

KG
11366
u.957



Harvard Lunar Plates

Measurements and Reductions

Mary Fowler

Volume LXXIV

Plate No.	Date	Page
3784	1913 Sept. 10	1
3811	1913 Sept 13	17

1
13
19

2
15
2

3
26
20

1
1

5
2

4 Stars - Measures

	d	N	d	N
1	9409	14811	16284	12910
13.6	20 ⁰⁹	1434042	1257990	1157160
19.9	8949	40	80	59
			66	00
	<u>19.9536</u>	<u>19530</u>	<u>13.6306</u>	<u>16340</u>
2	15447	16047	9934	1250920
15.9	858288	1289992	985954	2928
27.6	89	91	49	12449
	40	41		
	<u>27.6856</u>	<u>16849</u>	<u>15.9920</u> ✓	<u>9928</u>
3	19670	16541	20030	17090
29.6	1881410	739095	1688070	1023028
20.2	08	97	69	26
	55	47	20	71
	<u>20.0858</u> ✓	<u>0848</u>	<u>29.6846</u>	<u>6849</u>

Grade 3

18215621	19409	16183	19809
1321348080	1183840	8416	1755150
74	34	1618	4650
10	02	82	90
<u>13.2440</u>	<u>2433</u>	<u>18.2235</u>	<u>2256</u>
5519628	16766	15690	19492
8.71291922	1448481	1040098	1477075
25	79	9698	7275
21	56	80	75
<u>8.7201</u>	<u>7718</u>	<u>5.4713</u>	<u>4711</u>

3784

Stars - Measures

α	δ	α	δ
1	4409	14811	
136	20 ⁰⁹	1434042	
199	8949	40	

19.9536.9530

α	δ	α	δ
16284	17910		
1257990	1157160		
50	59		
60	00		

13.6306.6340

α	δ	α	δ
15447	16047		
159	858288	1289992	
276	89	9192	
	40	41	

27.6856.6849

α	δ	α	δ
9934	1250920		
985959	2928		
49	12449		

15.9920.9928

α	δ	α	δ
19670	16541		
246	1881410	739095	
22	08	97	
	55	47	

20.0855.0848

α	δ	α	δ
20030	17090		
16880	10230		
6970	26		
20	71		

29.6846.6849

Grade 3

α	δ	α	δ
18215621	19409		
1821348080	1183440		
79	34		
10	02		

13.2440.2433

α	δ	α	δ
16183	19809		
8416	1755150		
1618	4650		
82	90		

18.2235.2256

α	δ	α	δ
5519628	16766		
871291922	1448481		
2122	79		
21	50		

89701.7718

α	δ	α	δ
15690	19492		
1040098	1477075		
96	72		
80	75		

54713.4711

3784 Moon-Measures.

	d	N	d	N
1	18560	17200		
195	1023129	1553326		
188	31	29		
min	58	96		
in				
4	<u>18.8328</u>	<u>.4330</u>		

2	18585	17178
190	957965	1617070
189	59	71
	79	81
	<u>18.9012</u>	<u>.4992</u>

3	18136	18993
196	1238367	1476959
	70	48
	33	89
	<u>19.5761</u>	<u>.5768</u>

4
177
200

18457
1606961
61
43
17.7610

19121
1147771
7571
11
.7639

5
176
207
min
in
26

18419
1476860
62
09
19.6348

20180
1382010
08
71
.6362

6
177
210

17381
1401920
20
73
19.6642

20202
1357059
5059
90
.6634

3784 Moon - Measures.

$$\begin{array}{r}
 18560 \\
 171 \quad 1023129 \\
 188 \quad 31 \\
 58 \\
 418.8328 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 17200 \\
 1553326 \\
 29 \\
 96 \\
 5330 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 18585 \\
 190 \quad 957965 \\
 189 \quad 59 \\
 79 \\
 189012 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 17178 \\
 1617070 \\
 71 \\
 81 \\
 8992 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 18136 \\
 196 \quad 1238367 \\
 70 \\
 33 \\
 195761 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 18993 \\
 14769 \\
 4859 \\
 89 \\
 1768 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 177 \\
 200
 \end{array}$$

$$\begin{array}{r}
 176 \\
 207 \\
 20
 \end{array}$$

$$\begin{array}{r}
 177 \\
 210
 \end{array}$$

$$\begin{array}{r}
 18457 \\
 1606961 \\
 61 \\
 43 \\
 17.7610 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 18419 \\
 1476860 \\
 62 \\
 09 \\
 496348 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 17381 \\
 1401920 \\
 20 \\
 73 \\
 49.6642 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 19121 \\
 1147771 \\
 71 \\
 11 \\
 7639 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20180 \\
 1382010 \\
 08 \\
 71 \\
 6362 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20202 \\
 1357059 \\
 5059 \\
 90 \\
 6634 \\
 \hline
 \end{array}$$

18
2
18
2
18
2

3784

Moon - Measures

d

q

v

d

v

$\frac{7}{18.0}$ 17665
 984130
 21.7 81

59
21.7826

19570
 1740221
 1511

60
7844

$\frac{8}{18.2}$
 22.0

16970
 893930
 32
 80

18.1952

15227
 1323331
 38
 10

9990

9 scratch

188 16689
 224.12520 20
 21
 91

22.4170

14760
 893231
 38
 57

4174

15970
 1463021
 23
 65

18.8656

17590
 893229
 31
 72

8644

3784

Moon - Measures

d

h

v

d

v

2	17665	19570
180	954130	1740221
217	31	1511
	59	60
	<u>217826</u>	<u>7844</u>

~~5~~
182
220

16970	15227
893930	1323331
32	38
80	10
<u>181952</u>	<u>9990</u>

2 Scratch

88	12689	14760	15970	17590
24	12520	893231	1463021	893229
	21	38	23	31
	91	57	65	72
	<u>224170</u>	<u>4174</u>	<u>185656</u>	<u>5649</u>

3784 Times etc.

Ex h t stan	1913 Sept. 10.	20 ^h 39 ^m	-20 ^h 51 ^m
" " Moon		20 44 36.5	-20 44 36.7
Clock fast		2 28.1	
H. Sid T.		20 42 08.5	0-X-+0 ^h 33 ^m
H. long		4 44 31.05	
G. Sid T.		25 26 39.55	
Sid T. in horn		11 15 39.32	
Interval		14 11 00.23	
Red.		2 19.42	
B. m. T.		14 08 40.81	

From Mount Allen R. A. local

Moon 14 ^h	20 ^h 08 ^m	34.06	-29 ^h 36' 54"7
Interp. with 2.1526		8.030	
+8.6802		+18.68	+1 09.7
Tabular place	20 08	52.74	-29 35 45.0

Moon's age 10 days.

" parallax	54' 52.79
" semidiam	14 58.8
R	898.8

$$939 = 6.25$$

$$899 = 5.8$$

Augmentation

Irradiation (B)

R

R

$$a = -502.4$$

$$-478.4$$

a/R

(1+a)R

R²

+	5.8
-	0.7
	903.9
	1.9376
-	97.3
	1.8403
	3.3867

	1.9376
-	92.7
	1.8449
	3.4036

K²

3784

Times etc

Sept. 10. 1913	20 ^h 39 ^m	-20 ^h 51 ^m
Clouds	20 44	36.5 - 20 44 36.7
Clouds	2	28.1
H. L. I.	20 42	08.5 0-4-10 ^h 33 ^m
H. L. I.	4 44	31.05
G. L. I.	25 26	34.55
Sid. T. unknown	11 15	39.32
Infrared	14 11	00.23
Red.	2	19.42
B. M. I.	14 08	40.81

From Mount Allen

R. A.

Decl.

Mean 14 ^h	20 ^h 08 ^m	34.06	-24° 36' 59"7
Mean 2 11 26			8.030
+8.6802	+18.68		+1 09.7
Tabular place	20 08	52.74	-24 35 45.6

Mass age 10 days.

parallax	54' 52"79
amplitude	14 58.8
R	89.88
Augmentation	+ 5.8
Irradiation (B)	- 0.7
R	90.39
R	1.9376
a. - 502.4	OR
	(1 + a) R
- 978.9	R ²

1.9376

- 927

1.8444

3.4036

K²

stars in order of R.A.

7	54712	87710
	13.6323	19.9533
7	15.9924	27.6852
	18.2246	13.2436
7	29.6848	20.0853

5	3
	2
4	1

$$\begin{array}{ccccccc}
 3 & 4 & 03 & -4.83 & -5.4 & +4 & \\
 1 & +3.71 & -1.23 & -1 & +18 & +17 & +1 = +18 \\
 2 & +1.15 & -8.26 & +2 & -6 & -4 & +4 = +0 \\
 3 & -12.21 & -12.96 & -97 & +59 & -35 & +63 = -29 \\
 4 & -1.27 & +6.92 & -2 & +6 & +9 & -30 = +1 \\
 5 & +13.15 & -0.90 & +55 & -63 & -8 & +0 = -8 \\
 M. & +2.73 & -0.77 & 0 & -12 & +0 & = -8 = -0.03
 \end{array}$$

$$\begin{array}{ccccccc}
 \Delta 4 & -1.94 & -1.93 & +17 & & & \\
 - 0 & + 2 & + 2 & + 7 & = & + 9 & \\
 - 15 & + 16 & + 1 & - 2 & = & - 1 & \\
 - 97 & + 25 & - 72 & + 23 & = & - 49 & \\
 + 9 & - 13 & - 4 & + 2 & = & - 2 & \\
 - 7 & + 2 & - 2 & - 25 & = & - 27 & \\
 0 & + 1 & - 5 & + 13 & & &
 \end{array}$$

$$+ 0.6$$

3784

Plate Constants

	1	2	3	(1)	ft star
2	13.6323 [✓]	15.9924 [✓]	29.6848 [✓]	54712	18.2246
3	14.2912 [✓]	16.7304 [✓]	31.1525 [✓]	57842	19.1514
2-3	-6589 [✓]	-7380 [✓]	-14677 [✓]	-3130	-9268
4	19.9533 [✓]	27.6852 [✓]	20.0853 [✓]	87710	13.2436
4	20.7699 [✓]	28.9145 [✓]	21.0039 [✓]	89515	13.7343
4-4	-8116 [✓]	-12293 [✓]	-9186 [✓]	-1803	-4907

