

KG

11366

v. 938

LXII



Plate 2783

2797

2798



Harvard Lunar Plates.

Measurements and Reductions

Mary Fowler.

Volume LXII.

Plate No.	Date	Page
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2797	1913 Feb 18	10
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2783

Stars measures

1914 Feb 16.

1

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 1 \quad 16478 \quad 18865 \\
 7.3 \quad 1164146 \quad 1362652 \\
 32.5 \quad 41 \quad 5250 \\
 \quad 90 \quad 09 \\
 \hline
 324841 \quad 4839
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 15928 \quad 18260 \\
 8435 \quad 1574038 \\
 3641 \quad 2030 \\
 10 \quad 59 \\
 \hline
 32.2522 \quad 2526
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 2 \quad 104858 \quad 11843 \\
 15.1 \quad 79 \quad 1174630 \\
 10.0 \quad 10400 \quad 4530 \\
 \hline
 9.9916 \quad 9897
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 13859 \quad 18326 \\
 1502011 \quad 1716070 \\
 0504 \quad 6070 \\
 60 \quad 06 \\
 \hline
 15.1150 \quad 1161
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 3 \quad 20258 \quad 14471 \\
 24.4 \quad 1250922 \quad 1220006 \\
 29.7 \quad 2026 \quad 0806 \\
 \quad 54 \quad 70 \\
 \hline
 29.7736 \quad 7739
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 13696 \quad 16640 \\
 7681589 \quad 1262420 \\
 81 \quad 1820 \\
 78 \quad 27 \\
 \hline
 24.4000 \quad 4014
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 4 \quad 18900 \quad 16306 \\
 26.3 \quad 1658989 \quad 861020 \\
 10.3 \quad 8889 \quad 12 \\
 \quad 88 \quad 98 \\
 \hline
 20.2308 \quad 2314
 \end{array}$$

$$\begin{array}{r}
 \text{d} \quad \text{N} \\
 \hline
 17935 \quad 16490 \\
 1096970 \quad 1344037 \\
 61 \quad 33 \\
 40 \quad 80 \\
 \hline
 26.3029 \quad 3049
 \end{array}$$

Grade 6.

2783

Stars measured

1914 Feb 16.

	d	N
1	16478	18865
73	1164146	1362652
325	41	5250
	90	09
	<u>324841</u>	<u>4839</u>

d	N
15928	18260
8435	1574038
3641	2030
10	59
<u>322122</u>	<u>2526</u>

2	104858	11843
151	79	1174630
100	10400	4530
	<u>99916</u>	<u>9897</u>

13859	18326
1502011	1716070
0504	60
60	06
<u>151150</u>	<u>1161</u>

3	20258	14471
144	1210922	1220006
297	2026	08
	54	70
	<u>297736</u>	<u>7734</u>

13696	16640
768189	1262420
81	1820
78	27
<u>244000</u>	<u>4014</u>

4	18900	16306
263	16589	861020
103	88	12
	88	98
	<u>702308</u>	<u>2314</u>

17935	16490
1096970	1344037
61	33
40	80
<u>263029</u>	<u>3049</u>

Grade 6.

2783 Moon-measures.

α	μ	α	μ
1 scratch.			
20.5 18070	19450	18500	19981
17.8 9955	17580	14366	14105
6860	8985	6770	1010
66	37	93	99
<u>17.8106</u>	<u>18135</u>	<u>20.5871</u>	<u>5884</u>
2 11412	10665		
20.0 0101	985233		
18.0 11197	6039		

17.9792 .9781

3 scratch.			
19.4 17915	15720	17450	16405
18.5 1388081	977960	11365	1250000
77	6781	6960	10
20	31	41	00
<u>18.4038</u>	<u>.4045</u>	<u>19.3920</u>	<u>.3906</u>

4			
18.9		14232	13630
19.0		1391360	40 40
		59	13370
		<u>18.9725</u>	<u>.9733</u>

5			
18.8		17090	18131
19.9		1488906	1033930
min		05	28
*		89	34
		<u>18.7810</u>	<u>7801</u>

6			
19.0	15579	16765	
20.7	755065	1474451	
	8250	45	
	87	70	
<u>20.8023</u>	<u>.7981</u>		

2783 Moon Measures.

	d	μ	d	μ
1/ scratch				
20.5	18070	19450	18500	19981
178	9955	17580	14366	14105
	6860	8955	6770	1010
	66	37	93	99
	<u>17.8106</u>	<u>8138</u>	<u>20.5871</u>	<u>5884</u>

2	11412	10065
20.0	0101	985233
18.0	11197	6039
	<u>17.9792</u>	<u>9781</u>

	d	μ	d	μ
2/ scratch				
19.4	17915	15720	17450	16405
18.5	1388081	973960	11365	1250000
	77	6781	6960	10
	20	31	41	00
	<u>18.4038</u>	<u>4045</u>	<u>193920</u>	<u>3906</u>

4				
18.9			14232	13630
19.0			1395360	40
			59	13370
			<u>18.9725</u>	<u>9733</u>

5				
18.8			17090	18131
19.9			1488906	1033930
			05	28
			89	34
			<u>18.7810</u>	<u>7801</u>

6				
19.0	15579	16765		
20.7	755065	1474451		
	8250	45		
	87	70		
	<u>20.8023</u>	<u>7981</u>		

2783

known-measures.

d

4

v

d

v

$$\begin{array}{r} 2 \\ 19.2 \\ 21.0 \end{array}$$

$$\begin{array}{r} 15272 \\ 639180 \\ 9180 \\ 62 \end{array}$$

$$\begin{array}{r} 15272 \\ 639180 \\ 9180 \\ 62 \end{array}$$

$$\begin{array}{r} 17403 \\ 1627858 \\ 70 \\ 82 \\ \hline .1132 \end{array}$$

$$\hline 19.1124$$

$$\begin{array}{r} 8 \\ 21.0 \\ 21.7 \end{array}$$

$$\begin{array}{r} 19507 \\ 1190003 \\ 8203 \\ 11 \end{array}$$

$$\hline 21.7613$$

$$\begin{array}{r} 17780 \\ 1543020 \\ 20 \\ 75 \end{array}$$

$$\hline 7644$$

$$\begin{array}{r} 9 \\ 20.4 \\ 21.8 \end{array}$$

$$\begin{array}{r} 1430705 \\ 142705 \\ 13260 \end{array}$$

$$\hline 21.8947$$

$$\begin{array}{r} 13764 \\ 12860 \\ 5851 \end{array}$$

$$\hline .9092 \checkmark$$

$$\begin{array}{r} 19270 \\ 1372020 \\ 22 \\ 50 \end{array}$$

$$\hline 20.4462$$

$$\begin{array}{r} 19789 \\ 1533545 \\ 45 \\ 75 \end{array}$$

$$\hline .4440$$

min in y = about 17.5000

remeasures

$$\begin{array}{r} 1383960 \\ 5051 \end{array}$$

$$12930$$

$$\hline 21.9080$$

2783

known - measures

d

4

N

d

m

$$\begin{array}{r}
 2 \\
 19.2 \\
 21.0 \\
 \hline
 15272 \\
 639180 \\
 91 \\
 62
 \end{array}$$

$$\begin{array}{r}
 15272 \\
 639180 \\
 91 \\
 62
 \end{array}$$

$$19.1124$$

$$\begin{array}{r}
 17403 \\
 1627858 \\
 70 \\
 82 \\
 \hline
 1132
 \end{array}$$

$$\begin{array}{r}
 8 \\
 21.7 \\
 21.7 \\
 \hline
 19107 \\
 1190003 \\
 8203 \\
 11 \\
 21.7613
 \end{array}$$

$$\begin{array}{r}
 17780 \\
 15430 \\
 20 \\
 75 \\
 \hline
 7644
 \end{array}$$

$$\begin{array}{r}
 9 \\
 20.9 \\
 21.7 \\
 \hline
 1430 \\
 142705 \\
 13260 \\
 21.8947
 \end{array}$$

$$\begin{array}{r}
 137640 \\
 12860 \\
 8451
 \end{array}$$

$$9092$$

$$\begin{array}{r}
 19270 \\
 1372020 \\
 22 \\
 50
 \end{array}$$

$$20.4462$$

$$\begin{array}{r}
 19789 \\
 1523545 \\
 41 \\
 75 \\
 \hline
 4440
 \end{array}$$

from a y = about 17.5000

measures

$$\begin{array}{r}
 1383960 \\
 5051 \\
 2930 \\
 \hline
 21.9080
 \end{array}$$

2783
 exp. to stars 1913 Feb 15, 6^h 22^m ✓ - 6^h 34^m ✓
 " " known 6 27 57.9 ✓ - 6 27 58.2 ✓
 clock fast 0 48.0 ✓

H. Sid. T. 6 27 10.05 ✓ 6-22 + 1^h 22^m ✓
 H. long 4 44 31.05 ✓
 G. Sid. T. 11 11 41.10 ✓
 Sid. T. known 21 39 32.22 ✓
 Interval 13 32 08.88 ✓
 Reduction 2 130.5 ✓
 G. M. T. 13 29 55.83 ✓

From Kant Allen R.A. Decl
 Moon 13^h 5^h 03^m 39.76^s + 27° 50' 00"5 ✓
 Motion in 1^h 2.5587 ✓ 4.138 ✓
 " " 29.9305 ✓ + 1 16.58 ✓ + 2 03.9 ✓
 Tabular place 5 0.4 56.34 ✓ + 27 52 04.4 ✓

moon's age 10 days

parallax 58' 17.00 ✓
 semidiameter 15 54.5 ✓
 R 954.5 ✓
 Augmentation + 15.3 ✓
 Irradiation (6) - 1.1 ✓
 R 968.7 ✓
 R 207.65 ✓
 (1+2)R 207.58 ✓
 R² 4309.0 ✓
 a = -3.4

2783 Times etc.

exp. to stan	1913 Feb 15	6 ^h 22 ^m	- 6 ^h 34 ^m
moon	6	27	579 - 6 27 582
clock fast		0	48.0
H. Sid. T.	6	27	10.05 0-22 + 1 ^h 22 ^m
H. long	4	44	31.05
G. Sid. T.	11	11	41.10
Sid. T. in moon	21	39	32.22
Interval	13	32	08.88
Reduction		2	13.05
G. L. T.	13	29	55.83

From Kant Allen	R.A.	Decl.
moon 13 ^h	5 ^h 03 ^m 39 ^s 76	+ 27° 50' 00" 5
motion in 1 ^h 2.5587	4.138	
29.9305	+ 1 16.58	+ 2 03.9
Tabular place	5 04 56.34	+ 27 52 04.4

moon's age 10 days

parallax 58' 17.00

semidiameter 15 54.5

R 954.5

Augmentation + 1.53

Irradiation (6) - 1.1

R 968.7

R 2.0765

(1+α)R 2.0758

R² 4.309.0

$$939 = 14.6$$

$$954.5 = 15.3$$

$$a = -3.4$$

this plate checks up with 2782
for measures.

3		1
4		2

65

2283

Plate Constants

	1	2	3	4
x	7.2524	15.1156	24.4007	26.3039
y	7.0942	15.1793	24.2749	26.3689
$x-y$	+1.582	-637	+1.258	-650

x	32.4840	9.9906	29.7735	10.2311
y	33.0156	10.5988	30.4796	10.9561
$y-x$	-5316	-6082	-7061	-7250

$x-3$	-97.44	+3.42	+1.558
+1.582	-3164	-15.82	+25
-637	973	-1610	+51
+1.258	-2900	-1642	+83
-650	997	-1647	+89
20.8563	-1936	+71	
			= 20.8256

$y-x$	+1032	+1.24	+4.521
-5316	+747	+39	-4.530
-6082	+1558	+12	-4.512
-7061	+2513	+36	-4.512
-7250	+2709	+12	-4.529
19.8720	+2148	+24	
			= 20.5413

Tables $a = +0.9$ $a = +0.9$ $a - c = 0.0$ $b + a = 5.0$
 Obs $a = -3.4$ $a = -1.2$ $a - c = -2.2$ $b + a = -5.6$

2783

Plate Constants

	1	2	3	4
x	7.2524	15.1156	24.4007	26.3039
y	7.0942	15.1793	24.2749	26.3689
$x-3$	+1582	-637	+1258	-650

y	32.4840	9.9906	29.7735	10.2311
y	33.0156	10.5988	30.4796	10.9561
$y-y$	-5316	-6082	-7061	7250

$x-3$	-9794	+342	+1558	
+1582	-3164	-1582	+25	-1557
-637	973	-1610	+51	-1559
+1258	-2900	-1642	+83	-1559
-650	997	-1647	+89	-1558
20.8563	-1936	+71		20.8256

$y-y$	+1032	+124	+4521	
-5316	+747	-4569	+39	-4530
-6082	+1558	-4524	+12	-4512
-7061	+2413	-4548	+36	-4512
-7250	+2709	-4547	+12	-4529
19.8720	+2148	+24		20.5413

Tables $a = +0.9$ $b = +0.9$ $c = 0.0$ $d + a = 0.0$
 this $a = -3.4$ $b = -1.2$ $c = -2.2$ $d + a = -5.6$

Red. and locum app.

$$S = +27^{\circ} 36'$$

$$H + \alpha \quad 1^{\circ} 26' = 21^{\circ} 30'$$

$$H \quad 20 \quad 22$$

$$K \quad 5 \quad 04$$

$$G \quad 18 \quad 58$$

$$G + \alpha \quad 0 \quad 02 = 0^{\circ} 30'$$

$$\log \cos(61^{\circ}) \quad 0.0000$$

$$q \quad 0.9775$$

$$\sin \quad 9.9408$$

$$\tan S \quad 9.7183$$

$$\frac{1}{\cos} \quad 8.8239$$

$$g' \quad 0.9775$$

$$g \quad 7.4605$$

$$\begin{array}{r} f \quad + 0.37 \\ g \quad + 0.00 \\ h \quad + 0.53 \\ \hline + 0.90 \end{array}$$

$$L \cos S \quad 9.9475$$

$$L \quad 0.8340$$

$$(L) \quad 0.7815$$

$$L \sin S \quad 9.6659$$

$$\cos(f+V) \quad 9.9687$$

$$L \quad 1.2855$$

$$\sin \quad 9.5641$$

$$\sec S \quad 0.0525$$

$$\frac{1}{\cos} \quad 8.8239$$

$$L' \quad 0.9201$$

$$L \quad 9.7260$$

$$f' \quad + 9.50$$

$$L' \quad + 8.32$$

$$L \quad - 6.05$$

$$+ 11.77$$

2783 known mean Position (1913.0)

$$\begin{array}{r}
 X_0 = 20.8530^{\checkmark} \quad Y_0 = 19.8730^{\checkmark} \\
 \Delta\alpha = + 33^{\checkmark} \quad \Delta\delta = -10^{\checkmark} \\
 \hline
 20.8563^{\checkmark} \quad 19.8720^{\checkmark} \\
 (20.8570) \quad (19.8718)
 \end{array}$$

