

KG
11366
v. 988

CXXXV		
135		
Plate	Date	Page
9389	Oct. 21. '15	1
9413	Oct. 23. '15	11
9414	"	21

Harvard Lunar Plates
Measurements and Reductions
Martha C. Borton.

1
11.
13.

2
21.
26

3
31.
21

4
30
6

1
21.
19
-24

2
20
15.

9389

Star Measures.

	d	μ	d	μ	1
1	18870	19816	18770	20328	
11.6	13302	15398	17276	11842	
13.2	02	400	4877	47	
	72	36	70	30	
	<u>11.5569</u>	<u>11.5575</u>	<u>13.1523</u>	<u>13.1513</u>	

2	17810	20080	17674	19980	
21.4	17350	10590	15192	12460	
26.3	52	40	40	80	
	20	82	84	60	
	<u>21.0460</u>	<u>21.0958</u>	<u>26.2536</u>	<u>26.2545</u>	

3	19648	18748	17170	18538	
31.8	15203	13202	12900	12800	
21.5	99	02	06	796	
	52	50	88	42	
	<u>31.8448</u>	<u>31.7452</u>	<u>21.7277</u>	<u>21.7256</u>	

4	19998	18980	20726	18787	
30.1	18798	10170	12996	16896	
6.8	804	70	96	92	
	98	80	40	92	
	<u>30.1197</u>	<u>30.1190</u>	<u>6.7793</u>	<u>6.7724</u>	

Moon Measures.

20030	19302
11440	17900
30	898
50	16
<u>17.8612</u>	<u>17.8597</u>

19580	19682
17290	11992
82	80
92	82
<u>15.2296</u>	<u>15.2307</u>

1
21.4
17.9
-4

2
20
15.3

7389

Star Measures.

	d	1	d	1
1	18880	19816	18770	20328
11.6	13302	15398	17296	11892
13.2	02	900	9877	49
	72	36	70	30
	<u>11.5569</u>	<u>11.5575</u>	<u>13.1523</u>	<u>13.1513</u>

2	17810	20080	17679	19980
11.7	17350	10590	15192	12960
16.3	52	90	90	80
	20	82	89	60
	<u>21.0460</u>	<u>21.0958</u>	<u>26.2536</u>	<u>26.2515</u>

3	19698	18798	17170	18038
11.8	15203	13202	12900	12800
11.5	99	02	06	796
	52	50	88	92
	<u>31.9998</u>	<u>31.9952</u>	<u>21.9279</u>	<u>21.9256</u>

4	19998	18980	20726	18768
10.1	18798	10170	12996	16896
6.8	809	70	96	92
	98	80	40	92
	<u>30.1197</u>	<u>30.1190</u>	<u>6.7793</u>	<u>6.7729</u>

Moon Measures.

1		20030	19302
21.7		11440	17900
19.9		30	898
-4		50	16
		<u>19.8612</u>	<u>19.8599</u>

2		19580	19682
30		17290	11992
15.3		82	80
		92	82
		<u>15.2296</u>	<u>15.2309</u>

19
19
16
-
6
19
19
6
19
19
7
2
18
8
2
18
1

9389

Moon Measures.

2

$$\begin{array}{r}
 3 \\
 19.4 \\
 16 \\
 \hline
 20019 \\
 16110 \\
 10 \\
 30 \\
 \hline
 19.3912
 \end{array}
 \begin{array}{r}
 18814 \\
 12738 \\
 32 \\
 18 \\
 \hline
 19.3918
 \end{array}$$

$$\begin{array}{r}
 8 \\
 19.2 \\
 16.7 \\
 -X \\
 \hline
 20050 \\
 17628 \\
 30 \\
 58 \\
 \hline
 19.2423
 \end{array}
 \begin{array}{r}
 18798 \\
 10228 \\
 22 \\
 808 \\
 \hline
 19.2419
 \end{array}$$

$$\begin{array}{r}
 5 \\
 19.7 \\
 18 \\
 \hline
 19079 \\
 1171214 \\
 16 \\
 82 \\
 \hline
 19.7367
 \end{array}
 \begin{array}{r}
 19782 \\
 17174 \\
 68 \\
 88 \\
 \hline
 19.7387
 \end{array}$$

$$\begin{array}{r}
 5 \\
 19.3 \\
 17 \\
 \hline
 19056 \\
 16478 \\
 58 \\
 60 \\
 \hline
 19.2604
 \end{array}
 \begin{array}{r}
 19800 \\
 12928 \\
 20 \\
 02 \\
 \hline
 19.2622
 \end{array}$$

$$\begin{array}{r}
 7 \\
 20 \\
 18.3 \\
 \hline
 18272 \\
 15872 \\
 72 \\
 78 \\
 \hline
 18.9402
 \end{array}
 \begin{array}{r}
 19138 \\
 16734 \\
 32 \\
 50 \\
 \hline
 18.2908
 \end{array}
 \begin{array}{r}
 18786 \\
 11138 \\
 38 \\
 98 \\
 \hline
 18.2392
 \end{array}$$

$$\begin{array}{r}
 8 \\
 21.3 \\
 18.6 \\
 +7 \\
 \hline
 18100 \\
 12024 \\
 18 \\
 12 \\
 \hline
 18.6086
 \end{array}
 \begin{array}{r}
 18812 \\
 14880 \\
 70 \\
 32 \\
 \hline
 18.6056
 \end{array}$$

9389.

Moon Measures

2

3	20019	18819
19.4	16110	12738
16	10	32
	30	18
	<u>19.3912</u>	<u>19.3918</u>

2	20050	18798
19.2	17628	11228
16.7	30	22
-7	58	808
	<u>19.2923</u>	<u>19.2919</u>

5	19079	19782
19.7	1171219	17179
18	16	68
	82	88
	<u>19.7367</u>	<u>19.7387</u>

5	19056	19800
19.3	16978	12928
17	58	20
	60	02
	<u>19.2604</u>	<u>19.2622</u>

7	18272	19138	18786
20	15872	16739	11138
18.3	72	32	38
	78	50	98
	<u>18.2402</u>	<u>18.2908</u>	<u>18.2392</u>

8	18100	18812
21	15029	14850
18.6	18	70
+7	12	32
	<u>18.6086</u>	<u>18.6055</u>

9389 Times & Etc.

3

Oct 21 15^h

Exp. to Stars	3	32		3	47
" Moon	3	38	11.2 ^h	3	38 11.7 ^h
Clock fast		3	07.9 ^h		

H. Sid Time	3	35	03.4	$\theta - \alpha = +2^{\circ} 32^m$
H. Long	4	44	31.05 ^h	
G. Sid T.	8	19	34.45 ^h	
Sid T M.M.	13	55	29.06 ^h	
Interval	18	24	10.39 ^h	
Reduction		03	00.89 ^h	
G.M.T.	18	21	09.50 ^h	

From Naut alim	R. A.	Dec.
Moon 18 ^h	01 03 12.02	+11 38 19.3
Mercur m/m		1.9330 ^h 13.078
" 21.15.83		40.90 ^h 7 36.7 ^h
Vatular Place	01 03 52.92 ^h	+11 42 56.0 ^h

Moon's Age 13 days

Parallax	55" 27.03 ^h
Semid.	15" 08.2 ^h
R.	9 08.2 ^h
Aug.	10.7 ^h
Scr 3	-0.3 ^h
R	9 18.3 ^h
R	1.9685 ^h
AR	-990 ^h
Half R	1.8745 ^h
R ²	3.5137

939 = 11

9 =	-501.7
	<u>29</u>
	-477.7

9389 James & Etc.

Oct 21 15^h

Exp. to Stars	3	32		3	47
" Moon	3	38	11.2 ^h	3	38 11.9 ^h
Clock fast		3	07.9 ^h		
H. Sid Time	3	35	03.4	- 8.2	+ 2 ^h 32 ^m
H. Long	9	99	31.05 ^h		
g Sid T.	8	19	34.95 ^h		
Sid T M H.	13	55	29.06 ^h		
Interval	18	29	10.39 ^h		
Reduction		03	00.89 ^h		
g M T.	18	21	09.50 ^h		

From Hunt Alman

R A

Dec.

Moon 18 ^h	01	03	12.02	+ 11 38	19.3
Motion m/m			1.9330 ^h		12.075
" 21.15.83			90.90 ^h	9	36.7 ^h
Tabular Place	01	03	52.92 ^h	+ 11 42	56.0 ^h

Moon's Age 13 days

Parallax	25	27.03 ^h
Semid	15	08.2 ^h
R		9 08.2 ^h
Aug		10.9 ^h
R 3		- 0.3 ^h
R		9 18.3 ^h
R		1.9685 ^h
alt		- 9.90 ^h
Alt/R		1.8795 ^h
R ²		3.5137

939 11

$$\begin{array}{r}
 9 = -50.17 \\
 \quad \quad 29 \\
 \hline
 -47.77
 \end{array}$$

9389 Plate constants

x

x	11.5572	21.0959	31.4950	30.1193
y	12.4558	22.4732	33.3971	31.9061
x-y	- 8986	- 14273	- 19521	- 17868

η	13.1518	26.2525	21.4265	6.7733
η	13.0522	26.7484	21.6162	6.2395
$\eta-\eta$	+ 996	- 4959	- 1897	+ 5388

$$\begin{array}{rclcl}
 x-y & +500x & & +67.4y & +1.7x & +2301 \\
 -8986 + 5779 & = & -3207 & + 884 & = & -2321 + 20 = -2301 = 0 \\
 -14273 + 10523 & = & -3750 & & & \\
 -19521 + 15722 & = & -3799 & + 1944 & = & -2355 + 53 = -2302 = -1 \\
 -17868 + 15060 & = & -2808 & + 456 & = & -2352 + 51 = -2301 = 0 \\
 21.1176 - 10559 & & +1128 & & +36 & 22.5200
 \end{array}$$

$$\begin{array}{rclcl}
 \eta-y & +500y & & -63.8x & +2.9y & -6873 \\
 +996 + 6576 & = & +7572 & - 737 & = & +6835 + 38 = +6873 = 0 \\
 -4959 + 13126 & = & +8167 & & & \\
 -1897 + 10713 & = & +8816 & - 2066 & = & +6810 + 62 = + 72 = -1 \\
 +5388 - 3387 & = & +2001 & - 1922 & = & +6833 + 20 = + 73 = 0 \\
 16.7327 + 8.366 & & -1397 & & + 98 & 16.7521
 \end{array}$$

Tables	a = -8	e = -1.6	a-e = +8	b+d = -2.8
Obs	= -501.7	= -502.9	= +1.2	= -3.6
O-C	-500.9	-501.3		-0.8