Order	2	3	5	1	4
2-3	+500x	-54.54	+2.42	+847	
-3130+2736	= -394	-478	= -872	+13	= -859 = -12
-6589+6816	= +227	-1087	= -860	+33	= -827 = +20
-7380+7996	= +616	-1509	= -893	+38	= -855 = -8
-9268+9112	= -156	-722	= -878	+44	= -834 = +13
-14677+14842	= +165	-1095	= -930	+71	= -859 = -12
194732+9737		= -1127	+47		= 20.4236
194789+9739		= -1127 [✓]	+47 [✓]		= 20.4295 [✓]

4-4	+500y	+61x	+20.14+0.4y+0.6x	-3104
-1803+4386	= +2583	+334	= +2917	+176+4+3 = +3100 = -4
-8116+9977	= +1861	+832	= +2693	+401+8+8 = +3110 = +6
-12293+13843	= +1550	+976	= +2526	+556+11+10 = +3103 = -1
-4907+6622	= +1715	+1112	= +2827	+266+5+11 = +3109 = +5
-9186+10043	= +857	+1811	= +2668	+404+8+18 = +3098 = -6
20.6764+10338		+1188	+416+8+12 = 21.5622	
20.6775+10339		+1188 [✓]	+416 [✓] +8+12 = 21.5634 [✓]	

Tables a = +0.9 e = -17.3 a-e = +18.2 b+a = -40
 also a = -50.24 e = -520.5 a-e = +18.1 b+a = -7.1

c-o +5033[✓] +5032[✓]

+3.1[✓]

-3.3

-3.2

-3.1

3784

Plate Constants

	1	2	3	(1)	(2)
α	13.6323	15.9924	29.6848	54.712	18.2296
δ	14.2912	16.7304	31.1525	57.842	19.1519
$\alpha - \delta$	-6589	-7380	-14677	-3130	-9268
γ	19.9533	27.6852	20.0853	8.7710	13.2436
η	20.7649	28.9145	21.0039	8.9515	13.7343
$\gamma - \eta$	-8116	-12293	-9186	-1805	-4907

Order	2	3	5	1	4
$\alpha - \delta$	+1002	-54.54	+2.42	+847	
$-3130 + 2736 = -394$		$-478 - 872 = -1350$		$-859 = -12$	
$-6589 + 6816 = 227$		$-1087 - 860 = -1947$		$+33 - 827 = -794$	
$-7380 + 7996 = 616$		$-1509 - 893 = -2402$		$+38 - 855 = -817$	
$-9268 + 9122 = -146$		$-722 - 878 = -1600$		$+44 - 834 = -790$	
$-14677 + 14842 = 165$		$-1095 - 930 = -2025$		$+71 - 859 = -788$	
$194732 + 9737 = 204469$		$-1127 + 47 = -1080$		$+47 = 204469$	
$194789 + 9739 = 204528$		$-1127 + 47 = -1080$		$+47 = 204528$	

$\gamma - \eta$	+1004	+612	+20.14104 + 0.626	-3109	
$-1805 + 4386 = 2581$		$+334 + 2917 = 3251$		$7176 + 4 + 3 = 7183$	$+3100 = -4$
$-8116 + 9977 = 1861$		$+832 + 2693 = 3525$		$+401 + 8 + 8 = 417$	$+3110 = 16$
$-12293 + 13842 = 1549$		$+976 + 2526 = 3502$		$+556 + 11 + 10 = 577$	$+3103 = -1$
$-4907 + 6622 = 1715$		$+1112 + 2827 = 3939$		$+266 + 5 + 11 = 282$	$+3109 = 75$
$-9186 + 10043 = 857$		$+1511 + 2668 = 4179$		$+404 + 8 + 118 = 530$	$+3098 = -6$
$206764 + 10338 = 217102$		$+1155 + 416 + 8 + 12 = 217102$		$+416 + 8 + 12 = 436$	$+215634 =$
$206775 + 10339 = 217114$		$+1158 + 416 + 8 + 12 = 217114$		$+416 + 8 + 12 = 436$	$+215634 =$

Tabular α	+0.1	$\alpha - \delta$	-17.3	$\alpha - \delta$	+18.2	$\delta + \alpha$	-48
Obs α	-50.24	$\alpha - \delta$	-520.5	$\alpha - \delta$	+18.1	$\delta + \alpha$	-7.1
$\alpha - \delta$	+50.33	+50.32					+3.1

3784 Standard Coordinates (Star 1) different from 11073783

Cape W. 2784 mag 7.2 Cape 2790 mag 8.9

C 20° 04' 05.12" 20° 06' 52.67"

L 05.12" 74"

E

Mean 20 04 05.12" 20 06 52.70"

Prec + 47.05" + 47.29"

α 20 04 52.17" 20 07 39.99"

A 20 07 00" 20 07 00"

$\alpha - A$ - 2 07.83" + 39.99"

$\sin(\alpha - A)$ - 1.2783" + 39.99"

$\log \dots$ 2.10663" 1.60195"

$\dots$ 9.95535" 9.95198"

$\dots$ 0.56922" 0.06117"

$\dots$

$\dots$

$\dots$ -3.7087" + 1.1512"

$\dots$ - 1" + 2"

$\dots$ 14.2912" 19.1514"

$\dots$

$\dots$

$\dots$

C -25° 34' 37.5" -26° 29' 22.7"

L 37.3" 22.6"

E

Mean -25 34 37.4" -26 29 22.6"

Prec + 2 14.7" + 2 17.4"

δ -25 32 22.7" -26 27 05.2"

$(\delta - \delta)$ -25 22 50.1" -25 22 50.1"

$\tan(\delta - \delta)$ -9 32.7" -1 04 15.2"

$\dots$ -5727" -3855.6"

$\log \dots$ 2.75793" 3.58609"

$\dots$ 0.08908" 0.91724"

$\dots$

$\tan \dots$ 9.6793" 9.6968"

$\dots$ 1.1384" 0.1223"

$\dots$ 78711" 68725"

$\dots$

$\dots$

$\dots$ -1.2277" -8.2650"

$\dots$ - 74" - 7"

$\dots$ 20.7649" 13.7343"

$\dots$

$\dots$

3784 Stand and Coordinates (Star 1) different from 1178783

Cape W. 2789 mag 7.2 Cape 2790 mag 7.1

C 20° 04' 05.12 20° 06' 52.07

L 05.12 74

E

mean 20 04 05.12 20 06 52.70

Prece + 47.05 + 47.29

α 20 04 52.17 20 07 39.99

A 20 07 00 20 07 00

A-A1 - 2 07.83 + 39.99

A1-A1 - 127.83

log 2.10443 1.40195

log 9.95535 9.95198

-3 0.56922 0.06117

3 -3.7087 + 1.1512

3 - 1 + 2

3 14.2912 19.1514

20

20-3

C -25° 34' 37.5 -26° 29' 22.7

L 37.3 22.6

E

mean -25 34 37.4 -26 29 22.6

Prece + 2 14.7 + 2 17.4

α -25 32 22.7 -26 27 05.2

(-A) -25 32 22.7 -1 09 15.2

tan(A) -5727 -3855.6

log 2.75793 3.58609

log 0.08908 0.91724

tan 9.6793 9.4948

-3 11384 0.1223

21 78711 68725

20 -1.2277 -8.2650

21 - 74 - 7

21 20.7649 13.7343

21

21

1
2
3
4
5
6
7
8
9

1
2
3
4
5
6
7
8
9

3284

Inovis Center.

7

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	19.4800	0.0000	-7	0.0000	3.4236	+369
2	19.0000	-0.4800	-7	0.2311	3.4098	+231
3	18.0000	-1.4800	-4	2.1916	3.4137	+270
4	17.7624	-1.7176	-3	2.9512	3.4153	+286
5	17.6355	-1.8445	+0	3.4022	3.4022	+155
6	17.6638	-1.8162	+1	3.2983	3.4011	+144
7	18.0000	-1.4800	+4	2.1892	3.4111	+244
8	18.1971	-1.2829	+5	1.6445	3.3930	+63
9	18.8650	-0.6150	+7	0.3774	3.4057	+190

$$\text{comp } R^2: \begin{pmatrix} 3.3867 \\ 3.4036 \end{pmatrix}$$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	18.8329	-1.8471	-32	3.4236	180"
2	18.9002	-1.7798	-31	3.1787	195"
3	19.5764	-1.1036	-19	1.2221	232"
4	20.0000	-0.6800	-12	0.4641	248"
5	20.6800	0.0000	0	0.0000	270"
6	21.0000	+0.3200	+6	0.1028	280"
7	21.7835	+1.1035	+19	1.2219	307"
8	22.0000	+1.3200	+23	1.7485	315"
9	22.4172	+1.7372	+30	3.0283	342" 340"

Range 162

Approximate Center

$$x = 18.0 \quad y = 19.5764$$

$$21.7835$$

$$41.3599$$

$$y_0 = 20.6800$$

$$y - m = 18.8329$$

$$R = 1.8471$$

$$x - m = 17.6355$$

$$x_0 = 19.4826$$

$$\text{Center } \begin{cases} x_0 = 19.4800 \\ y_0 = 20.6800 \end{cases}$$

1
2
3
4
5
6
7
8
9

1
2
3
4
5
6
7
8
9

3784 Inverse Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - C$
1	19.4800	0.0000	-7	0.0000	3.4236	+369
2	19.0000	-0.4800	-7	0.2311	3.4098	+231
3	18.0000	-1.4800	-4	2.1916	3.4137	+270
4	17.7624	-1.7176	-3	2.9512	3.4153	+286
5	17.6355	-1.8445	+0	3.4022	3.4022	+155
6	17.6638	-1.8162	+1	3.2983	3.4011	+144
7	18.0000	-1.4800	+4	2.1892	3.4111	+244
8	18.1971	-1.2829	+5	1.6445	3.3930	+63
9	18.8650	-0.6150	+7	0.3774	3.4057	+190

$$\text{Comp } R^2 \begin{pmatrix} 3 & 3867 \\ 3 & 4.036 \end{pmatrix}$$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	18.8329	-1.8471	-32	3.4236	180
2	18.9002	-1.7798	-31	3.1787	195
3	19.5764	-1.1036	-19	1.2221	233
4	20.0000	-0.6800	-12	0.4641	248
5	20.6800	0.0000	0	0.0000	270
6	21.0000	+0.3200	+6	0.1024	280
7	21.7835	+1.1035	+19	1.2219	307
8	22.0000	+1.3200	+23	1.7485	315
9	22.4172	+1.7372	+30	3.0283	342