From Plate constants $X = 20.8256^{\checkmark}$ $Y = 20.5413^{\checkmark}$
 $(20.8263) \quad (20.5411)$

$$Z = + 2.8256^{\checkmark} (2.8263) \quad \eta = - 1.4587^{\checkmark} (-1.4589)$$

$$\begin{array}{r}
 \log Z \quad 0.45111^{\checkmark} (45122) \quad \log \tan S = 9.7196^{\checkmark} \\
 \cos S \quad 9.94753^{\checkmark} \quad 0.9022^{\checkmark} \\
 \quad 8.50724^{\checkmark} \quad 7.0534^{\checkmark} \\
 \quad \quad \quad 7.6752^{\checkmark}
 \end{array}$$

$$(X-A) \quad 1.99634^{\checkmark} (1.99645)$$

$$\alpha - A \quad + 1 \quad 39 \quad 16^{\checkmark} (39.19)$$

$$A \quad 5 \quad 02 \quad 08^{\checkmark}$$

$$\alpha - 5 \quad 03 \quad 47.16^{\checkmark} (47.19)$$

$$Red = + 0.90^{\checkmark}$$

$$\alpha' = 5 \quad 03 \quad 48.06^{\checkmark} (48.09)$$

$$\eta_1 = + 47^{\checkmark} \quad \eta_0 = - 1.4634^{\checkmark} (-1.4636)$$

$$\log \eta_0 = 0.16536^{\checkmark} (16542) \quad 7.3311^{\checkmark}$$

$$(S-D) \quad 2.83421^{\checkmark} (2.83427)$$

$$S-D = - 11 \quad 22.7^{\checkmark} (22.8)$$

$$D = + 27 \quad 47 \quad 20^{\checkmark}$$

$$\delta = + 27 \quad 35 \quad 57.3^{\checkmark} (27.2)$$

$$Red = + 11.8^{\checkmark}$$

$$\delta' = + 27 \quad 36 \quad 09.1^{\checkmark} (27.0)$$

2753 known mean Position (1913.0)

$$\begin{array}{r}
 X_0 = 20.8530 \\
 \Delta = + 33 \\
 \hline
 20.8563
 \end{array}
 \qquad
 \begin{array}{r}
 Y_0 = 19.8730 \\
 \Delta = -10 \\
 \hline
 19.8720
 \end{array}$$

From Plate constants $X = 20.8256$ $Y = 20.5413$

$$Z = + 2.8256$$

$$\eta = - 1.4587$$

$$\begin{array}{r}
 \log 3 \quad 0.45111 \\
 \log 5 \quad 9.94753 \\
 \hline
 8.50724
 \end{array}$$

$$\begin{array}{r}
 \log \tan S = 9.7196 \\
 \quad \quad \quad 0.9022 \\
 \quad \quad \quad 7.0534 \\
 \quad \quad \quad 7.6752
 \end{array}$$

$$(A-A) \quad 1.99634$$

$$\eta_1 = + 47$$

$$A-A \quad + 1.3916$$

$$\eta_0 = - 1.4634$$

$$A \quad 5 \quad 02 \quad 08$$

$$\begin{array}{r}
 \log \eta_0 = 0.16536 \\
 \quad \quad \quad 7.33115
 \end{array}$$

$$A \quad 5 \quad 03 \quad 47.16$$

$$Red = + 0.90$$

$$(S-D) \quad 2.83421$$

$$A' \quad 5 \quad 03 \quad 48.06$$

$$S-D = - 11.227$$

$$D = + 27 \quad 47 \quad 20$$

$$S = + 27 \quad 35 \quad 57.3$$

$$Red = + 11.8$$

$$S' = + 27 \quad 36 \quad 09.1$$

p	$p-c$	$\lambda \sin(p-c)$	$\beta \cos(p-c)$	θ	Corr Hayn		
187 ⁰	192 ⁰	+ 1.6	+ 6.3	- 4.4	+ 0.1	+	9
204.4	209.4	+ 3.8	+ 5.6	- 1.5	+ 0.5	+	46
225.0	230.0	+ 5.9	+ 4.1	+ 2.1	- 0.6	-	55
245.0	250.0	+ 7.2	+ 2.2	+ 5.3	+ 0.5	+	46
270.0	275.0	+ 7.7	- 0.6	+ 8.6	+ 0.4	+	37
295.3	300.3	+ 6.7	- 3.2	+ 10.2	0.0		0
303.0	308.0	+ 6.1	- 4.0	+ 10.4	+ 0.5	+	46
335.6	340.6	+ 2.6	- 6.1	+ 9.0	+ 0.4	+	37
348.6	353.6	+ 0.9	- 6.4	+ 7.6	+ 0.2	+	18

$$\lambda = -7^{\circ} 73$$

$$\beta = -6.40$$

$$c = 355^{\circ} 0$$

$\text{Old}(o-c)$	Hayn	$\text{New}(o-c)$
+ 82	+ 9	+ 73
+ 73	+ 46	+ 27
- 142	- 55	- 87
- 121	+ 46	- 167
- 142	+ 37	- 179
- 157	0	- 157
- 106	+ 46	- 152
- 101	+ 37	- 138
+ 11	+ 18	- 7

2783

Moon's Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	20.5878	-0.2652	0.0703	4.3172	+ 82
2	20.0000	-0.8530	0.7276	4.3163	+ 73
3	19.8910	-1.4620	2.1374	4.2948	- 142
4	18.9729	-1.8801	3.5348	4.2969	- 121
-5	18.7806	-2.0724	4.2948	4.2948	- 142
6	19.0000	-1.8530	3.4336	4.2933	- 157
7	19.1128	-1.7402	3.0283	4.2984	- 106
8	20.0000	-0.8530	0.7276	4.2989	- 101
9	20.4451	-0.4079	0.1664	4.3101	+ 11

Comp R^2 = 4.3090

	y	$y - y_0$	$(y - y_0)^2$
1	17.8122	-2.0608	4.2469
2	17.9786	-1.8944	3.5887
3	18.4042	-1.4688	2.1574
4	19.0000	-0.8730	0.7621
5	19.8730	0.0000	0.0000
6	20.8002	+0.9272	0.8597
7	21.0000	+1.1270	1.2701
8	21.7628	+1.8898	3.5713
9	21.9086	+2.0356	4.1437

Approx. Center

$$x = 20.0 \quad y = 17.9786$$

$$\underline{21.7628}$$

$$39.7414$$

$$y_0 = 19.8707$$

$$y_{\text{min}} = 17.8000$$

$$R = 2.0707$$

$$x_{\text{min}} = 18.7806$$

$$x_0 = 20.8513$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 20.8530 \\ y_0 = 19.8730 \end{array} \right.$$

2783

Lunar Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	20.5878	-0.2652	0.0703	4.3172	+ 82
2	20.0000	-0.8530	0.7276	4.3163	+ 73
3	19.3910	-1.4620	2.1374	4.2948	- 142
4	18.9729	-1.8801	3.5348	4.2969	- 121
5	18.7806	-2.0724	4.2948	4.2948	- 142
6	19.0000	-1.8530	3.4336	4.2933	- 157
7	19.1128	-1.7402	3.0283	4.2984	- 106
8	20.0000	-0.8530	0.7276	4.2989	- 101
9	20.4451	-0.4079	0.1664	4.3101	+ 11

Comp $R^2 = 4.3090$

	y	$y - Y_0$	$(y - Y_0)^2$
1	17.8122	-2.0608	4.2469
2	17.9786	-1.8944	3.5887
3	18.4042	-1.4688	2.1574
4	19.0000	-0.8730	0.7621
5	19.8730	0.0000	0.0000
6	20.8002	+0.9272	0.8597
7	21.0000	+1.1270	1.2701
8	21.7628	+1.8898	3.5713
9	21.9086	+2.0356	4.1437

Approx. Center

$$x = 20.0 \quad y = 17.9786$$

$$21.7628$$

$$39.7414$$

$$Y_0 = 19.8707$$

$$y - \text{min} = 17.8000$$

$$R = 2.0707$$

$$x - \text{min} = 18.7806$$

$$X = 20.8513$$

$$\begin{aligned} \text{Center } \left\{ \begin{array}{l} X_0 = 20.8530 \\ Y_0 = 19.8730 \end{array} \right. \end{aligned}$$

Formation of Vowels with Hayne Corrections

	ab	ad	bn	an	bn
1	+ 0.56	- 22.1	- 169.8	- 19.7	- 151.0
2	+ 1.61	- 62.0	- 138.0	- 23.0	- 51.0
3	+ 2.13	+ 207.2	+ 208.5	+ 127.0	+ 128.0
4	+ 1.63	+ 225.3	+ 105.2	+ 314.0	+ 145.0
5	- 0.00	+ 294.0	- 0.0	+ 370.0	- 0.0
6	- 1.72	+ 290.0	- 146.0	+ 290.5	- 146.0
7	- 1.97	+ 184.5	- 120.0	+ 264.5	- 171.9
8	- 1.61	+ 85.5	- 191.0	+ 117.4	- 26.1.0
9	- 0.84	- 4.5	+ 22.4	+ 29	- 14.3
	- 0.21	+ 1197.9	- 428.7	+ 1443.6	- 522.2

Residuals with Hayne Corr.

	O	C	O - C
1	+ 73	- 21 + 51 = + 30	+ 43
2	+ 27	- 67 + 46 = - 21	+ 48
3	- 87	- 116 + 36 = - 80	- 7
4	- 167	- 149 + 21 = - 128	- 39
5	- 179	- 164 - 0 = - 164	- 15
6	- 157	- 147 - 23 = - 170	+ 13
7	- 152	- 138 - 28 = - 166	+ 14
8	- 138	- 67 - 46 = - 113	- 25
9	- 7	- 32 - 50 = - 82	+ 75
			+ 193 - 86
			Average - 31

2783

Moon's Center

Conditional Equations

	a	b	0	c	0-c
1	-0.27	-2.07	+82	+18 + 42 = +24	+58
2	-0.85	-1.89	+73	-56 + 38 = -18	+91
3	-1.46	-1.47	-142	-96 + 20 = -66	-76
4	-1.88	-0.87	-121	-124 + 18 = -106	-5
5	-2.07	+0.00	-142	-136 - 0 = -136	-6
6	-1.85	+0.93	-157	-122 - 19 = -141	-16
7	-1.74	+1.13	-106	-115 - 23 = -138	+32
8	-0.85	+1.89	-101	-56 - 38 = -94	-7
9	-0.41	+2.04	+11	-27 - 41 = -68	+79
				+260	-110

Average: 41

Normal Equations

$$\begin{aligned}
 +18.12 - 0.21 &= +1198 \quad (+1444) \\
 -0.21 + 20.60 &= -429 \quad (-522)
 \end{aligned}$$

$$\begin{aligned}
 +0.21 - 0.00 &= +14 \quad (+17) \\
 +20.60 &= -415 \quad (-505) \quad b = -20.2 \quad (-24.5)
 \end{aligned}$$

$$\begin{aligned}
 +18.12 &= +1198 - 4 = +1194 \quad + \quad a = +66.0 \quad (+79.3) \\
 &= +1444 - 5 = +1439
 \end{aligned}$$

Moon's Mean Position (page 6)

$$\text{Arc measured} = 162^\circ \quad \text{Average } (0-c) = +17$$

$$\frac{pa}{n} = 0.21$$

$$+ \frac{17}{21} = +0.81 \quad \Delta n = +0.9$$

2783

Moon's Center

Conditional Equations

	a	b	0		c	0-c
1	-0.27	-2.07	+8.2	-	1.8 + 4.2 =	+2.4 + 5.8
2	-0.85	-1.89	+7.3	-	5.6 + 3.8 =	-1.8 + 9.1
3	-1.46	-1.47	-1.42	-	9.6 + 3.0 =	-6.6 - 7.6
4	-1.88	-0.87	-1.21	-	12.4 + 1.8 =	-10.6 - 5
5	-2.07	+0.00	-1.42	-	13.6 - 0 =	-1.36 - 6
6	-1.85	+0.93	-1.57	-	12.2 - 1.9 =	-1.41 - 1.6
7	-1.74	+1.13	-1.06	-	11.5 - 2.3 =	-1.34 + 3.2
8	-0.85	+1.89	-1.01	-	5.6 - 3.8 =	-9.4 - 7
9	-0.41	+2.04	+1.1	-	2.7 - 4.1 =	-6.8 + 7.9

+26.0 = 11.0

Average 41

Normal Equations

$$\begin{aligned}
 +18.12 - 0.21 &= +11.98 \\
 -0.21 + 20.60 &= -4.29
 \end{aligned}$$

$$\begin{aligned}
 +0.21 - 0.00 &= +1.4 \\
 +20.60 &= -4.15
 \end{aligned}$$

$$b = -20.2$$

$$+18.12 = +11.98 - 4 + 11.94$$

$$a = +6.60$$

Moon's Mean Position (page 6)

$$\alpha \text{ measured} = 162^\circ \quad \text{Average } (0-c) = +17$$

$$\frac{pc}{\sin} = 0.21$$

$$+ \frac{17}{21} = +0.81 \quad \Delta \alpha = +0.9$$

2783

Lunar Parallax.

9

$$\alpha = 5^h 03^m 48.06^s (48.09)$$

$$\delta = 6 \quad 27 \quad 100.5^{\circ}$$

$$+ 1 \quad 23 \quad 22.0^{\circ}$$

$$+ \quad 20 \quad 50' \quad 30''^{\circ}$$

$$+ \quad \quad \quad 8 \quad 40^{\circ}$$

$$+ \quad 20 \quad 41 \quad 50^{\circ}$$

$$9.95727^{\circ}$$

$$0.00000$$

$$0.02897^{\circ}$$

$$9.98624^{\circ}$$

$$\delta = 44 \quad 05 \quad 34^{\circ}$$

$$27 \quad 36 \quad 09^{\circ}$$

$$16 \quad 29 \quad 25^{\circ}$$

$$9.82640^{\circ}$$

$$8.22925^{\circ}$$

$$9.45310^{\circ}$$

$$0.15751^{\circ}$$

$$7.66626^{\circ}$$

$$\delta - \delta' = +15 \quad 56.5^{\circ}$$

$$(05.5^{\circ})$$

$$\delta = +27 \quad 52 \quad 05.6^{\circ}$$

$$\delta' = +27^{\circ} 26' 09.1''$$

$$IT = 58' 17.0'' (09.0)$$

$$9.86913^{\circ}$$

$$8.22925^{\circ}$$

$$9.55119^{\circ}$$

$$0.05354^{\circ}$$

$$7.70311^{\circ}$$

$$\alpha - \alpha' = +17' 21.21''$$

$$= +1^m 09.41''$$

$$\alpha = 5 \quad 04 \quad 57.47^{\circ} (57.50)$$

$$\kappa = 5 \quad 04 \quad 56.34^{\circ}$$

$$\text{Nautical } \delta = +27 \quad 52 \quad 04.4^{\circ}$$

$$O-C \quad + \quad 1.2^{\circ}$$

$$\text{With Frazer corrections } (+ \quad 1.1)$$

$$+1.13^{\circ}$$

$$(+1.16)$$

2783

Lunar Parallax

9

$$\begin{array}{r}
 \alpha = 5^h 03^m 48.06^s \\
 \delta = 6 \quad 27 \quad 10.05'' \\
 + 1 \quad 23 \quad 22.0'' \\
 + \quad 20 \quad 50 \quad 30'' \\
 + \quad \quad \quad 8 \quad 40'' \\
 \hline
 = 20 \quad 41 \quad 50''
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.02897 \\
 \hline
 9.98624
 \end{array}$$

$$\begin{array}{r}
 \delta = 44 \quad 05 \quad 34'' \\
 27 \quad 36 \quad 09'' \\
 16 \quad 29 \quad 25''
 \end{array}$$

$$\begin{array}{r}
 9.92640 \\
 8.22925 \\
 9.45310 \\
 0.15751 \\
 \hline
 7.66626
 \end{array}$$

$$\delta - \delta' = +15 \quad 56.5''$$

$$\delta = +27 \quad 52 \quad 05.6''$$

$$\text{Nautical } \delta = -27 \quad 52 \quad 04.4''$$

$$O - C = +1.2''$$

$$\delta' = +27^{\circ} 26' 09''$$

$$IT = 58' 17.0''$$

$$\begin{array}{r}
 9.86913 \\
 8.22925 \\
 9.55119 \\
 0.85354 \\
 \hline
 7.70311
 \end{array}$$

$$\alpha - \alpha' = +17' 21.21''$$

$$= +1 \quad 09.41''$$

$$\alpha = 5 \quad 04 \quad 57.47''$$

$$\kappa = 5 \quad 04 \quad 56.34''$$

$$+1.13''$$

1
9.1
2

11.1
14

3
31
23

4
28
23

2
13
28

9
3

2797

Stars - measures

1914 Feb 18.

$\frac{1}{9.5}$ 15597
 14440 30
 231 32
 03
23.1164

$\frac{1}{9.5}$ 19268
 10407 01
 06
 55
1149

$\frac{1}{9.5}$ 15484
 9728 10
 20 10
 30
9.4281

$\frac{1}{9.5}$ 14614
 10318 06
 20
 03
4295

$\frac{2}{11.6}$ 19400
 11159 58
 14.8 54
 94
14.8238

$\frac{2}{11.6}$ 19126
 17738 49
 40
 10
8220

$\frac{2}{11.6}$ 13114
 89480 70
 70
 10
11.6358

$\frac{2}{11.6}$ 19609
 13212 22
 16
 93
6382

$\frac{3}{31.5}$ 18313
 13170 79
 23.6 80
 89
23.5125

$\frac{3}{31.5}$ 17140
 12259 56
 59
 40
5.118

$\frac{3}{31.5}$ 19721
 13279 67
 66
 90
31.4071

$\frac{3}{31.5}$ 18171
 14051 76
 71
 57
4089

Shade 4.

