.8417	4.1761	+202
2	26.4372	+1.7942 +1	3.2195	4.1475	-84
3	26.6818	+2.0388 00	4.1567	4.1567	+8
4	26.4020	+1.7590 -1	3.0937	4.1699	+14.0
5	26.0000	+1.3570 -1	1.8411	4.1737	+178
6	25.0000	+0.8570 -2	0.1273	4.1610	+51
7	24.6430	0.0000 -2	0.0000	4.1616	+57
8	24.0000	-0.6430 -2	0.4137	4.1665	+106
CmR ²				4.1559	

are

1	14.4356	-1.5274 -5	2.3344	139
2	15.0000	-0.9630 -3	0.9280	118
3	15.9630	0.0000 -0	0.0000	90
4	17.0000	+1.0370 +4	1.0762	60
5	17.4898	+1.5268 +5	2.3326	42
6	17.9714	+2.0084 +7	4.0337	10
7	18.0030	+2.0400 +7	4.1616	0
8	17.8990	+1.9360 +7	3.7528	342
Range				157

$$x = 26 \quad y = 14.4356$$

$$17.4898$$

$$31.9254$$

$$y_0 \quad 15.9627$$

$$y_{\max} \quad 18.0030$$

$$R \quad 2.0403$$

$$\text{CmR} \quad 2.0386$$

$$x_{\max} \quad 26.6818$$

$$x_0 \quad 24.6415$$

$$\text{Mean Center} \begin{cases} x_0 & 24.6430 \\ y_0 & 15.9630 \end{cases}$$

Moon Center.

1	26.0000	+1.3570	+1	1.8417	41.761	+202
2	26.4372	+1.7942	+1	3.2195	41.475	-84
3	26.6818	+2.0388	00	4.1567	41.567	+8
4	26.4020	+1.7590	-1	3.0937	41.699	+140
5	26.0000	+1.3570	-1	1.8411	41.737	+178
6	25.0000	+0.3570	-2	0.1273	41.610	+51
7	24.6430	0.0000	-2	0.0000	41.616	+57
8	24.0000	-0.6430	-2	0.4137	41.645	+106
				Corr ²	41.559	

Arc

1	14.4356	-1.5274	-5	2.3344	139
2	15.0000	-0.9630	-3	0.9280	118
3	15.9680	0.0000	-0	0.0000	90
4	17.0000	+1.0370	+4	1.0762	60
5	17.4898	+1.5268	+5	2.3326	42
6	17.9714	+2.0084	+7	4.0337	10
7	18.0030	+2.0400	+7	4.1616	0
8	17.8990	+1.9360	+7	3.7528	342

Range 157

$$x = 26 \quad y = 14.4356$$

$$17.4898$$

$$31.9254$$

$$y_0 = 15.9627$$

$$y_{max} = 18.0030$$

$$R = 2.0403$$

$$\text{Corr } R = 2.0386$$

$$x_{max} = 26.6818$$

$$x_0 = 24.6415$$

$$\text{Moon Center} \begin{cases} x_0 = 24.6430 \\ y_0 = 15.9630 \end{cases}$$

Formation of Normals

1	- 2.04	+ 275.0	- 309.0
2	- 1.72	- 150.2	- 80.6
3	+ 0.00	+ 16.3	+ 0.0
4	+ 1.83	+ 247.0	+ 145.4
5	+ 2.08	+ 242.0	+ 273.0
6	+ 0.72	+ 18.4	+ 102.6
7	+ 0.00	+ 0.0	+ 116.2
8	- 1.24	- 67.8	+ 205.3
	+ 4.63	+ 798.7	+ 842.5
	- 5.00	- 218.0	- 389.6
	- 0.37	+ 580.7	+ 452.9

	L	b	C	$\cos D - C$
$G - + 5$	+ 7	- 5	- 6	+ 169
	+ 9	- 3	- 2	- 134
$b - + 3$	+ 16	0	+ 2	- 72
	+ 9	+ 3	+ 4	+ 99
$C - - 8$	+ 7	+ 5	+ 4	+ 165
	+ 2	+ 6	0	+ 87
	+ 0	+ 6	- 2	+ 106
	- 3	+ 6	- 5	+ 176

13019

Conditional Equations.