Range 162

Approximate Center

$$x = 18.0 \quad y = 19.5764$$

$$\frac{21.7835}{2}$$

$$41.3599$$

$$y_0 = 20.6800$$

$$y = 18.8329$$

$$R = 1.8471$$

$$x = 17.6355$$

$$x_0 = 19.4826$$

$$\text{Center} \begin{cases} x_0 = 19.4800 \\ y_0 = 20.6800 \end{cases}$$

Formation of Normals.

	ab		an		bn	(169.a)		[169.b]
1	- 0.00	+	0.0		- 682.5	+	0.0	- 312.6
2	+ 0.85	-	110.5		- 410.5	-	81.1	- 300.8
3	+ 1.63	-	400.0		- 297.0	-	250.1	- 185.9
4	+ 1.17	-	492.0		- 194.8	-	290.7	- 114.9
5	- 0.00	-	287.0		+ 0.0	-	311.0	+ 0.0
6	- 0.54	-	262.0		+ 46.1	-	307.6	+ 54.1
7	- 1.63	-	361.0		+ 268.5	-	250.1	+ 185.9
8	- 1.69	-	80.6		+ 83.1	-	216.3	+ 223.1
9	- 1.08	-	118.0		+ 330.5	-	104.8	+ 294.1
	- 133	-	2111.1		- 856.6	-	1811.7	- 157.0

+ 1811.7

- 299.4

+ 157.0

- 699.6

3784 Moon's Center-Conditional Equations

	0	C	0-C
1	+ 0.00 - 1.85 = + 3.69	- 0 + 133 = + 133	+ 23.6
2	- 0.48 - 1.78 = + 2.31	+ 65 + 128 = + 193	+ 3.8
3	- 1.48 - 1.10 = + 2.70	+ 200 + 79 = + 279	- 9
4	- 1.72 - 0.68 = + 2.86	+ 232 + 49 = + 281	+ 5
5	- 1.84 + 0.00 = + 1.55	+ 249 - 0 = + 249	- 9.4
6	- 1.82 + 0.32 = + 1.44	+ 246 - 23 = + 223	- 7.9
7	- 1.48 + 1.10 = + 2.44	+ 200 - 79 = + 121	+ 12.3
8	- 1.28 + 1.32 = + 6.3	+ 173 - 95 = + 78	- 15
9	- 0.62 + 1.74 = + 1.90	+ 84 - 125 = - 41	+ 23.1
			+ 63.3 - 19.7

Average = 9.2

Normal Equations

$$+ 1.629 - 1.33 = - 21.11$$

$$- 1.33 + 14.59 = - 8.57$$

$$+ 1.33 - 0.11 = - 1.72$$

$$+ 14.28 = - 10.29$$

$$+ 1.629 - 21.11 - 9.3 = - 22.04$$

$$h = - 7.20$$

$$a = - 135.3$$

Arc measured: 161° Average (0-C) = $+4.8 + 15.8$

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

$$+ \frac{4.8}{21} + 2.30 \Delta n = + 2.6$$

$$+ \frac{16}{21} + 0.75 \Delta n = + 0.87$$

3784 Moons Center Conditional Equations

	0		c	0-c
1	+0.00 - 1.85 = +3.69	-	0 + 133 = +133	+236
2	-0.48 - 1.78 = +2.31	+	65 + 128 = +193	+38
3	-1.48 - 1.10 = +2.70	+	200 + 79 = +279	-9
4	-1.72 - 0.68 = +2.86	+	232 + 49 = +281	+5
5	-1.84 + 0.00 = +1.55	+	249 - 0 = +249	-94
6	-1.82 + 0.32 = +1.44	+	246 - 23 = +223	-79
7	-1.48 + 1.10 = +2.44	+	200 - 79 = +121	+128
8	-1.28 + 1.32 = +6.3	+	173 - 95 = +78	-15
9	-0.62 + 1.79 = +1.90	+	84 - 125 = -41	+231
				+633 - 197

Average 92

Normal Equations

$$+16.29 - 1.33 = -21.11$$

$$-1.33 + 14.59 = -8.57$$

$$+1.33 - 0.11 = -1.72$$

$$+14.28 = -10.29$$

$$h = -720$$

$$+16.29 - 21.11 + 93 = -2204$$

$$a = -135.3$$

Arc measured 161° Average (0-c) = ~~+48~~ +158

$$\frac{p.c.}{m} = 0.21$$

$$+ \frac{48}{21} = +2.30 \quad \Delta n = +2.6$$

$$+ \frac{16}{21} = +0.76 \quad \Delta n = +0.8$$

3784 Brown's Mean Position (1913.0)

$$\begin{array}{r}
 X_0 = 19.4800 \quad Y_0 = 20.6800 \\
 \hline
 \alpha = \quad \quad - 68 \quad \quad \quad \delta = \quad \quad - 36 \\
 \hline
 19.4732 \quad \quad \quad 20.6764
 \end{array}$$

From plate constant to $X = 20.4236 \quad Y = 21.5622$

$$Z = +2.4236$$

$$\eta = -0.4378$$

$$\begin{array}{l}
 \log Z = 0.38446 \\
 \cos \delta = 9.95572 \\
 \quad \quad 8.50724
 \end{array}$$

$$\begin{array}{l}
 \log \tan \delta = 9.6736 \\
 \quad \quad 0.7689 \\
 \quad \quad 8.0534 \\
 \quad \quad 7.4959
 \end{array}$$

$$-(\alpha - A) = 1.92150$$

$$\eta_4 = -31$$

$$\alpha - A = +1.2346$$

$$\eta_0 = -0.4347$$

$$A = 20.0700$$

$$\begin{array}{l}
 \log \eta_0 = 9.63819 \\
 \quad \quad 7.33115
 \end{array}$$

$$\alpha_0 = 20.082346$$

$$2.30704$$

$$\mu \alpha = +3.81$$

$$\alpha' = 20.082727$$

$$\delta - D = -3.228$$

$$D = -25.2250$$

$$\delta_0 = -25.26128$$

$$\mu \delta = +1.3$$

$$\delta' = -25.26115$$

3784 Brown's Mean Position (1973.0)

$$X_0 = 194800 \quad Y_0 = 206500$$

$$\begin{array}{r} 194800 \\ - 68 \\ \hline 194732 \end{array} \quad \begin{array}{r} 206500 \\ - 36 \\ \hline 206464 \end{array}$$

$$\text{Front plate constant } X = 20.4236 \quad Y = 21.5622$$

$$Z = +2.4236$$

$$Z = -0.4378$$

$$\log 3 = 0.38446$$

$$\log 5 = 9.95572$$

$$8.50724$$

$$(2-1) = 1.92150$$

$$\alpha - \alpha = +1.2346$$

$$A = 20.0700$$

$$\alpha_0 = 20.082346$$

$$\text{Red} = +3.81$$

$$\alpha' = 20.082727$$

$$\log \tan 8 = 9.6736 \sim$$

$$0.7689$$

$$7.0534$$

$$7.4959 \sim$$

$$\eta_1 = -31$$

$$\eta_0 = -0.4347$$

$$\log \eta_0 = 9.63819 \sim$$

$$7.33115$$

$$2.30704 \sim$$

$$S-D = -3.228$$

$$D = -25.2250$$

$$S = -25.26128$$

$$\text{Red} = +1.3$$

$$S' = -25.26115$$

3284 Red. ad. volume app.

 $\delta - 25^{\circ} 26' 13''$

$$H + \alpha \quad 3^h \quad 01^m 5^s = 45^{\circ} 22'$$

$$H \quad 6 \quad 53.1$$

$$\alpha \quad 20 \quad 08.4$$

$$G \quad 21 \quad 49.2$$

$$G + \alpha \quad 17 \quad 57.6 = 269^{\circ} 24'$$

$$l \cos(G + \alpha) \quad 8.0200 m$$

$$l \quad 1.2456$$

$$\sin \quad 0.0000 m$$

$$\tan S \quad 9.6773 m$$

$$8.8239$$

$$f' \quad 9.2656 m$$

$$9.7468$$

$$f \quad +2.26$$

$$g \quad +0.56$$

$$h \quad +0.99$$

$$\underline{+3.81} \checkmark$$

$$l \cos S \quad 9.9557$$

$$l \quad \underline{0.9010}$$

$$(L) \quad 0.8567$$

$$l \sin S \quad 9.6330 m$$

$$\cos(H + \alpha) \quad 9.8467$$

$$h \quad 1.2755$$

$$\sin \quad 9.8522$$

$$\sec S \quad 0.0443$$

$$8.8239$$

$$h' \quad 0.7552 m$$

$$h \quad 9.9959$$

$$g' \quad -0.18 \checkmark$$

$$h' \quad -5.69$$

$$i \quad +7.19$$

$$\underline{+1.32} \checkmark$$

37.84 Red ad brownish

 $\delta - 25^{\circ} 26' 13''$

$H + A$ 3 015 = 45° 22'
 H 6 53.1
 A 20 08.4
 G 21 49.2
 $G + X$ 17 57.6 = 269° 24'

$\cos \delta$ 9.9557
 i 0.9010
 (i) 0.8567

$\sin \cos(G + X)$ 8.0200 ~
 $\sin$ 1.2456
 $\sin$ 0.0000 ~
 $\sin$ 9.6773 ~
 $\sin$ 8.8239