9389 Plate Coriolante

x

x	11.5572	21.0959	31.4950	30.1193
y	12.4558	22.4732	33.3971	31.9061
x-y	- 8986	- 14273	- 19321	- 17868

y	13.1518	26.2525	21.4265	6.7733
y	13.0522	26.7484	21.6162	6.2395
y-y	+ 996	- 4959	- 1897	+ 5388

x-y	+5001	+67.44	+1.71	+2301
-4986 + 5179	= -3207 + 884	= -2321 + 20	= -2301	= 0
-14273 + 10323	= -3750			
-19321 + 15722	= -3799 + 1994	= -2355 + 23	= -2302	= -1
-17868 + 15060	= -2808 + 956	= -2352 + 51	= -2301	= 0
21.1176	10559	+1128	+36	22.5200

y-y	+5004	-6381	+2.94	-6873
+996 + 6576	= +7572 - 737	= +6835 + 38	= +6873	= 0
-4959 + 13126	= +8167			
-1897 + 10713	= +8816 - 2006	= +6810 + 62	= +72	= -1
+5388 + 3387	= +8775 - 1922	= +6853 + 20	= +73	= 0
16.7327	+8366	-1397	+48	16.752

Table	a: -3	e: -1.6	a-e: +1.8	b+d: -1.8
Wls	= -501.7	= -502.9	= +1.2	= -3.6

$$\begin{array}{r} A + 2.8 \\ B + 7 \end{array}$$

9389 Moon's Center

5-

	X	$X - X_0$	ΔX	$(X - X_0)^2$	$(X - X_0)(Y - Y_0)$	$b - c$
1	21.1160	0.0000	-5	0.0000	3.5108	-29
2	20.0000	-1.1160	-4	1.2464	3.5087	-50
3	19.3915	-1.7245	-2	2.9796	3.5155	+18
4	19.2421	-1.8739	0	3.5115	3.5115	-22
5	19.2673	-1.8547	+1	3.4395	3.5103	-34
6	19.7377	-1.3783	+4	1.8986	3.5016	-121
7	20.0000	-1.1160	+4	1.2496	3.5075	-92
8	21.1160	0.0000	+5	0.0000	3.5089	-98

	Y	$Y - Y_0$	ΔY	$(Y - Y_0)^2$	$R = 3.5137$
1	-14.8603	-1.8739	-1	3.5108	+180°
2	13.2300	-1.5040	-1	2.2623	+218°
3	16.0000	-0.7340	-1	0.5389	+247°
4	16.7390	0.0000	0	0.0000	+270°
5	17.0000	+0.2660	+0	0.0708	+278°
6	18.0000	+1.2660	+1	1.6030	+313°
7	18.2372	+1.5032	+1	2.2599	+323°
8	+18.6071	+1.8731	+1	3.5089	+360° 180°

Approx Center

$$X - 20 \quad Y = 13.2300$$

$$18.2372$$

$$33.7672$$

$$Y_0 = 16.7336$$

$$Y_{\min} = 19.8603$$

$$R = 1.8733$$

$$X_{\min} = 19.2421$$

$$X_0 = 21.1154$$

$$\text{Plate Center} \begin{cases} X_0 & 21.1160 \\ Y_0 & 16.7340 \end{cases}$$

1
2
3
4
5
6
7
8

1
2
3
4
5
6
7
8

9389 *Amor's Center*

x	$x - x_0$	Δx	$x - x_0$	$(x - x_0)/(y - y_0)$	$\theta - C$
1 26.6660	0.0000	-5	0.0000	3.5108	-29
2 20.0000	-1.1660	-4	1.2769	3.5087	-50
3 19.3915	-1.7245	-2	2.9796	3.5155	+18
4 19.2921	-1.8739	0	3.5115	3.5115	-22
5 19.2873	-1.8547	+1	3.4395	3.5103	-39
6 19.7377	-1.3783	+4	1.8986	3.5016	-121
7 20.0000	-1.1660	+4	1.2796	3.5085	-92
8 21.1160	0.0000	+5	0.0000	3.5089	-98

y	$y - y_0$	Δy	$(y - y_0)^2$	$R = 3.5137$	
1 -19.8603	-1.8737	-1	3.5108	+180	
2 15.2300	-1.5090	-1	2.2623	+218	
3 16.0000	-0.7390	-1	0.5389	+247	
4 16.7390	0.0000	0	0.0000	+270	
5 17.0000	+0.2660	+0	0.6708	+278	
6 18.0000	+1.2660	+1	1.6038	+313	
7 18.2372	+1.5032	+1	2.2599	+323	
8 +18.6071	+1.8731	+1	3.5089	+360	180°

Approx Center

$$x - 20 \quad y = 15.2300$$

$$18.2372$$

$$23.7672$$

$$y_0 = 16.7336$$

$$y_{\text{min}} = 19.8603$$

$$R = 1.8733$$

$$x_{\text{min}} = 19.2921$$

$$y_0 = 21.1154$$

$$\text{Plate Center} \begin{cases} x_0 & 21.1160 \\ y_0 & 16.7390 \end{cases}$$

Formation of Normals.

1 + 0.00	+ 0.0	+ 51.5
2 + 1.68	+ 5.6	+ 75.0
3 + 1.25	- 3.1	- 13
4 0.0	+ 81.0	0.0
5 - 0.50	+ 63.0	- 92.0
6 - 1.75	+ 167.0	- 154.0
7 - 1.03	+ 168.0	- 138.0
8 - 0.0	+ 0.0	- 90.0
+ 2.93	+ 49.50	+ 126.5
- 3.28	- 3.1	- 487.0
- 0.35	+ 462.0	- 360.5

	a	b	c	new d-e	
a + 9	- 0	+ 2	+ 13	+ 17	+ 35
b - 1	- 10	+ 1	+ 5	+ 6	- 46
c + 13	- 13	+ 1	0	+ 1	+ 56
	- 17	+ 0	- 2	- 2	+ 37
	- 17	+ 0	- 2	- 2	+ 38
	- 12	- 1	+ 3	+ 2	- 42
	- 10	- 1	+ 5	+ 4	- 14
	- 0	- 2	+ 13	+ 13	+ 12

+11°

$$- 0.35 + 13.75 = + 0.81$$

$$+ [] - .01 = - 0.22$$

$$+ 13.77 = + 0.59$$

8389	Conditional Equations.										0-C	5-year
1	-0.00	-1.87	=	-29	-0	+47	=	+47	+18	+33		
2	-1.12	-1.50	=	-50	-36	+38	=	+2	-52	-47		
3	-1.72	-0.73	=	+18	-56	+19	=	-37	+55	+55		
4	-1.87	0.00	=	-22	-61	0	=	-61	+39	+37		
5	-1.85	+0.27	=	-39	-60	-6	=	-66	+32	+30		
6	-1.38	+1.27	=	-121	-45	-32	=	-77	-94	-71		
7	-1.12	+1.50	=	-92	-36	-38	=	-74	-18	-13		
8	-0.00	+1.87	=	-98	-0	-47	=	-47	-1	+14		

+149 - 115
Average 32

$$14.31 - 0.35 = +464.0 - 9.06$$

$$-0.35 + 13.75 = -360.5 + 0.81$$

$$+0.35 - 1.01 = +11.3$$

$$+13.74 = -399.2$$

$$14.31 - 0.09 = 464.0 = +463.9$$

$$+ 0.04 \Delta$$

$$b = - 25.4$$

$$a = + 32.3$$

$$- 0.63 \Delta$$

are measured 180°

$$\frac{P}{H} = 1.33$$

$$\frac{\Sigma V}{H} = +3.6$$

$$\text{Inr } 3 \quad R = 1.87$$

$$-2RC = +0.75$$

$$\frac{+3.6}{.33} = +11$$

$$\Delta R = +0.1$$

$$\text{corr } -0.2$$

$$\Delta b = +0.3$$

$$\Delta d = 0.10$$

$$\Delta R = +0.3$$

$$\Delta a = -0.47$$

$$\Delta d = -0.02$$

6389

Conditional Equations.

10-C

3

1	-0.00	-11.87	46	-29	-01	+47	= +87	+18
2	-1.12	-1.50	:	-50	-36	+38	= +2	-52
3	-1.72	-0.73	:	+18	-56	+19	= -37	+55
4	-1.87	0.00	:	-22	-61	0	= -61	+39
5	-1.85	+0.27	:	-39	-60	-6	= -66	+32
6	-1.38	+1.27	:	-121	-45	-32	= -77	-99
7	-1.12	+1.50	:	-92	-36	-38	= -74	-18
8	0.00	+1.87	:	-48	-0	-47	= -47	-1

$$+199 = 115$$

Average 32

$$19.31 - 0.33 = +969.0$$

$$-0.33 + 13.75 = -360.5$$

$$+0.33 - .01 = +11.3$$

$$+13.79 = -399.2$$

$$19.31 - 0.09 = 969.0 = +963.9$$

$$b = -25.9$$

$$a = +32.3$$

Are measured 180°

$$\frac{p}{q} = .33$$

$$\frac{2.1}{4} = +3.6$$

$$\frac{+3.6}{.33} = +11 \quad \Delta R = 10.1$$

6389 Moons Mean Position.

6

$$\begin{array}{r} X_0 \quad 21.1160'' \\ \quad + 16'' \\ \hline 21.1176'' \end{array}$$

$$\begin{array}{r} Y_0 \quad 16.7390'' \\ \quad - 13'' \\ \hline 16.7327'' \end{array}$$

From Plate Constants

$$X \quad 22.5200''$$

$$y \quad 16.7521''$$

$$\xi \quad +0.5200''$$

$$\eta \quad -1.2479''$$

$$\log 59.71600''$$

$$\log \text{land} \quad 9.2973''$$

$$\cos 9.99169''$$

$$\xi'' \quad 9.4320''$$

$$\underline{8.50729''}$$

$$\underline{7.0539''}$$

$$1.21712''$$

$$5.7827''$$

$$d-A \quad +.16.79''$$

$$h_1 + 0.0001$$

$$A \quad 01 \quad 01 \quad 89.40''$$

$$\log n_0 \quad 0.09608''$$

$$q_0 \quad 01 \quad 01 \quad 65.59''$$

$$\underline{7.33115''}$$

$$\underline{2.76789''}$$

$$582.0''$$

$$\text{Red} \quad + 7.90''$$

$$s-D \quad - 9 \quad 72.0''$$

$$q_1 \quad 01 \quad 01 \quad 89.99''$$

$$D \quad 11 \quad 22 \quad 01.8''$$

$$s_0 \quad 11 \quad 12 \quad 19.8''$$

$$\text{Red} \quad + 29.6''$$

$$s' \quad 11 \quad 12 \quad 79.7''$$

6389 Mrons Mean Position

$$\begin{array}{r} X_0 \quad 21.1160'' \\ \quad + 16'' \\ \hline 21.1176'' \end{array}$$

$$\begin{array}{r} Y_0 \quad 16.7390'' \\ \quad - 13'' \\ \hline 16.7327'' \end{array}$$

