

KG

11366

v.1042

CXCI

191

Plate No.	Date	Page
13668	Aug 27. 1917	1
13669		11
13716		21

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13668

Star Measures.

1

1	18810	17778	17318	18092
17.9	19756	16834	15193	10214
8.2	56	34	9192	14
	10	78	18	92
	<u>17.9054</u>	<u>17.9056</u>	<u>8.2126</u>	<u>8.2122</u>

2	18318	16755	16142	17170
26.1	10698	14380	8914	14390
23.7	98	80	18	90
	18	55	42	70
	<u>26.7620</u>	<u>26.7625</u>	<u>23.7226</u>	<u>23.7220</u>

3	18362	17402	17765	17750
31.9	986664	1591006	8961	1657064
62	62	02	6188	58
	62	02	65	50
	<u>31.8498</u>	<u>31.8504</u>	<u>6.1196</u>	<u>6.1186</u>

4	16038	18870	16574	16478
14.7	9080	15828	7558	15478
22.9	80	28	6260	78
	38	70	74	78
	<u>14.6958</u>	<u>14.6958</u>	<u>32.9014</u>	<u>32.9000</u>

Moon.

1		17770	17520
25.0		7790	1748684
15.0		90	82
		70	20
		<u>14.9980</u>	<u>14.9964</u>

2	16140	16268	
25.5	10548	1186862	
16.0	48	56	
	40	68	
	<u>25.5592</u>	<u>25.5594</u>	

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Star Measures.

17.9	19810	17778	17318	18092
82	19758	16834	15193	10214
	56	34	91	14
	10	78	18	92
	<u>17.9054</u>	<u>17.9056</u>	<u>8.2126</u>	<u>18.2122</u>
21	18318	16755	16142	17170
6.1	10698	14380	8914	14390
23.7	98	80	18	90
	18	55	42	70
	<u>267620</u>	<u>267625</u>	<u>237226</u>	<u>23.7220</u>
3	18362	17402	17765	17750
31.9	986664	1591006	89612	1657064
62	62	02	61	58
	62	02	65	50
	<u>31.8498</u>	<u>31.8504</u>	<u>6.11960</u>	<u>16.1186</u>
	16038	18870	16574	16478
	9080	15828	7558	15478
	80	28	62	78
	38	70	74	78
	<u>14.6958</u>	<u>14.6958</u>	<u>32.9014</u>	<u>32.9000</u>

Moon.

4			17740	17520
5.0			17740	17486
5.0			90	82
			70	20
			<u>14.9980</u>	<u>14.9964</u>
3	16140	16268		
55	10548	1186862		
16.0	48	56		
	40	68		
	<u>25.5592</u>	<u>25.5594</u>		

4
2
17

5
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18

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2
1

Moon

13668		
3	16168	16252
256	10058 ⁶⁰	12352
165	62	52
	68	52
	<u>25.6108</u>	<u>25.6100</u>

4	16188	16236
25.5	10890	11536
17.0	90	36
	88	36
	<u>25.5298</u>	<u>25.5300</u>

5.		18605	16786
25.		9775 ⁷³	15606
17.9		71	06
		05	86
		<u>17.8832</u>	<u>17.8820</u>

6		17380	17360
24.		13290	11448
18.9		90	48
		80	60
		<u>18.4090</u>	<u>18.4088</u>

7		17935	17762
23.5		13420 ²¹	12278
18.9		22	78
		35	62
		<u>18.4514</u>	<u>18.4516</u>

8		18434	17675
23		14840 ⁴²	11262 ⁶³
18.4		44	64
		34	75
		<u>18.3592</u>	<u>18.3588</u>

Moon

13668		
3	16168	16252
256	10058 ⁶⁰	12352
165	62	52
	68	52
	<u>25.6108</u>	<u>25.6100</u>

4	16188	16236
25.5	10890	11536
17.0	90	36
	88	36
	<u>25.5298</u>	<u>25.5300</u>

5		18605	16786
25		9775 ⁷³	15606
17.9		71	06
		05	86
		<u>17.8832</u>	<u>17.8820</u>

6		17380	17360
24		13290	11448
18.9		90	48
		80	60
		<u>18.4090</u>	<u>18.4088</u>

7		17935	17762
23.5		13420 ²¹	12278
18.9		22	78
		35	62
		<u>18.4514</u>	<u>18.4516</u>

8		18434	17675
23		14840 ⁴²	1125 ² 63
18.9		44	64
		34	75
		<u>18.3892</u>	<u>18.3588</u>

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Times Etc.

3

Date Oct 2, 1917

Exp. & Stars 4 25

" " Moon 4 31

Clock slow

25.6

47.4

4 37

4 31

25.9

H. Sid Time 4 32 13.15

H. Long 4 44 31.05

G. Sid. Time 9 16 44.20

" " " M.N 12 42 31.81

Interval 20 34 12.39

Red.

03

22.19

G.M.T 20 30 50.20

20.5139

12

 $\theta = + 1^h 52^m$

From Naut. Alman.

R.A.

Dec.

Moon 20^h 02 39 29.98 +19 41 47.2Moon 1^m 2.4347 +9.012" 30^m 8.367 01 15.08 +04 37.9

Tabular Place. 02 40 45.06 +19 46 25.1

9 34" = 13.2

Moon's age 17d.

a = -501.8

+24.0

-477.8

Parallax 59' 16.0

Semi-dian 16' 10.5

R 970.5

Aug 14.2

Inv 5 -0.3

R 984.4

R 2110.2

aR -1008

(1+a)R 20094

R² 4.0377

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Times Etc.

3

Date Oct 2, 1917

Exp to Stars	4	25		4	37
" " Mean	4	31	25.6	4	31 25.9
clock slow			47.4		

71 Sed Time	4	32	13.15
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71 Young	4	44	31.05
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G Sed Time	9	16	44.20
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" " " M.N	12	42	31.81
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Interval	20	34	12.39
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Red.		03	22.19
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G.M.T	20	30	50.20
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G = + 1^h 52^m20^h 51.39

From Naut. Alman.

R.A.

Dec.

Moon 20 ^h	02	39	29.98	+19	41	47.2
Moon 1 ^m			2.43.47			19.072
" 30 ^m 8367		01	15.08		04	37.9
Tabular Place.	02	40	45.06	+19	46	25.1

9 34" = 13.2

Moon ap 17^d

a = -501.8

+ 24.0

- 417.8

Parallax	59	16.0
Semi diam	16	10.5
R		970.5
Aug		14.2
Inv 5		-0.3
R		984.4
A		2110.2
AR		-1008
1+AR		20094
R ²		40379

Cafe No. 383 mag 5.7

02 33 08.16
08.14
08.15

02 33 08.15
57.82

x 02 34 05.97

A 02 38 09.65

- 4 03.68

- 243.67

2.386812

9.96837

0.862422

- 7.2848

- 55

S 14.7097

X 14.6958

X-S - .0139 7209

21 31 44.5

44.9

44.4

+ 21 31 44.6

+ 4 26.8

S + 21 36 11.4

D 19 34 29.9

+ 2 01 41.5

+ 7304.6

3.86360

1.19475

9.5977

1.7248

8.3759

η_0 + 15.6586

+ 0238

33.6824

16.450

y 32.9007

7817

- .7817 8633

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Cape No. 389 mg 8.1

Standard Coordinates

4

Cape No. AG 825

Cape No. 410 mg 6.1

C	0.2	34	57.62	2	39	58.84	2	42	55.62
q			57.64						55.59
E			57.57						55.60
m	0.2	34	57.61				2	42	55.60
Prec			+ 56.92			57.57			57.06
x	0.2	35	54.53	2	40	56.41	2	43	52.66
A	0.2	38	09.65	2	38	09.65	2	38	09.65
q-A	-	0.2	15.12	+	2	46.76	+	5	43.01
Sim			- 135.12			+ 166.76			+ 342.98
log	2.13	072	m		2.22	210		2.53	3527
log S	9.47	761			9.97	214		9.97	836
S ₁	0.6	1557	m		0.70	148		1.02	087
S ₂	-4.1	264			+ 5.02	90		+ 10.49	22
S ₃	-	13			+	7		+	68
S	17.8	723			27.02	97		32.49	90
X	17.9	155			26.76	23		31.85	01
X-S	+	0332			- .26	74		- .64	89

C	+18	10	08.6	+20	13	52.6	+17	52	02.0
S			08.4						02.2
z			08.7						01.6
m	+18	10	08.6				+17	52	01.9
Prec			+ 04	04	22.1		+ 04		17.5
S	+18	14	34.0	20	18	12.7	+17	56	19.4
D	19	34	29.9	19	34	29.9	19	34	29.9
q-S	-	1	19	55.9	+	43	42.8	-	1
log			-4796.7			+ 2622.9			-5892.7
log	3.68	095	m		3.41	878		-3.77	027
log H ₀	1.01	210	m		0.74	993		1.10	142
log S	9.51	80			9.56	82		9.51	06
S ₁	123	71			140	30		204	17
log n ₁	7.80	25			8.02	46		8.60	52
n ₀	-10.28	26			+ 5.62	25		-12.63	06
n ₁	+	0063			+ 0106			+ .04	03
n	7.72	37			23.68	31		5.40	97
y	8.21	24			23.72	23		6.11	93
y-n	+	4887			+ .08	92		+ .70	96

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Standard Coordinates

4

Cape No. 389 mg 8.1

Cape No. AG-825

Cape No. 410 mg 6.1

C	02	34	57.62	2	39	58.84	2	42	55.62
G			57.64						55.59
E			57.57						55.60
m	02	34	57.61				2	42	55.60
Pre			56.92			57.57			57.06
X	02	35	54.53	2	40	56.41	2	43	52.66
A	02	38	09.65	2	38	09.65	2	38	09.65
A	-	02	15.12	+	2	46.76	+	5	43.01
Sum			-135.12			+166.76			+342.98
log	2.13072				2.22210		2.53527		
log 80	9.97764				9.97214		9.97836		
S ₁	0.61557				0.70148		1.02087		
S ₀	-4.1264				+5.0290		+10.4922		
S ₁	-	13			+	7	+	68	
S	17.8723				27.0297		32.4998		
X	17.9055				26.7623		31.8501		
X-S	+0.332				-26.74		-64.82		

C	+18	10	08.6	+20	13	50.6	+17	52	02.0
S			08.4						02.2
Z			08.7						01.6
m	+18	10	08.6				+17	52	01.9
Pre		+04	25.4		04	20.1		-04	17.5
S	+18	14	34.0	20	18	12.7	+17	56	19.4
D	19	34	29.9	19	34	29.9	19	34	29.9
0-8	-	1	19	55.9	+	43	42.8	-1	38
tan			-47.96.7			+26.22.9			-58.92.7
log	3.68095				3.41888			-3.77027	
log 40	1.01210				0.74993			1.10142	
tan S	9.5180				9.5682			9.5101	
S ₀	1.2398				1.4030			2.0417	
log n ₁	7.8025				8.0246			8.0052	
n ₀	-10.2826				+5.6205			-12.6306	
n ₁	+	0063			+0106			+0403	
n	7.7237				23.6337			5.4097	
y	8.2124				23.7223			6.1193	
y-n	+4887				+0892			+7096	

S_0	m_0	ΔS	-5.55	$+ 97 = 0$
-7.28	$+15.66$	-54	$+ 40 = -$	$14 + 14 = 0$
-4.13	-10.28	-13	$+ 23 = +$	$10 - 9 = +1$
$+10.49$	-12.63	$+ 69$	$- 58 = +$	$11 - 11 = 0$

M	$+ 1.92$	$- 1.68$	$- 10$	$- 1 = -$	$- 11 = -0.09$
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$\Delta \eta$	-5.27	$+ 2.65 - 12$
$+ 112$	$- 81 = +$	$31 - 19 = +12$
$- 31$	$+ 53 = +$	$22 - 11 = +11$
$- 80$	$+ 65 = -$	$15 + 27 = +12$
	$+ 9$	$+ 5 = +2$

$$= +0.1^2$$

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Plate Center & Constants.