$\sin$ 9.6330 ~
 $\cos(H + A)$ 9.8467
 $\sin$ 1.2755 ~
 $\sin$ 9.8522
 $\cos$ 0.0443
 $\sin$ 8.8239

$\sin$ 9.2656 ~
 $\sin$ 9.7468

$\sin$ 0.7552 ~
 $\sin$ 9.9959

$\sin$ +2.26
 $\sin$ +0.56
 $\sin$ +0.99

 $\sin$ -3.81

$\sin$ -0.18
 $\sin$ -5.69
 i +7.19

 $\sin$ +1.32

3754 Lunar Parallax.

$$\alpha = 20^h 08^m 27.27^s$$

$$\delta = 20 \quad 42 \quad 08.5$$

$$\theta - \alpha: \quad + 33 \quad 41.23$$

$$\quad + 8^{\circ} \quad 25' \quad 20''$$

$$+ \quad \quad \quad 3 \quad 16$$

$$+ \quad 8 \quad 22 \quad 04$$

$$995727$$

$$000000$$

$$000465$$

$$\hline 996192$$

$$\delta = 42 \quad 29 \quad 30$$

$$- 25 \quad 26 \quad 12$$

$$67 \quad 55 \quad 42$$

$$9.82640$$

$$8.20312$$

$$996694$$

$$0.17039$$

$$\hline 8.16685$$

$$\delta - \delta': \quad + 50 \quad 28.9$$

$$\delta = 24 \quad 35 \quad 42.6$$

$$\text{Naut Altitude} = -24 \quad 35 \quad 44.9$$

$$0 - c \quad + \quad 2.3$$

$$\delta' = -25^{\circ} 26' 11.5''$$

$$\Pi = 54' 52.8''$$

$$9.86913$$

$$8.20312$$

$$9.16574$$

$$004131$$

$$\hline 7.27930$$

$$\alpha - \alpha' = + 6' \quad 32.40$$

$$= + 26.16$$

$$\alpha = 20 \quad 08 \quad 53.43$$

$$\alpha = 20 \quad 08 \quad 52.74$$

$$+ 0.59$$

3784 ~~Linear~~ ~~Parallel~~

$$\alpha = 20^h 08^m 27.27^s$$

$$\delta = 20^\circ 42' 08.5''$$

$$\begin{array}{r} 0 - \alpha \\ + 33 \quad 4123 \\ + 8^\circ \quad 25' \quad 20'' \end{array}$$

$$+ \quad \quad \quad 3 \quad 16$$

$$+ \quad 8 \quad 22 \quad 04$$

$$9.95727$$

$$000000$$

$$000465$$

$$\hline 996192$$

$$\delta = 42 \quad 29 \quad 30$$

$$- 25 \quad 26 \quad 12$$

$$67 \quad 55 \quad 42$$

$$982640$$

$$820312$$

$$996694$$

$$017039$$

$$\hline 816685$$

$$\delta - \delta' = \quad \quad + 50 \quad 289$$

$$\delta = 24 \quad 35 \quad 426$$

$$\text{Nant Allen } \delta = -24 \quad 35 \quad 449$$

$$0 - \epsilon \quad \quad \quad + \quad \quad 23$$

$$\delta = -25^\circ 26' 11.5''$$

$$\Pi = 54' 52.8''$$

$$986912$$

$$820312$$

$$916574$$

$$004131$$

$$\hline 727930$$

$$\alpha - \alpha' = + 6' \quad 3240$$

$$= + 2616$$

$$\alpha = 20 \quad 08 \quad 53.43$$

$$\alpha = 20 \quad 08 \quad 52.74$$

$$+ 0.59$$

	a	b	c	new O-C
	- 0	0	- 22	+ 84 ✓
	+ 7		- 15	- 54 ✓
a - 16	+ 22		0	+ 12 ✓
b 0	+ 26		+ 4	+ 47 ✓
c - 22	+ 28		+ 6	- 49 ✓
	+ 27		+ 5	- 45 ✓
	+ 22		0	+ 98 ✓
	+ 19		- 3	- 71 ✓
	+ 9		- 13	+ 82 ✓

- 29° 10'

$$- 1.33 + 18.39 = - 0.93 \Delta$$

$$+ [] - 0.11 = - 0.88 \Delta$$

$$+ 19.28 = - 0.05 \Delta$$

3784

With $R^2 = 3.4036$

	0		C	0 - C
1	+200	- 0 + 94 =	+94	+106
2	+62	+11 + 90 =	+101	-39
3	+101	+33 + 56 =	+89	+12
4	+117	+39 + 35 =	+74	+43
5	-14	+41 - 0 =	+41	-55
6	-25	+41 - 16 =	+25	-50
7	+75	+33 - 56 =	-23	+98
8	-106	+29 - 67 =	-38	-68
9	+21	+14 - 88 =	-74	+95
				+354 - 212
				Average = 63

Normal Equations

$$\begin{aligned}
 a & \quad b \\
 +16.29 - 1.33 &= -299.4 & -10.72 \Delta \\
 -1.33 + 14.39 &= -700 & -0.93 \Delta \\
 -1.33 - 0.11 &= -24 & -0.003 \Delta \\
 +14.28 &= -724 & b = -50.7 \\
 +16.29 - 299 - 67 &= -366 & a = -22.5 \\
 & & -0.66 \Delta
 \end{aligned}$$

arc 162

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

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

$$+16$$

$$\frac{+16}{20} = +.80$$

$$\Delta R = +1.0$$

$$\text{Corr} = +0.3$$

$$\Delta R = +0.7$$

$$\text{In } 9.5 - R = 1.89$$

$$-2RC = -1.10$$

$$\Delta h = 00 \quad \Delta \delta = 0''.0$$

$$\Delta a = +0''.73 \quad \Delta q = +0''.03$$

3784

12

with $R^2 = 34036$

	U		L	O - L
1	+200	- 0 + 94 =	+94	+106
2	+62	+11 + 90 =	+101	-39
3	+101	+33 + 56 =	+89	+12
4	+117	+39 + 35 =	+74	+43
5	-14	+41 - 0 =	+41	-55
6	-25	+41 - 16 =	+25	-50
7	+75	+33 - 56 =	-23	+98
8	-106	+29 - 67 =	-38	-68
9	+21	+14 - 88 =	-74	+95
				+354 - 212
				Average = 63

Normal Equations

$$+1629 - 133 = -299$$

$$- 133 + 1439 = -700$$

$$+ 133 - 011 = 24$$

$$+ 1428 = 729$$

$$+1629 - 299 - 67 = 366$$

$$b = -50.7$$

$$a = -22.5$$

arc 162

 $\frac{8K}{n}$

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

$$+16$$

$$\frac{+16}{20} = +.80$$

$$\Delta R = +1.0$$

Err Corr γ	+0.03	$\delta =$	0.0
γ 20 08	5-3.67	δ - 29 35-	71.5-
O-C =	+0. ^s 93	O-C =	+3. ["] 7

3784 Moon's Mean Position (1913.0)

$$X_0 = 194800$$

$$Y_0 = 20.6800$$

$$\Delta X = -11$$

$$\Delta Y = -25$$

$$X = 194789$$

$$Y = 20.6775$$

From Plate Constants $X = 20.4295$ $Y = 21.5634$

$$\bar{z} = +2.4295$$

$$\eta = -0.4366$$

$$\log \bar{z} = 0.38552$$

$$9.95572$$

$$8.50724$$

$$1.92256$$

$$\log \tan \delta = 9.6773$$

$$0.7710$$

$$7.0534$$

$$7.5017$$

$$\eta_1 = -32$$

$$\eta_0 = -0.4334$$

$$\alpha - A = 1 \quad 23.67$$

$$A = 20 \quad 07 \quad 00$$

$$\alpha_0 = 20 \quad 08 \quad 23.67$$

$$\text{Red} = + \quad 3.81$$

$$\alpha' = 20 \quad 08 \quad 27.48$$

$$\text{Lunar par} = + \quad 26.16$$

$$\alpha = 20 \quad 08 \quad 53.64$$

$$\text{Tables} = 20 \quad 08 \quad 52.74$$

$$O - C = +0.90$$

$$-0.03$$

$$\text{Curv of Plate} = -1.03$$

$$\log \eta_0 = 9.63689$$

$$7.33115$$

$$2.30574$$

$$\delta - D = 3 \quad 22.2$$

$$D = -25 \quad 22 \quad 50$$

$$\delta_0 = -25 \quad 26 \quad 12.2$$

$$\text{Red} = + \quad 1.3$$

$$\delta = -25 \quad 26 \quad 10.9$$

$$\text{Lunar par.} + 50 \quad 28.9$$

$$\delta = -24 \quad 35 \quad 42.0$$

$$\text{Tables} = 24 \quad 35 \quad 44.9$$

$$O - C = + \quad 2.9$$

$$+0.6$$

3784 Moons Mean Position (1913.0)

$$X_0 = 194800$$

$$Y_0 = 206800$$

$$\frac{1}{2}a = -11$$

$$b = -25$$

$$X = 194789$$

$$Y = 206775$$

From Plate Constant $X = 20.4295$ $Y = 21.5634$

$$\bar{z} = +2.4295$$

$$\eta = -0.4366$$

$$\log \bar{z} = 0.38552$$

$$995572$$

$$850724$$

$$1.92256$$

$$\log \tan \delta = 9.6773$$

$$0.7710$$

$$70534$$

$$75017$$

$$32$$

$$\eta_0 = -0.4334$$

$$\alpha - A = 1 \quad 2367$$

$$A = 20 \quad 07 \quad 00$$

$$A_0 = 20 \quad 08 \quad 2367$$

$$Red = + \quad 3381$$

$$\alpha' = 20 \quad 08 \quad 2748$$

$$\text{mean par} = + \quad 2616$$

$$\alpha = 20 \quad 08 \quad 5364$$

$$\text{ables} = 20 \quad 08 \quad 5274$$

$$0 - c = +090$$

$$\text{curv of plate} = -0.03$$

$$\log \eta_0 = 9.63689$$

$$7.33115$$

$$230574$$

$$\delta - D = 3 \quad 222$$

$$D = 25 \quad 22 \quad 50$$

$$\delta_0 = 25 \quad 26 \quad 122$$

$$Red = + \quad 1.3$$

$$\delta = -25 \quad 26 \quad 109$$

$$\text{mean par} = +50 \quad 289$$

$$\delta = -24 \quad 35 \quad 420$$

$$\text{Tables} = 24 \quad 35 \quad 449$$

$$0 - c = + \quad 29$$

$$\text{2nd ed 41}$$

$$+ \quad 0.35$$

23

1
7.5
22.12
21.3
29.73
24
1212.
3233.
17.