From Plate Constants

$$X \quad 22.5200''$$

$$Y \quad 16.7521''$$

$$S \quad +0.5200''$$

$$n \quad -1.2979''$$

$$\begin{array}{r} \log \epsilon \quad 9.71600'' \\ \log \delta \quad 9.99169'' \\ \hline 8.50729'' \\ 1.21712'' \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.2973'' \\ \epsilon'' \quad 9.9320'' \\ \hline 7.0539'' \\ 5.7421'' \end{array}$$

$$1-A \quad +16.99''$$

$$n_1 + 0.00001$$

$$A \quad 01 \quad 01 \quad 99.10''$$

$$\begin{array}{r} \log n_0 \quad 0.07608'' \\ \hline 7.33115'' \\ 2.76789'' \end{array}$$

$$T_0 \quad 01 \quad 01 \quad 65.59''$$

$$582.0''$$

$$Red \quad +7.90''$$

$$S-D \quad -9 \quad 92.0''$$

$$X \quad 01 \quad 01 \quad 69.99''$$

$$D \quad 11 \quad 22 \quad 01.8''$$

$$S_0 \quad 11 \quad 12 \quad 19.8''$$

$$Red \quad +29.6''$$

$$S' \quad 15 \quad 12 \quad 99.9''$$

6389 Linnar Parallax

7

$$\begin{array}{rcl}
 \alpha' & 0.1 & 01 \quad 69.79^{\circ} \\
 \delta & 3 & 35 \quad 03.9^{\circ} \\
 \delta - \alpha' + 2 & 32 & 53.71^{\circ} \\
 = +38^{\circ} & 13 & 21.15^{\circ} \\
 & 12 & 57.62^{\circ} \\
 +38 & 00 & 23.53^{\circ}
 \end{array}
 \quad
 \begin{array}{rcl}
 \pi & 55' & 27.03^{\circ} \\
 9.86913^{\circ} \\
 8.20761^{\circ} \\
 9.79489^{\circ} \\
 0.00917^{\circ} \\
 7.87739^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 9.95727^{\circ} \\
 0.00000^{\circ} \\
 0.10351^{\circ} \\
 0.06078^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 \alpha - \alpha' & 23' & 55.26^{\circ} \\
 = & 1 & 43.68^{\circ}
 \end{array}$$

$$\delta \quad 48 \quad 59 \quad 46.2^{\circ}$$

$$\begin{array}{rcl}
 \delta + 11 & 12 & 49.4^{\circ} \\
 37 & 46 & 56.8^{\circ}
 \end{array}$$

 $\delta - \delta'$

$$\begin{array}{rcl}
 9.82670^{\circ} \\
 8.20761^{\circ} \\
 9.78722^{\circ} \\
 0.12225^{\circ} \\
 7.97348^{\circ}
 \end{array}$$

$$\delta - \delta' \quad 30 \quad 10.0^{\circ}$$

$$\delta + 11 \quad 42 \quad 60.8^{\circ}$$

$$\text{Ephd} \quad 11 \quad 42 \quad 56.0^{\circ}$$

$$O-C \quad +7.8^{\circ}$$

$$\begin{array}{rcl}
 \text{Circ. of Plate} & +0.2 \\
 2 \text{nd slider Ref} & 0.0
 \end{array}$$

$$\text{Irr Corr} \quad 0.0$$

$$\delta + 11 \quad 42 \quad 60.7$$

$$O-C \quad +7.7$$

$$\alpha \quad 01 \quad 03 \quad 53.67^{\circ}$$

$$\text{Ephd} \quad 01 \quad 03 \quad 52.92^{\circ}$$

$$O-C \quad +0.75^{\circ} - 01$$

$$-0.02$$

$$\alpha \quad 01 \quad 03 \quad 53.65^{\circ}$$

$$+0.73$$

0389 - linear - Kunalat

L'	01	01	69.99	"	π	55"	27.03	"
T	3	35	03.9	"				
$\delta - L'$	+2	32	53.99	"		9.86	913	"
=	+38"	R3	21.85	"		8.20	161	"
		12	57.62	"		7.79	189	"
+38	00	23	53	"		0.00	917	"
						1.87	739	"

9.93727

0.00000

0.10351

0.06078

 $\delta - L'$ 25" 55.26"

= 1 99.48"

 δ 48 59 96.2 $\delta + 11$ 12 99.9

39 96 56.8

 $\delta - \delta$

9.82690

8.20761

9.78722

0.18225

7.97398

 $\delta - \delta$ 30 94.0 $\delta + 11$ 92 83.8 δ 01 03 53.67

Ephd 11 92 56.0

Ephd 01 03 52.92

W-C +7.8

W-C +0.75
-01

corr of Plate +0.2

2nd Order Ref 0.0

In-Corr 0.0

-0.02

 $\delta + 11$ 92 60.9 δ 01 03 53.65

Star Measures

	d	r	d	r
1	19638	17758	13250	17248
11.7	12038	15334	10900	10088
5.7	4240	3032	9698	8084
	12	40	38	48
	<u>11.7578</u>	<u>11.7578</u>	<u>5.2849</u>	<u>5.2836</u>
2	20162	17544	20338	17022
10.9	11953	15756	11278	16052
27.9	5152	5053	8883	5051
	53	26	28	22
	<u>20.8202</u>	<u>20.8212</u>	<u>27.9046</u>	<u>27.9028</u>
3	18340	16868	19338	17576
83.9	9152	16048	19080	7828
5.4	5654	4476	7276	2029
	26	78	28	76
	<u>33.9174</u>	<u>33.9178</u>	<u>5.0262</u>	<u>5.0248</u>

Moon Measures

1	18384	17558
24	18159	7768
157	4449	68
	84	67
	<u>15.0235</u>	<u>15.0209</u>
2	20388	15562
24.4	15998	9958
16	0200	5456
	92	70
	<u>24.4390</u>	<u>24.4390</u>
3	19362	15570
24.5	19874	10084
16.3	7072	8886
18	90	68
	<u>24.4502</u>	<u>24.4518</u>

Star Measures

	d	n	d	n
1	19638	17758	13250	17298
11.7	12038	15334	10900	10088
5.9	4240	3032	9698	8089
	12	40	38	48
	<u>11.7578</u>	<u>11.7578</u>	<u>5.2849</u>	<u>5.2836</u>
2	20162	17294	20338	17022
20.9	11953	15756	11278	16052
27.9	5152	5053	8883	5051
	53	26	28	22
	<u>20.8202</u>	<u>20.8212</u>	<u>27.9046</u>	<u>27.9028</u>
3	18340	16868	19338	17576
33.9	9152	16048	19080	7828
15.4	5657	4496	7276	2029
	26	78	28	76
	<u>33.9174</u>	<u>33.9178</u>	<u>5.0262</u>	<u>5.0248</u>

Moon Measures

1	18384	17558
29	18159	7768
15+	4449	68
	89	67
	<u>15.0235</u>	<u>15.0209</u>
2	20388	15562
29.4	15998.00	9958
16	02	5956
	92	70
	<u>24.4390</u>	<u>24.4390</u>
3	19362	15570
29.5	14874	10084
16.3	7072	8886
+x	90	68
	<u>24.4502</u>	<u>24.4518</u>

8
24
17

5
24
17

6
24
18

7
24
18
+

8
24
18

9413

Moon Measures

12

$$\begin{array}{r}
 2 \\
 24.2 \\
 17 \\
 \hline
 19376 \\
 16508 \\
 1210 \\
 78 \\
 \hline
 24.2866
 \end{array}
 \quad
 \begin{array}{r}
 15578 \\
 89663 \\
 6263 \\
 76 \\
 \hline
 24.2886
 \end{array}$$

$$\begin{array}{r}
 5 \\
 24 \\
 17.4 \\
 \hline
 20542 \\
 16068 \\
 6667 \\
 30 \\
 \hline
 17.4470
 \end{array}
 \quad
 \begin{array}{r}
 14898 \\
 934235 \\
 2835 \\
 78 \\
 \hline
 17.4486
 \end{array}$$

$$\begin{array}{r}
 6 \\
 23.1 \\
 18 \\
 \hline
 17632 \\
 15952 \\
 4850 \\
 42 \\
 \hline
 23.1684
 \end{array}
 \quad
 \begin{array}{r}
 18740 \\
 10484 \\
 7072 \\
 30 \\
 \hline
 23.1740
 \end{array}
 \quad
 \begin{array}{r}
 18172 \\
 16474 \\
 7876 \\
 68 \\
 \hline
 23.1698
 \end{array}$$

$$\begin{array}{r}
 18396 \\
 17416 \\
 0611 \\
 70 \\
 \hline
 18.0982
 \end{array}
 \quad
 \begin{array}{r}
 19580 \\
 1051809 \\
 0009 \\
 70 \\
 \hline
 18.0938
 \end{array}$$

$$\begin{array}{r}
 8 \\
 22.0 \\
 18.9 \\
 \hline
 20030 \\
 1009286 \\
 80 \\
 18 \\
 \hline
 17.9932
 \end{array}
 \quad
 \begin{array}{r}
 18110 \\
 1803028 \\
 26 \\
 20 \\
 \hline
 17.9918
 \end{array}$$

2
29
17

5
29
17

6
29
18

7
29
18
+

8
29
18

9913

Moon Measures

1

2	19376	15578
29.2	16508 ¹⁰	8966 ⁶³
17	12	62
	78	76
	<u>24.2866</u>	<u>24.2886</u>

5		20542	19898
29		16068 ⁶⁷	9392 ³⁰
17.4		66	28
		30	98
		<u>17.9970</u>	<u>17.9986</u>

6	17632	18740	18472
23.1	15952	10984	16474
18	48 ⁵⁰	70 ⁹²	78 ⁷⁶
	42	30	68
	<u>23.1684</u>	<u>23.1740</u>	<u>23.1698</u>

7		18396	19580
22.7		17916	10518 ⁰⁹
18+		06 ¹¹	00
17		70	70
		<u>18.0942</u>	<u>18.0938</u>

8		20030	18110
22.0		10092 ⁸⁶	18030 ²⁸
18.9		80	26
		18	20
		<u>17.9932</u>	<u>17.9918</u>

9413

Jinnies + Etc.