O-C

26

1	+ 1.36	- 1.53	= + 2.02	+ 55	- 38	= + 27	+ 175
2	+ 1.79	- 0.96	= - 84	+ 72	- 24	= + 48	- 132
3	+ 2.04	0.00	= + 8	+ 82	+ 0	= + 82	- 74
4	+ 1.76	+ 1.84	= + 140	+ 71	+ 26	= + 45	+ 95
5	+ 1.36	+ 1.53	= + 178	+ 55	+ 38	= + 17	+ 161
6	+ 0.36	+ 2.01	= + 51	+ 14	+ 50	= - 36	+ 87
7	+ 0.00	+ 2.04	= + 57	+ 0	+ 51	= - 51	+ 108
8	- 0.64	+ 1.94	= + 106	- 26	+ 49	= - 75	+ 181

+807 - 206

or 127

$$+14.69 - 0.37 = +580.7 \quad +8.03$$

$$- 0.37 + 18.62 = +452.9 \quad +6.07$$

$$+ () - 0.1 = + 14.6$$

$$+ 18.61 = + 467.5$$

+ 0.33 Δ

$$b = + 25.1''$$

$$+ 14.69 = + 580.7 + 9.3 = + 590.0$$

$$a = + 40.1''$$

+ 0.56

arc 15.7.

$$R = 2.04$$

$$\frac{P}{m} = .20$$

$$2Rc = - 441$$

$$\frac{\Sigma r}{m} = + 75.1$$

$$\Delta A = - 0.14 \quad \Delta \delta = - 0.1$$

$$\frac{+ 75.1}{.20} = + 376$$

$$\Delta \alpha = - 0.23 \quad \Delta \alpha = - 0.01$$

$$\Delta R = + 4.6$$

$$\text{corr } b = + 0.1$$

$$\text{True } \Delta R = + 4.5$$

Conditional Equations.

26
O-C

1	+ 1.36	- 1.53	= + 20.2	+ 55 - 38 = +	27	+ 195
2	+ 1.79	- 0.96	= - 84	+ 72 - 24 = +	48	- 132
3	+ 2.14	0.00	= + 8	+ 82 + 0 = +	82	- 74
4	+ 1.76	+ 1.14	= + 14.0	+ 71 + 26 = +	45	+ 95
5	+ 1.36	+ 1.53	= + 17.8	+ 55 + 38 = +	17	+ 161
6	+ 0.26	+ 2.01	= + 5.1	+ 14 + 50 = -	36	+ 87
7	+ 0.00	+ 2.04	= + 57	+ 0 - 51 = -	51	+ 108
8	- 0.64	+ 1.94	= + 10.6	- 26 + 49 = -	75	+ 181

$$+ 14.69 - 0.37 = + 580.7 \quad + 8.03$$

$$- 0.37 + 18.62 = + 452.9 \quad + 6.07$$

$$+ 1 - 0.1 = + 14.6$$

$$+ 18.61 = + 467.5$$

$$+ 0.33 \Delta$$

$$b = + 25.1$$

$$+ 14.69 = + 580.7 + 9.3 = + 590.0$$

$$a = + 40.1$$

$$+ 0.56$$

Cur 15.7

$$R = 2.04$$

$$\frac{P}{T} = 20$$

$$2Rc = 4.91$$

$$\frac{2K}{T} = + 75.1$$

$$\Delta L = -0.14 \quad \Delta S = -0.1$$

$$\frac{+ 75.1}{20} = + 3.76$$

$$\Delta a = -0.23 \quad \Delta x = -0.01$$

$$\Delta R = + 4.6$$

$$\text{Cur } 15.1 \quad + 0.1$$

$$\text{Line } \Delta R = + 4.5$$

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Mean Mean Position.