5-

$$\begin{array}{r r r r r r r r}
 17.9155 & 8.2124 & 02 & 35 & 54.53 & 18 & 14 & 34.0 \\
 22 & 18 & & +02 & 15.12 & +1 & 19 & 55.9 \\
 +4.0945 & 9.7876 & & & & & & \\
 \hline
 33 & 490 & & & & & &
 \end{array}$$

Plate Center

$$\begin{array}{l}
 A = 02 \quad 38 \quad 09.65 \\
 B = +19 \quad 34 \quad 29.9
 \end{array}$$

$$\begin{array}{r r r r r r r r}
 X-S & +500X & +84.3X & +1.8X & -11010 \\
 09 & -0139 + 7348 = 7209 & +2.774 = 9983 & +26 = 10009 \\
 +0332 + 8953 = 9285 & +692 = 9977 & +33 = 10010 \\
 -6489 + 15925 = 9436 & +516 = 9952 & +58 = 10010 \\
 23.6002 + 11800 & +1385 & +42 = 23.9219
 \end{array}$$

$$\begin{array}{r r r r r r r r}
 -82.9X & +3.8X & -7540 \\
 -7817 + 16450 = 8633 & -1218 = 7415 & +125 = 7540 \\
 +4887 + 4106 = 8993 & -1484 = 7509 & +31 = 7540 \\
 +7096 + 3060 = 10156 & -2640 = 7516 & +23 = 7539 \\
 16.4408 + 8220 & -1955 & +62 = 16.3195
 \end{array}$$

Tables

$$\begin{array}{r r r r r r r r}
 a = -0.7 & l = -1.3 & a-l = +0.6 & l+d = -1.2 \\
 -501.8 & -503.8 & = +2.0 & = -1.4 \\
 -501.1 & -502.5 & +1.4 & -0.2
 \end{array}$$

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Plate Center - Constants.

5-

7.9155	2.2124	02	35	54.53	18	14	34.0
22.	18.		+ 0.2	15.12	+ 1	19	55.9
<u>7.0945</u>	<u>9.7876</u>						
33	490						

Plate Center

$$\left\{ \begin{array}{l} A = 0.2 \quad 38 \quad 09.65 \\ B = +19 \quad 34 \quad 29.9 \end{array} \right.$$

$$\begin{aligned} -53.2 + 5700.8 &= 1200.6 + 84.38 & +1.8X &= 10011 \\ -0139 + 7348 &= 7209 + 2774 & &= 9983 + 26 &= 10009 \\ 1332 + 8953 &= 9285 + 692 & &= 9977 + 33 &= 10010 \\ 489 + 15925 &= 9436 + 516 & &= 9952 + 58 &= 10010 \\ 23600.2 + 11800 & & +1385 & & +42 &= 23927.9 \end{aligned}$$

$$\begin{aligned} & -82.9X & +3.8Y & -7540 \\ 7817 + 16450 &= 8633 - 1218 &= 7415 + 125 &= 7540 \\ 7887 + 4106 &= 8993 - 1484 &= 7509 + 31 &= 7540 \\ 8096 + 3060 &= 10156 - 2640 &= 7516 + 23 &= 7539 \\ 164408 + 8220 & & -1955 & & +62 &= 16.3193 \end{aligned}$$

ables

$$\begin{array}{llll} a = -0.7 & l = -1.3 & a-l = +0.6 & a+d = -1.2 \\ -501.8 & -503.8 & = +2.0 & = -1.4 \end{array}$$

1
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Moon Center

6.

		Δx	$x - x_0$	$y - y_0$		
1	25.0000	+1.4000	-1	19.597	4.0416	39
2	25.5593	+1.9593	-0	3.8389	4.0325	52
3	25.6104	+2.0104	-0	4.0417	4.0417	40
4	25.5299	+1.9299	+1	3.7249	4.0385	08
5	25.0000	+1.4000	+1	1.9603	4.0419	42
6	24.0000	+0.4000	+2	0.1602	4.0368	9
7	23.6000	+0.0000	+2	0.0000	4.0461	84
8	23.0000	-0.6000	+2	0.3598	4.0420	43
					R^2 4.0377	

		Δy		arc.
1	14.9971	-1.4429	-0	2.0819
2	16.0000	-0.4400	-0	0.1936
3	16.4400	-0.0000	-0	0.0000
4	17.0000	+0.5600	-0	0.3136
5	17.8828	+1.4428	0	2.0816
6	18.4089	+1.9689	0	3.8766
7	18.4515	+2.0115	0	4.0461
8	18.3589	+1.9189	0	3.6822
				Range 153

$$\begin{aligned}
 x &= 25 & y &= 14.9971 \\
 & & & 17.8828 \\
 & & & 32.8799 \\
 y_0 & & & 16.4399 \\
 y_{\max} & & & 18.4515 \\
 R & & & 2.0116 \\
 \text{Cum. } R & & & 2.0094 \\
 x_{\max} & & & 25.6104 \\
 x_0 & & & 23.5988
 \end{aligned}$$

$$\begin{aligned}
 \text{Moon Center } \left\{ \begin{aligned} x_0 &= 23.6000 \\ y_0 &= 16.4400 \end{aligned} \right.
 \end{aligned}$$

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Moon Center

6

		Δx	$x - x_0$	$y - y_0$		
1	25.0600	+1.4000	-1	19.597	40.416	+
2	25.5593	+1.9593	-0	38.889	40.325	-
3	25.6104	+2.0104	-0	40.417	41.417	+
4	25.5299	+1.9299	-1	37.249	40.385	+
5	25.0000	+1.4000	+1	19.603	40.419	+
6	24.0000	+0.4000	+2	0.1602	40.368	-
7	23.6000	+0.0000	+2	0.0000	41.461	+
8	23.0000	-0.6000	+2	0.3598	40.420	+
					R^2 40.371	

		Δx		arc.
1	14.9971	-1.4429	-0	20.816
2	16.0000	-0.4400	-0	0.1936
3	16.4400	-0.0000	-0	0.0000
4	17.0000	+0.5600	-0	0.3136
5	17.8828	+1.4428		2.0816
6	18.4089	+1.9689		3.8766
7	18.4515	+2.0115		4.0461
8	18.3589	+1.9189		3.6822

Range 15.3

$$\begin{aligned}
 x &= 25 & y &= 14.9971 \\
 & & & 17.8828 \\
 & & & 32.8799 \\
 & & y_0 & 16.4399 \\
 & & y_{\max} & 18.4515 \\
 & & R & 2.0116 \\
 & & \text{Corr } R & 2.0094 \\
 x_{\max} & 25.6104 \\
 x_0 & 23.5988
 \end{aligned}$$

$$\begin{aligned}
 \text{Moon Center } \left\{ \begin{aligned} x_0 &= 23.6000 \\ y_0 &= 16.4400 \end{aligned} \right.
 \end{aligned}$$

Formation of Normals-

1 - 2.02
 2 - 0.86
 3 0.00
 4 + 1.08
 5 + 2.02
 6 + 0.79
 7 + 0.00
 8 - 1.15
 + 3.89
 - 4.03
 - 0.14

+ 63.0
 - 90.5
 + 92.5
 + 27.0
 + 62.0
 - 1.2
 + 180.0
 - 29.4
 + 244.5
 - 121.1
 + 123.4

corr - 51.0
 + 72.4

- 64.8
 + 20.2
 0.0
 + 7.8
 + 69.5
 - 5.9
 + 180.9
 + 94.2
 + 372.6
 - 70.7
 + 301.9

corr - 36.1
 + 265.8

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Conditional Equations

7

				-6				O-C
1	+1.40	-1.44	= +45	+11	-28	= -17	+6.2	
2	+1.96	-0.44	= -46	+15	-8	= +7	-5.3	
3	+2.01	-0.00	= +46	+16	-0	= +16	+3.0	
4	+1.93	+0.56	= +14	+15	+11	= +26	-1.2	
5	+1.40	+1.44	= +48	+11	+28	= +39	+9	
6	+0.40	+1.97	= -3	+3	+38	= +41	-4.4	
7	+0.00	+2.01	= +90	+0	+39	= +39	+5.1	
8	-0.60	+1.92	= +49	-5	+37	= +32	+1.7	

+169-109

or 35

$$+16.04 - 0.14 = +72.4$$

$$-0.14 + 16.28 = +265.8$$

$$+ () - () = + 0.6$$

$$+16.28 = +266.4$$

$$f = +16.2$$

$$+16.04 = +72.4 + 2.3 = +74.7$$

$$a = +4.6$$

or 15.3

$$\frac{P}{n} = .18^v$$

$$\frac{\Sigma K}{n} = +15.7^v$$

$$\frac{+15.7}{.18} = +87^v$$

$$DR = +11^v$$

New O-C

+	6	-23	= -17	+5.6
+	9	-7	= +2	-5.4
+	9	-0	= +9	+3.1
+	9	+9	= +18	-1.0
+	6	+23	= +30	+1.2
+	2	+32	= +34	+2.5
	0	+33	= +33	+5.1
-	3	+31	= +28	+1.5

+190-64

or 32

13668

Conditional Equations

7

							O-C
1	+1.40	-1.44	= +45	+11	-28	= -17	+62
2	+1.96	-0.44	= -46	+15	-8	= +7	-53
3	+2.01	-0.00	= +46	+16	-0	= +16	+30
4	+1.93	+1.56	= +14	+15	+11	= +26	-12
5	+1.40	+1.44	= +48	+11	+28	= +39	+9
6	+0.40	+1.97	= +3	+3	+38	= +41	-44
7	+0.00	+2.01	= +90	+0	+39	= +39	+51
8	-0.60	+1.92	= +49	-5	+37	= +32	+17

$$+169 - 109 \\ \text{or } 35$$

$$+16.04 - 0.14 = +172.4$$

$$-0.14 + 16.28 = +265.8$$

$$+ (1 - 1) = +10.6$$

$$+16.28 = +266.4$$

$$b = +16.2$$

$$+16.04 = +172.4 + 23 = +174.7$$

$$a = +9.6$$

are 15.3

$$\frac{P}{n} = .118$$

$$\frac{\sum R}{n} = +15.7$$

$$\frac{+15.7}{.118} = +87$$

$$DR = +11$$

New O-C

+	6	-23	= -17	+56
+	9	-7	= +2	-54
+	9	-0	= +9	+31
+	9	+29	= +18	-10
+	6	+23	= +30	+12
+	2	+32	= +34	+25
-	0	+33	= +33	+51
-	3	+31	= +28	-15

$$+190 - 64 \\ \text{or } 32$$

13668

Mean Mean Position

8

X0 23.6000
+ 2
23.6002

40 16.4400
+ 08
16.4408

From Plate Constants.