13

Oct. 23 '15

Exp. to Stars	0	59		1	11	
" " Moon	1	07	33.7	1	07	39.0
Clockfast		3	10.6			
H. Sid J	1	01	23.25	0	-	1 ⁿ 32.3
H. Long	4	49	31.05			
G. Sid J	5	45	54.30			
G. J. M. N.	17	3	17.17			
Interval	15	42	37.13			
Reduction		2	39.43			
G. M. J.	15	40	02.70			

From Naut. Alm.		R. A.		Dec.	
Moons 13 th	2	32	36.09	+ 20	16 10.5
Motion in 1 ^m		1	22.05.15		9.608
" " 40.0950		1	22.13		6 27.7
Tabular Place	2	33	58.24	20	22 35.2

Moons age 15 days.

Parallax	59	92.09
Semi-d.	17	55.9
R		895.9
Aug		12.6
Rn. 3		-0.3
R.		908.2
M		1.9468
ap		-928
(1/4) R		1.8540
R ²		3.4373

$$939 = 13.65$$

$$a = -500.5$$

29

$$-476.5$$

9413

Oct 23'15

Jupiter + Etc.

Exp. to Stars	0	59		1	11	
" " Moon	1	09	33.7"	1	09	39.0"
Clock fast		3	10.6"			
H. Sid. T	1	01	23.25"	6	1	32.3"
H. Long	4	49	31.05"			
G. Sid. T	5	45	59.30"			
G. M. N.	19	3	17.17"			
Intermed	15	42	37.13"			
Reduction		2	39.43"			
G. M. T.	15	40	02.70"			

From Naut. Alm.

R. A.

Dec.

Moon 12"	2	32	38.99	+ 20	16	10.5"
Motion in 1 ^m		1	22.05.15"			7.608"
" " 40.0950		1	22.15"		6	29.8"
Tabular Place	2	33	58.24"	20	12	35.2"

Moon's age 15 days

Parallax	59	42.09"
Semi-d	19	55.9"
R		895.9"
Aug		12.6"
Ku		-0.3"
R		908.2"
R		1.9968"
ap		-92.8"
11+4R		1858.0"
R ²		3.4373"

939 = 13.65

a = - 500.5

29

- 976.5

31

7

+9

+1

-6

2

+2

-2

+2

10

Plate Center.

17

X	Y	X	Y
11.7578	5.2892	2 28	51.18
20.8207	27.9037	2 33	59.16
33.9176	5.0255	2 41	33.92
366.4961	38.2134	3 6	102 194.26

22.1654	12.7378	2 34	48.09
22	18		-5.1 0°
-1654	+5.2622	2 34	42.99 + 20
31 ^s	466.5		

$$-5.1 \quad +90' 58.8''$$

$$\text{Plate Center} \left\{ \begin{array}{l} 2 \quad 34 \quad 43.0 \\ +20 \quad 12 \quad 31.0 \end{array} \right.$$

$$\begin{array}{rcl} X-5 & +500X & -42.34 \\ +9898 & +5879 = +10777 & -223 = +10554 + 6 = +10560 = 0 \\ +1320 & +10910 = +11730 & -1180 = +10550 + 10 = +60 = 0 \\ -6209 & +16959 = +10755 & -212 = +10543 + 17 = +60 = 0 \\ 22.5979 & +11299 & -687 = +11 = 22.6092 \end{array}$$

$$\begin{array}{rcl} 9.7 & +500Y & +42.3X \\ +13855 & +2642 = +64970 & +497 = +6997 23 = +7017 \\ -7939 & +13952 = +6013 & -881 = +6897 123 = +17 \\ +3097 & +2513 = +3560 & +1435 = +6995 22 = +17 \\ 16.2371 & +8119 & +956 = +71 = 16.4500 \end{array}$$

$$\begin{array}{l} \text{Tables} \quad a=0 \quad e=0 \quad a-e=0 \quad b+d=+1 \\ \text{Obs} \quad -500.5 \quad -507.7 \quad =+3.9 \quad =-0. \\ \phi-C \quad -500.5'' \quad -504.4'' \quad \quad -1.0'' \end{array}$$

Table Center

19

X	Y	X	Y	X	Y	X	Y
11.7578	5.2872	2 28	51.18	18	30	20.6	
20.8207	27.9037	2 33	59.16	21	35	90.0	
33.9176	5.0255	2 41	33.92	18	28	50.7	
64.961	38.2134	3 6	102	194.26	57	93	111.0

12.1654	12.7378	2 34	48.09	19	31	37.0	
2	18		-51	9	90	58.8	
16.54	+5.2622	2 34	42.99	20	12	30.8	
31.5	966.5						

5.1

+90° 53.8"

Plate center

2 34 43.0
(+20 12 31.0)

$$\begin{array}{rclclcl}
 X-Y & +500X & -92.34 & +.5X & -10560 & \\
 9898 + 5879 = +10777 & -223 = +10554 & +6 = +10560 & =0 & \\
 11320 + 10910 = +11730 & -1180 = +10550 & +10 = + & 60 & 0 \\
 6204 + 16959 = +10755 & -212 = +10543 & +17 = + & 60 & 0 \\
 22.5979 + 11299 & -687 & +11 = & 22.6042 &
 \end{array}$$

$$\begin{array}{rclclcl}
 X-Y & +500X & +42.8X & +4.9X & +7017 & \\
 +3855 + 2692 = +6997 & +497 = +6997 & -23 = +7017 & & \\
 -7939 + 13952 = +6013 & +881 = +6894 & -123 = + & 17 & 0 \\
 +3897 + 2513 = +6560 & +1935 = +6995 & -22 = + & 17 & 0 \\
 16.2371 + 8119 & +956 & +71 = & 16.4500 &
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables} & a=0 & e=0 & a-e=0 & b+d=+1 \\
 \text{Obs} & -500.5 & -509.9 & =+39 & =-0
 \end{array}$$

ξ	η	$\Delta\xi$	-5.93	+24	-3
1	-10.73	-13.18	-57	+63	+3
2	-1.31	+10.70	-6	+8	+9
3	+12.53	-13.39	+80	-79	+3
4	+0.60	-1.55	0	-7	-10

$\Delta\eta$	-5.43	+63	+24
-91	+71	-20	-26
+32	-58	-26	-1
-105	+72	-33	+8
0	+84	+0	+34
			+78

9413

Standard Coordinates.

16

Cape No 372-Mg 6.8 Cape No 383-Mg 5.3 Cape No 903-Mg 8.5

C	2	28	00.98	2	33	08.16	02	40	43.49
I			1.02			8.17			43.55
E			0.95			8.15			43.79
Mean	2	28	0.98	2	33	08.15	02	40	43.51
Bice			+50.20			51.01			50.41
K	2	28	51.18	2	33	59.16	02	41	33.92
A	2	34	93.0	2	34	93.0	2	34	93.0
K-A	-	5	51.82	-	0	43.84	+	6	50.92
End-A	-	35	1.78	-	43	84	+	7	10.86
log n	2	54	627 n	1	69	187 n	2	61	370
log	9	97	697	9	96	839	9	97	701
F ₀	1	03	045 n	0	11	750 n	1	09	795

Σ_0	-10	72	63	-13	10	7	+12	53	00
Σ_1	-57			-6			+80		
Σ_2	-11	26	80	20	68	87	34	53	80
Σ_3	11	75	78	20	82	07	33	91	76
Σ_4	+48	98		+13	20		-	62	04

C	+18	26	20.7	+21	31	44.5	+18	25	01.6
I			20.6			44.9			0.9
E			20.7			44.7			0.6
Mean	+18	26	20.5	+21	31	44.6	+18	25	1.0
Bice	+4		0.1	+3		55.7	+3		49.7
S	18	30	206	21	35	400	18	28	50.4
D	20	12	31	20	12	31	20	12	31
S-D	-1	42	10.7	+1	23	08.0	-1	43	40.6
End-D	-6	13	2.2	+49	90	0.0	-62	22	2.5
log n	3	78	761 n	3	69	810	3	79	395 n
log	1	18	76 n	1	02	925	1	12	51.1

log S	9	52	47	9	59	75	9	62	40
Σ_0	2	06	09	0	23	50	2	19	59
Σ_1	8	63	90	6	88	59	8	77	33

Σ_0	-13	14	48	+10	69	68	-13	33	85
Σ_1	+0	09	35	+0	00	08	+0	05	93
Σ_2	48	78	7	28	69	76	+4	72	08
Σ_3	52	87	2	27	90	37	5	62	55
$(\Sigma_4 - \Sigma_1)$	+3	85	5	-	79	39	-	+3	07

7913

Standard coordinates.

16

Cape No	372-mg 6.8	Cape No	383-mg 5.3	Cape No	903-mg 8.2
C	2 28 00.98	2 33 08.16	02 40 43.99		
I	1.02	8.19	43.55		
E	0.95	8.15	43.99		
Mean	2 28 0.98	2 33 08.15	02 40 43.51		
Prec	+50.20	51.01	50.41		
λ	2 28 51.18	2 33 59.16	02 41 33.92		
A	2 39 43.0	2 39 43.0	2 39 43.0		
$\lambda-A$	-5 51.82	-0 43.84	+6 50.92		
Sun($\lambda-A$)	-3 51.78	-43.84	+4 10.86		
log μ	2.59627 n	1.69187 n	2.61370		
log μ	9.97699	9.96839	9.97701		
μ_0	1.03095 n	0.11750 n	1.09795		
μ_0	-10.7263	-1.3107	+12.5300		
μ_1	-57	-6	+80		
μ	-11.2680	20.6887	39.5380		
λ	11.7578	20.8207	33.9176		
$\lambda-\mu$	+4898	+1320	-6209		
C	+18 26 20.4	+21 31 49.5	+18 25 01.6		
I	20.6	49.9	0.9		
E	20.4	49.9	0.6		
Mean	+18 26 20.5	+21 31 49.6	+18 25 1.0		
Prec	+4 0.1	+3 55.4	13 49.7		
λ	18 30 20.6	21 35 40.0	18 28 50.4		
D	20 12 32.0	20 12 31	20 12 34		
$\lambda-D$	21 22 20.4	+1 23 08.0	-1 23 40.6		
Sun($\lambda-D$)	-4 132.2	+8990.0	-4222.5		
log μ	3.78385 n	3.89880	3.79396 n		
μ_0	1.11876 n	1.02925	0.72514		
log μ	9.5247	9.5975	9.5240		
μ_0	2.0609	0.2356	2.1959		
μ_1	8.6390	6.8859	8.7733		
μ_0	-13.6978	+10.5948	-13.3385		
μ_1	+0.0935	+0.0008	+0.0593		
μ	88987	286976	797208		
λ	52872	277037	50255		
$(\lambda-\mu)$	+738.55	-7939	-23047		