$\frac{4}{28.7}$ 14751
 23.5 10067 71
 75
 35
23.4672

$\frac{4}{28.7}$ 14525
 92100 9
 07
 40
4676

$\frac{4}{28.7}$ 15289
 12936 21
 27 33
 69
28.7745

$\frac{4}{28.7}$ 15749
 7970 79
 71
 39
7774

$\frac{5}{23.7}$ 9523 32
 23.9 21
 9040
23.9519

$\frac{5}{23.7}$ 10659
 10185 80
 80
9523

$\frac{5}{23.7}$ 16561
 13192 00
 91
 59
236634

$\frac{5}{23.7}$ 17006
 10358 50
 60
 00
6647

$\frac{9.7}{33.2}$ 16378
 13830 28
 21
 60
33.2548

$\frac{9.7}{33.2}$ 12801
 534146
 39
 88
2550

$\frac{9.7}{33.2}$ 15388
 13747 51
 51
 93
9.8361

$\frac{9.7}{33.2}$ 15418
 7040 35
 40
 10
8074

2797

Star - lucasina

1914 Feb 18.

a

v

d²

v

1 15597
 91 14440.30
 231 32
 03
23.1164

19268
 1040701
 06
 55
1149

15434
 97710
 2010
 30
9.4281

19614
 1031806
 20
 03
4295

3 19400
 11 15958
 148 54
 99
14.8238

19126
 17735
 4049
 10
8220

13114
 1947070
 70
 10
11.2358

19609
 1321222
 1622
 93
6382

3 18313
 315 13170.79
 236 80
 89
23.5125

17140
 1225956
 59
 40
5.118

19721
 1377967
 66
 90
314071

18171
 1405176
 71
 57
4089

Shade 4.

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 287 1006771
 235 75
 35
23.4672

14125
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 1293621
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18
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w
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2797

moon-measures

$$\begin{array}{r}
 \text{d} \quad \text{v} \quad \text{d} \quad \text{v} \\
 1 \quad 16939 \quad 15609 \\
 18.0 \quad 14665 \quad +779499 \\
 18.3 \quad 80 \quad 9699 \\
 \quad 29 \quad 00 \\
 \hline
 18.2263 \quad .2194
 \end{array}$$

$$\begin{array}{r}
 2 \\
 17.2 \\
 19.0
 \end{array}$$

$$\begin{array}{r}
 18261 \quad 16530 \\
 10020/0 \quad 14749 \\
 \quad 00 \quad 60 \\
 \quad 56 \quad 03 \\
 \hline
 17.1752 \quad 1772
 \end{array}$$

$$\begin{array}{r}
 3 \\
 120 \quad 15140 \quad 16179 \\
 19.4 \quad 11589/17 \quad 962168 \\
 \quad 05 \quad 3069 \\
 \quad 37 \quad 81 \\
 \hline
 19.3535 \quad .3467
 \end{array}$$

very oblique

$$\begin{array}{r}
 4 \\
 16.9 \\
 20.1 \\
 \text{min} \\
 \text{w} \\
 \text{2c} \\
 \text{5-} \\
 17.01 \\
 21.0
 \end{array}$$

$$\begin{array}{r}
 16059 \quad 20051 \\
 14579 \quad 1150092 \\
 \quad 64 \quad 63 \quad 0492 \\
 \quad 47 \quad 30 \\
 \hline
 16.8512 \quad .8534
 \end{array}$$

$$\begin{array}{r}
 13530 \quad 15797 \\
 \quad 19 \quad 30 \quad 1548079 \\
 13219 \quad 7579 \\
 \hline
 17.0307 \quad 0319
 \end{array}$$

$$\begin{array}{r}
 6 \\
 18.0 \quad 11070 \quad 1222314 \\
 22.1 \quad 10490 \quad 2014 \\
 \quad 8894 \quad 11644 \\
 \hline
 22.0579 \quad .0575
 \end{array}$$

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98
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100

2797

moon-measures.

d

4

N

d x

N

2

19759

18941

19.0

1658683

1159317

22.3

81

14

mean

47

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in

22.3172

.3175

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saratoh

19.6

20270

18524

19750

19499

22.2

1817771

1062018

1665550

1257880

59

19

50

79

61

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35

99

222100

.2105

19.6907

.6920

2797

Moon - Measures

d

7

N

d

7

N

2 19759

18941

170 1658683

1159317

223 81

14

mm 47

30

m 223172

3175

4

8 scratch

146 20270

18524

19750

19499

222 1817771

1062018

1665550

1257880

59

19

50

79

61

11

35

99

222100

2105

196907

6920

2297	Times etc.				
Ephestian 1913 Feb. 18,	7 ^h 34 ^m	-	-	7 ^h 46 ^s	
" " Moon	7 40	09.8 ^v	-	7 40	10.2 ^v
Chase fast	0	48.9 ^v			
H. Sid T.	7 39	21.1 ^v		0-x=-0 ^h 41 ^m	
H. hour	4 44	31.0 ^v			
G. Sid T.	12 23	52.1 ^v			
Sid T. M. Moon	21 51	21.88 ^v			
Internal	14 32	30.27 ^v			
Reduction	2	22.94 ^v			
G. M. T.	14 30	07.33 ^v			

from Kant. alum.	R.A.	Decl.
Moon 14 ^h	8 ^h 18 ^m 56.44 ^v	+24° 20' 33.3 ^v
Meridian 1 ^m = 2.6409 ^v	10.111 ^v	
" 30.1222 ^v	+ 1 19.55 ^v	- 5 09.6 ^v
Tabular place.	8 20 15.99 ^v	+24 15 28.7 ^v

Meridian age 13 days

	parallax	60' 52.88 ^v
	secundum	16 36.9 ^v
934 = 14.75 ^v	R	996.9 ^v
997 = 16.8	Augmentation	+ 16.8 ^v
	Irradiation (4)	- 0.8 ^v
	R	1012.9 ^v
	R	2.1713 ^v
2 = +2.5	(1+a) R	2.1718 ^v
	R ²	4.7167 ^v

2297 Times etc.
 Whiston 1913 Feb. 18 7^h 34^m - 7^h 46^s
 " " 7 40 09.8 - 7 40 10.2
 Clock for 0 489

H Sid T. 7 39 211 0-x = -0^h 41^m
 H. H. H. 4 44 31.05
 G. Sid T. 12 23 5215
 Sid T. H. H. 21 51 2188
 Internal 14 32 3027
 Reduction 2 22.94
 G. H. T. 14 30 0733

From Hunt. Alman.
 Moon 14^h 8^h 18^m R. A. 56^h 44^m + 24^m 20^s 33.3
 Moon 1^h 2.6409 10.111
 30.1222 + 1 19.55 - 5 09.6
 Tabular place 8 20 15.99 + 24 15 28.7

Moon's age 13 days
 parallax 60' 52" 88
 semidiameter 16 36.9

939 = 14.75
 997 = 16.8

R 996.9
 Augmentation + 16.8
 Irradiation (9) - 0.8
 R 1012.9
 R 2.1713
 (1+a) R 2.1718
 R² 47167

2 = +2.5

28.7760 23.4674

Plate Constants with star (4) instead of (3)

$a = +0.9$

$e = +5.2$

$b = +143.5$

$d = -141.1$

$c = -313.4$

$f = +1693$

$a - e = -4.3$

$b + d = +2.4$

Plate Constants with stars (3) and (4)

$a = +0.8$

$e = +6.3$

$b = +147.5$

$d = -141.1$

$c = -320.8$

$f = +1672$

$a - e = -5.5$

$b + d = +6.4$

	-147.54		-0.82		-320.8
+191	-3410	= -3219	-8	= -3227	= -19
-996	-2186	= -3182	-9	= -3191	= +17
+259	-3461	= -3202	-23	= -3225	= -17
+303	-3468	= -3165	-25	= -3290	= +18

	+141.12		-6.34		-1672
+483	+1330	= +1813	-146	= +1667	= +5
+129	+1642	= +1771	-93	= +1678	= +6
-2246	+4060	= +1814	-148	= +1666	= -6
-2606	+4432	= +1826	-148	= +1678	= +6

Plate constant.

Center $\left\{ \begin{array}{l} 8^h \ 20^m \ 15^s \\ + 24^\circ \ 09' \ 49'' \end{array} \right.$

$$\begin{array}{r} y - in + 140.7x - 5.44 - 1686 \\ + 483 + 1327 = +1810 - 125 = +1685 = -1 \\ + 129 + 1637 = +1766 - 80 = +1686 = 0 \\ - 2606 + 4419 = +1813 - 127 = +1686 = 0 \\ w. 1422 + 2677 - 109 = 202304 \end{array}$$

Tables $a = +0.4$ $e = +0.4$ $a - e = +0.0$ $b + a = 0.0$
Obs $a = +2.5$ $e = +5.4$ $a - e = -2.9$ $b + a = +3.3$

Preliminary Reduction

$$\begin{array}{rclcl}
 x - 5 - 1424 & - 76 & + 3107 & & \\
 + 191 - 3282 & + 3091 - 9 & = - 3100 & = + 7 & \\
 + 1630 - 4722 & = - 3092 - 10 & = - 3102 & = + 5 & \\
 - 996 - 2105 & = - 3101 - 12 & = - 3113 & = - 6 & \\
 + 307 - 3401 & = - 3094 - 24 & = - 3118 & = - 11 & \\
 + 259 - 3332 & = - 3073 - 29 & = - 3102 & = + 5 & \\
 + 303 - 3339 & = - 3036 - 31 & = - 3067 & \text{reject} & \\
 190237 - 2860 & - 19 & = 19.0465 & - 2 &
 \end{array}$$

From 5
 $a = +6$
 $b = +12$
 $c = -20$

$$\begin{array}{rclcl}
 y - 2 & + 1412 & - 24 & - 1755 & \\
 + 483 + 1329 & = + 1812 - 46 & = + 1766 & = + 11 & \\
 + 424 + 1387 & = + 1811 - 67 & = + 1744 & = - 11 & \\
 + 129 + 1641 & = + 1770 - 30 & = + 1740 & = - 15 & \\
 - 1530 + 3337 & = + 1807 - 48 & = + 1759 & = + 4 & \\
 - 2246 + 4057 & = + 1811 - 47 & = + 1764 & = + 9 & \\
 - 2606 + 4428 & = + 1822 - 47 & = + 1775 & & \\
 201422 + 2682 & - 40 & = 20.2309 & - 4 &
 \end{array}$$

From 5
 $a = +15$
 $b = -15$
 $c = -3$

$2c$
 9.4289
 9.8368
 11.6370
 23.6640
 28.7760
 31.4080

y
 231156
 332549
 148229
 239521
 234674
 235122

From 5 stars (neglecting 1189)

Tables	$a = +0.4$	$x = +0.4$	$a - c = 0.0$	$b + a = 0.0$
Obs	$a = +0.7$	$x = +1.4$	$a - c = -0.7$	$b + a = +1.1$
C - c	-0.3	-1.0	+0.7	-1.1

$\begin{cases} b = +141.4 \\ d = -140.3 \end{cases}$

2797

Plate Constant

x	y	$10 A$	$10 B$
9.4289	23.1156	8 15 22	+24 17 99
11.6370	14.8229	16 43	23 13 46
31.4080	23.5122	27 52	24 22 53
3 5247	61.45	58 117	71 52 148
1749	20.48	8 19 59	+23 58 09
-18	27	+ 16	+ 11 40
51	1.52	8 20 15	+24 09 99
31	46.62		
165	700.4		

Center $\left\{ \begin{array}{l} 8^h 20^m 15^s \\ + 24^\circ 09' 49'' \end{array} \right.$

2-3	-14.94	-2.52	+31.61
+191	-33.29	-31.38	-24
-996	-21.35	-31.31	-29
+303	-33.86	-30.83	-79
190237	-29.00	-48	=19.0450

$y-m$	+140.72	-5.44	-16.86
+423	+13.27	+18.10	-12.5
+129	+16.37	-17.66	-80
-2606	+44.19	+18.13	-12.7
201422	+26.77	-109	=20.2304

Tables $a = +0.4$ $a = +0.4$ $a = -2$ $+0.0$ $b+a = 0.0$
 Obs $a = +2.5$ $a = +5.4$ $a = -2.9$ $b+a = +3.3$