23.9219
32.
+ 1.9219

16.3195
18.
- 1.6805

log S₁ 0.28372
C₀ S₀ 9.97473
8.50724
S₁ X₁ A 1.80175

log tan δ 9.54555
S₀ 2 0.5675
7.0534
log η₁ 7.1664

α₁ A 01 03.35

η₁ + 0.0015
η₀ - 1.6820

A 02 28 09.65

α₀ 02 39 13.00

log h₁ 0.22583
7.33115
tan δ - δ 2.89468

Red + 4.79

δ - δ - 7847

α' 02 39 17.79

-13 04.7
δ + 19 34 29.9

S₀ + 19 21 25.2

Red + 22.1

δ' + 19 21 47.3

13668

Mean Mean Position

8

X0 23 60 00
+ 2
23.6002

40 16 44 00
+ 108
16.4408

From Plate Constants.

23 9 22 8
12
+ 1.9224

16 3 19 8
18
- 1.6805

log S₁ 0.28372
cos S₁ 9.97473
S 5 07 24
In X A 1.80175

log tan δ 9.5455
S₂ 0.5675
7 45 34
log η₁ 7.1664

X A 01 03.35

η₁ +0.0015
η₀ -1.6820

A 02 28 09.65

log h₀ 0.22583
7.33115

X₀ 02 39 13.00

tan δ - 2 2.89468

Red + 4.79

S₀ - 7.847

X' 02 39 17.79

-13 04.0

S + 19 34 29.9

S₀ + 19 21 25.2

Red + 22.1

S' + 19 21 47.3

$$\begin{array}{r}
 1. \quad 02 \quad 34 \quad 10.850 \\
 \quad \quad \quad 6.008 \\
 \hline
 \quad \quad \quad +4.842
 \end{array}$$

$$\begin{array}{r}
 2. \quad 02 \quad 40 \quad 31.796 \\
 \quad \quad \quad 27.153 \\
 \hline
 \quad \quad \quad +4.593 \\
 \quad \quad \quad 1.95
 \end{array}$$

$$\begin{array}{r}
 3. \quad 02 \quad 45 \quad 10.615 \\
 \quad \quad \quad 5.632 \\
 \hline
 \quad \quad \quad +4.983
 \end{array}$$

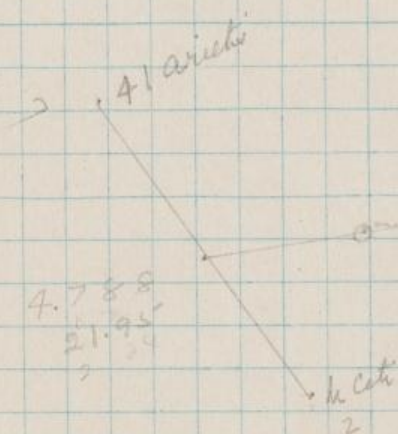
$$\begin{array}{r}
 +21 \quad 36 \quad 33.39 \\
 \quad \quad \quad 11.29 \\
 \hline
 \quad \quad \quad +22.10
 \end{array}$$

$$\begin{array}{r}
 9 \quad 46 \quad 15.96 \\
 \quad \quad \quad 45 \quad 52.09 \\
 \hline
 \quad \quad \quad +23.87
 \end{array}$$

$$\begin{array}{r}
 26 \quad 55 \quad 29.18 \\
 \quad \quad \quad 9.16 \\
 \hline
 \quad \quad \quad 20.02
 \end{array}$$

$$\begin{array}{r}
 4.983 \\
 4.593 \\
 \hline
 .390
 \end{array}$$

$$\begin{array}{r}
 4.842 \\
 4.788 \\
 \hline
 .054
 \end{array}$$



$$\begin{array}{r}
 22.10 \\
 21.95 \\
 \hline
 0.15
 \end{array}$$

$$\begin{array}{r}
 3.85 \\
 3.4
 \end{array}$$

$$+29$$

$$+24$$

$$+19$$

$$+14$$

$$+9$$

$$+4$$

47 45 43 41 39 37 35 33 31 29

13668.

Reduction to Apparent Place.

9

$H + \alpha_0$	0.7	57.3	119° 19.5	$\delta_0 + 19^\circ$	21.4
H	0.5	18.1			
α_0	0.2	39.2			
G	23	43.8			
$G + \alpha_0$	2	23.0	35° 45.0		

$\cos \delta_0$	9.9747
$\log i$	0.9047
(i/i)	0.8794

$\log \cos G + \alpha_0$	9.9093
$\log$	1.3364
$\sin G + \alpha_0$	9.7666
$\tan \alpha_0$	9.5457
	8.8239

$\sin \delta_0$	9.5204
$\cos H + \alpha_0$	9.6900 m
$\log h$	1.2748
$\sin H + \alpha_0$	9.9404
$\sec \delta_0$	0.0253
	8.8239

$\log g'$	1.2457
g	9.4726

$\log h'$	0.4852 m
h	0.0644

g	+3.330
g	+0.297
h	+1.160
Red	+4.787

g'	+17.610
g'	-3.128
h	+7.575
Red.	+22.057

13668

Reduction to Apparent Place.

9

$$H + \chi_0 \quad 0.7 \quad 57.3 \quad 119^\circ 19.5' \quad \delta_0 + 14^\circ = 21.4$$

$$H \quad 0.5 \quad 18.1$$

$$\chi_0 \quad 0.2 \quad 39.2$$

$$G \quad 23 \quad 43.8$$

$$G + \chi_0 \quad 2 \quad 23.0 \quad 35^\circ 45'$$

$$\cos \delta_0 \quad 9.9747$$

$$\log l \quad 0.9047$$

$$l(i) \quad 0.8794$$

$$\sin \delta_0 \quad 9.5204$$

$$\cos H + \chi_0 \quad 9.6900$$

$$\log h \quad 1.2748$$

$$\sin H + \chi_0 \quad 9.9404$$

$$\sec \delta_0 \quad 0.2253$$

$$8.8239$$

$$\log \cos G + \chi_0 \quad 9.9093$$

$$g \quad 1.3364$$

$$\sin G + \chi_0 \quad 9.7666$$

$$\tan \delta_0 \quad 9.5457$$

$$8.8239$$

$$\log g' \quad 1.2457$$

$$g \quad 9.4726$$

$$f \quad +3.330$$

$$g \quad +0.297$$

$$h \quad +1.160$$

$$\text{Red} \quad +4.787$$

$$\log h' \quad 0.4852$$

$$h \quad 0.0644$$

$$g' \quad +27.610$$

$$l' \quad -3.128$$

$$l \quad +7.573$$

$$\text{Red.} \quad +22.057$$

13668

Yunar Parallax

10

α'	02	39	17.79"	π	59	16.8"
θ	04	32	13.15"			
$\delta - \alpha'$	01	52	55.36"	$\log \sin \pi$	9.86913	
$=$	+28	13	50.40"	$\log \sin \pi$	8.23652	
$\frac{1}{2} \alpha \alpha'$		11	01.18"	$\cos \delta - \alpha'$	9.67488	
$\delta - \alpha' - \frac{1}{2} \alpha \alpha'$	+28	02	49.22"	$\sec \phi \delta$	0.02639	
				$\sin \alpha \alpha'$	7.80692	

$\log \tan \gamma$	9.95727		
$\cos \frac{1}{2} \alpha \alpha'$	0.00000		
$\sec \delta - \alpha'$	0.05426		
$\log \tan \gamma$	0.01153		

$$\alpha = \alpha' + 22 \quad 02.36"$$

$$= + 11 \quad 28.16"$$

γ	45	45	38.9
δ'	+19	21	47.3
$\gamma - \delta'$	+26	23	51.1

$\log \sin \pi$	9.82640		
$\log \sin \pi$	8.23652		
$\sin \gamma - \delta'$	9.64796		
$\cos \alpha \alpha'$	0.14482		
$\sin \delta - \delta'$	7.85570		

$$\delta - \delta' \quad + 24 \quad 39.6$$

$$\delta \quad + 19 \quad 46 \quad 26.9$$

$$\gamma - \delta + 19 \quad 46 \quad 25.1$$

$$O-C \quad + 1.8$$

$$\text{curr.} \quad + 0.1$$

$$2^{\text{nd}} \text{ Clid. Ref} \quad 0.0$$

$$\delta \quad + 19 \quad 46 \quad 27.0$$

$$O-C \quad + 1.9$$

$$\alpha \quad 02 \quad 40 \quad 45.95$$

$$\gamma - \alpha \quad 02 \quad 40 \quad 45.06$$

$$O-C \quad + 0.89$$

$$\text{curr.} \quad - 0.03$$

$$\alpha \quad 02 \quad 40 \quad 45.92$$

$$O-C \quad + 0.86$$

13668

Juvax Parallax

10

α' 02 39 17.79"
 θ 04 32 13.15"
 $\phi - \alpha'$ 01 52 55.36"
 $=$ +28 13 50.40"
 $\frac{1}{2} \alpha' \alpha'$ 11 01.28
 $\phi - \alpha' - \frac{1}{2} \alpha' \alpha' + 28$ 02 49.22

$\log \sin \Pi$ 9.86913 -
 $\sin \theta - \alpha'$ 9.67488"
 $\sin \phi$ 002639"
 $\sin \alpha' \alpha'$ 7.80692"
 $\alpha = \alpha' + 2.2$ 02.34"
 $= + 11$ 28.16"

$\log \tan \gamma$ 0.01153 -
 γ 45 45 38.9
 δ' +19 21 47.3
 $\gamma - \delta'$ +26 23 51.1

$\log \sin \Pi$ 9.82640
 $\sin \gamma - \delta'$ 9.64796 -
 $\cos \alpha'$ 0.14482 -
 $\sin \delta - \delta'$ 7.85570 -

$\delta - \delta'$ 24 39.6

δ +19 46 28.9

$\gamma - \delta$ -19 46 25.4

$\delta - \alpha$ +1.8

$\cos \alpha$ +0.1

2nd Red Ref 0.0

δ +19 46 27.0

$\delta - \alpha$ +1.9

α 02 40 45.93

$\gamma - \alpha$ 02 40 45.08

$\delta - \alpha$ +0.89

$\cos \alpha$ -0.03

α 02 40 45.72

$\delta - \alpha$ +1.0

13669

Star Measures.

11

L	166.18	17232	18042	165.20
14.2	15070	8778 ⁸⁰	118.52 ⁵⁰	12718
32.7	70	82	48	18
	18	32	42	20
	<u>141548</u>	<u>141548</u>	<u>32.6192</u>	<u>32.6198</u>

7	16738	19610	16054	16170
7.2	15162 ⁶⁰	11190 ⁹²	6964 ⁶²	15258
7.9	58	94	60	5456
	38	10	54	70
	<u>17.1578</u>	<u>17.1582</u>	<u>7.9092</u>	<u>7.9086</u>

3	16950	16216	17513	17476
31.1	16110	7062	10530 ³⁷	14448
5.7	10	62	42	48
	50	16	15	76
	<u>31.0840</u>	<u>31.0846</u>	<u>5.6976</u>	<u>5.6972</u>

Moon

L	16242	17020
25.0	7860	15399 ⁰⁰
14.9	60	01
	42	20
	<u>14.8382</u>	<u>14.8380</u>

2	16795	16750
25.6	1077873	12768
6.0	68	68
	95	50
	<u>25.6022</u>	<u>25.6018</u>

3	16746	16760
25.7	10534 ³²	12978
6.5	30	78
	46	60
	<u>25.6219</u>	<u>25.6218</u>

13669

Star Measures.