$A = .8^m$ $B = 0$ 

9413

Moons Center

16

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x + x_0)^2 + (\Delta x)^2$	
1	24,0000	+1,9100	+1	1,9884	3,4600	+ 227
2	24,4390	+1,8490	+0	3,4188	3,4790	+ 367
3	+24,9510	+1,8610	0	3,4633	3,4633	+ 260
4	24,2876	+1,6976	-1	2,8815	3,4667	+ 294
5	24,0000	+1,4100	-1	1,9878	3,4587	+ 214
6	23,1719	+0,5719	-1	0,3274	3,4423	+ 50
7	22,5900	0,0000	-1	0,0000	3,4633	+ 260
8	22,0000	-0,5900	-1	0,3482	3,4370	- 3

3.4373

	y	$y - y_0$	Δy	$(y - y_0)^2$	Δ
1	15,0219	-1,2131	0	1,4716	131 ✓
2	16,0000	-0,2350	✓	0,0552	97 ✓
3	16,2350	0,0000		0,0000	90 ✓
4	17,0000	+0,7650		0,5852	66 ✓
5	17,4978	+1,2128		1,4709	49 ✓
6	18,0000	+1,7650		3,1152	18 ✓
7	+18,0960	+1,8610		3,4633	0 ✓
8	17,9925	+1,7575		3,0888	342 ✓

1790

Approx. Center

$$\begin{aligned}
 x = 24 \quad y = & 15,0219 \\
 & 17,9978 \\
 & \hline
 & 32,4697 \\
 y_0 & 16,2348
 \end{aligned}$$

$$\begin{aligned}
 y_{max} & 18,0960 \\
 R & 1,8612 \\
 x_{max} & 24,9510 \\
 x_0 & 22,5898
 \end{aligned}$$

$$\begin{aligned}
 \text{Moons} \quad x_0 & \{ 22,5900 \\
 \text{Center} \quad y_0 & \{ 16,2350
 \end{aligned}$$

9913

Moons center

16

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x + x_0) / (1 + y_0)$	
1	24.0000	+19.100	+1	1.9889	3.4600	+ 2.27
2	24.9390	+18.490	+0	3.4188	3.4790	+ 3.67
3	+24.9510	+18.610	0	3.4633	3.4633	+ 2.60
4	24.2876	+1.6976	-1	2.8815	3.4667	+ 2.94
5	24.0000	+1.100	-1	1.9878	3.4587	+ 2.14
6	23.1719	+0.5719	-1	0.3270	3.4423	+ 5.0
7	22.5900	0.0000	-1	0.0000	3.4633	+ 2.60
8	22.0000	-0.5900	-1	0.3482	3.4370	- 3

3.4373

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	15.0219	-1.2131	0	1.4716	1.31
2	16.0000	-0.2350	↓	0.0552	1.97
3	16.2350	0.0000		0.0000	9.0
4	17.0000	+0.7650		0.5852	6.6
5	17.9978	+1.2128		1.4709	4.9
6	18.0000	+1.7650		3.1152	1.8
7	+18.0960	+1.8610		3.4633	0
8	17.9925	+1.7575		3.0888	3.2

Approx center

$$y = 29 \quad y = \begin{array}{r} 15.0219 \\ 17.9978 \\ \hline 32.9697 \end{array}$$

$$y_0 = 16.2348$$

$$y_{max} = 18.0960$$

$$R = 1.8612$$

$$x_{min} = 24.9510$$

$$x_0 = 22.5898$$

Moons
center

$$\begin{array}{l} x_0 \\ y_0 \end{array} \left\{ \begin{array}{l} 22.5900 \\ 16.2350 \end{array} \right.$$

Formation of Normals

1	- 1.70	+ 320.0	- 275.0
2	- 8.94	+ 679.0	- 88.0
3	00	+ 983.5	00
4	+ 129	+ 500.0	+ 224.0
5	+ 171	+ 302.0	+ 259.0
6	+ 100	+ 28.5	+ 88.0
7	+ 600	+ 0.0	+ 983.5
8	- 109	+ 20	- 55
	+ 9.00	2815.0	+ 1054.5
	- 3.18		- 368.5
	+ 0.82		+ 686.0

	a	b	c + 15
a	- 8	- 11	+ 7
b	- 6	- 12	+ 1
c	+ 13	- 12	0
		- 14	- 4
		- 11	- 5
		- 3	- 10
		- 0	- 11
		+ 3	- 13
			+ 7

$$+ 0.83 + 13.25 = + 5.90$$

$$+ [] + 0.05 = + 0.47$$

$$+ 13.20 = + 5.43$$

$$14.41 = + 8.21 - 0.34 = + 7.87$$

+ 20°

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Conditional Equations

0-c ¹⁷
new
0-c

1	+	1.41	-	1.21	=	+	227	(	+	223	-	51	=	+	274	-	47	-	36
2	+	1.85	-	0.29	=	+	367	)	-	292	-	10	=	+	282	+	85	+	89
3	+	1.86		0.00	=	+	260		-	294		0	=	+	294	-	34	-	31
4	+	1.70	+	0.76	=	+	294		-	268	+	32	=	+	236	+	58	+	55
5	+	1.41	+	1.21	=	+	214		+	223	+	51	=	+	172	+	42	+	41
6	+	0.57	+	1.76	=	+	50		+	90	+	74	=	+	164	-	114	-	114
7	+	0.00	+	1.86	=	+	260		+	0	+	78	=	+	78	+	182	+	186
8	-	0.59	+	1.76	=	-	3		-	93	+	74	=	-	19	+	16	+	23
										+ 383 - 195									

$$+ 14.41 + 0.83 = +2315$$

$$+ 8.24$$

$$+ 0.83 + 13.25 = +686$$

$$+ 5.90$$

$$+ 0.83 + 105 = +133$$

$$+ 0.41 \Delta$$

$$+ 13.2 = +553$$

$$+ 71.8$$

$$14.41 = +2315 - 35 = +2280$$

$$a = + 15.8$$

$$+ 0.55$$

Arc measured 1490

$$\frac{p}{q} = 155$$

$$\frac{p}{q} = +23.5$$

$$\ln 3 \quad p \quad 1.85$$

$$+23.5 = +152 \quad \Delta R = +1.9$$

$$-2/PC = +0.74$$

$$155$$

$$\text{Corr} = -0.2$$

$$\Delta b = +0.30$$

$$\Delta \delta = +0.1$$

$$\Delta R = +2.1$$

$$\Delta a = +0.41$$

$$\Delta \alpha = +0.01$$

2

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Muir's Mean Position

18

$$\begin{array}{r} \gamma_0 \quad 22.5700^{\circ} \\ \quad + 79^{\circ} \\ \hline 22.5779^{\circ} \end{array}$$

$$\begin{array}{r} \gamma_0 \quad 16.2350^{\circ} \\ \quad + 21^{\circ} \\ \hline 16.2371^{\circ} \end{array}$$

From Plate

Constants

$$\begin{array}{r} \gamma \quad 22.6072^{\circ} \\ \gamma_1 + 0.6072^{\circ} \\ \log \gamma \quad 9.78118^{\circ} \\ \cos \delta \quad 9.97297^{\circ} \\ \quad 8.50729^{\circ} \\ \quad \cancel{1.30100} \\ \quad 1.30097^{\circ} \\ \delta - A \quad + 20.00^{\circ} \end{array}$$

$$A \quad 2 \quad 34 \quad 73.0^{\circ}$$

$$\delta_0 \quad 2 \quad 35 \quad 03.00^{\circ}$$

$$\text{Red} \quad 7.70^{\circ}$$

$$\delta' \quad 2 \quad 35 \quad 07.70^{\circ}$$

$$\begin{array}{r} \gamma \quad 16.4500^{\circ} \\ \gamma_1 - 1.5500^{\circ} \\ \log \tan \delta \quad 9.5670^{\circ} \\ \quad 9.5624^{\circ} \\ \quad 7.0534^{\circ} \\ \quad 6.1763^{\circ} \end{array}$$

$$n_1 + 1.0002^{\circ}$$

$$n_0 - 1.5502^{\circ}$$

$$\begin{array}{r} \log n_0 \quad 0.19037 n^{\circ} \\ \quad 7.33116^{\circ} \\ \quad 2.85924 n^{\circ} \end{array}$$

$$\begin{array}{r} \quad \quad \quad 723.2 \\ \delta - D \quad + 12 \quad 03.2^{\circ} \end{array}$$

$$\delta + 20 \quad 12 \quad 31.0^{\circ}$$

$$\text{Red} \quad 20 \quad 00 \quad 27.8^{\circ}$$

$$\text{Red} \quad 26.07^{\circ}$$

$$\delta' \quad 20 \quad 00 \quad 53.9^{\circ}$$

9913

Moon's Mean Position

158

$$\begin{array}{r} \lambda_0 \quad 22.5900'' \\ \quad + 79'' \\ \hline 22.5979'' \end{array}$$

$$\begin{array}{r} \gamma_0 \quad 16.2350'' \\ \quad + 21'' \\ \hline 16.2371'' \end{array}$$

From Plate

Constants

$$\begin{array}{r} \lambda_1 \quad 22.6092'' \\ \quad + 0.6092'' \\ \hline \log \zeta \quad 9.78118'' \\ \cos \delta \quad 9.97297'' \\ \quad 8.50729'' \\ \hline \quad 1.30730'' \\ \quad 1.30097'' \\ \hline \lambda - A \quad \quad + 2090'' \end{array}$$

$$A \quad 2 \quad 39 \quad 43.0''$$

$$\lambda_0 \quad 2 \quad 35 \quad 03.00''$$

$$\text{Red} \quad \quad \quad 9.70''$$

$$\lambda' \quad 2 \quad 35 \quad 07.00''$$

$$\begin{array}{r} \gamma \quad 16.2500'' \\ n \quad - 1.5500'' \\ \hline \log \tan \delta \quad 9.5530'' \\ \quad \quad \quad 9.5629'' \\ \quad \quad \quad 7.0539'' \\ \hline \quad \quad \quad 6.1773'' \end{array}$$

$$n_1 \quad +.0002''$$

$$n_0 \quad -1.5522''$$

$$\begin{array}{r} \log H_0 \quad 0.19039 n'' \\ \quad \quad \quad 7.33115'' \\ \hline \quad \quad \quad 2.85924 n'' \end{array}$$

$$S-D \quad \quad \quad +12 \quad 03.2$$

$$D \quad +20 \quad 12 \quad 31.6$$

$$158 \quad 20 \quad 00 \quad 278$$

$$\text{Red} \quad \quad \quad 26.07$$

$$S' \quad 20 \quad 00 \quad 03.9$$

$$\begin{array}{r}
 2 \quad 31 \quad 29.16 \\
 \underline{29.68} \\
 4.48
 \end{array}$$