$$\begin{array}{r} X_0 \quad 24.6430 \checkmark \\ \quad \quad + 20 \checkmark \\ \hline X \quad 24.6450 \checkmark \end{array}$$

$$\begin{array}{r} Y_0 \quad 15.9630 \checkmark \\ \quad \quad + 13 \checkmark \\ \hline \quad 15.9643 \checkmark \end{array}$$

From Plate Constants

$$\begin{array}{r} 25.0178 \checkmark \\ 22 \\ \hline + 3.0178 \checkmark \end{array}$$

$$\begin{array}{r} 15.8950 \checkmark \\ 18 \\ \hline - 2.1550 \checkmark \end{array}$$

$$\begin{array}{r} \log s_0 \quad 0.47969 \checkmark \\ \log \cos \delta \quad 9.99642 \checkmark \\ \quad \quad 8.50724 \\ \log \sin \alpha - A \quad 1.97603 \checkmark \end{array}$$

$$\begin{array}{r} \alpha - A \quad + 94.63 \\ \quad \quad + 01 \quad 34.63 \end{array}$$

$$A \quad 22 \quad 11 \quad 45.66 \checkmark$$

$$\alpha_0 \quad 22 \quad 13 \quad 20.29 \checkmark$$

$$\text{Red} \quad + 3.63 \checkmark$$

$$\alpha' \quad 22 \quad 13 \quad 23.92 \checkmark$$

$$\begin{array}{r} \log \tan \delta \quad 9.1106 \checkmark \\ \quad \quad 3.2 \quad 0.9594 \end{array}$$

$$\log n_1 \quad 7.0534 \checkmark$$

$$\begin{array}{r} n_1 \quad - 0.013 \checkmark \\ n_0 \quad - 2.1537 \checkmark \end{array}$$

$$\log n_0 \quad 0.33319 \checkmark$$

$$\log \tan \delta - D \quad 7.33115 \checkmark$$

$$\delta - D \quad 3.00204 \checkmark$$

$$\delta - D \quad - 1.004.7 \checkmark$$

$$B \quad - 16 \quad 44.7 \checkmark$$

$$\delta_0 \quad - 07 \quad 04 \quad 05.0 \checkmark$$

$$\text{Red} \quad + 19.1 \checkmark$$

$$\delta' \quad - 07 \quad 20 \quad 30.6 \checkmark$$

Mean Mean Position.

$$\begin{array}{r} X_0 \quad 24.6430 \checkmark \\ \quad \quad 2 \quad + 20 \checkmark \\ \hline 1 \quad 24.6450 \checkmark \end{array}$$

$$\begin{array}{r} Y_0 \quad 15.9630 \checkmark \\ \quad \quad 13 \checkmark \\ \hline 15.9643 \checkmark \end{array}$$

From Plate Constants

$$\begin{array}{r} 25.0178 \checkmark \\ 22 \\ \hline + 3.0178 \checkmark \end{array}$$

$$\begin{array}{r} 13.8450 \checkmark \\ 18 \\ \hline - 2.1550 \checkmark \end{array}$$

$$\begin{array}{r} \log S_0 \quad 0.47969 \checkmark \\ \log S \quad 9.92642 \checkmark \\ \quad \quad 8.50724 \\ \log S_0 - A \quad 1.97603 \checkmark \end{array}$$

$$\begin{array}{r} \alpha - A. \quad + 94.63 \\ \quad \quad + 01 \quad 34.63 \end{array}$$

$$A \quad 22 \quad 11 \quad 45.66 \checkmark$$

$$\alpha_0 \quad 22 \quad 13 \quad 20.29 \checkmark$$

$$\text{Red} \quad + 3.63$$

$$\alpha' \quad 22 \quad 13 \quad 25.92 \checkmark$$

$$\begin{array}{r} \log \tan S \quad 9.4706 \checkmark \\ S_1^2 \quad 0.9544 \end{array}$$

$$\log \eta \quad 7.0534$$

$$\eta_1 \quad -0.013$$

$$\eta_0 \quad -2.1537$$

$$\log \eta_{0.1} \quad 0.33219 \checkmark$$

$$7.33115 \checkmark$$

$$\log \tan S-E \quad 3.00204 \checkmark$$

$$S-E \quad -1.0048$$

$$-16 \quad 44.7$$

$$\theta \quad -0.7 \quad 04 \quad 05.0$$

$$S_0 \quad -0.7 \quad 20 \quad 49.7$$

$$\text{Red} \quad +19.1$$

$$S' \quad -0.7 \quad 20 \quad 30.6$$

13019

Lunar Parallax.