11

1	166.18	17232	18042	165.20
14.2	15070	8798.80	118.52 ⁵⁰	12718
32.7	70	22	48	18
	18	32	42	20
	<u>141548</u>	<u>141548</u>	<u>326192</u>	<u>32.6198</u>

2	16738	19610	16054	16170
7.2	15162 ⁶⁰	11190 ⁹²	6964 ⁶²	15258
7.9	58	94	60	54 ⁵⁶
	38	10	54	70
	<u>171578</u>	<u>17.1582</u>	<u>79092</u>	<u>7.9086</u>

3	16950	16216	17513	17476
31.1	16110	7062	10530 ³⁷	14448
5.7	10	62	42	48
	50	16	13	76
	<u>310840</u>	<u>31.0846</u>	<u>56996</u>	<u>56972</u>

Moon.

5.0	16242	17020
12.9	7860	15399 ⁰⁰
	60	01
	42	20
	<u>148382</u>	<u>14.8380</u>

2	16795	16750
25.6	1077873	12768
16.0	68	68
	95	50
	<u>256022</u>	<u>25.6018</u>

3	16746	16760
25.7	10534 ³²	12978
16.5	30	78
	46	60
	<u>256219</u>	<u>25.6218</u>

13669

Moon

12

4	16130	167.80
25.6	11.20506	117.7675
17.0	07	1.4
	30	80
	<u>25.4924</u>	<u>25.4935</u>

5
25.0
17.7

16382	16590
8934	14044
34	38
82	90
<u>17.7498</u>	<u>17.7451</u>

6
24.0
18.1

17774	16070
1513430	8870207
26	12
74	70
<u>18.2644</u>	<u>18.2637</u>

7
23.5
18.2

17105	17758
14078	10778
8079	78
05	58
<u>18.3026</u>	<u>18.3020</u>

8
23
18.1

17400	16938
15350	8980
4848	80
00	38
<u>18.2052</u>	<u>18.2042</u>

13668

Moon

12

4	16130	167.80
25.6	11.205 ⁰⁶	117.2625
17.0	07	1.4
	30	80
	<u>254924</u>	<u>254935</u>

25.0
17.7

16382	16590
8934	14044
34	38
82	90
<u>177448</u>	<u>177451</u>

24.0
18.1

17774	16070
15134 ³⁰	88702
26	12
74	70
<u>182644</u>	<u>182637</u>

23.5
18.2

17105	17758
14078	10778
80 ⁷⁹	78
05	58
<u>183026</u>	<u>183020</u>

23
18.1

17400	16938
13350 ⁴⁸	8980
46	80
00	38
<u>182052</u>	<u>182042</u>

13669

Times Etc.

13

Date Oct 2, 1917

Exp. & Stars

4 39 ✓

4 51 ✓

" " Moon

4 45 10.4 ✓

4 45 10.6 ✓

Clock Slow

+ 47.4 ✓

H. Sid. Time

4 45 57.9 ✓

 $\theta = +2^h 5^m$

H. Long

4 44 31.05 ✓

G. Sid. Time

9 30 28.95 ✓

" " " M.N.

12 42 31.81 ✓

Interval

20 47 57.14 ✓

20^h 7424 ✓

Red

3 24.45 ✓

G. M. T

20 44 32.69 ✓

From Naut. Almanac

R. A.

Dec.

Moon 20^h

02 39 29.98 ✓

+19 41 47.2 ✓

Motion 1st

2.4349 ✓

8.997 ✓

" 44.5448 ✓

01 48.46 ✓

06 40.8 ✓

Tabular Place.

02 41 18.44 ✓

+19 48 28.0 ✓

934" = 12.9 ✓

Moon age 17^d $a = -502.4$

+240

-478.4

Parallax

59 15.5 ✓

Semi-diam

16 10.3 ✓

R

990.3 ✓

ang

13.9 ✓

2nd 5

-0.3 ✓

R

983.9 ✓

R

2109.1 ✓

a R

-10.09 ✓

(1+a) R

2008.2 ✓

R²

4.0329 ✓

13169

Times Etc.

13

Date Oct 2, 1917

Exp X Stars

4 39

4 51

" " Moon

4 45

10.4

4 45

10.6

Clock Slow

- 47.4

H. Sid Time

4 45

57.9

 $\theta = +2^{\circ} 5'$

H. Long

4 44

31.05

G. Sid Time

9 30

28.95

" " " " " " " "

12

42

31.81

Interval

20

47

57.14

20.7424

Red

3

24.45

G. M. T

20

44

32.69

From Naut. Almanac

R. A

Dec.

Moon

20

02

39

29.98

+19

41

47.2

Motion 1st

24349

3.997

" 44.54483

01

48.46

06

40.8

Tabular Place

02

41

18.44

+19

48

28.0

934" = 12.9

Motion age 174

a = -502.4

+24.0

-478.4

Parallax

59

15.5

Semi-diam

16

10.3

R

970.3

avg

13.9

30 5

-0.3

R

983.9

R

21091

AR

-10.09

11+AR

20082

R2

41329

13669

Plate Center

14

$$\begin{array}{r} X \quad 14.1548 \\ S \quad 14.7097 \\ - .5549 \end{array}$$

$$\begin{array}{r} 17.1580 \\ 17.8723 \\ - .7143 \end{array}$$

$$\begin{array}{r} 31.0843 \\ 32.4990 \\ - 1.4147 \end{array}$$

$$\begin{array}{r} y \quad 32.6195 \\ \eta \quad 33.6824 \\ - 1.0629 \end{array}$$

$$\begin{array}{r} 7.9089 \\ 7.7237 \\ + .1852 \end{array}$$

$$\begin{array}{r} 5.6974 \\ 5.4097 \\ + .2877 \end{array}$$

$$\begin{array}{r} X-S + 500X \\ -5549 + 70.77 = 1528 - 34y \\ -7143 + 85.79 = 1436 - 27y \\ -1.4147 + 155.42 = 1395 - 19y \\ 23.6142 + 118.07 = 55 \end{array}$$

$$\begin{array}{r} +24X \\ +33 = 1450 \\ +41 = 1450 \\ +74 = 1450 \\ +57 = 24.6501 \end{array}$$

$$\begin{array}{r} y-\eta + 500y \\ -1.0629 + 163.10 = 5681 + 6.7X \\ + .1852 + 395.4 = 5806 + 95 = 5776 + 192 = 5968 \\ + .2877 + 284.9 = 5726 + 114 = 5920 + 47 = 5967 \\ 16.2928 + 81.46 = 5726 + 208 = 5934 + 34 = 5968 \\ + 158 + 96 = 16.5360 \end{array}$$

$$\begin{array}{r} \text{Tables} \quad a = -1.0 \quad b = -1.5 \quad a-b = +0.5 \quad t+d = -1.5 \\ -502.4 \quad -505.9 \quad +3.5 \quad -3.3 \\ -501.4 \quad -504.4 \quad +3.0 \quad -1.8 \end{array}$$

13669

Plate Center

14

$$\begin{array}{r} X \quad 14.1548 \\ S \quad 14.7097 \\ - .5549 \end{array}$$

$$\begin{array}{r} 17.1580 \\ 17.8723 \\ - .7143 \end{array}$$

$$\begin{array}{r} 31.0843 \\ 32.4990 \\ - 14147 \end{array}$$

$$\begin{array}{r} y \quad 32.6195 \\ \eta \quad 33.6824 \\ - 1.0629 \end{array}$$

$$\begin{array}{r} 7.9089 \\ 7.7237 \\ + .1852 \end{array}$$

$$\begin{array}{r} 5.6974 \\ 5.4097 \\ + .2877 \end{array}$$

$$\begin{array}{rcll} X-S + 5001 & -3.4y & +2.9x & -1450 \\ .5549 + 7077 & = 1528 - 111 & = 1417 + 33 & = 1450 \\ .7143 + 8579 & = 1436 - 27 & = 1409 + 41 & = 1450 \\ 1.4147 + 163542 & = 1395 - 19 & = 1376 + 74 & = 1450 \\ .142 + 11807 & - 55 & + 57 & = 24.6501 \end{array}$$

$$\begin{array}{rcll} y-\eta + 500y & +6.7x & +5.9y & -5968 \\ 1.0629 + 16310 & = 5681 + 95 & = 5776 + 192 & = 5968 \\ -.1852 + 3954 & = 5806 + 114 & = 5920 + 47 & = 5967 \\ -.2877 + 2849 & = 5726 + 208 & = 5934 + 34 & = 5968 \\ 928 + 8146 & + 158 & + 96 & = 16.5360 \end{array}$$

$$\begin{array}{rcll} Hrs & a = -1.0 & b = -1.5 & a-b = +0.5 \\ & -502.4 & -505.9 & +3.5 \\ & & & f+d = -1.5 \\ & & & -3.3 \end{array}$$

13669.

Moon Center

	X	X - X ₀	(X - X ₀) ²	+	(y - y ₀) ²	0 - 2	15'
1	25.0000	+1.3880 - 2	1.9260		4.0398	+	69
2	25.6020	+1.9900 - 0	3.9601		4.0454	+	125
3	25.6216	+2.0096 0	4.0385		4.0385	+	66
4	25.4930	+1.8810 + 1	3.5386		4.0399	+	70
5	25.0000	+1.8880 + 2	1.9271		4.0383	+	54
6	24.0000	+0.8880 + 3	0.1507		4.0395	+	66
7	23.6120	0.0000 + 3	0.0000		4.0413	+	84
8	23.0000	-0.6120 + 3	0.3741		4.0326	-	3
Σ 15.9151 R ² 4.0329							

	y	y - y ₀	Σ y - 0	arc.
1	14.8381	-1.4539	2.1138	136° ✓
2	16.0000	-0.2920	0.0853	98° ✓
3	16.2920	0.0000	0.0000	90° ✓
4	17.0000	+0.7080	0.5013	70° ✓
5	17.7450	+1.4530	2.1112	44° ✓
6	18.2640	+1.9720	3.8888	11° ✓
7	18.3023	+2.0103	4.0413	0° ✓
8	18.2047	+1.9127	3.6585	-18° ✓
Σ 16.4002				Range 154°

$X = 25$ $y = 14.8381$
 17.7450
 32.5831
 y₀ 16.2915
 y_{max} 18.3023
 R 2.0108
 Corr R 2.0082
 X_{max} 25.6216
 X₀ 23.6108

Moon Center. X₀ = 23.6120
 y₀ 16.2920

13669

Mean Center

15

	X	1-X ₀	1-X ₀ ²	+ 1-X ₀ ²	0.0	15
1	25.0000	+1.3880 - 2	1.9260	40398	+	69
2	25.6020	+1.9900 - 0	3.9601	40459	+	125
3	25.6216	+2.0096 0	4.0385	40385	+	66
4	25.4930	+1.8810 + 1	3.5386	40349	+	70
5	25.0000	+1.3880 + 2	1.9271	40383	+	54
6	24.0000	+0.3880 + 3	0.1507	40395	+	66
7	23.6120	0.0000 + 3	0.0000	40413	+	84
8	23.0000	-0.6120 + 3	0.3741	40326	-	3
						R ² 40329