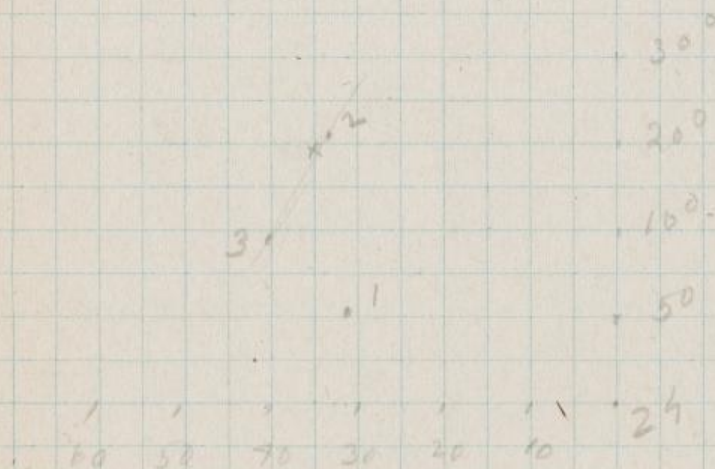
$$\begin{array}{r}
 5 \quad 13 \quad 99.9 \\
 \underline{22.7} \\
 272
 \end{array}$$

$$\begin{array}{r}
 2 \quad 33 \quad 63.94 \\
 \underline{59.20} \\
 4.74
 \end{array}$$

$$\begin{array}{r}
 21 \quad 35 \quad 63.9 \\
 \underline{80.0} \\
 25.9
 \end{array}$$

$$\begin{array}{r}
 2 \quad 90 \quad 20.29 \\
 \underline{20.67} \\
 4.37
 \end{array}$$

$$\begin{array}{r}
 9 \quad 95 \quad 98 \\
 \underline{21.5} \\
 26.5
 \end{array}$$



Log Cur 8 9,9739

$$2 \quad 13.386$$

95-933

Jan 6 9.5528

8.8239

$\log \sin \delta \quad 9.5267$

9.289

k'	2.8863. n
------	-----------

$9 + 0.183$

1	3	5	0
---	---	---	---

+ 4 7 1 0

$$\frac{1}{2} = 0.774$$

n'	6.680
------	-------

+ 26087

Reduction to Mean Position.

19

$$\begin{array}{rcl}
 H + \Delta & 6 & 27.5 = 96^{\circ} 52.5 \quad \delta + 19 \quad 32.09 \\
 H & 3 & 52.5 \\
 \alpha & 2 & 35.0 \\
 G & 22 & 98.8 \\
 G + \Delta & 1 & 23.8 = 20^{\circ} 57.0
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos \delta & & 9.9739 \\
 & & \sim 0.8995 \\
 & & \hline
 & & 0.8239
 \end{array}$$

$$\begin{array}{rcl}
 \cos G + \Delta & & 9.9703 \\
 g & & 13.346 \\
 \sin \alpha & & 9.5533 \\
 \tan \delta & & 9.5528 \\
 & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log g' & & 1.3049 \\
 & g & 9.2846
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \delta & & 9.5267 \\
 \cos H + \Delta & & 9.0781 \\
 & h & 1.2835 \\
 \sin H + \Delta & & 9.9969 \\
 \sin \delta & & 0.0261 \\
 & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 L' & & 9.8853 \\
 & h & 0.1304
 \end{array}$$

$$\begin{array}{rcl}
 f & + & 3.167 \\
 g & + & 0.183 \\
 h & & 1.350 \\
 & + & 4.700
 \end{array}$$

$$\begin{array}{rcl}
 g' & & 20.18 \\
 L' & & -0.774 \\
 i' & & 6.660 \\
 & + & 26.066
 \end{array}$$

9413

Sun on Parallax

20

$$\alpha' \quad 2 \quad 35 \quad 07.70^{\circ}$$

$$\delta \quad 1 \quad 01 \quad 23.25^{\circ}$$

$$\alpha - \alpha' - 1 \quad 33 \quad 44.95^{\circ}$$

$$= -23^{\circ} \quad 26 \quad 6.75^{\circ}$$

$$-8 \quad 35.67$$

$$\frac{1}{2}(\alpha - \alpha') - 23 \quad 17 \quad 31.68^{\circ}$$

$$\pi \quad 59 \quad 42.09^{\circ}$$

$$9.86913$$

$$8.20171^{\circ}$$

$$9.59957^{\circ}$$

$$0.02806^{\circ}$$

$$7.69847^{\circ}$$

$$9.95727^{\circ}$$

$$0.00000^{\circ}$$

$$0.03692^{\circ}$$

$$9.99419^{\circ}$$

$$\alpha - \alpha' \quad -17 \quad 10.17^{\circ}$$

$$= \quad -1 \quad 8.68^{\circ}$$

$$\gamma \quad 44 \quad 37 \quad 00^{\circ}$$

$$\delta \quad 20 \quad 00 \quad 53.9^{\circ}$$

$$\gamma - \delta \quad 24 \quad 36 \quad 06.1^{\circ}$$

$$9.82670^{\circ}$$

$$8.20171^{\circ}$$

$$9.61982^{\circ}$$

$$0.15374^{\circ}$$

$$7.80097^{\circ}$$

$$\delta - \delta' \quad 21 \quad 49.4^{\circ}$$

$$\delta \quad 20 \quad 22 \quad 38.3^{\circ}$$

$$\delta \quad 2 \quad 33 \quad 59.02^{\circ}$$

$$\text{Ann Eph } \delta \quad 20 \quad 22 \quad 35.2^{\circ}$$

$$\text{Ann Eph } \quad 2 \quad 33 \quad 58.27^{\circ}$$

$$b - c \quad +3.1^{\circ}$$

$$b - c^{\circ} \quad +0.78^{\circ}$$

$$\text{Curv of Plate} \quad +0.9$$

$$-0.3$$

$$\text{2nd slider Ref} \quad 0.0$$

$$\text{Irr Corr} \quad +0.1$$

$$+0.01$$

$$\delta \quad +20 \quad 22 \quad 38.7$$

$$\delta \quad 2 \quad 33 \quad 59.03$$

$$b - c \quad +3.2$$

$$+0.79$$

Sun as Parallax

20

$$\chi' \quad 2 \quad 35 \quad 07.80''$$

$$\theta \quad 1 \quad 01 \quad 23.25''$$

$$\theta - \chi' - 1 \quad 33 \quad 99.95''$$

$$= -23^\circ \quad 26 \quad 6.95''$$

$$-8 \quad 35.87$$

$$\chi' (1-\chi') - 23 \quad 17 \quad 31.628''$$

$$\pi \quad 59 \quad 92.09''$$

$$9.86913$$

$$8.20171''$$

$$9.59957''$$

$$0.02806''$$

$$7.69887''$$

$$9.95727''$$

$$0.00000''$$

$$0.03692''$$

$$9.99419''$$

$$\chi - \chi' \quad -17 \quad 10.18''$$

$$= -1 \quad 8.68''$$

$$\chi \quad 99 \quad 37 \quad 00''$$

$$\delta \quad 20 \quad 50 \quad 53.9''$$

$$\gamma - \delta \quad 29 \quad 58 \quad 56.1''$$

$$9.82690''$$

$$8.20171''$$

$$9.61982''$$

$$0.15399''$$

$$7.80697''$$

$$\delta - \delta' \quad 21 \quad 49.4''$$

$$\chi \quad 20 \quad 22 \quad 38.3''$$

$$\delta \quad 2 \quad 33 \quad 59.02''$$

$$\text{Ann Eph} \delta \quad 20 \quad 22 \quad 35.2''$$

$$\text{Ann Eph} \quad 2 \quad 33 \quad 58.28''$$

$$\delta - \epsilon \quad +3.1''$$

$$\delta - \epsilon \quad +0.78''$$

$$\text{Curv of Plate} \quad +0.9$$

$$-0.3$$

$$\text{2nd Order Ref} \quad 0.0$$

9419

Star Measures.

21

	d	r	d	r	d	r
1	20.088	19750	17518	20050		
11.9	11110	18726	19610	12920		
513	0407	3229	2216	2221		
	80	38	10	20		
	<u>11.8974</u>	<u>11.8982</u>	<u>5.2900</u>	<u>5.2899</u>		
2	20326	19954	20622	18140		
21.9	1195455	18330	11010	17728		
27.9+	56	30	0206	2029		
	24	44	12	28		
	<u>20.8370</u>	<u>20.8378</u>	<u>27.9606</u>	<u>27.9589</u>		
3	18548	19950	19948	19912		
34	17990	10524	18912	10914		
5.1	9894	20	1011	1042		
	48	58	52	02		
	<u>34.0554</u>	<u>34.0564</u>	<u>5.1538</u>	<u>5.1508</u>		

Moon Measures.

1	19516	18976		
24.9	989086	18830		
16.	8286	620		
	22	80		
	<u>24.9636</u>	<u>24.9644</u>		
2	16608	19920		
25+	1597478	10530		
16.6	82	28		
1X	14	12		
	<u>25.0630</u>	<u>25.0616</u>		
3	16610	18916		
25+	1639699	911209		
17	40299	0609		
	18	06		
	<u>25.0212</u>	<u>25.0202</u>		

9419

Star Measures.

21

	d	h	d	h
1	20.088	19750	17518	20050
11.9	11110	18726	19610	12920
5.3	0407	3229	2216	2221
	80	38	10	20
	<u>11.8974</u>	<u>11.8982</u>	<u>5.2900</u>	<u>5.2899</u>
2	20326	19954	20622	18190
20.9	1195955	18330	11010	17728
27.9	56	30	0206	2029
	24	44	12	28
	<u>20.8370</u>	<u>20.8378</u>	<u>27.9606</u>	<u>27.9589</u>
3	18598	19960	19998	19916
34	17990	10524	18912	10919
5.1	9894	20	1011	1012
	48	58	52	02
	<u>34.0554</u>	<u>34.0564</u>	<u>5.1538</u>	<u>5.1508</u>

Moon Measures.