1913 Sept. 13

3811

Stan - measures

1914 May 14.

17

	α	δ	μ
1	18845	19446	
75	1029101	18001	
229	00	9596	
	59	30	
	<u>228560</u>	<u>8554</u>	

2	13142	1319084	
213	1226963	81	
292	70	12318	
	<u>290875</u>	<u>0867</u>	

3	16257	18460	
248	835055	16860	
128	50	5569	
	57	64	
	<u>228405</u>	<u>8401</u>	

Grade 3

12.0	16102	15673	
32.4	1289495	888689	
	9595	81	
	05	71	
	<u>323208</u>	<u>3213</u>	

33.4	14625	17777	
17.7	736561	15045	
	59	4340	
	35	75	
	<u>177280</u>	<u>7267</u>	

	α	δ	μ
	17932	17961	
	1291120	12960	
	19	5859	
	29	51	
	<u>74986</u>	<u>4997</u>	

	17839	18781	
	1095040	15675	
	51	7770	
	39	79	
	<u>213108</u>	<u>3106</u>	

	13331	1158981	
	1216150	7486	
	58	10400	
	29		
	<u>248826</u>	<u>8818</u>	

	13079	9719	
	8179	981909	
	12895	0809	
	<u>120185</u>	<u>0210</u>	

	15325	16155	
	970499	1175561	
	94	5961	
	10	60	
	<u>334383</u>	<u>4399</u>	

1913 Sept 13
3811

Stan - measures

1914 May 14

17

	α	δ
1	15845	19446
75	1029101	18001
229	00	9,26
	59	30
	<u>228560</u>	<u>8554</u>

2	13142	1319084
213	1226963	81
212	70	12318
	<u>290875</u>	<u>6867</u>

3	16757	18460
298	835055	16860
128	50	5569
	57	64
	<u>128405</u>	<u>18401</u>

Grade 3

120	16102	15673
324	1289495	888689
	95	81
	05	71
	<u>323208</u>	<u>3213</u>

334	14625	17777
177	736561	15045
	59	4340
	35	75
	<u>177280</u>	<u>7267</u>

	α	δ
1	17932	17961
129	1120	12960
	19	5859
	29	51
	<u>74986</u>	<u>4997</u>

17839	18781
1095040	15675
51	7770
39	79
<u>213108</u>	<u>3106</u>

13331	1158981
1216150	7486
58	10400
29	
<u>248826</u>	<u>8818</u>

13079	9719
8179	988109
12895	0809
<u>120185</u>	<u>0210</u>

15325	16155
970499	11755
94	5961
10	60
<u>334383</u>	<u>4399</u>

1913811

Moon - Measures

1914 May 14,

18

$$\begin{array}{r}
 16212 \\
 18.2 \quad 824952 \\
 8.8 \quad 50 \\
 \text{min} \quad 11 \\
 \hline
 18.7961
 \end{array}$$

$$\begin{array}{r}
 13925 \\
 11849 \\
 5059 \\
 19 \\
 \hline
 7929
 \end{array}$$

$$\begin{array}{r}
 15223 \\
 180 \quad 716165 \\
 8.8 \quad 61 \\
 \quad 19 \\
 \hline
 18.8058
 \end{array}$$

$$\begin{array}{r}
 13905 \\
 1194161 \\
 58 \\
 11 \\
 \hline
 8044
 \end{array}$$

$$\begin{array}{r}
 15290 \\
 17.0 \quad 1301089 \\
 18.3 \quad 00 \\
 \quad 90 \\
 \hline
 19.2290
 \end{array}$$

$$\begin{array}{r}
 15628 \\
 788985 \\
 92 \\
 25 \\
 \hline
 2260
 \end{array}$$

$$\begin{array}{r}
 16.5 \\
 20.0
 \end{array}$$

$$\begin{array}{r}
 16.4 \\
 20.6 \\
 \text{min} \\
 \text{min} \\
 \text{min}
 \end{array}$$

$$\begin{array}{r}
 16.5 \\
 21.0
 \end{array}$$

$$\begin{array}{r}
 19178 \\
 1385060 \\
 55 \\
 74 \\
 \hline
 16.4679
 \end{array}$$

$$\begin{array}{r}
 16330 \\
 1164446 \\
 49 \\
 26 \\
 \hline
 4679
 \end{array}$$

$$\begin{array}{r}
 19142 \\
 1271908 \\
 10 \\
 38 \\
 \hline
 16.3572
 \end{array}$$

$$\begin{array}{r}
 16360 \\
 12760 \\
 6569 \\
 49 \\
 \hline
 3591
 \end{array}$$

$$\begin{array}{r}
 19175 \\
 1314855 \\
 50 \\
 65 \\
 \hline
 16.3982
 \end{array}$$

$$\begin{array}{r}
 16384 \\
 1240000 \\
 95 \\
 90 \\
 \hline
 3988
 \end{array}$$

1913811

Brown Measures

1914 May 14

189

	d	N
1	16212	13925
182	824952	11849
188	50	5059
mm	11	19
	<u>187961</u>	<u>7929</u>

2	15223	13909
180	716165	1194161
188	61	58
	19	11
	<u>188058</u>	<u>8044</u>

3	15290	15628
170	1301089	788985
193	00	42
	90	29
	<u>192290</u>	<u>2260</u>

4
165
200

5
164
206
mm
2

6
165
210

19178	16330
13850	1164946
5560	49
74	20
<u>164679</u>	<u>4679</u>

19142	16360
1271908	12760
10	6569
38	49
<u>163572</u>	<u>3591</u>

19175	16384
1314855	1240000
50	95
65	90
<u>163982</u>	<u>3988</u>

3811

d Brown Measures

7

17.0

220±

22.0000

8 scratch

175 18241

223 15399.19

10 09

35

22.2830

17200

100 1929

30

09

2820

19001

1359792

86

01

17.4591

17910

1332921

21

01

4581

2811 Brown Dwarves

d 9 N d 2 N

7

170

22 0000

2201

8 scratch

175 18241

17200

223 1539919

100 1929

10 09

30

35

09

22.28302820

19001

17910

1359792

1332921

8692

2121

01

01

17.45914581

3811	Times etc.			
Ephestian 1913 Sept 13,	22 ^h	33 ^m	-22 ^h	45 ^m
moon	22	38	52	6 ^v -22 38 52.8 ^v
clock fast		2	31	5 ^v
11 Sid T.	22	36	212 ^v	0 -x- +0 ^h 3 ^m
Nhony	4	44	31.05 ^v	
6 Sid T.	27	20	52.25 ^v	
Sid T. m. noon	11	27	28.98 ^v	
Interval	15	53	23.27 ^v	
Red.		2	36.19 ^v	
G. m. T	15	50	47.08 ^v	

From Saw Alu	R. A				Decl.
noon 16 ^h	22 ^h	33 ^m	23 ^s 25 ^v	-10 ^o	52' 35" 8 ^v
Motion in 1 ^m	1.7992 ^v		13.352 ^v		
" -9.2353 ^v			16.58 ^v		2 0 3.0 ^v
Tabular Place	22	33	06.67 ^v	-10	54 38.8 ^v

Moon's age	13 days
Moon's parallax	54' 02.70 ^v
Semidiameter	14' 45.2 ^v
R	885.2 ^v
Augmentation	+8.5 ^v
Irradiation (3) (45)	-0.7
R	893.0
R	1914.3
a R	-91.2
(1+a) R	1823.1
R ²	3.3237

$$934 = 9.4$$

$$885 = 8.5$$

$$a = -500.6$$

$$-2.4$$

$$-476.6$$

3811 Times etc
 Whitelan 1913 Sept 13, 22^h 33^m - 22^h 45^m
 Moon 22 38 52.6 - 22 38 52.8
 Clock fast 2 31.5

11 Sed T. 22 36 212.0 - 22 36 212.0
 11 Sed T. 9 44 310.5
 11 Sed T. 27 20 522.5
 Sed T. in. Nov. 11 27 289.8
 In. Nov. 15 53 232.7
 Red 2 36.19
 3 in T. 15 50 470.8

Trom. Grav. Alu. R A. H. A. 11 Sed
 Moon 16^h 22^h 33^m 23^h 25^m - 10^h 52^m 35^s 8
 Motion in 1.7992 13.35^m
 - 9.2853 - 16.58 - 2 0 30
 Tabular Place. 22 33 06.67 - 10 54 38.8

Moon's Age 13 days
 Moon's parallax 54 0.270
 Semidiameter 14 45.2
 R 885.2
 Augmentation +8.5
 Irradiation (3) -0.7
 R 893.0
 R 1914.3
 a R - 91.2
 11 to R 1823.1
 R² 3.3237

934 = 9.4
 885 = 8.5

a - 500.6
 2.8

- 476.6

Stars in order
of R.A.