	Y	Y-Y ₀	Y-Y ₀ ²	ARC.
1	14.8381	-1.4539	2.1138	136°
2	16.0000	-0.2920	0.0853	98
3	16.2920	0.0000	0.0000	90°
4	17.0000	+0.7080	0.5013	70
5	17.7450	+1.4530	2.1112	44
6	18.2640	+1.9720	3.8888	11
7	18.3023	+2.0103	4.0483	0°
8	18.2047	+1.9127	3.6585	-18°

154

$X = 25$ $Y = 14.8381$
 17.7450
 32.5831
 $Y_0 = 16.2915$
 $y_{max} = 18.3023$
 $R = 2.0108$
 $Corr R = 2.0082$
 $X_{max} = 25.6216$
 $Y_0 = 23.6108$

Mean Center. $X_0 = 23.6120$
 $Y_0 = 16.2920$

Formation of Normals

1	- 2.82
2	- 0.57
3	0.00
4	+ 1.33
5	+ 2.02
6	+ 0.77
7	+ 0.00
8	- 1.16
	+ 4.12
	- 3.75
	+ 0.37

+	96.0
+	248.0
+	132.0
+	131.5
+	75.2
+	25.8
+	0.0
+	1.8
	+ 710.3

-	100.0
-	36.2
+	0.0
+	50.0
+	78.3
+	130.0
+	168.6
-	5.7
	+ 426.9
	- 141.9
	+ 285.0

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Conditional Equations

16

O-C

1	+	1.39	-	1.45	=	+ 69	+	61	-	24	=	+ 37	+	32
2	+	1.99	-	0.29	=	+ 125	+	88	-	47	=	+ 41	+	84
3	+	2.01		0.00	=	+ 66	+	89		0	=	+ 89	-	23
4	+	1.88	+	0.71	=	+ 20	+	83	+	12	=	+ 95	-	25
5	+	1.39	+	1.45	=	+ 54	+	61	+	24	=	+ 85	-	31
6	+	0.39	+	1.97	=	+ 66	+	17	+	32	=	+ 49	+	17
7	+	0.00	+	2.01	=	+ 84	+	0	+	33	=	+ 33	+	51
8	-	0.61	+	1.91	=	- 3	-	27	+	31	=	+ 4	-	7

+184-86

av 34

$$+ 15.91 + 0.37 = +710.3$$

$$+ 0.37 + 16.40 = +285.0$$

$$- () - (0.00) = - 16.5$$

$$+ 16.40 + 268.5$$

$$t = + 16.4$$

$$+ 15.91 = +710.3 - 6.0 = +704.3$$

$$a = + 44.1$$

arc 154

$$\frac{P}{n} = .18^v$$

$$\frac{\Sigma K}{n} = +12.3^v$$

$$\frac{+12.3}{.18} = +68.5^v$$

$$\Delta R = +0.8^v$$

83

1
2
3
4
5
6
7
8

13668

Conditional Equations

16

O-C

1	+	1.39	-	1.45	=	+	69	+	61	-	24	=	+	37	+	32
2	+	1.49	-	0.29	=	+	125	+	88	-	47	=	+	41	+	89
3	+	2.01		0.00	=	+	66	+	89		0	=	+	89	-	23
4	+	1.88	+	0.71	=	+	70	+	83	+	12	=	+	95	-	25
5	+	1.39	+	1.45	=	+	54	+	61	+	24	=	+	85	-	31
6	+	0.39	+	1.97	=	+	66	+	17	+	32	=	+	49	+	17
7	+	0.00	+	2.01	=	+	84	+	0	+	33	=	+	33	+	51
8	-	0.61	+	1.91	=	-	3	-	27	+	31	=	+	4	-	7

+184-86

av 34

$$+15.91 + 0.37 = +710.3$$

$$+0.37 + 16.40 = +285.0$$

$$- () - (0.00) = -16.5$$

$$+16.40 + 268.5$$

$$f = +16.4$$

$$+15.91 = +710.3 - 6.0 = +704.3$$

$$a = +44.1$$

arc 154

$$\frac{D}{m} = 1.8$$

$$\frac{\Sigma K}{n} = +12.3$$

$$\frac{+12.3}{1.8} = +68.5$$

$$\Delta R = +0.8$$

13669

Mopis Mean Position

17

$$\begin{array}{r} \gamma_0 \quad 23.6120 \checkmark \\ \quad + 22 \checkmark \\ \hline 23.6142 \checkmark \end{array}$$

$$\begin{array}{r} 16.2920 \checkmark \\ \quad + 8 \checkmark \\ \hline 16.2928 \checkmark \end{array}$$

From Plate Constants

$$\begin{array}{r} 94.6501 \checkmark \\ 22 \checkmark \\ \hline + 2.6501 \checkmark \end{array}$$

$$\begin{array}{r} 16.5360 \checkmark \\ 18 \checkmark \\ \hline - 1.4640 \checkmark \end{array}$$

$$\begin{array}{r} S_0 \quad 0.42329 \checkmark \\ \cos \delta \quad 997466 \checkmark \\ \quad 8.50724 \checkmark \\ \sin \alpha - A \quad 1.94137 \checkmark \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.5463 \checkmark \\ \quad 0.8465 \checkmark \\ \quad 7.0534 \checkmark \\ \log \eta_1 \quad 7.4462 \checkmark \end{array}$$

$$\alpha - A \quad 01 \quad 27.37 \checkmark$$

$$\begin{array}{r} \eta_1 \quad 0.0028 \checkmark \\ \eta_0 \quad -1.4668 \checkmark \end{array}$$

$$A \quad 02 \quad 38 \quad 09.65 \checkmark$$

$$0.16637 \checkmark$$

$$\alpha_0 \quad 02 \quad 39 \quad 37.02 \checkmark$$

$$7.33115 \checkmark$$

$$\tan \delta - D \quad 2.83522 \checkmark$$

$$\text{Red} \quad +4.99 \checkmark$$

$$\delta - D \quad -11 \quad 24.3 \checkmark$$

$$D \quad +19 \quad 34 \quad 29.9 \checkmark$$

$$\alpha_1 \quad 02 \quad 39 \quad 41.81 \checkmark$$

$$\delta_0 \quad +19 \quad 23 \quad 05.6 \checkmark$$

$$\text{Red} \quad +22.1 \checkmark$$

$$\delta' \quad +19 \quad 23 \quad 27.7 \checkmark$$

13669

Moons Mean Position

17

$$\begin{array}{r} \gamma_0 \quad 23.6120 \\ \quad + 22 \\ \hline 23.6142 \end{array}$$

$$\begin{array}{r} 16.2920 \\ \quad + 8 \\ \hline 16.2928 \end{array}$$

Transit Plate Constants

$$\begin{array}{r} 24.6501 \\ 22. \\ \hline + 2.6501 \end{array}$$

$$\begin{array}{r} 16.5360 \\ 18 \\ \hline - 1.9640 \end{array}$$

$$\begin{array}{r} S_0 \quad 0.42327 \\ \cos \delta \quad 997466 \\ \hline 8.50724 \\ \sin \alpha \cdot A \quad 1.94137 \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.5463 \\ \quad 0.8465 \\ \hline 7.0534 \\ \log \eta_1 \quad 7.4462 \end{array}$$

$$\alpha \cdot A \quad 01 \quad 27.37$$

$$\begin{array}{r} \eta_1 \quad 0.0028 \\ \eta_0 \quad -1.4668 \end{array}$$

$$A \quad 02 \quad 38 \quad 09.65$$

$$0.16637$$

$$\alpha_0 \quad 02 \quad 39 \quad 31.02$$

$$7.33115$$

$$\tan \delta \cdot \odot \quad 2.83522$$

$$\text{Red} \quad +479$$

$$S_2 \quad -11 \quad 24.3$$

$$\odot \quad +19 \quad 34 \quad 29.9$$

$$\alpha_1 \quad 02 \quad 39 \quad 41.81$$

$$S_0 \quad +19 \quad 23 \quad 05.6$$

$$\text{Red} \quad +22.1$$

$$S' \quad +19 \quad 23 \quad 27.7$$

13669

Lunar Parallax

18

α'	02	39	41.81 [✓]
θ	04	45	57.90 [✓]
$\theta - \alpha'$	02	06	16.09 [✓]
$=$	+31	34	01.35 [✓]
$\frac{1}{2}\alpha - \alpha'$		+12	11.78 [✓]
$\theta - \alpha' = \frac{1}{2}\alpha - \alpha'$	31	21	49.57 [✓]

Π	59'	15.5 [✓]
	9.86913 [✓]	
$\log \sin \Pi$	8.23645 [✓]	
$\sin \theta - \alpha'$	9.71891 [✓]	
$\sec \delta$	0.02649 [✓]	
$\sin \alpha - \alpha'$	7.85098 [✓]	

	9.95727 [✓]
$\cos \frac{1}{2}\alpha - \alpha'$	0.00000
$\sec \theta - \alpha' = \frac{1}{2}\alpha - \alpha'$	0.06861 [✓]
$\log \tan \gamma$	0.02588 [✓]

$\alpha - \alpha'$	+24'	23.55 [✓]
$=$	+1	37.57 [✓]

γ	+46	42	21.6 [✓]
δ'	+19	23	27.7 [✓]
$\gamma - \delta'$	+27	18	53.9 [✓]
	9.82640		
Π	8.23645 [✓]		
	9.66170		
	0.13796 [✓]		
$\sin \delta - \delta'$	7.86251 [✓]		

$\delta - \delta'$	25	02.9 [✓]
--------------------	----	-------------------

δ	+19	48	30.6 [✓]
----------	-----	----	-------------------

$\frac{1}{2}\delta$	+19	48	28.0 [✓]
---------------------	-----	----	-------------------

$O - C$		+2.6 [✓]
---------	--	-------------------

curr		+0.1 [✓]
------	--	-------------------

2nd Ord. Ref.		0.0
---------------	--	-----

δ	+19	48	30.7
----------	-----	----	------

$O - C$		+2.7
---------	--	------

α	02	41	19.38
----------	----	----	-------

$\frac{1}{2}\alpha$	02	41	18.44 [✓]
---------------------	----	----	--------------------

$O - C$		+0.94 [✓]
---------	--	--------------------

curr		+0.03 [✓]
------	--	--------------------

α	02	41	19.35 [✓]
----------	----	----	--------------------

$O - C$		+0.91
---------	--	-------

13669

Lunar Parallax

18

α' 02 39 41.81"
 θ 04 45 57.90"
 $\theta - \lambda'$ 02 06 16.09"
 $= + 31 34 01.35$
 $\frac{1}{2} \lambda - \lambda'$ + 12 11.78"
 $\theta - \lambda' - \frac{1}{2} \lambda - \lambda'$ 31 21 49.55"

9.95727
 $\cos \frac{1}{2} \lambda - \lambda'$ 0.000000
 $\sec \theta - \lambda' - \frac{1}{2} \lambda - \lambda'$ 0.06861
 $\log \tan \gamma$ 0.02588

γ + 46 42 21.6"
 δ' + 19 23 27.7"
 $\gamma - \delta'$ - 27 18 53.9"
 9.82640
 Π 8.23645"
 9.66170
 0.13796
 $\sin \delta - \delta'$ 7.86251"

$\delta - \delta'$ 25 02.9"

δ + 19 48 30.5"

γ/δ + 19 48 28.0"

$\theta - C$ + 2.6"

curr + 0.1

2nd Ord. Ref. 0.0

δ + 19 48 30.7

$\theta - C$ + 2.7

Π 59' 15.5"
 9.86913
 $\log \sin \Pi$ 8.23645"
 $\sin \theta - \lambda'$ 9.71891"
 $\sec \delta$ 0.02649"
 $\sin \lambda - \lambda'$ 7.85098"

$\alpha - \alpha'$ + 24' 23.55"
 $=$
 $= + 1 37.55$

α 02 41 19.38

γ/λ 02 41 18.44

$\theta - C$ + 0.94

curr + 0.03

λ 02 41 19.35

$\theta - C$ + 0.91

1
1
1
2
26
2
3
34
18
1
24
14
2
2
13
3
25
16

13716

Star Measures

21

1	17232	16116	17904	17480
13	7310 ¹²	16030	8430	16950
129	14	30	30	50
	32	16	04	80
	<u>12.9920</u>	<u>12.9914</u>	<u>12.9474</u>	<u>12.9470</u>

2	16575	17698	16944	16594
265	1061621	13648	16880	6642
24	26	48	80	42
	75	98	44	94
	<u>26.5954</u>	<u>26.5950</u>	<u>24.0064</u>	<u>24.0048</u>

3	17480	16980	16110	17378
34.9	8385 ⁸⁶	1606871	15900	7574 ⁷²
18.0	87	74	00	70
	80	80	10	78
	<u>34.9094</u>	<u>34.9091</u>	<u>18.0210</u>	<u>18.0194</u>

Moon.