Cape W. 1183 m 95.7

$$\begin{array}{r} 8^h 25^m 35^s 77 \\ \quad \quad \quad 81 \\ \quad \quad \quad 78 \checkmark \end{array}$$

$$\begin{array}{r} 8 \quad 25 \quad 35.79 \checkmark \\ \quad \quad + 46.18 \checkmark \end{array}$$

$$8 \quad 26 \quad 2197$$

$$8 \quad 20 \quad 15$$

$$+ 6 \quad 06.97 \checkmark$$

$$+ 366.93$$

$$2.56459 \checkmark$$

$$9.95945 \checkmark$$

$$103128 \checkmark$$

$$+ 10.7468 \checkmark$$

$$+ \quad \quad 33$$

$$28.7501 \checkmark$$

$$28.7760 \checkmark$$

$$+ 259 \checkmark$$

$$+ 24^{\circ} 25' 06''$$

$$06.8$$

$$06.5 \checkmark$$

$$+ 24 \quad 25 \quad 06.5 \checkmark$$

$$- 2 \quad 35.8 \checkmark$$

$$+ 24 \quad 22 \quad 30.7 \checkmark$$

$$+ 24 \quad 09 \quad 49. \checkmark$$

$$+ 12 \quad 41.7 \checkmark$$

$$+ 76.17$$

$$2.88178 \checkmark$$

$$021293 \checkmark$$

$$9.6562 \checkmark$$

$$2.0625 \checkmark$$

$$8.7722$$

$$+ 1.6328 \checkmark$$

$$+ \quad \quad 59.2 \checkmark$$

$$23.6920 \checkmark$$

$$23.4674 \checkmark$$

$$- 2248$$

Cape W. 1180 m 96.1 Cape W. 1163 m 97.4

$$\begin{array}{r} 8^h 22^m 41^s 10 \\ \quad \quad \quad 15 \\ \quad \quad \quad 10 \end{array}$$

$$8 \quad 22 \quad 41.12$$

$$+ \quad \quad 46.30$$

$$8 \quad 23 \quad 27.42$$

$$8 \quad 20 \quad 15$$

$$+ 3 \quad 12.42$$

$$+ \quad \quad 19.241$$

$$228423$$

$$995925$$

$$075072$$

$$+ 5.6328$$

$$+ \quad \quad 5$$

$$23.6333$$

$$23.6640$$

$$+ 307$$

$$+ 24 \quad 28 \quad 36.5$$

$$36.8$$

$$36.3$$

$$+ 24 \quad 28 \quad 36.5$$

$$- \quad \quad 2 \quad 33.1$$

$$+ 24 \quad 26 \quad 03.4$$

$$+ 24 \quad 09 \quad 49$$

$$+ 16 \quad 14.4$$

$$+ 97.44$$

$$298874$$

$$031989$$

$$9.6574$$

$$1.5014$$

$$8.2122$$

$$+ 20888$$

$$+ \quad \quad 163$$

$$241051$$

$$23.9521$$

$$- 1530$$

Cape W. 1163 m 97.4

$$\begin{array}{r} 8^h 14^m 41^s 18 \\ \quad \quad \quad 23 \\ \quad \quad \quad 16 \end{array}$$

$$8 \quad 14 \quad 41.19$$

$$+ \quad \quad 46.77$$

$$8 \quad 15 \quad 27.96$$

$$8 \quad 20 \quad 15$$

$$4 \quad 47.04$$

$$- 28702$$

$$2.45791m$$

$$9.95509$$

$$092024m$$

$$- 8.3222$$

$$- \quad \quad 40$$

$$9.6738$$

$$9.8368$$

$$+ 1630$$

$$+ 25^{\circ} 39' 04''$$

$$05.7$$

$$05.1$$

$$+ 25 \quad 39 \quad 05.1$$

$$- \quad \quad 2 \quad 24.1$$

$$+ 25 \quad 36 \quad 40.9$$

$$+ 24 \quad 09 \quad 49$$

$$+ 1 \quad 26 \quad 51.9$$

$$+ 5213.0$$

$$3.71709$$

$$1.04824$$

$$9.6807$$

$$1.8405$$

$$8.5746$$

$$+ 11.1749$$

$$+ \quad \quad 376$$

$$33.2125$$

$$33.2549$$

$$+ 424$$

2797

Standard Coordinates

Cape No. 1162 mag 5.9				Cape No. 1165 mag 8.2				Cape No. 1189 mag 6.9			
C	8 ^m	14 ^m	35.46	8	15	56.92		8	27	05.50	
L			50			96				54	
E			48 [✓]			93 [✓]				49 [✓]	
mean	8	14	35.48 [✓]	8	15	56.94 [✓]		8	27	05.51 [✓]	
Proc			+ 46.44 [✓]			+ 46.12 [✓]				+ 46.15 [✓]	
K	8	15	21.92 [✓]	8	16	43.06 [✓]		8	27	51.66 [✓]	
A	8	20	15 [✓]	8	20	15 [✓]		8	20	15 [✓]	
K-A	-	4	53.08 [✓]	-	3	31.94 [✓]		-	7	36.66 [✓]	
sub-A			- 293.06 [✓]			- 211.93 [✓]				+ 456.58 [✓]	
log..			2.46696 [✓]			2.32619 [✓]				2.65952 [✓]	
cos			9.95972 [✓]			9.96328 [✓]				9.95943 [✓]	
"50			0.93392 [✓]			0.79671 [✓]				1.12619 [✓]	
Σ ₀			- 8.5886 [✓]			- 6.2620 [✓]				+ 13.3718 [✓]	
Σ ₁			- 16 [✓]			- 14 [✓]				+ 59 [✓]	
Σ			9.4098 [✓]			11.7366 [✓]				31.3777 [✓]	
ΣΣ			9.4289 [✓]			11.6370 [✓]				31.4080 [✓]	
Σ-Σ			+ 191 [✓]			- 996 [✓]				+ 303 [✓]	
L	+ 24°	20'	14.4	+ 23	16	12.5		+ 24°	25'	29.9 [✓]	
L			14.6			12.2				30.3	
E			14.1 [✓]			12.1 [✓]				30.4	
mean	+ 24	20	14.4 [✓]	+ 23	16	12.3		+ 24	25	30.2 [✓]	
Proc	- 2		25.1 [✓]	- 2		26.0 [✓]		- 2		36.9 [✓]	
S	+ 24	17	49.3 [✓]	+ 23	13	46.3		+ 24	22	53.3 [✓]	
D	+ 24	09	49 [✓]	+ 24	09	49 [✓]		+ 24	07	49 [✓]	
S-D	+	8	00.3 [✓]	-	56	02.7 [✓]		+	13	04.3 [✓]	
tan(S-D)			+ 480.3 [✓]			- 3363.0 [✓]				+ 784.3 [✓]	
log..			2.68151 [✓]			3.52673 [✓]				2.89448 [✓]	
"η ₂			0.01266 [✓]			0.85788 [✓]				0.22563 [✓]	
tan S			9.6546 [✓]			9.6327 [✓]				9.6563 [✓]	
"Σ ²			18678 [✓]			15934 [✓]				22524 [✓]	
η ₁			85758 [✓]			82795 [✓]				89621 [✓]	
η ₀	+	1.0296 [✓]		-	7.2090 [✓]			+	1.6812 [✓]		
η ₁	+	377 [✓]		+	190 [✓]			+	916 [✓]		
η			23.0673 [✓]			14.8100 [✓]				23.7728 [✓]	
η			23.1156 [✓]			14.8229 [✓]				23.5122 [✓]	
η-η			+ 483 [✓]			+ 129 [✓]				- 2606 [✓]	

Least Square Solution - Plato Constants

$$\begin{aligned}
 &+ 9.43 + 23.12 + 1 = +7 \\
 &+ 9.84 + 33.25 + 1 = +5 \\
 &+ 11.64 + 14.82 + 1 = -6 \\
 &+ 23.66 + 23.95 + 1 = -11 \\
 &+ 28.78 + 23.47 + 1 = +5 \\
 &+ 10.30 + 23.73 + 1 = +2.00 \\
 &+ 26.22 + 23.71 + 1 = -3.00 \\
 &+ 16.62 + 20.47 + 1 = +2.00 \\
 &+ 16.75 + 28.60 + 1 = -3.00
 \end{aligned}$$

$$\begin{aligned}
 &4 - 5 \\
 &+ 1.1 \\
 &- + 1 \\
 &- 1.5 \\
 &+ 4 \\
 &+ 9 \\
 &- 5.00 \\
 &+ 6.50 \\
 &+ 1.67 \\
 &- 3.50
 \end{aligned}$$

$$\begin{aligned}
 - 15.92 + 0.02 &= +5.00 & - 11.50 \\
 - 0.13 - 8.13 &= +5.00 & + 5.17 \\
 + 0.13 - 0.00 &= -0.04 & + 0.09 \\
 - 8.13 &= +4.96 & + 5.26 \\
 &= -0.61 & - 0.65
 \end{aligned}$$

$$- 15.92 = +5.00 \quad a = -0.31 \quad + 0.72$$

$$\begin{array}{r}
 +2.0 \quad -3.0 \quad +2.0 \quad -3.0 \\
 +3.2 \quad +7.8 \quad +5.1 \quad +5.2 \\
 \hline
 +14.4 \quad +14.4 \quad +12.4 \quad +17.4 \\
 \hline
 +19.6 \quad +19.2 \quad +19.5 \quad +19.6
 \end{array}$$

$$\begin{array}{r}
 -5.0 \quad +6.5 \quad +1.7 \quad -3.5 \\
 -7.4 \quad -14.9 \quad -12.0 \quad -12.1 \\
 \hline
 +15.4 \quad +15.3 \quad +13.2 \quad +18.5 \\
 \hline
 +3.0 \quad +3.0 \quad +3.0 \quad +3.0
 \end{array}$$

$$\begin{array}{r}
 + 7 - 15 + 3 = -5 \quad +11 \quad +16 \\
 + 7 - 21 + 3 = -11 \quad -11 \quad 0 \\
 + 8 - 10 + 3 = +1 \quad -15 \quad -16 \\
 + 17 - 15 + 3 = +5 \quad +4 \quad -1 \\
 + 21 - 15 + 3 = +9 \quad +9 \quad 0
 \end{array}$$

$$\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} y - 7$$

$$\begin{array}{r}
 - 3 - 14 + 20 = +3 \quad +7 \quad +4 \\
 - 3 - 20 + 20 = -3 \quad +5 \quad +8 \\
 - 4 - 9 + 20 = +7 \quad -6 \quad -13 \\
 - 7 - 15 + 20 = -2 \quad -11 \quad -9 \\
 - 9 - 14 + 20 = -3 \quad +5 \quad +8
 \end{array}$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} x - 3$$

2797

Standard Coordinates

Cape W. 1162 m 59				Cape W. 1165 m 82				Cape W. 1189 m 69			
C	8"	19"	35.46	8	15	56.92		8	27	05.50	
L			50			96				59	
E			48			93				19	
mean	8	14	35.48	8	15	56.94		8	27	05.51	
Prac			+ 46.44			+ 46.12				+ 46.15	
A	8	15	21.92	8	16	43.06		8	27	51.66	
A	8	20	15	8	20	15		8	20	15	
x-A	-	4	53.08	-	3	31.94		-	7	36.66	
sub-A			- 293.06			- 211.93				+ 456.58	
log			2.46696~			2.32619~				2.65952	
cos			99.5972			99.6328				99.5993	
sin			0.93392~			0.79671~				1.12619	
3 ₁	-	8	58.86	-	6	26.20		+ 1	3	37.18	
3 ₂	-		16	-		14		+ 1		59	
3 ₃			940.98			1173.66				3137.77	
2-2			942.89			1163.70				3140.80	
2-3			+ 191			+ 996				+ 303	
L	+ 24°	20'	14.4	+ 23	16	12.5		+ 24°	25'	29.9	
L			14.6			12.2				30.3	
E			19.1			12.1				30.9	
mean	+ 24	20	14.4	+ 23	16	12.3		+ 24	25	30.2	
Prac		- 2	25.1	-	2	26.0			- 2	36.9	
S	+ 24	17	49.3	+ 23	13	46.3		+ 24	22	53.3	
D	+ 24	09	49	+ 24	09	49		+ 24	09	49	
S-D		+ 8	00.3	-	5	02.7			+ 13	04.3	
tan(S-D)			+ 480.3			- 336.30				+ 784.3	
log			2.68151			3.52673~				2.89448	
log			0.01266			0.85788~				0.22563	
tan S			9.6546			9.6327				9.6563	
3 ₂			186.78			159.34				225.24	
3 ₃			857.58			827.95				896.21	
3 ₀			+ 1.0296			- 7.2090				+ 1.6812	
3 ₁			+ 377			+ 190				+ 916	
3 ₂			230.673			148.100				237.728	
3 ₃			23.1156			148.229				23.5122	
3-3			+ 483			+ 129				- 2606	

	β	$p-c$	$\lambda \sin(p-c)$	$\beta \cos(p-c)$	λ	$\cos$	
1	-152°	-165	+1.0	+5.7	-6.4	+0.9	+83
2	-122	-135	+2.7	+4.2	-6.6	-0.2	-18
3	-112	+125	+3.1	+3.4	-6.2	-1.3	-120
4	-90	-103	+3.7	+1.3	-4.7	-1.1	+101
5	-66	-79	+3.7	-1.1	-2.3	-1.0	-92
6	-28	-41	+2.5	-4.5	+2.3	-0.2	-18
7	0	-13	+0.9	-5.7	+5.1	+0.3	+28
8	+18	+5	-0.3	-5.8	+6.4	0.0	0

$$\lambda = -3.8$$

$$\beta = -5.9$$

$$c = 130$$

$o-c$	Hayn's Corr	$o-c$ corr
+153	+43	+70
+12	-18	+30
+1-9	-120	+179
-19	+101	-120
-115	-92	-23
+2	-18	+20
+112	+28	+124
+561	0	+56

Average:
71

+479-143
Average: 78

Old ($o-c$)

	Hayn	new ($o-c$)
1	+235	+143
2	+167	+195
3	+232	+287
4	+170	+152
5	+63	+72
6	+100	+100
7	+165	+165
8	+8	+26

$p-c$	λ	$\cos$	$o-c$
195	-4.4	+1.0	+92
225	-1.2	-0.3	-28
235	0.0	-0.6	-55
257	+2.7	+0.2	+18
281	+5.1	-0.1	-9
319	+7.3	0.0	0
347	+6.9	0.0	0
5	+5.8	-0.2	-18

$o-c$
+61
+40
+114
-37
-106
+2
+152
+74

2997

Moon's Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	18.0000	-1.0280	1.0568	4.7402	+235
2	17.1762	-1.8518	3.4292	4.7334	+167
3	17.0000	-2.0280	4.1128	4.7399	+232
4	16.8523	-2.1757	4.7337	4.7337	+170
5	17.0813	-1.9967	3.9868	4.7230	+63
6	18.0000	-1.0280	1.0568	4.7267	+100
7	19.0000	0.0280	0.0008	4.7332	+165
8	19.6914	+0.6634	0.4401	4.7175	+8

$$\text{comp } R^2 = 4.7167$$

	y	$y - Y_0$	$(y - Y_0)^2$
1	18.2228	-1.9192	3.6834
2	19.0000	-1.1420	1.3042
3	19.3501	-0.7919	0.6271
4	20.1420	0.0000	0.0000
5	21.0000	+0.8580	0.7362
6	22.0577	+1.9157	3.6699
7	22.3174	+2.1754	4.7324
8	22.2102	+2.0682	4.2774

measure another fit
if possible.