α	γ
74992	228557
120198	323210
213107	290871
248822	188403
334391	177274

3811

Plate constants

x	y	RA	$Decl.$
74992	228557	22 27 05 -11	21 09
213107	290871	34 41 10	29 01
248822	128403	36 49 12	41 13
5369	6478	31 97 95	133 91 23
1790	2159	22 32 52 -11	30 28
18	22	+ 3	+ 3 10
10	41	22 32 55 -11	27 18
31	466		
3 ^s	190		

Center of Plate $\begin{cases} A = 22^h 32^m 55^s \\ D = -11^\circ 27' 18'' \end{cases}$

$$\begin{array}{rclcl}
 x-5 & +500x & -145y & +0.6x & -5906 \\
 +5464 + 3750 = +9214 & -3314 = +5900 + 4 = +5904 & & & : -2 \\
 +4577 + 6010 = +10587 & -4687 = +5900 + 7 = +5907 & & & : +1 \\
 -543 + 10655 = +10112 & -4218 = +5894 + 13 = +5907 & & & : +1 \\
 -4680 + 12441 = +7761 & -1862 = +5899 + 15 = +5914 & & & : +8 \\
 -8270 + 16720 = +8450 & -2570 = +5880 + 20 = +5900 & & & : -6 \\
 18.1824 + 9091^v & -2989^v & +11^v & & = 18.2031
 \end{array}$$

$$\begin{array}{rclcl}
 y-7 & +500y & +144.6x & +6.2y & -13518 \\
 +860 + 11428 = +12288 & +1084 = +13372 + 142 = +13514 & & & : -4 \\
 -4577 + 16160 = +11583 & +1738 = +13321 + 200 = +13521 & & & : +3 \\
 +4293 + 14544 = +10251 & +3082 = +13333 + 180 = +13513 & & & : -5 \\
 +3426 + 6420 = +9846 & +3598 = +13444 + 79 = +13523 & & & : +5 \\
 -289 + 8864 = +8575 & +4835 = +13410 + 110 = +13520 & & & : +3 \\
 20.6150 + 10308^v & +2629^v & +128^v & & = 20.5697
 \end{array}$$

Tables $a = +0.4$ $e = -4.6$ $a - e = +5.0$ $b + d = 0.0$
 Obs $a = -0.6$ $e = -6.2$ $a - e = +5.6$ $b + d = +0.4$
 $a = -500.6$ $e = -506.2$

$$\begin{array}{rclcl}
 a - 0 & +501.0 & +501.6 & & -0.4 \\
 b - c & -501.0 & -501.6 & & +0.4
 \end{array}$$

$$\begin{array}{rclcl}
 & -3.23 & & +2.24 & -15 \\
 M & & & & \\
 -34 & +36 & = & +2 & +2 & = & +4 \\
 +6 & -11 & = & -5 & +17 & = & +12 \\
 +20 & -24 & = & +4 & -22 & = & -18 \\
 -25 & +21 & = & +4 & +25 & = & +21 \\
 +109 & -54 & = & +55 & -10 & = & +45 \\
 M. \bar{x} = +1.2 & -1 & & -3 & -19 & = & -0.06
 \end{array}$$

$$\begin{array}{rclcl}
 & -2.44 & & +1.13 & +2 \\
 +2 & -2 & = & 0 & -12 & = & -12 \\
 +13 & -18 & = & -5 & +4 & = & -1 \\
 -32 & +23 & = & -9 & +8 & = & -1 \\
 +41 & -26 & = & +15 & -7 & = & +8 \\
 -30 & +10 & = & -20 & +18 & = & -2 \\
 M. \bar{x} = -1.9 & +3 & & 0 & +5 & = & +0.2
 \end{array}$$

3811

Plate Count and

2	9	RA	Decl.
74992	228557	22 27 05	-11 21 09
213107	290871	34 41 10	29 01
248822	228403	36 49 12	41 13
5369	6478	97 95	33 91 23
1790	2159	22 32 52	-11 30 28
18	22	+	3 + 3 10
10	41	22 32 55	-11 27 18
31	766		
3	190		

Center of Plate $\left\{ \begin{array}{l} A = 22^{\circ} 32' 55'' \\ D = -11^{\circ} 27' 18'' \end{array} \right.$

$$\begin{array}{rclcl}
 2-5 & +500x & -145y & +0.6z & -5906 \\
 +5464 + 3750 = +9214 & -3314 & +5900 & -4 & = +5904 & : -2 \\
 +4577 + 6010 = +10587 & -4687 & +5900 & +7 & = +5907 & : +1 \\
 -543 + 10655 = +10112 & -4218 & +5894 & +13 & = +5907 & : +1 \\
 -4680 + 12441 = +7761 & -1868 & +5899 & -15 & = +5914 & : +4 \\
 -8270 + 16720 = +8450 & -2570 & +5880 & +20 & = +5900 & : -6 \\
 181824 & +9091 & -2989 & +11 & & = 182031
 \end{array}$$

$$\begin{array}{rclcl}
 y-7 & +500y & +1446x & +62y & -13518 \\
 +86011428 = +12288 & +1084 & +13372 & +142 & = +13514 & : -4 \\
 -4577 + 16160 = +11583 & +1738 & +13321 & +200 & = +13521 & : +3 \\
 +4293 + 14544 = +10251 & +3082 & +13333 & +180 & = +13513 & : -5 \\
 +342616420 = +9846 & +3598 & +13444 & +79 & = +13523 & : +5 \\
 -289 + 8864 = +8575 & +4835 & +13410 & +110 & = +13520 & : +2 \\
 206150 & +10308 & +2629 & +128 & & = 205697
 \end{array}$$

$$\begin{array}{llll}
 \text{Tables } a = +0.4 & b = -46 & a - b = +50 & b + a = 0.0 \\
 \text{Obs } a = -0.6 & b = -62 & a - b = +56 & b + a = +0.4 \\
 a = -5006 & b = -5062 & &
 \end{array}$$

$$G=0 \quad +501.0 \quad +501.6 \quad -0.4$$

See the page before

Curvature of plate.

ξ	η	$\Delta \xi$	$\Delta \eta$
1 X - 11.08	+ 0.80	-37	-3.63
2 X + 3.36	+ 7.52	+6	+1.54
3 + 7.35	- 9.79	+25	- 8
4 X - 6.73	+10.79	-25	+40 = -6
5 + 16.26	- 8.18	+109	-12 = -6
Moon + 0.20	-1.43	0	-26 = -1
			+23 = -2
			-59 = +50
			-6 = +98
			+36
			-11
			0
			+2
			+2

$$3(+26.97 - 6.15 = +140 = -99)$$

$$2(-17.47 + 11.59 = -59 = +93)$$

$$+8.87 - 2.05 = +46.7 = -16.3$$

$$-8.73 + 5.79 = -29.5 = +21.5$$

$$+17.60 - 7.84 = +46.2 = -37.8$$

$$= -18.0 = +18.8$$

$$+17.60 = +58.2 = -19.0$$

$$\eta = +3.3 = -1.1$$

$$3(-18.11 + 19.11 = -53 = +56)$$

$$2(+23.61 - 13.67 = +134 = -62)$$

$$-4.70 + 6.37 = -17.7 = +18.7$$

$$+11.80 - 6.83 = +67.0 = -31.0$$

$$+16.50 - 13.20 = +88.7 = -49.7$$

$$+27 - 7.35 = +71.5 = -35.9$$

$$-5.85 = +13.2 = -14.3$$

$$\eta = -2.3 = +2.4$$

3811 Standard Coordinates

22

Cape W. 3131 mag 6.4 Cape W. 3143 mag 7.2 Cape W. 3144 mag 6.8

C	22° 26' 23.28"	22° 34' 00.32"	22° 36' 07.88"
L		38	07.90
E		33	07.91
Mean		22 34 00.34	22 36 07.90
Prece	+ 4136	+ 41.07 ^W	+ 41.34
S	22 27 04.64	22 34 41.41	22 36 49.24
D	22 32 55	22 32 55	22 32 55
S-D	- 5 50.36	+ 1 46.41	+ 3 54.24
tan(S-D)	- 3 50.32	+ 1 06.41	+ 23.423
log ₁₀	2.54446 ^m	2.02698	2.36964
mag	9.99142 ^V	9.992.69 ^W	9.98928
S ₀	1.04312 ^m	0.52691	0.86615
M ₀	- 11.0438	+ 3.3644	+ 7.3477
M ₁	- 34	+ 6	+ 25
M ₂	6.9528	27.3650	25.3502
Z	7.4992	21.3107	24.8822
Z-S	+ 5.464	- 5.43	- 4.680

C	- 11° 25' 05.0"	- 10° 32' 53.4"	- 12° 45' 06.8"
L		53.3	07.1
E		53.6	07.6
Mean	- 11 25 05.0	- 10 32 53.4	- 12 45 07.2
Prece	+ 3 59.0	+ 4 02.6 ^W	+ 4 03.5
S	- 11 21 06.0	- 10 28 50.8	- 12 41 03.7
D	- 11 27 18	- 11 27 18	- 11 27 18
S-D	+ 6 12.0	+ 58 27.2 ^V	- 1 13 45.7
tan(S-D)	+ 3 72.0	+ 35 07.5 ^W	- 44.26.4
log ₁₀	2.57054	3.54500 ^V	3.64605 ^m
mag	9.90169	0.87615 ^V	0.97720 ^m
tan S	9.3027 ^m	9.2671 ^m	9.3524 ^m
S ₂	20862	10538 ^V	17323
Z ₁	84423 ^m	7.3743 ^m	8.1381 ^m
Z ₂	+ 0.7974	+ 7.5188 ^V	- 9.4886
Z ₃	- 277	- 24	+ 137
Z ₄	227697	29.5164 ^V	12.4927
Z ₅	22.8557	29.0871	12.8403
Z ₆	+ 860	- 4293	+ 3426

3811 Standard Coordinates

22

Cape W. 3131 mag 6.4 Cape W. 3143 mag 7.2 Cape W. 3144 mag 6.8

C	22° 26' 23.28	22° 34' 00.32	22° 36' 07.88
L		38	07.90
E		33	07.91
Asc	22 34 00.34	22 36 07.90	
Dec	+ 41 36	+ 41 07	+ 41 34
S	22 27 04.64	22 34 41.41	22 36 49.24
A	22 32 55	22 32 55	22 32 55
X-A	- 5 50.36	+ 1 46.41	+ 3 54.24
Y-A	- 3 50.32	+ 1 06.41	+ 2 34.23
log	2.54446	2.02698	2.36964
mod	999142	999269	998928
S ₀	1.04312	0.52691	0.86615
U	- 11.0938	+ 3.3649	+ 7.3477
V	-	6	25
W	6.9528	21.3650	25.3502
X	7.4992	21.3107	24.8522
Y	+ 5.464	- 5.43	- 4.680