1		17876	16468
24.0		947880	1484854
14.9		82	60
		76	68
		<u>14.8396</u>	<u>14.8386</u>

2		16258	16914
25.0		8220	14940
15.9		20	40
		58	14
		<u>15.8038</u>	<u>15.8026</u>

3	17650	16510
25.1	1687678	727276
16.0	80	80
	50	10
	<u>25.0772</u>	<u>25.0766</u>

13716

Star Measures

5

1	17232	16116	17904	17480
13	7310	16030	8430	16950
129	1412	30	30	50
	32	16	04	80
	129920	129914	129474	129970

2	16575	17698	16944	16594
245	10616	13698	16880	6642
24	26	48	80	42
	75	98	44	94
	265954	265950	240064	240048

3	17480	16980	16110	17378
49	8385	16068	15900	7574
180	87	74	00	70
	80	80	10	78
	349094	349091	180210	180194

Moon.

17876	16468
947880	1484854
82	60
76	68
148396	148386

16258	16914
8220	14940
20	40
58	14
158038	158026

17650	16510
1687678	727276
80	80
50	10
258772	250766

Moon

2

13716
 4 17610 16548
 25.1 159046 8254
 165 08 54
 10 48
25.1704 25.1706

5
 25.1 17600 16115
 1700 1635658 736864
 60 60
 00 15
25.1242 25.1249

6
 25.0 16752 16982
 17.3 131026 10622
 10 22
 52 82
17.3646 17.3640

1
 24.5 16660 16825
 18.0 11318 12175
 18 75
 60 25
24.5342 24.5350

8
 24.0 16104 16344
 18.3 1276461 9680
 58 8281
 04 44
18.3343 18.3337

13716

Moon

1

	17610	16548
25.1	15904.6	8254
6.5	08	54
	10	48
	<u>25.1704</u>	<u>25.1706</u>

5	17600	16115
5.1	1635658	736864
7.0	60	60
	00	15
	<u>25.1242</u>	<u>25.1249</u>

6		16752	16982
25.0		131026	10622
17.3		10	22
		52	82
		<u>17.3846</u>	<u>17.3640</u>

2	16660	16825
24.5	11318	12175
18.0	18	75
	60	25
	<u>24.5342</u>	<u>24.5350</u>

8		16104	16344
4.0		1276461	9680
83		58	8281
		04	44
		<u>18.3343</u>	<u>18.3339</u>

13716

Juno

23

Date Oct 6, 1917

Exp. Stars

5 34

5 46

" Moon

5 39

55.3

5 39

55.6

Clock slow

49.6

H. Sid. Time

5 40

45.05

H. Long

4 44

31.05

G. Sid. Time

10 25

16.10

 $\Theta = -0^h 52^m$

" " " M.N.

12 58

18.02

Interval

21 26

58.08

Red

- 03

30.84

G. M.T

21 23

27.24

21^h 39 09

From Naut. Alman.

R.A.

Dec.

Moon 21^h

06 31

33.10

+23

05

13.1

Motion 1^m

2.2367

-4.458

Moon 22^h 45 40

52.46

01

44.6

Tabular Place

06 32

25.56

+23

03

28.5

934" = 14.6

moon age 21^d

Parallax

55 41.0

Semi-dian

15 12.0

R

912.0

any

13.9

Lib's-

-03

R

925.6

R

1.984.1

1AR

-950

1+AR

1.889.1

R2

3.5687

a = -512.9

+24.0

-478.9

13716

Juno

21

Date Oct 6, 1917

Exp Stars

5 34

5 46

" Moon

5 39

55.3

5 39

55.6

Clock slow

49.6

H Sid Time

5 40

45.05

H Long

4 44

31.05

G Sid Time

10 25

16.10

 $\theta = -0^h 52^m$

" " " M.N.

12 58

18.02

Interval

21 26

58.08

Red

- 13

30.84

G M.T

21 23

27.24

21^h 39 09

From Naut. Alman.

R. A.

Dec.

Moon 21^h

06 31

33.10

+ 23

05

13.1

Moon 1^m

2.2367

4.458

Moon 23^h 45 40

52.46

01

44.6

Folular Phase

06 32

25.56

+ 23

03

28.5

934" = 14.6

moon age 214

a = -512.9

+24.0

-478.9

Parallax

55 41.0

Semi diam.

15 12.0

R

912.0

any

13.9

Limb 5-

-0.3

R

925.6

R

1.984.1

a.R.

-950

(1+4)R

1.889.1

R2

3.5687

S_0	η_0	ΔS	-4.35	$+2.22$	$= \underline{1}$
-9.71	-5.30	-30	$+42 = +12$	$-12 = 0$	
$+4.60$	$+6.31$	$+7$	$-20 = -13$	$+14 = +1$	
$+13.31$	-0.07	$+58$	$-57 = +1$	$-0 = +1$	
$M + 1.10$	-1.46		-5	$-3 = -9$	$= -0.03^v$

$\Delta \eta$	-1.8η	$-2S = +4$
-16	$+10 = -6$	$+2 = -4$
$+9$	$-11 = -2$	$-1 = -3$
-1	$+0 = -1$	$-3 = -4$
	$+3$	$-0 = +7$
		$= +0.3^v$

13716

Standard Coordinates

24

Cape No. 929 mag 7.2

Cape No. 949 mag 7.8 Cape No. 966 mag 6.8

C	06	25	57.98	6	34	0.02	6	32	53.70
q			58.01			0.09			53.73
z			57.99			0.01			53.68
m	06	25	57.99	6	34	0.04	6	38	53.70
Prec		01	01.46		01	02.12		01	01.70
α	06	26	59.45	6	35	02.16	6	39	55.40
A	06	32	25.92	6	32	25.92	6	32	25.92
$\alpha - A$		-05	26.47		+02	36.24		+07	29.48
Sin "		-3	26.44		+1	56.24		+4	49.41
log "		2.51	382		2.19	379		2.65	264
cos δ		9.96	642		9.96	157		9.96	6427
S_0		0.98	748		0.66	260		1.12	415
S_0		-9.71	58		+4.59	83		+13.30	91
S_1		-	30		+7			+5	74
S		12.28	12		26.59	90		35.31	48
X		12.99	17		26.59	52		34.90	92
X-S		+7.10	5		-	.0038		-	4056

C +22	15	23.3	+23	45	49.7	22	56	19.4
q		22.3			49.7			19.4
z		21.7			49.0			18.6
m +22	15	22.4	23	45	49.5	22	56	19.1
Prec		-39.3			-51.1			-58.3
δ +22	14	43.1	+23	44	58.4	22	55	20.8
δ +22	55	55.7	+22	55	55.7	+22	55	55.7
$\delta - \delta$	-41	12.6	+	49	02.7	-		34.9
tan "	-24	72.7			+29	42.9		-34.9
log "	339	317			346	878		1.54
log "	0.72	432			0.79	993		8.87
tan δ	9.61	117			9.64	34		9.62
S_2	1.97	50			1.32	52		2.24
log η	8.64	01			8.02	20		8.92
η_0	-5.30	05			+6.30	86		-0.07
η_1	+0.04	37			0.01	05		0.08
η	12.74	32			24.31	91		18.00
η	12.94	72			24.00	56		18.02
$\eta - \eta$	+2.04	0			-31	25		+0.01

13716

Standard Coordinates

24

Cape No. 929 mag 7.2

Cape No. 949 mag 7.8

Cape No. 960 mag 6.8

C	06	28	57.98	6	34	0.02	6	38	53.70
q			58.01			0.09			53.73
z			57.99			0.00			53.68
m	06	25	57.99	6	34	0.04	6	38	53.70
Prec		01	01.46		01	02.12		01	01.7
α	06	26	59.45	6	35	02.16	6	39	55.4
A	06	32	25.92	6	32	25.92	6	32	25.92
$\alpha - A$		-05	26.47		+02	36.24		+07	29.48
Sum "			-326.44			+156.24			+499.41
log "			2.51382			2.19379			2.65264
cos δ			9.96642			9.96157			9.96427
S ₀			0.98748			0.66260			1.12415

S ₀	-9.7158	+4.5983	+13.3091
S ₁	-30	+7	+57
S	12.2812	26.5990	35.3148
λ	12.9917	26.5952	34.9092
I-S	+7105	- .0038	- 4056

C +22	15	23.3	+23	45	49.7	22	56	19.9
q		22.3			49.7			19.4
z		21.7			49.0			18.6
m +22	15	22.4	23	45	49.5	22	56	19.1
Prec		39.3			51.1			58.3
δ +22	14	43.1	-23	44	58.4	22	55	20.8
B +22	55	55.7	+22	55	55.7	+22	55	55.7
$\delta - B$	-41	12.6	+49	0.27		-		34.9
tan "		-24.72.7			+29.42.9			-34.9
log "		3.39317			3.46878			1.54283
" "		0.72432			0.79993			8.87398
tan δ		9.6117			9.6434			9.6262
S ₂		1.9750			1.3252			2.2483
log η		8.6401			8.0220			8.9279

η_0	+5.3005	+6.3086	-0.0748
η_1	+0.0437	0.0105	0.0847
η	12.7432	24.3191	18.0099
η	12.9472	29.0056	18.0202
$\eta - \eta_0$	+ .2040	- .3135	+ .0103

13716

Plate Center + Constants.