Approx. Center

$$x = 18.0 \quad y = 18.2228$$

$$22.0577$$

$$4.02805$$

$$Y_0 = 20.1402$$

$$y_{\text{max}} = 22.3174$$

$$R = 2.1772$$

$$x_{\text{min}} = 16.8523$$

$$X_0 = 19.0295$$

$$\text{Center } \begin{cases} X_0 = 19.0280 \\ Y_0 = 20.1420 \end{cases}$$

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Moon's Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	18.0000	-1.0280	1.0568	4.7402	+235
2	17.1762	-1.8518	3.4292	4.7334	+167
3	17.0000	-2.0280	4.1128	4.7399	+232
4	16.8523	-2.1757	4.7337	4.7337	+170
5	17.0813	-1.9467	3.9568	4.7230	+63
6	18.0000	-1.0280	1.0568	4.7267	+100
7	19.0000	0.0280	0.0008	4.7332	+165
8	19.6914	+0.6634	0.4401	4.7195	+8

$$\text{Comp } R^2 = 4.7167$$

	y	$y - Y_0$	$(y - Y_0)^2$
1	18.2228	-1.9192	3.6839
2	19.0000	-1.1420	1.3042
3	19.3501	-0.7919	0.6271
4	20.1420	0.0000	0.0000
5	21.0000	+0.8580	0.7362
6	22.0577	+1.9157	3.6699
7	22.3174	+2.1754	4.7324
8	22.2102	+2.0682	4.2774

Approx. Center

$$x = 18.0 \quad y = 18.2228$$

$$22.0577$$

$$4.02805$$

$$Y_0 = 20.1402$$

$$y_{\text{max}} = 22.3174$$

$$R = 2.1772$$

$$x_{\text{min}} = 16.8523$$

$$X_0 = 19.0295$$

$$\text{Center } \begin{cases} X_0 = 19.0280 \\ Y_0 = 20.1420 \end{cases}$$

Formation of Houmat

	ab	an	bn	an	with Hayis correction
1	+ 1.97	- 24.0	- 45.0	- 147.7	- 257.5
2	+ 2.11	- 30.9	- 190.5	- 361.0	- 222.5
3	+ 1.60	- 47.1	- 183.2	- 584.0	- 226.6
4	- 0.00	- 37.0	+ 0.0	- 331.5	+ 0.0
5	- 1.72	- 126.0	+ 54.2	- 144.0	+ 61.9
6	- 1.97	- 103.0	+ 192.0	- 103.0	+ 192.0
7	- 0.07	- 5.0	+ 360.0	- 5.0	+ 360.0
8	+ 1.36	+ 5.3	+ 16.5	+ 17.2	+ 53.7
	+ 3.28	- 162.2	- 202.0	- 1659.0	- 39.0

Resid with Hayis Correction

	O	C	O - C
1	+ 143	+ 93 - 25 = + 68	+ 75
2	+ 195	+ 167 - 15 = + 152	+ 43
3	+ 287	+ 184 - 10 = + 174	+ 113
4	+ 152	+ 197 + 0 = + 197	- 45
5	+ 72	+ 181 + 11 = + 192	- 120
6	+ 100	+ 93 + 25 = + 118	- 18
7	+ 165	+ 3 + 29 = + 32	+ 133
8	+ 26	- 60 + 27 = - 33	+ 59
			+ 423 - 183
			Average = 76

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Moon's Center. Conditional Equations

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	a	b	c	0	c	0-c	
1	-1.03	-1.92	=	+2.35	+90-8=	+82	+153
2	-1.85	-1.14	=	+1.67	+161-5=	+155	+12
3	-2.03	-0.74	=	+2.32	+176-3=	+173	+59
4	-2.18	+0.00	=	+1.70	+189+0=	+189	-19
5	-2.00	+0.86	=	+6.3	+174+4=	+178	-115
6	-1.03	+1.92	=	+1.00	+90+8=	+98	+2
7	-0.03	+2.18	=	+1.65	+3+10=	+13	+152
8	+0.66	+2.07	=	+8	-57+9=	-48	+56

+434-134

Average = 71

Normal Equations

$$+18.82 + 3.28 = -1621 \quad (-1659)$$

$$+3.28 + 19.03 = -202 \quad (-39)$$

$$-3.28 - 0.57 = +283 \quad (+282)$$

$$+18.46 = +81 \quad (+243) \quad b = +4.4 \quad (+13.2)$$

$$+18.82 = -1621 - 14 = -1635$$

$$-1659 - 43 = -1702$$

$$a = -86.9 \quad (-90.5)$$

Arc measured: 170°

Average (0-c) = +37.5

$$\frac{pc}{m} = 0.26$$

$$+ \frac{37.5}{26} = +1.44$$

$$\Delta a = +1.6$$

2797

Linos Center
Conductivity Equations

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	a	b	0	c	0-c
1	-1.03	-1.92	+2.55	+90-8 = +82	+153
2	-1.85	-1.14	+1.67	+161-5 = +155	+12
3	-2.03	-0.79	+2.52	+176-3 = +173	+59
4	-2.18	+0.00	+1.70	+189+0 = +189	-19
5	-2.00	+0.66	+6.3	+174+4 = +178	-115
6	-1.03	+1.92	+1.00	+90+8 = +98	+2
7	-0.03	+2.18	+1.65	+3+10 = +13	+152
8	+0.66	+2.07	+8	-57+9 = -48	+56

+439-134

Average = 71

Normal Equations

$$+18.82 + 3.28 = -16.21$$

$$+3.28 + 19.03 = -20.2$$

$$-3.28 - 0.57 = +28.3$$

$$+18.46 = +81$$

$$b = +1.44$$

$$+18.82 = -16.21 - 14 = -16.35$$

$$a = -86.9$$

Arc measured: 170° Average $0-c = +37.5$

$$\frac{pc}{\sim} = 0.26$$

$$+ \frac{37.5}{26} = +1.44 \quad \Delta c = +1.6$$

2797 Moon's Mean Position (1913.0)

$$X_0 = 19.0280^\circ$$

$$Y_0 = 20.1420^\circ$$

$$\begin{array}{r} 19.0280^\circ \\ - 43^\circ \\ \hline 19.0237^\circ \end{array}$$

$$\begin{array}{r} 20.1420^\circ \\ + 2^\circ \\ \hline 20.1422^\circ \end{array}$$

$$\text{Hagen (19.0235)}$$

$$(20.1427)$$

$$\text{From Plate Constants } X = 19.0463^\circ \quad Y = 20.2305^\circ$$

$$(19.0461)$$

$$(20.2309)$$

$$Z = +1.0463^\circ \quad (1.0461)$$

$$\eta = -1.7696^\circ \quad (-1.7691)$$

$$\log Z = 0.01966^\circ \quad (0.1957)$$

$$\begin{array}{r} 9.96095^\circ \\ 8.50729^\circ \end{array}$$

$$\log \tan S = 9.6486^\circ$$

$$0.0382^\circ$$

$$7.0534^\circ$$

$$6.7402^\circ$$

$$(X-A) = 1.55147^\circ \quad (1.55156)$$

$$\eta_1 = +$$

$$X-A = + 35.60^\circ \quad (35.61)$$

$$\eta_0 = -1.7702^\circ \quad (-1.7697)$$

$$A = 8 \quad 20 \quad 15^\circ$$

$$\log \eta_0 = 0.24803^\circ \quad (24.790)$$

$$7.33115^\circ$$

$$X = 8 \quad 20 \quad 50.60^\circ \quad (50.61)$$

$$(X-D) = 2916.88^\circ \quad (2916.75)$$

$$\text{Red} = + 1.91^\circ$$

$$S-D = - 13 \quad 45.8^\circ \quad (45.6)$$

$$X' = 8 \quad 20 \quad 52.51^\circ \quad (52.52)$$

$$D = + 24 \quad 09 \quad 49^\circ$$

$$\text{Cor. to stand } \eta = + 0.2^\circ$$

$$S_0 = + 23 \quad 56 \quad 03.2^\circ \quad (03.4)$$

$$\text{Red} = + 2.6^\circ$$

$$S' = + 23 \quad 56 \quad 05.8^\circ \quad (06.0)$$

$$\text{Cor. to stand } \eta = - 0.1^\circ$$

2797 known mean position (1913.0)

$$X_0 = 19.0280$$

$$Y_0 = 20.1420$$

$$u = + 43$$

$$v = + 2$$

$$19.0237$$

$$20.1422$$

From Plate Constants $X = 19.0463$ $Y = 20.2309$

$$z = +1.0463$$

$$w = -1.7696$$

$$\log z = 0.01966$$

$$\cos z = 9.96095$$

$$8.50724$$

$$(z-A) = 1.55447$$

$$x-A = + 35.66$$

$$A = 8 \ 20 \ 15$$

$$x = 8 \ 20 \ 50.66$$

$$\text{Red.} = + 1.91$$

$$x = 8 \ 20 \ 52.57$$

$$\log \tan S = 9.6486$$

$$0.0382$$

$$7.0534$$

$$6.7402$$

$$z_1 = + 6$$

$$z_2 = -1.7702$$

$$\log \gamma_0 = 0.24803$$

$$7.33115$$

$$(d-D) = 291688$$

$$S-D = - 13 \ 45 \ 8$$

$$D = + 24 \ 09 \ 49$$

$$S_0 = + 23 \ 56 \ 03.2$$

$$\text{Red.} = + 2.6$$

$$S_1 = + 23 \ 56 \ 05.8$$

2797

Red. ad locum sph.

19

$$\begin{array}{rcl}
 H + \alpha & 4^{\circ} 30' = 67^{\circ} 30' \\
 H & 20 & 09 \\
 \alpha & 8 & 21 \\
 G & 19 & 04 \\
 G + \alpha & 3 & 25 = 51^{\circ} 15'
 \end{array}$$

$$S + 23^{\circ} 56'$$

$$\begin{array}{rcl}
 h \cos S & 9.9610 \\
 \dots & 0.8482 \\
 (h) & 0.8092
 \end{array}$$

$$\begin{array}{rcl}
 h \cos(G + \alpha) & 9.7965 \\
 g & 0.9864 \\
 \sin & 9.8920 \\
 \tan S & 9.6472 \\
 \tan & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 (g') & 0.7829 \\
 (g) & 9.3495
 \end{array}$$

$$\begin{array}{rcl}
 h & +0.40 \\
 g & +0.22 \\
 m & +1.29 \\
 \hline
 & +1.91 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 h \sin S & 9.6082 \\
 \cos(H + \alpha) & 9.5828 \\
 h & 1.2837 \\
 \sin & 9.9656 \\
 \sec S & 0.0390 \\
 \tan & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 (h') & 0.4747 \\
 (h) & 0.1122
 \end{array}$$

$$\begin{array}{rcl}
 g' & +6.07 \\
 h' & +2.98 \\
 i & -6.44 \\
 \hline
 & +2.61
 \end{array}$$

2797 Red ad locum - 1913

 $+23^{\circ} 56'$

$$H + \alpha \quad 4^{\circ} 30' = 67^{\circ} 30'$$

$$H \quad 20 \quad 09$$

$$\alpha \quad 8 \quad 21$$

$$G \quad 19 \quad 09$$

$$G + \alpha \quad 3 \quad 25 = 51^{\circ} 15'$$

$$\cos(G + \alpha) \quad 9.7965$$

$$q \quad 0.9864$$

$$\sin \quad 9.8920$$

$$\tan S \quad 9.6472$$

$$i \quad 8.8239$$

$$(f') \quad 0.7829$$

$$(g') \quad 9.3495$$

$$L \quad +0.90$$

$$S \quad +0.22$$

$$u \quad +1.29$$

$$\quad +1.91$$

$$\begin{array}{r} \cos S \quad 9.9610 \\ \quad \quad 0.8482 \\ \hline 0.8092 \end{array}$$

$$\sin S \quad 9.6082$$

$$\cos(H + \alpha) \quad 9.5828$$

$$h \quad 1.2837$$

$$\sin \quad 9.9656$$

$$\cos S \quad 0.0390$$

$$i \quad 8.8239$$

$$f' \quad 0.4797$$

$$h' \quad 0.1122$$

$$i \quad +6.07$$

$$S' \quad +2.98$$

$$u \quad -6.95$$

$$\quad +2.61$$

27.97

Lunar Parallax

$$\alpha' = 8^h 20^m 52.51^s (52.52) \quad \delta' = +23^\circ 56' 05.8'' (06.0)$$

$$\theta = 7 \quad 39 \quad 21.1^{\circ}$$

$$\theta - \alpha = - \quad 41 \quad 31.37^{\circ}$$

$$= - \quad 10^\circ 22' 50''$$

$$- \quad \quad \quad 4 \quad 26^{\circ}$$

$$10 \quad 18 \quad 24^{\circ}$$

$$\begin{array}{r} 995727^{\circ} \\ 000000 \\ 000707^{\circ} \\ \hline 996434^{\circ} \end{array}$$

$$\gamma = 42 \quad 39 \quad 00^{\circ}$$

$$23 \quad 56 \quad 06^{\circ}$$

$$18 \quad 42 \quad 54^{\circ}$$

$$\begin{array}{r} 9.82640^{\circ} \\ 8.24819^{\circ} \\ 9.50632^{\circ} \\ 0.16908^{\circ} \\ \hline 7.74999^{\circ} \end{array}$$

$$\delta - \delta' = +19 \quad 19.9^{\circ}$$

$$\delta = +24 \quad 15 \quad 25.7^{\circ} (25.9) \quad \alpha = 8 \quad 20 \quad 16.97^{\circ} (16.92)$$

$$\text{haultalm } \delta = +24 \quad 15 \quad 28.7^{\circ} \quad \alpha = 8 \quad 20 \quad 15.99^{\circ}$$

$$\delta - \alpha = - \quad 3.0^{\circ} \quad +0.92^{\circ}$$

$$\text{with Hayn. correction } (-2.8) \quad (+0.93)$$

$$\text{cor. to stan } \alpha = -0.1 \quad +0.02$$

2797

Lunar Parallax

$$\alpha' = 8^{\circ} 20' 52.5''$$

$$S' = +23^{\circ} 56' 05.8''$$

$$G = 7 \quad 39 \quad 21.1$$

$$G - \alpha = -41 \quad 31.37$$

$$\pi = 60' 52.9''$$

$$= -10^{\circ} 22' 50''$$

$$- \quad \quad \quad 4 \quad 26$$

$$10 \quad 18 \quad 24$$

$$9.95727$$

$$000000$$

$$000707$$

$$\hline 996434$$

$$\delta = 42 \quad 37 \quad 00$$

$$23 \quad 56 \quad 06$$

$$18 \quad 42 \quad 54$$

$$9.82640$$

$$824819$$

$$950632$$

$$016908$$

$$\hline 774999$$

$$S - S' = +19 \quad 19.9$$

$$S = +24 \quad 15' \quad 25.7$$

$$\alpha = 8 \quad 20 \quad 16.91$$

$$\text{Hautalm } S = +24 \quad 15' \quad 28.7$$

$$\alpha = 8 \quad 20 \quad 15.99$$

$$G - L = - \quad \quad \quad - \quad 30$$

$$+0.92$$

2798

Stars - Measures

1914 Feb. 19.

21

	d	y	x
1	9117	15291	97
9.5	822231	9697	
22.1	3031	15402	

22.0889.0893

d	x	y
15388	19883	
997878	1527080	
68	72	
75	79	
9.4594	4607	

20179	18970
1219906	1693939
01	34
79	45
13.7977	7966

19388	20189
1602131	1352626
29	30
90	71
11.6638	6650

3	18270	18630
31.5	1349891	1340294
225	96	06
	67	40
22.4774	4776	

19751	19240
14090	1488270
8189	80
35	47
31.4345	4365

Grade 4.