1	19516	18976
24.9	989086	18830
16	8286	620
	22	80
	<u>24.9636</u>	<u>24.9644</u>

2	16608	19920
25.7	1597478	10530
16.6	82	28
+1	14	12
	<u>25.0630</u>	<u>25.0616</u>

3	16610	18916
25.7	1639699	911209
17	40299	0609
	18	06
	<u>25.0212</u>	<u>25.0202</u>

8
24
18

5
2
18

6
2
18

7
2
18

8
2
18

$$\begin{array}{r}
 9319 \\
 4 \quad 17896 \quad 17740 \\
 244 \quad 13640 \quad 12032 \\
 18 \quad 3236 \quad 2227 \\
 \quad 92 \quad 38 \\
 \hline
 24.4258 \quad 24.4288
 \end{array}$$

$$\begin{array}{r}
 5 \\
 24 \\
 18.3
 \end{array}$$

$$\begin{array}{r}
 18272 \quad 18880 \\
 15472 \quad 1169287 \\
 \quad 6468 \quad 82 \\
 \quad 89 \quad 80 \\
 \hline
 18.2806 \quad 18.2806
 \end{array}$$

$$\begin{array}{r}
 6 \\
 23.2 \\
 18.4 \\
 1.7
 \end{array}$$

$$\begin{array}{r}
 17274 \quad 17842 \\
 12638 \quad 1245059 \\
 \quad 3039 \quad 58 \\
 \quad 64 \quad 70 \\
 \hline
 18.4636 \quad 18.4610
 \end{array}$$

$$\begin{array}{r}
 7 \\
 23 \\
 18.3
 \end{array}$$

$$\begin{array}{r}
 17262 \quad 17830 \\
 12772 \quad 12320 \\
 \quad 6468 \quad 20 \\
 \quad 66 \quad 70 \\
 \hline
 18.4496 \quad 18.4489
 \end{array}$$

$$\begin{array}{r}
 8 \quad 17050 \quad 14772 \\
 244 \quad 712831 \quad 14688 \\
 18 \quad 34 \quad 7881 \\
 \quad 44 \quad 78 \\
 \hline
 21.9919 \quad 21.9908
 \end{array}$$

9314	
17896	17740
13690	12032
3236	2227
92	38
<u>24.9228</u>	<u>24.9288</u>

18272	18880
12472	11692
6468	82
89	80
<u>18.2806</u>	<u>18.2806</u>

17274	17842
12638	12450
3039	58
69	90
<u>18.4636</u>	<u>18.4610</u>

17262	17830
12772	12320
6968	20
66	90
<u>18.4996</u>	<u>18.4989</u>

17050	14772
712831	17688
39	7481
44	58
<u>21.9919</u>	<u>21.9908</u>

9814 Jinnis + Etc

23

Oct 23-15

Eph. to Stars	01	12		01	27
" " Moon	1	18	07.7	1	18 08.0
Clockface		3	10.6		

H. Sid J.	1	14	57.25	-2-	- 1" 20m
H. Long	4	44	31.05		
J. Sid J.	5	59	28.30		
Sid. J. M.M.	14	3	17.17		
Internal	15	56	11.13		
Reduction		2	36.65		
G.M.J.	15	53	34.48		

From Hank. Alm.		R. A.		Dec.	
Moon	2	32	36.09	20	16 10.5
Motion in 1m			2.0579		+9.597
" " 53.5797		1	49.93	8	34.16
Tabular Place	2	34	26.02	20	24 44.66

Moon's age 16 days

Parallax	54' 41.90"
Semid.	18 55.9
R.	895.9
Aug.	12.8
En. 3	-0.3
R.	908.4
R.	1.9473
alt.	-9.30
(1+a)/R	1.8543
R	34 384

934 = 13.9

a2 - 50 1.8

29
477.8

9814

Jupiter + Etc

23

Oct 23-13

Epp. To Stars	0.1	1.2		0.1	2.9
" " Moon	1	18	07.7	1	18 08.0
Clockwork		3	10.6		

H. Sid T	1	19	57.25	4-2 = -	1 ^h 20 ^m
H. Long	4	99	31.05		
G. Sid T	5	59	28.30		
Sid. T. M. H	14	3	17.17		
External	15	56	11.13		
Reduction		2	36.65		
G. M. J.	15	53	39.48		

From Haut Alm.		R. A.		Dec.	
Moon	2	32	36.09	20	16 10.5
Motion in 1 ^m			2.0519		+9.597
" " 53.5797		1	19.93	8	34.16
Tabular Place	2	39	26.02	20	29 49.66

Moon's Age 16 days

Parallax	54' 91.90"
Semi-d.	19' 55.9"
R.	895.9
Aug	12.8
Err. 3	-0.3
R.	908.4
R.	1,997.3
alt.	-9.30
(1+4)/R	1.8593
R.	34387

$$939 = 13.9$$

$$a = -501.8$$

$$\frac{29}{977.8}$$

9914

Plate constants

29

$$\begin{array}{rclcl}
 X & 11.8978 & 20.8374 & 39.0559 \\
 Y & 11.2680 & 20.6887 & 39.5380 \\
 1-3 & +6298 & +1487 & -4821
 \end{array}$$

$$\begin{array}{rclcl}
 \eta & 5.2897 & 27.9595 & 5.1523 \\
 \eta & 4.8987 & 28.6976 & 4.7208 \\
 \eta-\eta & +3970 & -7381 & +4315
 \end{array}$$

$$\begin{array}{rclcl}
 \eta-3 & +5001 & +14.34 & +1.84 & -12373 \\
 +6298 + 5999 = +12297 + 75 = +12322 + 22 = +12344 = +1 \\
 +1487 + 10419 = +11906 + 900 = +12306 + 38 = +12344 +1 \\
 -4821 - 17028 = -12207 + 79 = -12281 + 64 = -12342 -1 \\
 232082 + 11609 = +237 = +42 = 23.1622
 \end{array}$$

$$\begin{array}{rclcl}
 \eta-\eta & +5004 & -15.14 & +8.04 & -6398 \\
 +3910 + 2645 = +6555 - 179 = +6376 + 22 = +6398 = 0 \\
 -7381 + 13980 = +6599 - 315 = +6284 + 114 = +6398 0 \\
 +4315 + 2576 = +6891 - 519 = +6377 + 21 = +6398 0 \\
 16.6049 + 8302 = -350 = +68 = 16.7671
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables } a: -1.4 & c: -1.4 & a-c=0 & b+d= +.5 \\
 \text{Obs} & = -501.8 & = -509.1 & = +2.3 & = +.8
 \end{array}$$

$$\begin{array}{rclcl}
 0-C & -501.4 & -503.7 & & +0.3
 \end{array}$$

9414

Plate Constants

.57

λ	11.8978	20.8379	39.0559
ξ	11.2680	20.6887	34.5380
η	+6298	+1987	-9821

η	5.2897	27.9595	5.1523
η	9.8987	28.6976	9.7208
$\eta-\eta$	+3910	-7381	+9315

$\eta-\xi$	+5001	+17.34	+1.81	-12373
+6298 + 5999	= +12297	+75	= +12322	+22 = +12344
+1987 + 10919	= +11906	+900	= +12306	+38 = +12344
-9821 + 17628	= +12207	+79	= +12281	+61 = +12342
232082 + 11609		+237		+42 = 23.1622

$\eta-\eta$	+5004	-15.11	+8.04	-6398
+3910 + 2695	= +6555	-179	= +6376	+22 = +6398
-7381 + 13980	= +6599	-315	= +6284	+114 = +6398
+9315 + 2576	= +6891	-519	= +6377	+11 = +6398
16.6099 + 8302		-350		+68 = 16.7671

Tables	$a: -.4$	$c: -.4$	$a \cdot c: 0$	$b+d: +.5$
lbs	= -501.8	= -509.1	= +2.3	= +.8

$a = .8$ $B = +.9$ 

7919

Mozz's Center

	X	X-Y ₀	ΔX	(X-Y ₀) ²	(X-Y ₀) + (Y-Y ₀) ²	0-e
1	24,9640	+1,7550	+0	3,0800	3,4509	+115
2	+25,0623	+1,8533	0	3,4347	3,4397	-37
3	25,0207	+1,8117	-0	3,2822	3,4351	-33
4	24,9273	+1,2183	-1	1,4840	3,4192	-192
5	24,0000	+0,7910	-1	0,6255	3,4201	-183
6	23,2090	0,0000	-1	0,0000	3,4351	-033
7	23,0000	-0,2090	-1	0,0437	3,4297	-87
8	21,9911	-1,2179	1	1,4835	3,4187	-197

	Y-Y ₀	ΔY	(Y-Y ₀) ²	(X-Y ₀) + (Y-Y ₀) ²	L
1	16,0000	-0,6090	-0	0,3709	109
2	16,6090	0,0000	0	0,0000	90
3	17,0000	+0,3910	+0	0,1529	68°78
4	18,0000	+1,3910	+1	1,9352	41
5	18,2806	+1,6716	+1	2,7946	25
6	+18,4623	+1,8533	+1	3,4351	0
7	18,4490	+1,8400	+1	3,3860	354
8	18,0000	+1,3910	+1	1,9352	319

Approx. Center

$$M = 18.$$

$$X = 24,4273$$

$$= 21,9911$$

$$464184$$

$$Y_0 = 23,2092$$

$$X_{max} = 25,0623$$

$$R = 1,8529$$

$$M_{max} = 18,4623$$

$$M_0 = 16,6099$$

Plate Center

$$\begin{cases} X_0 = 23,2090 \\ Y_0 = 16,6090 \end{cases}$$

9919

Mean Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$x - x_0 + (x - x_0)^2$	$(x - x_0)^2$
1	24.9640	+1.7550	+0	3.0800	3.4509	+115
2	+25.0623	+1.8533	0	3.4347	3.4347	-37
3	25.0207	+1.8117	-0	3.2822	3.4351	-33
4	24.4273	+1.2183	-1	1.4840	3.4192	-192
5	24.0000	+0.7910	-1	0.6255	3.4201	-183
6	23.2040	0.0000	-1	0.0000	3.4351	-033
7	23.0000	-0.2090	-1	0.0437	3.4297	-87
8	21.9911	-1.2179	1	1.4833	3.4187	-197

	$x - x_0$	Δx	$(x - x_0)^2$	
1	16.0000	-0.6090	0.3709	
2	16.6090	0.0000	0.0000	109
3	17.0000	+0.3910	0.1529	90
4	18.0000	+1.3910	1.9352	68
5	18.2806	+1.6716	2.7946	71
6	+18.4623	+1.8533	3.4351	25
7	18.4490	+1.8400	3.3860	0
8	18.0000	+1.3910	1.9352	359
				319

Approx. Center

$$M = 18.$$

$$x = 24.4273$$

$$= 21.9911$$

$$469184$$

$$x_0 = 23.2092$$

$$x_{max} = 25.0623$$

$$R = 1.8529$$

$$M_{max} = 18.4623$$

$$M_0 = 16.6099$$

Plate Center

$$\{ x_0 = 23.2090$$

$$\{ M_0 = 16.6090$$

Formation of Normals.