25

$$\begin{array}{r}
 \begin{array}{r}
 26.5952 \\
 22. \\
 \hline
 -4.5952 \\
 \hline
 24 \\
 \hline
 -156.24
 \end{array}
 \begin{array}{r}
 24.0056 \\
 18. \\
 \hline
 -6.0056 \\
 \hline
 490 \\
 \hline
 -2942.7
 \end{array}
 \end{array}$$

Plate Center

$$A = 06 \quad 32 \quad 25.92$$

$$D = +22 \quad 55 \quad 55.7$$

$$\begin{array}{r}
 x - S \quad +5.00x \quad +27.3y \quad +29x -13992 \\
 +7105 + 6496 = 13601 + 353 = 13954 + 38 = 13992 \\
 -0038 + 13298 = 13260 + 656 = 13916 + 77 = 13993 \\
 -4056 + 17455 = 13399 + 492 = 13891 + 101 = 13992 \\
 23.2811 + 11640 \quad +452 \quad +67 = 23.0978
 \end{array}$$

$$\begin{array}{r}
 y - \eta + 5.00y \quad -27.9x \quad +2.2y -8179 \\
 +2040 + 6474 = 8514 - 362 = 8152 + 28 = 8180 \\
 -3135 + 12003 = 8868 - 742 = 8126 + 53 = 8179 \\
 +0103 + 9010 = 9113 - 974 = 8139 + 40 = 8179 \\
 16.5863 + 8293 \quad -650 \quad +37 = 16.5364
 \end{array}$$

Table

$$a = -1.0$$

$$l = -1.0$$

$$a - l = 0.0$$

$$t + d = 0.0$$

$$-502.9$$

$$-512.2$$

$$= -0.7$$

$$+0.6$$

$$-501.9$$

$$-501.2$$

$$-0.7$$

$$+0.6$$

13716

Plate Center + Constants.

2:

$$\begin{array}{r}
 \times \\
 26.5952 \quad 24.0056 \quad 06 \quad 35 \quad 02.16 + 23 \quad 44 \quad 58.4 \\
 22. \quad 18. \quad - 02 \quad 36.24 \quad - 49 \quad 02.7 \\
 \hline
 -45.952 \quad -6.0056 \\
 \hline
 24 \quad 490 \\
 \hline
 -156.24
 \end{array}$$

Plate Center

$$A = 06 \quad 32 \quad 2592$$

$$B = 22 \quad 55 \quad 58.7$$

$$\begin{array}{r}
 x - S \quad + 500x \quad + 27.3y \quad + 2.9x - 13992 \\
 -7115 + 6496 = 13601 + 353 = 13954 + 38 = 13992 \\
 -0138 + 13298 = 13260 + 656 = 13916 + 77 = 13993 \\
 4056 + 17455 = 13399 + 492 = 13891 + 101 = 13992 \\
 232811 + 11640 \quad + 452 \quad + 67 = 23,0978
 \end{array}$$

$$\begin{array}{r}
 -\eta + 500\gamma \quad - 27.9x \quad + 2.2\gamma - 8179 \\
 2040 + 6474 = 8514 - 362 = 8152 + 28 = 8180 \\
 3135 + 12003 = 8868 - 742 = 8126 + 53 = 8179 \\
 0103 + 9010 = 9113 - 974 = 8139 + 40 = 8179 \\
 16.5863 + 8293 \quad - 650 \quad + 37 = 16.5369
 \end{array}$$

$$\begin{array}{r}
 \text{Table} \quad a = -1.0 \quad l = -1.0 \quad g - e = 0.0 \quad f + d = 0.0 \\
 \quad \quad -502.9 \quad -512.2 \quad = -0.7 \quad + 0.6
 \end{array}$$

13716

Moon Center

26

 $\Delta X = 0$

O - C

1	24.0000	+0.7190	0.5170	3.5683	-	4
2	25.0000	+1.7190	2.9550	3.5678	-	9
3	25.0769	+1.7959	3.2252	3.5686	-	1
4	25.1705	+1.8895	3.5700	3.5700	+	13
5	25.1245	+1.8435	3.3988	3.5697	+	10
6	25.0000	+1.7190	2.9550	3.5607	-	80
7	24.5346	+1.2536	1.5715	3.5712	+	25
8	24.0000	+0.7190	0.5170	3.5724	+	37
			8.7090R ²	3.5687		

dy

arc.

1	14.8393	-1.7467	-1	3.0513
2	15.8032	-0.7828	-0	0.6128
3	16.0000	-0.5860	-0	0.3434
4	16.5860	0.0000	0	0.0000
5	17.0000	+0.4140	+0	0.1714
6	17.3643	+0.7783	+0	0.6057
7	18.0000	+1.4140	+1	1.9997
8	18.3340	+1.7480	+1	3.0554

9.8397

Range 1.36

$$x = 24 \quad y = 14.8393$$

$$18.3340$$

$$33.1733$$

$$y_0 = 16.5867$$

$$x = 25 \quad y = 15.8032$$

$$17.3643$$

$$33.1675$$

$$y_0 = 16.5837$$

$$x \text{ max} = 25.1705$$

$$\text{Com A} \quad 1.8891$$

$$y_0 \quad 23.2814$$

Moon Center

$$x_0 \quad 23.2810$$

$$y_0 \quad 16.5860$$

13716

Mean Center

26

dx

0 e

1	24.0000	+0.7190	0.5170	3.5683	-	4
2	25.0000	+1.7190	2.9550	3.5678	-	9
3	25.0769	+1.7959	3.2252	3.5686	-	1
4	25.1705	+1.8895	3.5700	3.5700	+	13
5	25.1245	+1.8435	3.3983	3.5697	+	10
6	25.0000	+1.7190	2.9550	3.5607	-	80
7	24.5346	+1.2536	1.5715	3.5712	+	25
8	24.0000	+0.7190	0.5170	3.5724	+	37

R² 3.5681

dy

arc.

1	14.8393	-1.7467	-1	3.0513
2	15.8032	-0.7828	-0	0.6128
3	16.0000	-0.5860	-0	0.3434
4	16.5860	0.0000	0	0.0000
5	17.0000	+0.4140	+0	0.1714
6	17.3643	+0.7783	+0	0.6057
7	18.0000	+1.4140	+1	1.4997
8	18.3340	+1.7480	+1	3.0554

158

115

108

90°

77

66

42

22

Range 1.36

x = 24 y = 14.8393

18.3340

33.1733

y₀ = 16.5867

x = 25 y = 15.8032

17.3643

32.1675

y₀ = 16.5837

y max = 25.1705

Cm A 1.8891

y₀ 23.2814

Mean Center {

x₀ 23.2810

y₀ 16.5860 :

Formation of Normals

1 - 1.26
 2 - 1.34
 2 - 1.06
 4 0.00
 5 + 0.75
 6 + 1.34
 7 + 1.76
 8 + 1.26
 + 5.11
 - 3.66
 + 1.45

- 2.9
 - 15.4
 - 1.8
 + 24.6
 + 18.4
 - 137.3
 + 31.2
 + 26.6
 + 100.8
 - 157.4
 + 56.6

+ 7.0
 + 7.0
 + 0.6
 + 0.0
 + 4.1
 - 62.4
 + 35.2
 + 64.8
 + 118.7
 - 62.4
 + 56.3

13716

Conditional Equations

27

								0-c
1	+ 0.72	- 1.75	= -	4	+	2	- 9 = - 7	+ 3
2	+ 1.72	- 0.78	= -	9	+	4	- 4 = 0	- 9
3	+ 1.80	- 0.59	= -	1	+	5	- 3 = + 2	- 3
4	+ 1.89	0.00	= +	13	+	5	0 = + 5	+ 8
5	+ 1.84	+ 0.41	= +	11	+	5	+ 2 = + 7	+ 3
6	+ 1.72	+ 0.78	= -	80	+	4	+ 4 = + 8	- 88
7	+ 1.25	+ 1.41	= +	25	+	3	+ 8 = + 11	+ 14
8	+ 0.72	+ 1.75	= +	37	+	2	+ 9 = + 11	+ 26

+ 54 - 100

AR 19

$$+ 18.71 + 1.45 = + 56.6$$

$$+ 1.45 + 9.84 = + 56.3$$

$$- () - 0.11 = - 4.4$$

$$+ 9.73 = + 51.9$$

$$t = + 5.4$$

$$+ 18.71 = + 56.6 - 7.7 = + 48.9 \quad a = + 2.6$$

are 13.6

$$R = .08''$$

$$\frac{\Sigma K}{n} = - 5.7''$$

$$- \frac{5.75}{0.8} - 7.2''$$

$$\Delta R = - 0.9''$$

13710

Conditional Equations

27

O-C

1	+ 0.72	- 1.75	= - 4	+ 2	- 9	= - 7	+ 3
2	+ 1.72	- 0.78	= - 9	+ 4	- 4	= 0	- 9
3	+ 1.80	- 0.59	= - 1	+ 5	- 3	= + 2	- 3
4	+ 1.89	0.00	= + 13	+ 5	0	= + 5	+ 8
5	+ 1.84	+ 0.41	= + 11	+ 5	+ 2	= + 7	+ 3
6	+ 1.72	+ 0.78	= - 80	+ 4	+ 4	= + 8	- 88
7	+ 1.25	+ 1.41	= + 25	+ 3	+ 8	= + 11	+ 14
8	+ 0.72	+ 1.75	= + 37	+ 2	+ 9	= + 11	+ 26

+ 54 - 100

av 19

$$+ 18.71 + 1.45 = + 56.6$$

$$+ 1.45 + 9.84 = + 56.3$$

$$- () - 0.11 = - 4.4$$

$$+ 9.73 = + 51.9$$

$$f = + 5.4$$

$$+ 18.71 = + 56.6 - 7.7 = + 48.9 \quad a = + 2.6$$

ave 136

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

$$\frac{\Sigma R}{n} = 5.7$$

$$- \frac{5.75}{0.8} = 7.2$$

0.8

$$\Delta R = - 0.9$$

13716

Mean Mean Position

28

$$\begin{array}{r} X_0 \quad 23.2810 \\ \quad \quad + 1 \\ \hline 23.2811 \end{array}$$

$$\begin{array}{r} Y_0 \quad 16.5860 \\ \quad \quad + 3 \\ \hline 16.5863 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 23.0978'' \\ 22. \\ \hline S_0 + 1.0978'' \end{array}$$

$$\begin{array}{r} 16.5364'' \\ 18. \\ \hline -1.4636 \end{array}$$

$$\begin{array}{r} \log S_0 \quad 0.04052 \\ \cos \delta_0 \quad 9.96485'' \\ \quad \quad 8.50724'' \end{array}$$

$$\log \sin \alpha - A \quad 1.56843''$$

$$\sin \alpha - A \quad + 37.02''$$

$$A \quad 06 \quad 32 \quad 25.92''$$

$$X_0 \quad 06 \quad 33 \quad 02.94''$$

$$\text{Red} \quad + 4.12''$$

$$X' \quad 06 \quad 33 \quad 07.06''$$

$$\log \tan \delta \quad 9.6222''$$

$$S_0^2 \quad 0.0810$$

$$7.0534$$

$$\log H_1 \quad 6.7566''$$

$$\eta_1 \quad 0.0006''$$

$$\eta_0 \quad -1.4642''$$

$$\log H_2 \quad 9.16560''$$

$$7.33115''$$

$$\log \tan \delta - D \quad 2.83445''$$

$$\tan \delta - D \quad -683.0$$

$$-11. \quad 23.0''$$

$$D \quad +22 \quad 55'' \quad 55.7''$$

$$S_0 \quad +22 \quad 44 \quad 32.7''$$

$$\text{Red} \quad -1.7''$$

$$S' \quad +22 \quad 44 \quad 31.0''$$

13716

Mean Mean Position

28

$$\begin{array}{r} \lambda_0 \quad 232810 \\ \quad \quad + 1 \\ \hline 232811 \end{array}$$

$$\begin{array}{r} \mu_0 \quad 16.5860 \\ \quad \quad + 3 \\ \hline 16.5863 \end{array}$$