28.8	18319	19349
22.5	1398072	1367485
	83	82
	19	99
22.4341	4331	

19181	19359
1729849	1128531
5049	75
87	51
28.8067	8073

9.9	19841	18270
32.3	1756770	1054641
	69	43
	33	60
32.2271	2281	

19414	19061
1808999	1038576
91	76
19	66
9.8678	8686

23.7	18589	16826
22.9	941115	1598999
	10	89
	80	25
22.9169	9166	

19718	17429
1664548	1048585
48	85
18	40
23.6929	6953

2798

Stars - measures

1914 Feb. 19.

21

$$\begin{array}{r}
 \frac{1}{95} \quad 9117 \\
 221 \quad 822231 \\
 \quad \quad 3031 \\
 \hline
 22.0889
 \end{array}$$

$$\begin{array}{r}
 1529147 \\
 9697 \\
 \hline
 15402
 \end{array}$$

$$\begin{array}{r}
 \frac{1}{95} \quad 15388 \\
 221 \quad 997878 \\
 \quad \quad 68 \\
 \quad \quad 75 \\
 \hline
 94594
 \end{array}$$

$$\begin{array}{r}
 19883 \\
 1527080 \\
 72 \\
 79 \\
 \hline
 4607
 \end{array}$$

$$\begin{array}{r}
 \frac{2}{117} \quad 20179 \\
 13.8 \quad 1219906 \\
 \quad \quad 01 \\
 \quad \quad 79 \\
 \hline
 13.7977
 \end{array}$$

$$\begin{array}{r}
 18970 \\
 1693339 \\
 34 \\
 65 \\
 \hline
 7966
 \end{array}$$

$$\begin{array}{r}
 19388 \\
 1602131 \\
 29 \\
 90 \\
 \hline
 11.6638
 \end{array}$$

$$\begin{array}{r}
 20189 \\
 1352626 \\
 30 \\
 71 \\
 \hline
 6650
 \end{array}$$

$$\begin{array}{r}
 \frac{3}{315} \quad 18270 \\
 225 \quad 1349891 \\
 \quad \quad 96 \\
 \quad \quad 67 \\
 \hline
 22.4774
 \end{array}$$

$$\begin{array}{r}
 18630 \\
 1340294 \\
 0694 \\
 80 \\
 \hline
 4776
 \end{array}$$

$$\begin{array}{r}
 19751 \\
 14090 \\
 8189 \\
 35 \\
 \hline
 31.4345
 \end{array}$$

$$\begin{array}{r}
 19240 \\
 1488278 \\
 80 \\
 47 \\
 \hline
 4365
 \end{array}$$

Grade 4.

$$\begin{array}{r}
 \frac{4}{288} \quad 18319 \\
 225 \quad 1398072 \\
 \quad \quad 83 \\
 \quad \quad 19 \\
 \hline
 224341
 \end{array}$$

$$\begin{array}{r}
 19349 \\
 1367485 \\
 82 \\
 99 \\
 \hline
 4331
 \end{array}$$

$$\begin{array}{r}
 19181 \\
 1724849 \\
 5049 \\
 87 \\
 \hline
 28.8067
 \end{array}$$

$$\begin{array}{r}
 19359 \\
 1128551 \\
 7551 \\
 51 \\
 \hline
 8073
 \end{array}$$

$$\begin{array}{r}
 \frac{5}{23} \quad 19841 \\
 1756770 \\
 69 \\
 35 \\
 \hline
 32.2271
 \end{array}$$

$$\begin{array}{r}
 18270 \\
 1054641 \\
 43 \\
 60 \\
 \hline
 2281
 \end{array}$$

$$\begin{array}{r}
 19414 \\
 1808999 \\
 9199 \\
 19 \\
 \hline
 9.8678
 \end{array}$$

$$\begin{array}{r}
 19061 \\
 1038576 \\
 76 \\
 66 \\
 \hline
 8686
 \end{array}$$

$$\begin{array}{r}
 \frac{6}{29} \quad 18589 \\
 941115 \\
 10 \\
 80 \\
 \hline
 229169
 \end{array}$$

$$\begin{array}{r}
 16826 \\
 1598999 \\
 8999 \\
 25 \\
 \hline
 9166
 \end{array}$$

$$\begin{array}{r}
 19718 \\
 1664548 \\
 4848 \\
 18 \\
 \hline
 236929
 \end{array}$$

$$\begin{array}{r}
 17429 \\
 1048555 \\
 8555 \\
 40 \\
 \hline
 6953
 \end{array}$$

2798 Moon-measures.

1	18078	19950
19.0	10146	1785650
18.8	4947	61
	81	52
	<u>16.7933</u>	<u>7905</u>

may be
on terminator

$$\begin{array}{r} 2 \\ 18.6 \\ 17.0 \end{array}$$

$$\begin{array}{r} 16885 \\ 1275969 \\ 62 \\ 79 \\ \hline 18.5880 \end{array}$$

$$\begin{array}{r} 15161 \\ 928005- \\ 84 \\ 70 \\ \hline 5875 \end{array}$$

3	16985	14071
18.0	1127071	981011
17.5	74	0911
	97	79
	<u>17.5719</u>	<u>5735</u>

$$\begin{array}{r} 4 \\ 17.8 \\ 18.0 \end{array}$$

$$\begin{array}{r} 15649 \\ 1337172 \\ 69 \\ 46 \\ \hline 17.7723 \end{array}$$

$$\begin{array}{r} 15207 \\ 747678 \\ 7878 \\ 10 \\ \hline 7732 \end{array}$$

$$\begin{array}{r} 5 \\ 17.7 \\ 18.8 \\ 17.0 \end{array}$$

$$\begin{array}{r} 15736 \\ 1185450 \\ 50 \\ 19 \\ \hline 17.6122 \end{array}$$

$$\begin{array}{r} 16214 \\ 1008189 \\ 8989 \\ 18 \\ \hline 6230 \end{array}$$

6 scratch

17.8	14298	16752
19.5	855867	1251120
	61	18
	01	72
	<u>19.5738</u>	<u>5744</u>

$$\begin{array}{r} 16510 \\ 1400509 \\ 99 \\ 00 \\ \hline 17.7497 \end{array}$$

$$\begin{array}{r} 17125 \\ 960500 \\ 92 \\ 03 \\ \hline 7510 \end{array}$$

2798 *Hydrogen - measures*

<u>1</u>	18078	19950
190	10146	17856
168	4947	6150
	81	52
	<u>16.7933</u>	<u>7905</u>

may be
on Terminator

$$\begin{array}{r} 2 \\ 15.6 \\ 17.0 \end{array}$$

$$\begin{array}{r} 16885 \\ 12759 \\ 62 \\ 79 \\ \hline 18.5880 \end{array}$$

$$\begin{array}{r} 15161 \\ 92800 \\ 84 \\ 70 \\ \hline 5875 \end{array}$$

<u>3</u>	16985	14071
180	11270	9810
17.1	74	09
	97	79
	<u>17.5719</u>	<u>5735</u>

$$\begin{array}{r} 4 \\ 178 \\ 180 \end{array}$$

$$\begin{array}{r} 15649 \\ 1337172 \\ 69 \\ 46 \\ \hline 17.7723 \end{array}$$

$$\begin{array}{r} 15207 \\ 747678 \\ 7878 \\ 10 \\ \hline 7732 \end{array}$$

$$\begin{array}{r} 5 \\ 177 \\ 188 \\ 180 \end{array}$$

$$\begin{array}{r} 15736 \\ 1185450 \\ 50 \\ 19 \\ \hline 17.6122 \end{array}$$

$$\begin{array}{r} 16214 \\ 1008189 \\ 89 \\ 18 \\ \hline 6230 \end{array}$$

6 scratch

178	14298	16772
19.5	855867	1251120
	61	18
	01	72
	<u>19.5738</u>	<u>5744</u>

$$\begin{array}{r} 16510 \\ 1400509 \\ 99 \\ 00 \\ \hline 17.7497 \end{array}$$

$$\begin{array}{r} 17125 \\ 960500 \\ 92 \\ 03 \\ \hline 7510 \end{array}$$

2798

Moon-measures

2	9836	1195069
18.0	928091	70
20.1	91	11430

20.05490533

8	19950	17426
19.0	1157259	1582912
20.8	60	10
	56	28

20.83918391

9	15080	12897
19.8	7971	1277081
21.0	14961	79

max

20.9884

9880

10 scratch possibly on termination

20.5	14446	18850	19982	18974
20.8	1102637	17311	15620	1333357
	36	0499	1120	4557
	40	65	84	70
<u>20.8408</u>	<u>8412</u>	<u>20.5634</u>	<u>5629</u>	

2798

Moon-measures

2	9836	1195069
18.0	928091	70
20.1	91	11430

20.05490533

8	19950	17426
19.0	1117259	1582912
20.8	60	10
	56	28

20.83918391

9	15080	12897
19.8	7971	1277081
21.0	14961	79

man

20.98849880

10 scratch possibly in terminal

20.5	19446	18850	19982	18974
20.8	1102637	17311	15620	1333357
	36	0499	1120	4551
	40	65	84	70
	<u>20.8408</u>	<u>8412</u>	<u>20.5634</u>	<u>5029</u>

Rejecting 6th star as on plate 2797.

$$\begin{array}{rclcl}
 x-3 & -142.54 & & -1.1x & +2671 \\
 +502-3148 & = -2646 & -10 & = -2656 & = +15 \\
 +1944-4592 & = -2648 & -11 & = -2659 & = +12 \\
 -722-1966 & = -2688 & -13 & = -2701 & = -30 \\
 +608-3266 & = -2658 & -26 & = -2684 & = -13 \\
 +569-3197 & = -2628 & -32 & = -2660 & = +11 \\
 19.7842-2681 & \checkmark & -22 & & = 19.7810 \checkmark
 \end{array}$$

$$\begin{array}{rclcl}
 y-4 & +145.3x & & +1.8y & +8374 \\
 -9782+1375 & = -8407 & +40 & = -8367 & = +7 \\
 -9849+1434 & = -8415 & +58 & = -8357 & = +17 \\
 -10128+1695 & = -8433 & +25 & = -8408 & = -34 \\
 -11883+3443 & = -8440 & +41 & = -8399 & = -25 \\
 -12584+4186 & = -8398 & +40 & = -8358 & = +16 \\
 188157 & +2875 & +34 & & = 19.9434 \checkmark
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Tables} & a = +0.9 & e = +0.4 & a-e = 0.0 & b+a = 0.0
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Obs.} & a = +1.1 & e = -1.8 & a-e = -2.9 & b+a = -2.7
 \end{array}$$

$$\begin{array}{lclcl}
 c-u & -0.7 & +2.2 & +2.9 & +2.7
 \end{array}$$

2798	Times etc.					
Expt class 1913 Feb 18	7 ^h 48 ^m			- 8 ^h 00 ^m		
" known	7 54	04.6	- 7 54	05.1		
clock fast	0	48.9				
H. Sid T.	7 53	15.95		0 - 0 - 0	28	
H. time	4 44	31.05				
G. Sid T.	12 37	47.00				
Sid T. known	21 51	21.88				
Interval	14 46	25.12				
Reduction	2	25.22				
G. M. T.	19 43	59.90				

From Kant. Alm.		R. A.		Local	
known 15 ^h	8 ^h 21 ^m	34 ^s 83	+ 24°	10' 23.9"	
known 15 ^h = 2.6380			10 222		
" - 16.0017		- 4221	+ 2	43.6	
Tabular place	8 20	52.62	+ 24	13 07.5	

known's age 13 days.

$$934 = 19.8$$

$$997 = 16.9$$

parallax	60' 53' 23"
semidiameter	16' 36.9"
R	996.9
Augmentation	+ 16.9
Irradiation 4	- 0.8
R	1013.0
R	2.1715
(1+a)R	2.1717
R ²	4.7163

$$a = +0.8$$

4600	98682	11.6644	23.6991	28.8070	31.4355
4098	96738	11.7366	23.6333	28.7501	31.3777
+502	+1944	-722	+608	+569	+578
22.0891	32.2276	13.7972	22.9168	22.4336	22.4775
23.0673	33.2125	14.8100	24.1051	23.6920	23.7728
.9782	-.9849	1.0178	1.1883	1.2584	1.2953

	-1504	+24	+24	+24	+24	+2688			
+	502-3313	= -2811	+44	= -2767	+44	= -2723	+44	= -2679	+9
+	1944-4834	= -2890	+64	= -2826	+64	= -2762	+64	= -2698	-10
-	722-2070	= -2792	+28	= -2764	+28	= -2736	+28	= -2708	-20
+	608-3438	= -2830	+46	= -2784	+46	= -2738	+46	= -2692	-4
+	569-3365	= -2796	+45	= -2751	+45	= -2706	+45	= -2661	+29
+	578-3372	= -2794	+45	= -2749	+45	= -2704	+45	= -2659	

+9.41+23.07+1 = +9
+9.67+33.21+1 = -10
+11.74+14.81+1 = -20
+23.63+24.11+1 = -4
+28.75+23.69+1 = +27

+22
-6
+10
-31
+1

+10.27+23.70+1 = -7.00
+26.19+23.90+1 = +11.00
+16.63+20.52+1 = +5.33
+16.65+28.66+1 = -7.00

+8.67
-13.00
+12.33
-18.50

-15.92-0.20 = -18.50
-0.02-8.14 = +12.33

+21.67
+30.83

+0.02+0.00 = +0.02
-8.14 = +12.35

-0.03
+30.80

$$f = -3.79$$

$$-15.92 = -18.50 + 0.30 = -18.20 \quad a = +1.14$$

$$-15.92 = +21.67 - 0.80 = +20.87 \quad a = -1.31$$

-7.0	+11.5	+5.3	-7.0
-11.7	-29.9	-19.0	-19.0
+36.0	+36.3	+31.2	+43.6
+17.3	+16.9	+17.5	+17.6

+8.7	-13.0	+12.3	-18.5
+13.4	+34.3	+21.8	+21.8
+89.8	+90.1	+77.8	+108.9
+111.9	+111.8	+111.7	+112.2

C	0	0-6
+11-35+17 = -7	+9	+16
+11-50+17 = -22	-10	+12
+13-23+17 = +7	-20	-29
+27-37+17 = +7	-4	-11
+33-36+17 = +14	+27	+13

C	0	0-6
-12-188+112 = -12	+22	+10
-13-126+112 = -27	-6	+21
-14-56+112 = +41	+10	-31
-31-91+112 = -10	-31	-21
-38-60+112 = -16	+5	+21

+12	-11
+16	+13

+21	-21
-----	-----

	+ 1 4 4 x		- 2 4		+ 8 4 8 6				
- 9 7 8 2	+ 1 3 6 2	=	- 8 4 2 0	- 4 4	=	- 8 4 6 4	:	+ 2 2	}
- 9 8 4 9	+ 1 4 2 1	=	- 8 4 2 8	- 6 4	=	- 8 4 9 2	:	- 6	
- 1 0 4 2 8	+ 1 6 8 0	=	- 8 4 4 8	- 2 8	=	- 8 4 7 6	:	+ 1 0	
- 1 1 8 8 3	+ 3 4 1 2	=	- 8 4 9 1	- 4 6	=	- 8 5 1 7	:	- 3 1	
- 1 2 1 8 4	+ 4 1 4 8	=	- 8 4 3 6	- 4 5	=	- 8 4 8 1	:	+ 5	
								2 4 3 0	

2798	Times etc						
Sept 18 1913 Feb 18	7 ^h 48 ^m			- 8 ^h 00 ^m			
known	7	54	046	- 7	54	051	
clock fast		0	489				
H. H. T.	7	53	1595		0 - 8 - 0	28	
H. H. T.	4	44	3105				
G. H. T.	12	37	4700				
S. H. T. in known	21	51	2188				
Interval	14	46	2512				
Reduction		2	2522				
G. H. T.	14	43	5990				

From Hand Clock			R. A.		10000	
known 15 ^h	8 ^h 21 ^m	34 ^s 83		+ 24 ^h	10 ^h 23 ^m 9 ^s	
known 15 ^h 2.6380				10.222		
-16.0017		-4221			+ 2 43.6	
Tabular place	8, 20	52.62		+ 24	13 07.5	

known age 12 days.