C	- 11° 25' 05.0	- 10° 32' 53.4	- 12° 45' 06.8
L		53.3	07.1
E		53.6	07.6
Asc	- 11 25 05.0	- 10 32 53.4	- 12 45 07.2
Dec	+ 3 59.0	+ 4 02.6	+ 4 03.5
S	- 11 21 06.6	- 10 28 50.8	- 12 41 03.7
D	- 11 27 18	- 11 27 18	- 11 27 18
S-D	+ 6 42.0	+ 5.8 27.2	- 1 13 45.7
X-D	+ 3 72.4	+ 3.8 97.5	- 4.4 26.4
log	2.57054	3.54500	3.64605
mod	990169	087695	097720
log	9.3027	9.2677	9.3529
mod	20862	10538	17323
log	8.4423	7.3743	8.1381
U	+ 0.7919	+ 7.5988	- 9.4886
V	- 2.77	- 2.4	+ 1.37
W	22.7697	2.95964	12.4977
X	22.8557	2.90871	12.8403
Y	+ 8.60	- 4.293	+ 3.426

3811 Standard Coordinates

Cape W. 3133 mag 6.4 Cape W. 3154 mag 8.5

C	22 ^h	28 ^m	50 ^s .60	22 ^h	40 ^m	50 ^s .73
L			58			75
E			58			74
Mean	22	28	50.59	22	40	50.74
Prece		+	41.13		+	41.19
X	22	29	31.72	22	41	31.93
A	22	32	55	22	32	55
X-A		-3	23.28		+8	36.93
sin(X-A)		-20	32.7		+5	16.82
log u	230	807	m	271	334	
cos	9.99	327		9.99	041	
$\frac{1}{u}$	080	858	m	1.21	099	
$\frac{1}{u}$	-64	354		+16	255	2
$\frac{1}{u}$	-	25		+	109	
$\frac{1}{u}$	115	621		34.2	661	
$\frac{1}{u}$	120	198		334	391	
$x+\frac{1}{u}$	+44	577		-82	70	

C	-10°	07'	27".1	-12°	03'	53".2
L			27.5			53.3
E			27.2			53.8
Mean	-10	07	27.3	-12	03	53.4
Prece		+4	00.4		+4	05.3
S	-10	03	26.9	-11	59	48.1
D	-11	27	18	-11	27	18
S-D	+1	23	51.1	-	32	30.1
tan(S-D)		+50	32.1		-19	50.2
log u	3.70	175		3.29	005	m
$\frac{1}{u}$	1.03	290		0.62	120	m
$\frac{1}{u}$	9.24	89	m	9.32	76	m
$\frac{1}{u}$	161	72		2.42	220	
$\frac{1}{u}$	7.91	95	m	8.80	30	m
η_0	+10.7	870		-4.1	802	
η_1	-	83		-	635	
η	32.7	787		17.7	563	
η	32.3	210		17.7	274	
$\eta-m$	-44	577		-28	9	

3811 Standard Coordinates

Cape W 3133 mag 6.4 Cape W 3154 mag 8.5

C	22°	28'	50.60	22°	40'	50.75
L			5.8			7.5
E			5.8			7.4
Mean	22	28	50.59	22	40	50.74
Proc		+	4113		+	4119
X	22	29	31.72	22	41	31.93
A	22	32	5.5	22	32	5.5
X-A		-3	23.28		+8	36.93
sin(X-A)		-20327			+51682	
log u	230807	m		271334		
cos	999327			999091		
$\frac{u}{\cos}$	080858	m		121099		
$\frac{u}{\sin}$	-64354			+162552		
$\frac{u}{\tan}$	-	25		+	10.9	
$\frac{u}{\sec}$	115621			342661		
K	120198			334391		
X-K	+4577			-8270		

C	-10°	07'	27.1	-12°	03'	53.2
L			27.5			53.3
E			27.2			53.8
Mean	-10	07	27.3	-12	03	53.4
Proc		+	4004		+	4053
S	-10	03	26.9	-11	59	48.1
D	-11	27	18	-11	27	18
S-D	+1	23	51.1		-32	30.1
Tan(S-D)		+5032.1			-1950.2	
log u	3.70175			3.29005	m	
η_0	1.03290			0.62120	m	
tan	92489	m		9.3276	m	
$\frac{u}{\tan}$	16172			24220		
η_1	79195			88030	m	
η_2	+10.7870			-41802		
η_3	-	83		-	035	
η_4	32.7787			17.7563		
η_5	32.3210			17.7274		
η_6	-4577			-289		

Formation of Normals (check)

	ab	ac	bc
1	- 0.00	- 0.0	+ 180.0
2	+ 0.33	+ 28.6	+ 287.5
3	+ 1.63	+ 82.5	+ 97.0
4	+ 0.26	+ 64.6	+ 23.2
5	- 0.00	+ 85.6	- 0.0
6	- 0.69	+ 12.5	- 2.7
7	- 1.63	+ 98.0	- 115.0
8	- 1.20	+ 120.0	- 278.5
	- 1.30	+ 491.8	+ 191.5

Normal Equation

$$+ 10.56 - 1.30 = +492$$

$$- 1.30 + 13.47 = +192$$

$$+ 1.30 - 0.16 = +61$$

$$+ 13.31 = +253$$

$$+ 10.56 = +492 + 25 = +517$$

$$b = +19.0 +$$

$$a = +48.9$$

3811 Moon's Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	18.1800	0.0000	0.0000	3.3138	- 99
2	18.0000	-0.1800	0.0324	3.3078	-1.59
3	17.0000	-1.1800	1.3924	3.3167	- 70
4	16.4679	-1.7121	2.9312	3.3086	-1.51 $\frac{1}{2}$ wt
5	16.3582	-1.8218	3.3190	3.3190	+ 47
6	16.3985	-1.7815	3.1738	3.3230	- 7
7	17.0000	-1.1800	1.3924	3.3154	- 83
8	17.4586	-0.7214	0.5204	3.3070	-1.67

$$\text{comp } R^2 = 33237$$

	y	$y - Y_0$	Δy	$(y - Y_0)^2$	
1	18.7945	-1.8195	-9	3.3138	180
2	18.8051	-1.8089	-9	3.2754	186
3	19.2275	-1.3865	-7	1.9243	220
4	20.0000	-0.6140	-3	0.3774	251
5	20.6140	0.0000	0	0.0000	270
6	21.0000	+0.3860	+2	0.1492	282
7	22.0000	+1.3860	+7	1.9230	319
8	22.2825	+1.6685	+8	2.7866	336

Range 156

Approx Center

$$X_0 = 17.0 \quad y = 19.2275$$

$$22.0000$$

$$41.2275$$

$$Y_0 = 20.6138$$

$$y_{\text{min}} = 18.7945$$

$$R = 1.8193$$

$$x_{\text{min}} = 16.3582$$

$$X_0 = 18.1775$$

$$\text{Center } \left\{ \begin{array}{l} X_0 = 18.1800 \\ Y_0 = 20.6140 \end{array} \right.$$

3811 Moon's Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 \cdot y \cdot y_0$	$d - c$
1	181800	00000	00000	33138	-99
2	180000	-01800	00324	33078	-159
3	170000	-11800	13924	33167	-70
4	164679	-17121	29312	33086	-151 $\frac{1}{2}$ not
5	163582	-18218	33190	33190	+7
6	163985	-17815	31738	33230	-7
7	170000	-11800	13924	33154	-83
8	174586	-07214	05204	33070	-167

Comp Σ 33237

	y	$y - Y_0$	$d y$	$(y - Y_0)^2$	
1	187945	-18195	-9	33138	180
2	188051	-18089	-9	32754	0
3	192275	-13865	-7	19243	220
4	200000	-06140	-3	03774	251
5	206140	00000	0	00000	270
6	210000	+03860	+2	01492	282
7	220000	+13860	+7	19230	319
8	222825	+16685	+8	27566	336

Range 156

Approx Center

$$\begin{array}{r}
 X_0 = 170 \quad y = 192275 \\
 \hline
 220000 \\
 \hline
 412275 \\
 Y_0 = 206138 \\
 \hline
 y = 187945 \\
 X = 18193 \\
 y = 163582 \\
 X = 181775
 \end{array}$$

$$\begin{array}{l}
 \text{Center} \left\{ \begin{array}{l} X_0 = 181800 \\ Y_0 = 206140 \end{array} \right.
 \end{array}$$

Formation of Normals.

	ab	an	
1	- 0.00	- 0.0	+ 180.2
2	+ 0.33	+ 28.6	+ 288.0
3	+ 1.64	+ 82.6	+ 97.4
4	+ 0.26	+ 64.5	+ 23.0
5	- 0.00	+ 85.5	- 0.0
6	- 0.69	+ 12.5	- 2.7
7	- 1.64	+ 98.0	- 115.2
8	- 1.20	+ 120.2	- 279.0
9	- 1.30	+ 491.9	+ 191.7

	a	b	c	new O-C
	- 0	+ 9	- 13	- 77
a	- 19	+ 3	+ 9	- 125
b	- 3	+ 22	+ 7	+ 22
c	- 22	+ 32	+ 3	- 19
	+ 35	- 0	+ 13	+ 55
	+ 34	- 2	+ 10	+ 15
	+ 22	- 4	- 7	- 59
	+ 14	- 8	- 16	- 180

$$-1.30 + 13.71 = -2.18\Delta$$

$$+ [] - 0.16 = -1.07\Delta$$

$$+ 13.25 = -3.25\Delta$$

$$+ 10.56 = -8.57\Delta - 0.32\Delta = -8.89\Delta$$

3811

Ono's Center

Conditional Equations

1	+ 0.00 - 1.52 =	- 99	+	0	- 35 =	- 35	- 64
2	- 0.18 - 1.81 =	- 159	-	9	- 35 =	- 44	- 115
3	- 1.18 - 1.39 =	- 70	-	58	- 27 =	- 85	+ 15
4	- 1.71 - 0.61 =	- 151	-	42	- 6 =	(- 48)	- 27
5	- 1.82 + 0.00 =	- 47	-	89	+ 0 =	- 89	+ 42
6	- 1.78 + 0.39 =	- 7	-	87	+ 75 =	- 12	+ 5
7	- 1.18 + 1.39 =	- 83	-	58	+ 27 =	- 31	- 52
8	- 0.72 + 1.67 =	- 167	-	35	+ 32 =	- 3	- 164
							+ 62 - 422
							Average = 64