1 - 1.07	+ 201.5	- 70.0
2 + 0.0	- 68.5	- 0.0
3 + 0.70	- 59.5	- 13.0
4 + 1.70	- 239.0	- 267.0
5 + 132	- 144.0	- 306.0
6 + 0.0	- 0.0	- 61.0
7 - 0.39	+ 18.5	- 16.0
8 - 1.70	+ 24.0	- 27.4
+ 3.72	+ 244.0	- 1151.0
- 3.16	- 506.0	
+ .56	- 262.0	

	a	b	c
a - 6	- 10	- 5	0
b - 8	- 11	+ 0	+ 7
c + 15	- 11	+ 3	+ 7
	- 7	+ 11	+ 19
	- 5	+ 13	+ 23
	- 0	+ 15	+ 30
	+ 1	+ 17	+ 30
	+ 7	+ 11	+ 33

+20⁶

$$+0.56 + 17.01 = +7.92$$

$$+ [] + .02 = +0.25$$

$$+13.99 = +7.67$$

$$13.73 = +5.99 - .31 = +5.68$$

9414

Conditional

26
b-c - 0-c^{new}

1	+1.75	-0.61	= +115	-28	+50	= +22	+93	+99
2	+1.85	+0.00	= -37	-30	-0	= -30	-7	-3
3	+1.81	+0.39	= -33	-29	-32	= -61	+28	+35
4	+1.22	+1.39	= -192	-20	-119	= -139	-58	-39
5	+0.79	+1.67	= -183	-13	-137	= -150	-33	-10
6	+0.00	+1.85	= -033	-0	-151	= -151	+118	+198
7	-0.21	+1.89	= -87	+3	-150	= -147	+60	+90
8	+1.22	+1.39	= -197	+20	-113	= -93	-104	-71

+299 - 202

Average = 63

$$13.43 + 0.56 = -262.0 + 5.99$$

$$+0.56 + 19.01 = -1151.0 + 7.92$$

$$+0.56 + 1.02 = -10.9$$

+ .55

$$+13.99 = -1140.1$$

$$b = -81.7$$

$$13.43 = -262.0 + 7.56 = -216.9$$

$$a = -16.1$$

+ 0.82

Arc. measured 150°

$$\frac{p}{h} = .15$$

$$\frac{\Sigma V}{h} = +12.1$$

In 3 R 1.85

$$-2PC = +0.79$$

$$+ \frac{12.1}{15} = +80$$

$$\Delta R = +1.0$$

$$\text{Corr} = -0.2$$

$$\Delta b = +0.81$$

$$\Delta d = +0''.2$$

$$\Delta R = +1.2$$

$$\Delta a = +0.31$$

$$\Delta \alpha = +0''.01$$

9919

Conditional

26

1	+1.75	-0.61	= +115	-28	+50	= +22	+93
2	+1.82	+0.00	= -37	-30	-0	= -30	-7
3	+1.81	+0.39	= -33	-29	-32	= -61	+28
4	+1.22	+1.39	= -192	-20	-119	= -139	-58
5	+0.79	+1.67	= -183	-13	-137	= -150	-33
6	+0.00	+1.85	= -033	-0	-121	= -121	+118
7	-0.21	+1.89	= -87	+3	-150	= -147	+60
8	-1.22	+1.39	= -197	+20	-113	= -93	-109
							+299 - 202
							Average = 63

$$13.43 + 0.56 = -262.0$$

$$+0.56 + 19.01 = -1151.0$$

$$+0.56 + .02 = -10.9$$

$$+1399 = -1190.1 \quad b = -81.7$$

$$13.43 = -262.0 + 92.6 = -216.9 \quad a = -16.1$$

Are measured 150"

$$\frac{p}{h} = .15$$

$$\frac{EV}{h} = +12.1$$

$$+\frac{12.1}{15} = +80$$

$$\Delta R = +1.0$$

9414

Moon's Mean Position.

27

$$\begin{array}{r} x = 23.2090 \\ - 8 \\ \hline 23.2082 \end{array}$$

$$\begin{array}{r} y = 16.6090 \\ - 71 \\ \hline 16.6079 \end{array}$$

From Plate Constants

$$\begin{array}{r} x = 23.1622 \\ z = +1.1622 \end{array}$$

$$\begin{array}{r} y = 16.7671 \\ n = -1.2329 \end{array}$$

$$\begin{array}{r} \log z = 0.06528 \\ \log s = 9.97285 \\ \hline 8.50724 \\ 9.58519 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.5611 \\ z = 0.1305 \\ \hline 7.0539 \\ 6.7450 \end{array}$$

$$\begin{array}{r} d-A \\ 38.48 \end{array}$$

$$n_1 + 0.0006$$

$$A + 0.2 \quad 38 \quad 93.0$$

$$\log h_0 = 0.09117$$

$$A_0 + 0.2 \quad 35 \quad 21.78$$

$$\begin{array}{r} 7.33115 \\ \hline 2.75999 \end{array}$$

$$575.9$$

$$\text{Red} \quad 4.70$$

$$S-D \quad -9.354$$

$$x' \quad 0.2 \quad 33 \quad 26.18$$

$$D \quad 20 \quad 12 \quad 31.0$$

$$d_0 + 20 \quad 2 \quad 55.6$$

$$\text{Red} \quad 26.1$$

$$s' \quad 20 \quad 3 \quad 21.7$$

9414

Hobbs Mean Position

27

$$\begin{array}{r} x = 23.2040 \\ \quad - 8 \\ \hline 23.2032 \end{array}$$

$$\begin{array}{r} y = 16.6090 \\ \quad - 91 \\ \hline 16.6079 \end{array}$$

From Plate Constants

$$\begin{array}{r} x = 23.1622 \\ \quad + 1.1622 \end{array}$$

$$\begin{array}{r} y = 16.7671 \\ \quad - 1.2329 \end{array}$$

$$\begin{array}{r} \log z = 0.06528 \\ \log d = 9.97285 \\ \quad 8.50724 \\ \hline 8.58589 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.5611 \\ \quad 0.1305 \\ \hline 7.0539 \\ \quad 6.7450 \end{array}$$

$$A = 38.48$$

$$h_1 = +0.06$$

$$A + 0.2 = 38.68$$

$$\begin{array}{r} \log h_2 = 0.09117 \\ \quad 7.33115 \\ \hline 2.75999 \end{array}$$

$$A_0 + 0.2 = 35.2178$$

$$0.709$$

$$Red = 4.70$$

$$D = -9.33.9$$

$$X' = 0.2 = 35.2618$$

$$L = 20.12.31.0$$

$$D_0 + 20 = 2.55.6$$

$$Red = 26.1$$

$$D' = 20.3.21.7$$

9419 Reduction to Apparent Place.

28

$$\begin{array}{rcl}
 \alpha & 2 & 35 \quad 26.18 \checkmark \\
 \delta & 1 & 14 \quad 57.25 \checkmark \\
 \alpha - \delta & -1 & 20 \quad 28.93 \checkmark \\
 = & -20 & 07 \quad 13.95 \checkmark \\
 \frac{1}{2} & & -7 \quad 25.58 \checkmark \\
 \frac{1}{2} & -19 & 59 \quad 48.37 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 9.95727 \checkmark \\
 0.00000 \checkmark \\
 0.02700 \checkmark \\
 \hline
 9.98427 \checkmark
 \end{array}$$

$$\pi \quad 57 \quad 41.9 \checkmark$$

$$\begin{array}{rcl}
 9.86913 \checkmark \\
 8.20169 \checkmark \\
 9.53655 \checkmark \\
 0.02816 \checkmark \\
 7.63553 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 \alpha - \delta' & -14 & 51.16 \checkmark \\
 = & - & 59.71 \checkmark
 \end{array}$$

$$\gamma \quad 43 \quad 57 \quad 45.6 \checkmark$$

$$\delta \quad 20 \quad 03 \quad 21.7 \checkmark$$

$$\delta - \delta \quad 23 \quad 54 \quad 23.9 \checkmark$$

$$\begin{array}{rcl}
 9.82670 \checkmark \\
 8.20169 \checkmark \\
 9.60772 \checkmark \\
 0.15852 \checkmark \\
 \hline
 7.79433 \checkmark
 \end{array}$$

$$\delta - \delta' \quad 21 \quad 27.58$$

$$\delta \quad 20 \quad 27 \quad 46.26 \checkmark \quad \alpha \rightarrow 2$$

$$\begin{array}{rcl}
 \text{Am Ephs } 20 \quad 27 \quad 49.66 \checkmark & \text{Am Eph } 2 & 37 \quad 26.77 \checkmark \\
 & & 37 \quad 26.02 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 \text{O-C} & +1.6 \checkmark & \text{O-C} \quad +0.75 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 \text{Curv. of Plate} & -0.6 & -0.3 \\
 2^{\text{nd}} \text{ Order Ref} & 0.0 &
 \end{array}$$

$$\begin{array}{rcl}
 \text{Iss. Corr} & +0.2 & +0.01
 \end{array}$$

$$\delta \quad +20 \quad 27 \quad 46.5 \checkmark \quad \alpha \quad 2 \quad 37 \quad 26.78 \checkmark$$

$$\begin{array}{rcl}
 \text{O-C} & +1.8 & +0.76
 \end{array}$$

7419 Reduction to Apparent Place.

20

$$\begin{array}{r}
 \alpha \quad 2 \quad 35 \quad 26.14 \\
 \delta \quad 1 \quad 14 \quad 57.25 \\
 \alpha - \alpha' \quad -1 \quad 20 \quad 28.73 \\
 = \quad -20 \quad 07 \quad 13.95 \\
 \frac{1}{2} \quad -7 \quad 25.58 \\
 2 \quad -19 \quad 59 \quad 48.37
 \end{array}$$

$$\begin{array}{r}
 \pi \quad 59 \quad 41.9 \\
 9.86913 \\
 8.20167 \\
 9.53655 \\
 00291.6 \\
 763553
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.02700 \\
 \hline
 9.98427
 \end{array}$$

$$\begin{array}{r}
 \alpha - \alpha' \quad -14 \quad 51.16 \\
 = \quad -59.91
 \end{array}$$

$$\gamma \quad 43 \quad 27 \quad 45.6$$

$$\delta \quad 20 \quad 03 \quad 21.7$$

$$\gamma - \delta \quad 23 \quad 24 \quad 23.9$$

$$\begin{array}{r}
 9.82690 \\
 8.20169 \\
 9.60772 \\
 0.15852 \\
 \hline
 7.79433
 \end{array}$$

$$\delta - \delta' \quad 21 \quad 24.58$$

$$\delta \quad 20 \quad 29 \quad 46.23$$

$$\begin{array}{r}
 \text{Ann } \gamma - \delta \quad 20 \quad 24 \quad 44.66 \\
 \text{Ann } \delta \quad 2 \quad 34 \quad 26.77 \\
 \text{Ann } \delta \quad 2 \quad 34 \quad 26.02
 \end{array}$$

$$\begin{array}{r}
 \text{C-C} \quad +1.6 \\
 \text{C-C} \quad +0.75
 \end{array}$$

$$\begin{array}{r}
 \text{Curve of Plate} \quad -0.6 \\
 \text{2nd Order Ref} \quad 0.0 \\
 \quad \quad \quad -0.3
 \end{array}$$