934 = 198	parallax	60' 53" 23
997 = 169	semidiameter	16' 36" 9
	R	996.9
	Augmentation	+ 16.9
	Irradiation 4	- 0.8
	R	1013.0
	R	2171.5
a = +0.8	(1+a)R	2171.7
	R ²	9716.3

$$\begin{array}{r}
 4 \\
 2 \quad 288070 \\
 3 \quad 287501 \\
 2-5 \quad + \quad 569
 \end{array}$$

$$\begin{array}{r}
 4 \quad 224336 \\
 7 \quad 236920 \\
 4-7 \quad -12584
 \end{array}$$

$$\begin{array}{r}
 5- \\
 9.8682 \\
 9.6738 \\
 +1944
 \end{array}$$

$$\begin{array}{r}
 322276 \\
 332125 \\
 - \quad 9849
 \end{array}$$

$$\begin{array}{r}
 6 \\
 256941 \\
 236333 \\
 +608
 \end{array}$$

$$\begin{array}{r}
 229168 \\
 241051 \\
 -11883
 \end{array}$$

Preliminary Reduction (in order of R A)

$$\begin{array}{r}
 2-5 \quad -1504 \\
 +502 \quad -3313 \\
 +1944 \quad -4834 \\
 +722 \quad -2070 \\
 +608 \quad -3437 \\
 +569 \quad -3365 \\
 +578 \quad -3372 \\
 197842 \quad -2522
 \end{array}$$

$$\begin{array}{r}
 +2802 \\
 -9 \\
 12 \\
 +10 \\
 -27 \\
 +6 \\
 +8
 \end{array}$$

$$+2796$$

$$-15$$

$$+6$$

$$+4$$

reject

at -4

$$0$$

$$+3$$

$$= 19.7816 + 3$$

$$\begin{array}{r}
 4-4 \quad +1442 \\
 -9782 \quad +1363 \\
 -9849 \quad +1421 \\
 -10128 \quad +1680 \\
 -11883 \quad +3412 \\
 -12584 \quad +4148 \\
 -12953 \quad +4527 \\
 18.8151 \quad +2849
 \end{array}$$

$$\begin{array}{r}
 -9 \\
 -8419 \\
 -8428 \\
 -8448 \\
 -8471 \\
 -8436 \\
 -8426 \\
 -19
 \end{array}$$

$$-9$$

$$-22$$

$$-8441$$

$$+8454$$

$$+13$$

$$-6$$

$$-8$$

$$-23 \quad (-8444) \text{ reject}$$

$$-4$$

$$+6$$

$$= 19.9434 +$$

Stars in order of R A

$$\begin{array}{r}
 94600 \\
 98682 \\
 116644 \\
 236941 \\
 288070 \\
 31.9355
 \end{array}$$

$$\begin{array}{r}
 220891 \\
 322276 \\
 137972 \\
 229168 \\
 224336 \\
 224775
 \end{array}$$

$$\begin{array}{r}
 \text{Table } a = +0.4 \quad b = +0.4 \quad c = 0.0 \quad d = 0.0 \\
 \text{Table } a = +0.2 \quad b = +0.9 \quad c = 0.5 \quad d = 0.7
 \end{array}$$

2798

Plate Constants

	1	2	3
x	9.4600	11.6644	31.4355
y	9.4098	11.7366	31.3777
$x-\bar{x}$	+502	-722	+578
y	220891	13.7972	22.4775
y	23.0673	14.8100	23.7728
$y-\bar{y}$	-9782	-10128	-1.2953

$$\begin{array}{rclcl}
 x-\bar{x} & -1474 & & -y & -0.82 & & +2774 \\
 +502 & -3247 & = & -2745 & -22 & = & -2775 & = -1 \\
 -722 & -2028 & = & -2750 & -14 & = & -2773 & = +1 \\
 +578 & -3304 & = & -2726 & -22 & = & -2773 & = +1 \\
 19.7842 & -2766 & & -19 & -16 & & = 19.7815
 \end{array}$$

$$\begin{array}{rclcl}
 y-\bar{y} & +144.32 & & -3.44 & & +8492 \\
 -9782 & +1365 & = & -8417 & -75 & = & -8492 & = 0 \\
 -10128 & +1683 & = & -8445 & -47 & = & -8492 & = 0 \\
 -1.2953 & +45.36 & = & -8417 & -76 & = & -8493 & = -1 \\
 18.8141 & +28.55 & & -64 & & & = 19.9434
 \end{array}$$

see few pages back.

$$\begin{array}{lclcl}
 \text{Tables } a = +0.4 & e = +0.4 & a-e = 0.0 & b+d = 0.0 \\
 \text{Obs } a = +0.8 & e = +3.4 & a-e = -2.6 & b+d = +3.7
 \end{array}$$

$$\begin{array}{r}
 2 \quad 28.8070 \\
 3 \quad 28.7501 \\
 x-3 \quad + \quad 569
 \end{array}$$

$$\begin{array}{r}
 9.8682 \\
 9.6738 \\
 + 1944
 \end{array}$$

$$\begin{array}{r}
 23.6941 \\
 23.6333 \\
 + 608
 \end{array}$$

$$\begin{array}{r}
 y \quad 22.4336 \\
 m \quad 23.6920 \\
 y-m \quad -1.2584
 \end{array}$$

$$\begin{array}{r}
 32.2276 \\
 33.2125 \\
 - 9849
 \end{array}$$

$$\begin{array}{r}
 22.9168 \\
 24.1051 \\
 - 1.1883
 \end{array}$$

Preliminary Reduction (in order of R.A.)

$$\begin{array}{r}
 x-3 \quad -1504 \\
 +502 - 3313 = -2811 \\
 +1944 - 4834 = -2890 \\
 -722 - 2070 = -2792 \\
 +608 - 3437 = -2829 \\
 +569 - 3365 = -2796 \\
 +578 - 3372 = -2794 \\
 19.7842 - 2822
 \end{array}$$

$$\begin{array}{r}
 +2802 \\
 = -9 \\
 = +12 \\
 = +10 \\
 = -27 \\
 = +6 \\
 = +8
 \end{array}$$

$$\begin{array}{r}
 +2796 \\
 -15 \\
 +6 \\
 +4 \\
 0 \\
 +3
 \end{array}$$

reject

$$= 19.7816 + 3$$

Sum
R.S.S.

$$\begin{array}{l}
 ax = -4 \\
 by = -19 \\
 c = +26
 \end{array}$$

$$\begin{array}{r}
 y-m \quad +1442 \\
 -9782 + 1363 = -8419 \\
 -9849 + 1421 = -8428 \\
 -10128 + 1680 = -8448 \\
 -1.1883 + 3412 = -8471 \\
 -1.2584 + 4148 = -8436 \\
 -1.2953 + 4527 = -8426 \\
 18.8151 + 2849
 \end{array}$$

$$-9$$

$$-22$$

$$-32$$

$$-14$$

$$-23$$

$$-22$$

$$-22$$

$$-19$$

$$+8454$$

$$+13$$

$$-6$$

$$-8$$

$$-4$$

$$+6$$

$$+3$$

$$+3$$

$$= 19.9434 + 3$$

$$\begin{array}{l}
 ay = +2 \\
 az = +2 \\
 c = -1
 \end{array}$$

Stars in order of R.A.

$$\begin{array}{r}
 9.4600 \\
 9.8682 \\
 11.6644 \\
 23.6941 \\
 28.8070 \\
 31.4355
 \end{array}$$

$$\begin{array}{r}
 22.0891 \\
 32.2276 \\
 13.7972 \\
 22.9168 \\
 22.4336 \\
 22.4775
 \end{array}$$

$$\begin{array}{l}
 \text{Tables} \quad a = +0.4 \quad c = +0.4 \quad a - c = 0.0 \quad b + a = 0.0 \\
 \text{Obs} \quad a = +0.2 \quad c = +0.9 \quad a - c = -0.7 \quad b + a = +6.9
 \end{array}$$

2798

Plate Constants

	1	2	X
2	9.4600	11.6644	31.4355
3	9.4098	11.7366	31.3777
4-3	+502	-722	+578
7	220891	13.7972	22.4775
91	23.0673	14.8100	23.7728
4-7	-9782	-10128	-1.2953

$$\begin{aligned}
 2-3 &= -1474 & 4-7 &= -082 & 2-7 &= 2774 \\
 +502-3247 &= -2745 & 22-8 &= -2775 & &= -1 \\
 -722-2028 &= -2750 & 14-9 &= -2773 & &= +1 \\
 +578-3309 &= -2726 & 22-25 &= -2773 & &= -1 \\
 197892-2766 & & -19-16 & & &= 197815
 \end{aligned}$$

$$\begin{aligned}
 4-7 &+14432 & & -394 & & +8492 \\
 -9782+1365 &= -8417 & -75 &= -8492 & &= 0 \\
 -10128+1683 &= -8445 & -47 &= -8492 & &= 0 \\
 -12953+4536 &= -8417 & -76 &= -8493 & &= -1 \\
 188151+2855 & & -64 & & &= 199434
 \end{aligned}$$

see few pages back

$$\begin{aligned}
 \text{Tables } a &= +0.4 & e &= +0.4 & a-e &= 0.0 & b+a &= 0.0 \\
 \text{Obs. } a &= +0.4 & e &= +0.4 & a-e &= -2.6 & b+a &= +3.7
 \end{aligned}$$

Least Square Solution - Plate Analemma

$$\begin{array}{rclcl}
 2y & + & 9.41 + 23.09 + 1 & = & -1.5 & +1.3 \\
 2Y & + & 9.67 + 33.21 + 1 & = & +6 & -6 \\
 2y & + & 11.74 + 14.81 + 1 & = & +4 & -8 \\
 \hline
 & & \cancel{+23.63 + 24.11 + 1} & = & & \\
 Xy & + & 28.75 + 23.69 + 1 & = & 0 & -4 \\
 XY & + & 31.38 + 23.77 + 1 & = & +3 & +6
 \end{array}$$

$$\begin{array}{rclcl}
 +10.27 + 23.70 + 1 & = & -1.67 & -0.33 \\
 +30.06 + 23.73 + 1 & = & +1.50 & +1.00 \\
 +16.63 + 20.52 + 1 & = & -3.67 & +0.33 \\
 +20.52 + 28.49 + 1 & = & +4.50 & 0.00
 \end{array}$$

$$\begin{array}{rclcl}
 -19.79 - 0.03 & = & -3.17 & -1.33 \\
 -389 - 797 & = & -817 & +0.33
 \end{array}$$

$$\begin{array}{rclcl}
 +3.89 + 0.01 & = & +0.62 & +0.26 \\
 -7.96 & = & -7.55 & +0.59 \\
 \hline
 & = & +0.95 & -0.07
 \end{array}$$

$$\begin{array}{rclcl}
 -19.79 : -3.17 + 0.33 & = & -3.14 & -1.33 \\
 a & = & +0.16 & +0.07
 \end{array}$$

$$\begin{array}{cccccc}
 -1.7 & +1.5 & -3.7 & +4.5 & -0.3 & +1.6 & +0.3 & 0.0 \\
 -22.5 & -22.5 & -19.5 & -27.0 & +1.8 & +1.8 & +1.5 & +2.1 \\
 -1.6 & -4.9 & -2.6 & -3.3 & -0.7 & -2.1 & -1.1 & -1.4 \\
 \hline
 -25.8 & -25.9 & -25.8 & -25.8 & +0.8 & +0.7 & +0.7 & +0.7
 \end{array}$$

$$\begin{array}{rclcl}
 & & C & 0 & 0 - C \\
 +1 + 22 - 26 & = & -3 & -1.5 & -1.2 \\
 +2 + 32 - 26 & = & +8 & +6 & -2 \\
 +2 + 14 - 26 & = & -10 & +4 & +1.4 \\
 +5 + 22 - 26 & = & +1 & 0 & -1 \\
 +5 + 23 - 26 & = & +2 & +3 & +1
 \end{array}$$

$$\begin{array}{rclcl}
 +1 - 2 + 1 & = & 0 & +1.3 & +1.3 \\
 +1 - 2 + 1 & = & 0 & -6 & -6 \\
 +1 - 1 + 1 & = & +1 & -8 & -9 \\
 +2 - 2 + 1 & = & +1 & -4 & -5 \\
 +2 - 2 + 1 & = & +1 & +6 & +5
 \end{array}$$

2798

Moon's Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	19.00000	-0.7850	0.6162	4.7091	-72
2	18.5878	-1.1972	1.4333	4.7275	+112
3	18.00000	-1.7850	3.1862	4.7295	+132
4	17.7728	-2.0122	4.0489	4.7131	-32
5	17.6126	-2.1724	4.7193	4.7193	+30
6	17.7504	-2.0346	4.1396	4.7158	-5
7	18.00000	-1.7850	3.1862	4.7216	+53
8	19.00000	-0.7850	0.6162	4.7132	-31
9	19.7850	0.0000	0.0000	4.7228	+65
10	20.5632	+0.7782	0.6056	4.7184	+21

$$\text{Comp } R^2 = 4.7163$$

	y	$y - y_0$	$(y - y_0)^2$
1	16.7919	-2.0231	4.0929
2	17.0000	-1.8150	3.2942
3	17.5727	-1.2423	1.5433
4	18.0000	-0.8150	0.6642
5	18.8150	0.0000	0.0000
6	19.5741	+0.7591	0.5762
7	20.0541	+1.2391	1.5354
8	20.8391	+2.0241	4.0970
9	20.9882	+2.1732	4.7228
10	20.8430	+2.0280	4.1128

Approx Center

$$x = 19.0 \quad y = 16.7919$$

$$20.8391$$

$$37.6310$$

$$y_0 = 18.8155$$

$$y = \text{max} = 20.9882$$

$$R = 2.1727$$

$$x = \text{min} = 17.6126$$

$$x_0 = 19.7853$$

$$x = 18.0 \quad y = 17.5727$$

$$20.0541$$

$$37.6268$$

$$18.8134$$

$$\text{Center } \begin{cases} x_0 = 19.7850 \\ y_0 = 18.8150 \end{cases}$$

	p	$p - c$	$\lambda_{\text{new}}(p-c)$	$\beta_{\text{new}}(p-c)$	λ	Corr	$\times 92$
1	201	188	+0.5	+5.8	-6.0	-1.5	-138
2	213	200	+1.3	+5.5	-6.5	-0.2	-18
3	235	222	+2.5	+4.4	-6.6	+0.5	+46
4	248	235	+3.1	+3.4	-6.2	-1.3	-120
5	270	257	+3.7	+1.3	-4.7	+1.1	+101
6	291	278	+3.7	-0.8	-2.6	-0.4	-37
7	305	292	+3.5	-2.1	-1.1	+0.6	+55
8	339	326	+2.1	-4.9	+3.1	+1.9	+175
9	0	347	+0.9	-5.8	+5.2	+0.3	+28
10	21	8	-0.5	-5.9	+6.7	+0.2	+18

$$\lambda = -38$$

$$\beta = -59$$

$$c = 13$$

Residuals	Hays's Corr	$O - C$	Aldo-C)	Hays	New(O-C)
-83	-138	+55	-72	-147	+75
+97	-18	+115	+112	+37	+75
+105	+46	+59	+132	+18	+114
-63	-120	+57	-32	-147	+115
-5	+101	-106	+30	+18	+12
-39	-37	-2	-5	-9	+4
+22	+55	-33	+53	+46	+7
-48	-175	+127	-31	-55	+24
+61	+28	+33	+65	0	+65
+30	+18	+12	+21	-9	+30
+315-238		+458-141			
Average 55		Average 60			

	λ	$O - C$	λ	$O - C$
188	-50	-1.6	-147	+64
200	-39	+0.4	+37	+60
222	-1.6	+0.2	+18	+87
235	00	-1.6	-147	+84
257	+27	+0.2	+18	-23
278	+48	-0.1	-9	-30
292	+59	+0.5	+46	-24
326	+73	-0.6	-55	+7
347	+70	0.0	0	+61
8	+57	-0.1	-9	+39