Normal Equations

$$\begin{aligned} +10.56^{\checkmark} - 130^{\checkmark} &= +492^{\checkmark} & -8.57 \Delta \\ -130 + 13.41 &= +192^{\checkmark} & -2.18 \Delta \end{aligned}$$

$$+ 1.30 - 0.16 = + 61$$

$$+ 13.25 = + 253$$

$$b = +19.1 - 0.27 \Delta$$

$$+ 10.56 = +49.2 + 25.2 + 51.7$$

$$a_v + \$8.9 - 0.89 \Delta$$

$$2PR = 9,5 \quad PR = 1,82$$

$$-2PRC = -1,09$$

$$\Delta b = + 0''.26$$

$$\Delta \delta = +0.1''$$

$$\Delta a = + 0.97^{\#}$$

$$\Delta q = +0.03^S$$

Arc measured = 117° average (O-C) = -48°

$$\frac{K_c}{n} = 1,19$$

$$\frac{-48.0}{19} = -2.52 \quad \Delta a = -2.8$$

-3.1
 $Corr = +.3$
 $\Delta P = -3.7$

3811 Orions Center Conditional Equations

1	+000-182=	-99	-	0	-35=	-35	-	64
2	-018-181=	-159	-	9	-35=	-44	-	115
3	-118-139=	-70	-	58	-27=	-85	+	15
4	-171-061=	-151	-	42	-6=	(-48)	-	27
5	-182+000=	-47	-	89	+6=	-89	+	42
6	-178+039=	-7	-	87	+75=	-12	+	5
7	-118+139=	-83	-	58	+27=	-31	-	52
8	-072+167=	-167	-	35	+32=	-3	-	164

$$+62 = 422$$

$$\text{Average} = 64$$

Normal Equations

$$+10.56a - 130b = +492$$

$$-130a + 1341b = +192$$

$$+130 = 016 = +61$$

$$+13.25 = +253$$

$$b = +19.1$$

$$+10.56 = +492 + 21 = +517$$

$$a = +48.9$$

$$\text{Arc measured} = 157^\circ \quad \text{Average } \alpha - \delta = 48^\circ$$

$$\frac{100}{19} = 5.26$$

$$-450$$

$$19$$

$$-202$$

$$20 = 2.8$$

Red ad locus app

$$S = -11^{\circ} 38' 31''$$

$$\begin{array}{rcl}
 H + \alpha & 5 & 13 = 78^{\circ} 15' \\
 N & 6 & 40 \\
 \alpha = 22^{\circ} & & 33'' \\
 G & 21 & 48 \\
 a + \alpha & 20 & 21 = 305^{\circ} 15'
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos S & = & 9.9910 \\
 \log \sin S & = & 0.9003 \\
 \log \tan S & = & 0.8963
 \end{array}$$

$$\begin{array}{rcl}
 \log(H + \alpha) & 9.7613 \\
 \log N & 1.2498 \\
 \log \sin \alpha & 9.9120 \\
 \log \tan S & 9.3139 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & 1.0111 \\
 \delta & 9.2996
 \end{array}$$

$$\begin{array}{rcl}
 h & + 2.28 \\
 \delta & + 0.20 \\
 \delta & + 1.25 \\
 \hline
 & + 3.73
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin S & 9.3049 \\
 \log(H + \alpha) & 9.3089 \\
 h & 1.2747 \\
 \log \sin \alpha & 9.9908 \\
 \log \sec S & 0.0090 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 h' & 9.8885 \\
 h & 0.0984
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & + 10.36 \\
 \delta & - 0.77 \\
 \delta & + 7.88 \\
 \hline
 & 17.47
 \end{array}$$

3811 Orionis (mean Position (1913.0))

$$X_0 = 18.1800$$

$$Y = 20.6140$$

$$\frac{1}{2}a = +24$$

$$\frac{1}{2}b = +10$$

$$18.1824$$

$$20.6150$$

From Plate Constants $X = 18.2031^{\circ}$ $Y = 20.5697^{\circ}$

$$z = +0.2031^{\circ}$$

$$\eta = -1.4303^{\circ}$$

$$\log z = 9.30771^{\circ}$$

$$\cos 9.99099^{\circ}$$

$$8.50724$$

$$(X-A) 0.80948^{\circ}$$

$$X-A$$

$$+ 645^{\circ}$$

$$A \quad 22 \quad 32 \quad 5-5^{\circ}$$

$$X_0 = 22 \quad 33 \quad 01.45^{\circ}$$

$$\text{Red:}$$

$$+ 373^{\circ}$$

$$X' = 22 \quad 33 \quad 05.18^{\circ}$$

$$\log \tan S = 9.3130^{\circ}$$

$$8.6154$$

$$7.0534$$

$$4.9818^{\circ}$$

$$\log \eta_0 = 0.15543^{\circ}$$

$$7.33115$$

$$2.82428^{\circ}$$

$$S-D = - \quad 11 \quad 07.2^{\circ}$$

$$D = -11 \quad 27 \quad 18^{\circ}$$

$$S_0 = -11 \quad 38 \quad 25.2^{\circ}$$

$$\text{Red:} \quad +17.5^{\circ}$$

$$S' = -11 \quad 38 \quad 07.7^{\circ}$$

3811 Sirius Mean Position (1913.0)

$$X_0 = 18.1800$$

$$Y = 20.6140$$

$$20 = +24$$

$$20 = +10$$

$$18.1824$$

$$20.6150$$

True Place Constants $X = 18.2031$ $Y = 20.5697$

$$\bar{x} = +0.2031$$

$$y = +1.4303$$

$$\log \bar{x} = 9.30771$$

$$\log |x| = 9.3120$$

$$\log 20 = 9.99097$$

$$8.6154$$

$$8.50724$$

$$7.0534$$

$$(x-A) = 0.80950$$

$$4.9818$$

$$x-A = +6.45$$

$$\log y_0 = 0.15543$$

$$7.33115$$

$$A = 22 \quad 32 \quad 5.5$$

$$2.82428$$

$$x_0 = 22 \quad 33 \quad 01.45$$

$$S-D = 11 \quad 07.2$$

$$Red = +3.73$$

$$D = -11 \quad 27 \quad 18$$

$$x = 22 \quad 33 \quad 05.18$$

$$S_0 = -11 \quad 38 \quad 25.2$$

$$Red = +1.75$$

$$S' = -11 \quad 38 \quad 07.7$$

3811 Lumin Parallax.

$$\alpha' = 22^{\circ} 33' 05.18''$$

$$\delta = 22^{\circ} 36' 21.2''$$

$$\begin{aligned} \alpha - \alpha' &= + 3' 16.02'' \\ &+ 0'' 49' 00'' \end{aligned}$$

$$9.95727$$

$$0.00000$$

$$0.00004$$

$$9.95731$$

$$\gamma = 42 \quad 11 \quad 19$$

$$- 11 \quad 38 \quad 08$$

$$53 \quad 49 \quad 27$$

$$9.82690$$

$$8.19646$$

$$990699$$

$$0.17290$$

$$8.10275$$

$$\delta - \delta' = + 43 \quad 33.3''$$

$$\delta = -10 \quad 54 \quad 34.4''$$

$$\text{hamb. Allen } \delta = -10 \quad 54 \quad 38.8''$$

$$\alpha - \alpha' = + 4.4''$$

$$\text{Cur. of Plate} = + 0.7''$$

$$\text{2nd Ord. Ref.} = + 0.1''$$

$$\text{In Corr} = + 0.1''$$

$$\delta = -10 \quad 54 \quad 37.2''$$

$$\alpha - \alpha' = + 7.6''$$

$$\delta' = -11^{\circ} 38' 07.7''$$

$$\pi = 54' 02.70''$$

$$9.86913$$

$$8.19646$$

$$8.15391$$

$$0.00792$$

$$6.22742$$

$$\alpha - \alpha' = + 0' 34.82''$$

$$= + 02.32''$$

$$\alpha = 22 \quad 33 \quad 07.50''$$

$$\alpha = 22 \quad 33 \quad 06.67''$$

$$+ 0.83''$$

$$- 0.09''$$

$$+ 0.03''$$

$$\alpha = 22 \quad 33 \quad 07.53''$$

$$+ 0.86''$$

3811 Lumen Parallax

 $\alpha = 22^\circ 33' 05'' 18$ $\delta = 22^\circ 36' 21'' 2$

$$\begin{array}{r} 0 - \alpha \\ + 3^\circ 16' 02'' \\ + 0^\circ 49' 00'' \end{array}$$

9957.27

000000

000004

9957.31

 $\gamma = 42^\circ 11' 19''$ $- 11^\circ 38' 49''$ $53^\circ 50' 08''$

9.82690

8.19646

990701

0.17290

810281

 $S - S = +43^\circ 33.6'$ $S = -10^\circ 54' 40.3''$ Hamblen $S = -10^\circ 54' 28.8''$

0 - C

+ 7.7

3rd (red. Ref)

+ 0.1

 $S = -11^\circ 38' 13.9''$ $IT = 54^\circ 02' 70''$

9.86913

8.19646

8.15391

000792

622742

 $\alpha - \alpha = +0^\circ 34' 8''$

= + 02.32

 $\alpha = 22^\circ 33' 07.50''$ $\alpha = 22^\circ 33' 06.67''$

+ 0.83

9