27

α' 22 13 23.92"
 θ 21 45 44.55"
 $\theta - \alpha$ - 27 39.37
 $=$ - 06 54 50.55"
 $\delta(\alpha - \alpha')$ - 2 42.28"
 $\theta - \alpha' - \frac{1}{2}(\alpha - \alpha') - 06$ 52 08.27"

$\log \sin \Pi$ 9.86913
 $\log \sin \Pi$ 8.24434
 $\sin \theta - \alpha'$ 9.08055"
 $\sec \delta$ 1.000287"
 $\sin \alpha \alpha$ 7.19689"

$\cos \frac{1}{2} \alpha \alpha'$ 9.95727
 $\sec \delta - \frac{1}{2} \alpha \alpha'$ 0.00000
 $\tan \gamma$ 9.96040"

$\alpha \alpha' - 5'$ 24.57"
 $=$ - 21.65"

γ 42 23 18.8"
 δ' - 07 20 30.6
 $\gamma - \delta'$ 49 43 59.4

$\log \sin \Pi$ 9.82640
 $\sin \gamma - \delta'$ 8.24434"
 $\csc \gamma$ 0.17122"
 $\sin \delta - \delta'$ 8.12451"

$\delta - \delta'$ + 45 47.9"

δ - 06 34 43.2"
 $\gamma \delta$ - 06 34 44.9"

$\delta - \delta'$ + 1.7"

curr. + 0.4"

2nd Ord. Ref. + 0.1

δ - 06 34 42.7

$\delta - \delta'$ + 2.2

α 22 13 02.27"

$\gamma \alpha$ 22 13 01.50"

$\delta - \alpha$ + 0.77"

curr. - 0.03

α 22 13 02.24

$\delta - \alpha$ + 0.74

13019

Lunar Parallax

2

α' 22 13 23.92"
 δ 21 45 44.55"
 $\delta - \alpha$ - 27 39.37
 $\delta - \alpha$ - 06 54 50.55"
 $\delta(x - x')$ - 2 42.28
 $\delta - \alpha - \frac{1}{2}(x - x')$ - 06 52 08.27"

986913
 $\log \sin \Pi$ 8.24439
 $\sin \delta - \alpha$ 908005
 $\sin \delta$ 1000287
 $\sin x - x$ 7.19689

9.95727
 $\cos x - x$ 000000
 $\sec \delta - x - \frac{1}{2}(x - x')$ 000313
 $\tan \delta$ 9.96040

$\alpha - \alpha'$ - 5' 24.57"
 $\delta - \delta'$ - 21.65"

γ 42 23 28.8

δ' - 07 20 30.6

$\gamma - \delta'$ 49 43 59.4

9.82640
 $\log \sin \Pi$ 8.24439
 $\sin \gamma - \delta'$ 988255
 $\cos \gamma$ 0.17122
 $\sin \delta - \delta'$ 8.12451

$\delta - \delta'$ + 45 47.4

δ - 06 34 43.2

$\gamma - \delta$ - 06 34 44.9

$\delta - \delta'$ + 1.7

$\cos \gamma$ + 0.4

$\frac{1}{2} \text{ And Ref}$ + 0.1

δ - 06 34 42.7

$\delta - \delta'$ + 2.2

α 22 13 02.27

$\gamma - \alpha$ 22 13 01.50

$\delta - \alpha$ + 0.77

$\cos \gamma$ - 0.03

α 22 13 02.24

$\delta - \alpha$ + 0.74