2798 *lunar Center*

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$
1	19.0000	-0.7850	0.6162	4.7091	-7.2
2	18.5878	-1.1972	1.4333	4.7275	+1.2
3	18.0000	-1.7850	3.1862	4.7295	+1.32
4	17.7728	-2.0122	4.0489	4.7131	-3.2
5	17.6126	-2.1724	4.7193	4.7193	+3.0
6	17.7509	-2.0346	4.1396	4.7158	-5
7	18.0000	-1.7850	3.1862	4.7216	+5.3
8	19.0000	-0.7850	0.6162	4.7132	-3.1
9	19.7850	0.0000	0.0000	4.7228	+6.5
10	20.5632	+0.7782	0.6056	4.7184	+2.1

$$\text{Comp } R^2 = 4.7163$$

	y	$y - y_0$	$(y - y_0)^2$
1	16.7919	-2.0231	4.0929
2	17.0000	-1.8150	3.2942
3	17.5727	-1.2423	1.5433
4	18.0000	-0.8150	0.6642
5	18.8150	0.0000	0.0000
6	19.5741	+0.7591	0.5762
7	20.0541	+1.2391	1.5354
8	20.8391	+2.0241	4.0970
9	20.9882	+2.1732	4.7228
10	20.8430	+2.0280	4.1128

Affine Center

$$\begin{aligned}
 x &= 19.0 & y &= 16.7919 \\
 & & & \underline{20.8391} \\
 & & & 37.6310 \\
 y_0 &= 18.8155 \\
 y_{\text{max}} &= 20.9882 \\
 R &= 2.1727 \\
 x_{\text{min}} &= 17.6126 \\
 x_0 &= 19.7853
 \end{aligned}$$

$$\begin{aligned}
 x &= 18.0 & y &= 17.5727 \\
 & & & \underline{20.0541} \\
 & & & 37.6268 \\
 & & & 18.8134
 \end{aligned}$$

Center

$$\left. \begin{aligned} X_0 &= 19.7850 \\ Y_0 &= 18.8150 \end{aligned} \right\}$$

Formation of Uonuat with Hayn corrections

	ab	an	ab	an
1	+ 1.57	+ 56.1	+ 145.4	- 58.5
2	+ 2.18	- 134.5	- 204.0	- 90.0
3	+ 2.21	- 235.0	- 164.0	- 203.0
4	+ 1.65	+ 64.4	+ 26.2	- 231.0
5	- 0.00	- 65.1	+ 0.0	- 26.4
6	- 1.54	+ 10.1	- 3.8	- 8.1
7	- 2.21	- 94.4	+ 65.7	- 12.5
8	- 1.57	+ 24.2	- 62.6	- 18.7
9	+ 0.00	+ 0.0	+ 141.0	+ 0.0
10	+ 1.58	+ 16.4	+ 42.6	+ 23.4
	+ 3.87	- 357.8	- 13.5	- 624.8
				- 261.7

	O	C	O - C
1	+ 75	+ 23 - 13 = + 10	+ 65
2	+ 75	+ 35 - 12 = + 23	+ 52
3	+ 119	+ 51 - 8 = + 43	+ 71
4	+ 115	+ 58 - 5 = + 53	+ 62
5	+ 12	+ 63 + 0 = + 63	- 51
6	+ 4	+ 59 + 5 = + 64	- 60
7	+ 7	+ 51 + 8 = + 59	- 52
8	+ 24	+ 23 + 13 = + 36	- 12
9	+ 65	- 0 + 14 = + 14	+ 51
10	+ 30	- 23 + 13 = - 10	+ 40

+ 341 - 175
Average = 52

2798

Lunar's Center
Conditional Equations

	a	b	c	0 - c	
1	-0.78	-2.02	= -7.2	+13 - 4 = +11	-8.3
2	-1.20	-1.82	= +1.12	+19 - 4 = +15	+9.7
3	-1.78	-1.24	= +1.32	+29 - 2 = +27	+10.5
4	-2.01	-0.82	= -3.2	+33 - 2 = +31	-6.3
5	-2.17	+0.00	= +3.0	+35 - 0 = +35	-5
6	-2.03	+0.76	= -5	+33 + 1 = +34	-3.9
7	-1.78	+1.24	= +5.3	+29 + 2 = +31	+2.2
8	-0.78	+2.02	= -3.1	+13 + 4 = +17	-4.8
9	+0.00	+2.17	= +6.5	- 0 + 4 = +4	+6.1
10	+0.78	+2.03	= +2.1	-13 + 4 = -9	+3.0
					+31.5 - 23.8

Average = 5.7

Normal Equations

$$\begin{aligned}
 &+22.55 + 3.87 = -35.8 \quad (-62.5) \\
 &+ 3.87 + 24.64 = -14 \quad (-26.2) \\
 &- 3.87 - 0.66 = + 6.1 + 10.7 \\
 &\quad + 23.98 = + 47 - 15.5 \quad b = +2.0 \quad (+6.5) \\
 &+22.55 = -35.8 - 8 = -36.6 \quad a = -16.2 \quad (-28.8) \\
 &\quad -62.5 - 20 = -65.0
 \end{aligned}$$

Arc measured = 180° Average (0-c) = +8

$$\frac{p_c}{m} = 0.33$$

$$+\frac{8}{0.33} = +0.23$$

$$\Delta z = +0.3$$

2798

Knowns Center
Conditional Equations

	a	b	0	c	0 - c
1	-078	-202	-72	+13 - 4 = +11	-83
2	-120	-182	+112	+19 - 4 = +15	+97
3	-178	-124	+132	+29 - 2 = +27	+105
4	-201	-082	-32	+33 - 2 = +31	-63
5	-217	+000	+30	+35 - 0 = +35	-5
6	-203	+076	-5	+33 + 1 = +34	-39
7	-178	+724	+53	+29 + 2 = +31	+22
8	-078	+202	-31	+13 + 4 = +17	-48
9	+000	+217	+65	-0 + 4 = +4	+61
10	+078	+203	+21	-13 + 4 = -9	+30
					+315 - 238

Average = 51

Normal Equations

$$+2255 + 387 = -358$$

$$+ 387 + 2464 = -14$$

$$- 387 - 0.66 = + 61$$

$$+ 2398 = + 47$$

$$b = +20$$

$$+2255 = -358 - 8 = -366$$

$$a = -162$$

$$\text{Arc measured} = 180^\circ \quad \text{Average } (0-c) = +8$$

$$\frac{pc}{m} = 0.33$$

$$+ \frac{8}{0.33} = +0.23$$

$$\Delta z = +0.3$$

2798

Moon's Mean Position (1913.0)

$$X_0 = 197850^{\vee} \quad 18.8150^{\vee}$$

$$\frac{1}{2} \Delta = \quad \quad \quad 8^{\vee} \quad \frac{1}{2} \Delta = \quad \quad \quad +1^{\vee}$$

$$197842^{\vee} \quad 18.8151^{\vee}$$

$$\text{Hayn (19.7836)} \quad (18.8153)$$

$$\text{From Plate Constants } X = 19.7810^{\vee} \quad Y = 19.9434^{\vee}$$

$$(19.7804) \quad (19.9436)$$

$$Z = +1.7819^{\vee} \quad (1.7804) \quad \eta = -2.0566^{\vee} \quad (2.0564)$$

$$\log \xi = 0.25066^{\vee} \quad (0.25052)$$

$$\cos \xi \quad 9.96105^{\vee}$$

$$\quad \quad \quad 8.50724$$

$$\log \tan \delta = 9.6486^{\vee}$$

$$\quad \quad \quad 32 = 0.5016^{\vee}$$

$$\quad \quad \quad 7.0534$$

$$\quad \quad \quad 7.2036^{\vee}$$

$$(\alpha - A) \quad 17.8234^{\vee} \quad (17.8220)$$

$$\alpha - A \quad + \quad 1 \quad 00.58^{\vee} \quad (00.56)$$

$$A \quad 8 \quad 20 \quad 15^{\vee}$$

$$\alpha_0 \quad 8 \quad 21 \quad 15.58^{\vee} \quad (15.56)$$

$$\text{Red} \quad \quad \quad + \quad 1.91^{\vee}$$

$$\alpha' = 8 \quad 21 \quad 17.49^{\vee}$$

$$(17.47) \quad (S-D) = -16 \quad 00.2^{\vee} \quad (00.1)$$

$$\text{cor to tan } \alpha = \quad \quad \quad +.02$$

$$D = +24 \quad 09 \quad 49^{\vee}$$

$$S_0 = +23 \quad 53 \quad 48.8^{\vee} \quad (48.9)$$

$$\text{Red} \quad \quad \quad + \quad 2.61^{\vee}$$

$$\delta' = +23 \quad 53 \quad 51.4^{\vee} \quad (51.5)$$

$$\text{Cor to Stand. } \alpha = \quad \quad \quad -0.1$$

2798 ~~James Mac - 4 sister (1913.0)~~
 $\times - 197850$ 188150
8 1
 197842 188151

From Plate Constant $X = 197819$ $Y = 199437$

3 = 4 1 7 8 1 9

$$n = 2, 2, 5, 6, 3$$

log 5	0.25088
log 5	9.96108
	5.50724

② $72034 - 96481 = 72034$

1.78256

$$\Delta - \Delta \quad + \quad 1 \quad 006\phi$$

-20579

A. 500 200 1 5"

long : 0, 3, 1, 3, 4, 3
7, 3, 3, 1, 1, 5

$$\begin{array}{r} 4.8217561 \\ + 1.91 \end{array}$$

2 9 8 2 2 8

$$\alpha' = 821 \quad 17.5^\circ$$

$$E_{\text{avg}}(S-D) = 160005$$

D - 924 09 99

$S_n = 723 \quad 53 \quad 490x$

$$6' + 23 \quad 53 \quad 5, 6'$$

2798 Reductive ad locum aff.

$$S + 23^{\circ} 54'$$

$$H + \alpha \quad 9^{\circ} 30' = 67^{\circ} 30'$$

$$H \quad 20 \quad 09$$

$$\alpha \quad 8 \quad 21$$

$$G \quad 19 \quad 04$$

$$G + \alpha \quad 3 \quad 25 = 51^{\circ} 15'$$

$$L \cos(G + \alpha) \quad 9.7965$$

$$q \quad 0.9865$$

$$\sin \quad 9.8920$$

$$\tan S \quad 9.6465$$

$$t_s \quad 8.8239$$

$$\log(g) \quad 0.7830$$

$$(g) \quad 9.3489$$

$$f \quad + 0.40$$

$$g \quad + 0.22$$

$$h \quad + 1.29$$

$$+ 1.91 \checkmark$$

$$\log \cos S \quad 9.9611$$

$$.. i \quad 0.8480m$$

$$.. (i) \quad 0.8091m$$

$$L \sin S \quad 9.6076$$

$$\cos(H + \alpha) \quad 9.5828$$

$$h \quad 1.2837$$

$$\sin \quad 9.9656$$

$$\sec S \quad 0.0384$$

$$t_s \quad 8.8239$$

$$(h') \quad 0.4744$$

$$(h) \quad 0.1121$$

$$g' \quad + 6.07$$

$$h' \quad + 2.98$$

$$i \quad - 6.44$$

$$+ 2.61 \checkmark$$

2798 *Redshifted 2d Luminous obj.*

S + 23° 54'

$$H + \alpha \quad 4 \quad 30 = 67^{\circ} 30'$$

$$H \quad 20 \quad 09$$

$$\alpha \quad 8 \quad 21$$

$$G \quad 19 \quad 04$$

$$G + \alpha \quad 3 \quad 25 = 51^{\circ} 15'$$

$$\log \cos(G + \alpha) \quad 9.7965$$

$$g \quad 0.9865$$

$$\sin \quad 9.8920$$

$$\tan S \quad 9.6465$$

$$+ \quad 8.2339$$

$$\log(g) \quad 0.7830$$

$$(g) \quad 9.3989$$

$$l \quad + 0.40$$

$$s \quad + 0.22$$

$$h \quad + 1.29$$

$$\hline + 1.91 \checkmark$$

$$\log \cos S \quad 9.9611$$

$$L \quad 0.8480$$

$$G \quad 0.8091$$

$$\tan S \quad 9.6076$$

$$\cos(H + \alpha) \quad 9.5828$$

$$L \quad 1.2837$$

$$\sin \quad 9.5656$$

$$\tan S \quad 0.0384$$

$$+ \quad 8.2339$$

$$h' \quad 0.4794$$

$$h \quad 0.1121$$

$$8 \quad + 6.07$$

$$h \quad + 2.98$$

$$i \quad - 6.44$$

$$\hline + 2.61 \checkmark$$

2798

Lunar parallax

$$\begin{array}{r} \alpha' = 8^h 21^m 17.49'' \\ \theta = 7 \quad 53 \quad 15.95'' \\ - \quad 28 \quad 01.56'' \\ - \quad 7^0 \quad 0.0' \quad 23'' \end{array}$$

$$- \quad \quad \quad 3 \quad 00''$$

$$- \quad 6 \quad 57 \quad 23''$$

$$\begin{array}{r} 995727 \\ 0.00000 \\ 0.00320 \\ \hline 996047 \end{array}$$

$$f = 42 \quad 23 \quad 45.5''$$

$$23 \quad 53 \quad 51.5''$$

$$18 \quad 29 \quad 540''$$

$$\begin{array}{r} 982640 \\ 8.24823 \\ 9.50144 \\ 0.17118 \\ \hline 774725 \end{array}$$

$$\delta - \delta' = +19 \quad 12.6''$$

$$\delta = +24 \quad 13 \quad 04.0''$$

$$\text{Nautical } \delta = +24 \quad 13 \quad 07.5''$$

$$\delta - c = -0.35''$$

$$\text{with Hayn's Corr.} \quad (-0.34)$$

$$\text{cor + stan n} = -0.1$$

$$(1797) \quad \delta' = +23^0 \quad 53' \quad 51.4''$$

$$H = 60' \quad 53.23''$$

$$986913''$$

$$8.24823''$$

$$9.08629''$$

$$0.04001''$$

$$\hline 724266''$$

$$\alpha - \alpha' = -6' \quad 00.65''$$

$$= -24.04''$$

$$\alpha = 8 \quad 20 \quad 53.45''$$

$$\alpha = 8 \quad 20 \quad 52.62''$$

$$+0.83''$$

$$(+0.81)$$

$$+0.02$$

2798

Lunar parallax

 $\alpha' = 8^h 21^m 17.5^s$ (17.50) $\delta' = +23^\circ 53' 51.6''$ (51.7) $\theta = 7^h 53^m 15.9^s$ $H = 60^\circ 53' 23''$ $- 28^m 01.56^s$ $- 7^m 00^s 23$ $- 3^m 00^s$ $- 6^m 57^s 23$

995727

000000

000320

996047

986913

824823

908629

004001

724266 $\alpha - \alpha' = -6^m 00.6^s$ $= -24.04$ $\gamma = 42^\circ 23' 45.5''$ $23^\circ 53' 51.5''$ $18^\circ 29' 54.0''$

982640

824823

950144

017118

774725 $\delta - \delta' = +19^\circ 12.6'$

(04.3)

 $\delta = +24^\circ 13' 04.2''$

(53.46)

 $\alpha = 8^h 20^m 53.48^s$ Nautical $\delta = +24^\circ 13' 07.5''$ $\alpha = 8^h 20^m 52.62^s$ $\theta - \theta' = -03.3$ $+ 0.86$ with Ray's Correction (-0.32) $(+ 0.84)$