From Plate Constants

$$\begin{array}{r} 23.0978'' \\ 22. \\ \hline S_0 + 1.0978'' \end{array}$$

$$\begin{array}{r} 16.5369'' \\ 18. \\ \hline -1.4636 \end{array}$$

$$\begin{array}{ll} \log S_0 & 0.04052 \\ \cos \delta_0 & 996485'' \\ & 850729' \\ \log \sin \alpha & 1.56843' \end{array}$$

$$\begin{array}{ll} \log \tan \delta & 9.6222'' \\ S_0^2 & 0.0800 \\ & 7.0534 \\ \log H_1 & 6.7560'' \end{array}$$

$$\sin \alpha - A \quad + 37.00''$$

$$\begin{array}{ll} \eta_1 & 0.0006'' \\ \eta_0 & -1.4642'' \end{array}$$

$$A \quad 06 \quad 32 \quad 25.92''$$

$$\log H_0 \quad 0.16560''$$

$$x_0 \quad 06 \quad 33 \quad 02.94''$$

$$\begin{array}{ll} & 7.33115'' \\ \log \tan \delta - 2 & 2.83445'' \end{array}$$

$$\text{Red} \quad + 4.12$$

$$\tan \delta - 2 \quad - 683.0$$

$$q' \quad 06 \quad 33 \quad 07.04''$$

$$\begin{array}{ll} & -10. \quad 23.0'' \\ D + 22 \quad 55'' & 55.7 \end{array}$$

$$S_0 + 22 \quad 44 \quad 32.7$$

$$\text{Red} \quad - 1.7$$

$$S' + 22 \quad 44 \quad 31.0$$

$$\begin{array}{r}
 1 \quad 6 \quad 24 \quad 06.20.3 \\
 \underline{2.105} \\
 + 4.098 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 + 20 \quad 15 \quad 56.87 \\
 \underline{56.75} \\
 + 0.12 \\
 \hline
 \end{array}$$

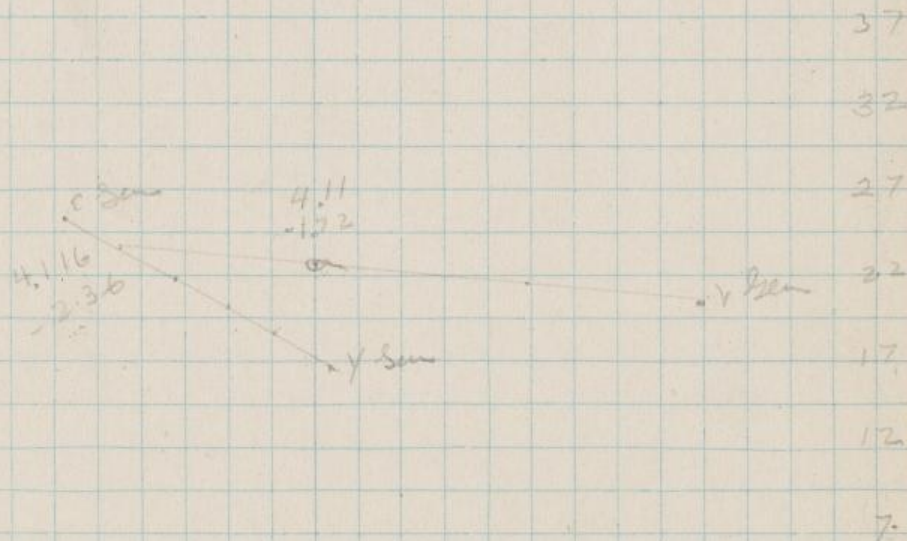
$$\begin{array}{r}
 2 \quad 6 \quad 32 \quad 59.000 \\
 \underline{55.063} \\
 + 3.937 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 16 \quad 28 \quad 16.63 \\
 \underline{16.07} \\
 + 0.56 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3 \quad 6 \quad 38 \quad 53.751 \\
 \underline{49.590} \\
 + 4.161 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 25 \quad 12 \quad 48.86 \\
 \underline{25} \\
 \underline{51.95} \\
 - 3.09 \\
 \hline
 \end{array}$$

224



42 41 39 37 35 33 31 29 27 25 23

6.1

13716

Reduction to Apparent Place.

29

$H+\alpha'$	11	34.1	$173^\circ 31.5'$	$\delta_0 + 22^\circ - 44.5'$
H	05	01.1		
α'	06	33.0		$\cos \delta_0$ 9.9648
B	23	45.5		$\log l$ 0.8986
$G+\alpha'$	6	18.5	$94^\circ 37.5'$	$\log l$ 0.8634

$\cos R+\alpha'$	8.9065
q	1.3418
$\sin G+\alpha'$	9.9986
$\tan \delta_0$	9.6224
	8.8239

$\sin \delta_0$	9.5873
$\cos H+\alpha'$	9.9972
h	1.2759
$\sin H+\alpha'$	9.0521
$\sec \delta_0$	0.0352
	8.8239

$\log g$	0.2483
$\log$	9.7867

$\log h'$	0.8604
h	9.1871

q	+3.354
g	+0.612
h	+0.154
Red	+4.120

q	-1.771
h'	-7.251
h	+7.302
Red	-1.720

13718

Reduction to Apparent Place.

29

H+x'	1.1	34.1	178° 31.5'	$S_0 + 22^\circ - 44.5'$	
H	0.5	01.1			
x'	0.6	33.0		$\cos S_0$	9.9648
G	2.3	45.5		$\log l$	0.8986
G+x'	6	18.5	99° 37.5'	"(1)	0.8634

$\cos G+x'$	89065
q	1.3418
$\sin G+x'$	99986
$\cos S_0$	96224
	88239

$\sin S_0$	9.5873
$\cos H+x'$	9.9972
h	1.2759
$\sin H+x'$	9.0526
$\sin S_0$	0.0352
	88239

$\log q$	0.2483
$\log$	9.7867

$\log h'$	0.8604
h	9.1871

q	+3354
q	+0.612
h	+0.154
Red	+4.120

q	-1.771
h'	+7.251
h	+7.302
Red	-1.720

13716

Lunar Parallax.

30

$$\begin{array}{rcl}
 \alpha' & 06 & 33 \quad 0.7.06'' \\
 \delta & 05 & 40 \quad 45.05'' \\
 \delta - \alpha & & -52 \quad 22.01'' \\
 = & -13^\circ & 05 \quad 30.15'' \\
 \frac{1}{2} \alpha - \alpha' & & -05 \quad 04.23'' \\
 \alpha - \alpha' - \frac{1}{2} \alpha - \alpha' - 13^\circ & & 0 \quad 25.92''
 \end{array}$$

$$\pi \quad 5^\circ 5' 41.0''$$

$$9.86913$$

$$\begin{array}{l}
 \sin \pi \quad 8.20943'' \\
 \sin \delta - \alpha' \quad 9.35508'' \\
 \sec \delta \quad 0.03616'' \\
 \sin \alpha \alpha' \quad 7.46980''
 \end{array}$$

$$\begin{array}{l}
 9.95727'' \\
 \cos \frac{1}{2} \alpha \alpha' \quad 0.00000 \\
 \sec \delta - \alpha'' \quad 0.01129'' \\
 \log \tan \gamma \quad 9.96856''
 \end{array}$$

$$\alpha - \alpha' \quad -10' 8'' 45''$$

$$= \quad - \quad 40.56''$$

$$\begin{array}{rcl}
 \gamma & 42 & 55 \quad 40.8'' \\
 \delta' & 22 & 44 \quad 31.0'' \\
 \gamma - \delta' & 20 & 11 \quad 09.8''
 \end{array}$$

$$\begin{array}{l}
 9.82640 \\
 \log \sin \pi \quad 8.20943 \\
 \sin \gamma - \delta' \quad 9.53791'' \\
 \operatorname{cosec} \gamma \quad 0.16681'' \\
 \sin \delta - \delta' \quad 7.74055''
 \end{array}$$

$$\delta - \delta' \quad +18 \quad 55.0''$$

$$\begin{array}{rcl}
 \delta & +23 & 03 \quad 26.0'' \\
 \gamma - \delta & +23.03 & 28.5'' \\
 \delta - \epsilon & & -2.5''
 \end{array}$$

$$\text{curr} \quad +0.3''$$

$$\text{quad. Clad. Ry.} \quad 0.0$$

$$\delta \quad +23 \quad 03 \quad 26.3$$

$$\delta - \epsilon \quad -2.2$$

$$\alpha \quad 06 \quad 32 \quad 26.50$$

$$\gamma - \alpha \quad 06 \quad 32 \quad 25.56''$$

$$\delta - \epsilon \quad +0.94''$$

$$\text{curr} \quad -0.02''$$

$$\alpha \quad 06 \quad 32 \quad 26.48$$

$$\delta - \epsilon \quad +0.92$$

13716

Lunar Parallax.

30

$$\begin{array}{rcl}
 \alpha & 06 & 33 \quad 07.06'' \\
 \delta & 05 & 40 \quad 45.05'' \\
 \delta - \alpha & & - 52 \quad 22.01'' \\
 = & -13^\circ & 05' \quad 30.15'' \\
 \frac{1}{2} \alpha \cdot \alpha & & - 05' \quad 04.23'' \\
 \delta - \frac{1}{2} \alpha \cdot \alpha & -13^\circ & 0' \quad 25.92''
 \end{array}$$

$$\begin{array}{rcl}
 \log \frac{1}{2} \alpha \cdot \alpha & 9.95727 & \\
 \log \delta - \alpha & 0.00000 & \\
 \log \tan \gamma & 9.96856 &
 \end{array}$$

$$\begin{array}{rcl}
 \gamma & 42 & 55' \quad 40.8'' \\
 \delta & 22 & 44 \quad 31.0'' \\
 \gamma - \delta & 20 & 11 \quad 09.8''
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \gamma & 9.82640 & \\
 \log \sin \gamma - \delta & 8.20943 & \\
 \log \sin \gamma & 9.53791 & \\
 \log \sin \gamma & 0.16681 & \\
 \log \sin \gamma & 7.74055 &
 \end{array}$$

$$\delta - \delta' + 18 \quad 55.0''$$

$$\begin{array}{rcl}
 \delta & +23 & 03 \quad 26.0'' \\
 \gamma - \delta & -23 & 03 \quad 28.5'' \\
 \delta - \gamma & & - 25''
 \end{array}$$

$$\text{curr} + 0.3$$

$$\text{2nd Ord Ry} \quad 0.0$$

$$\delta + 23 \quad 03 \quad 26.3$$

$$\delta - \gamma - 2.2$$

$$\pi \quad 5^\circ 5' \quad 41.0''$$

$$\begin{array}{rcl}
 9.86913 & & \\
 \sin \pi & 8.20943 & \\
 \sin \delta - \alpha & 9.35508 & \\
 \sec \delta & 0.03616 & \\
 \sin \alpha \cdot \alpha & 7.46980 &
 \end{array}$$

$$\begin{array}{rcl}
 \alpha - \alpha' & +10' \quad 8'' \quad 45'' \\
 = & = & 40.56''
 \end{array}$$

$$\alpha \quad 06 \quad 32 \quad 26.50$$

$$\gamma - \alpha \quad 06 \quad 32 \quad 25.56$$

$$\delta - \alpha \quad + 0.94''$$

$$\text{curr} - 0.02$$

$$\alpha = 06 \quad 32 \quad 26.48$$

$$\delta - \alpha \quad + 0.92''$$

