

KG

11366

n.901



Volume XXV



Plates

1407

1408

1412

1911phae.proj.10

Harvard Lunar Plates

Measures and Reductions

Mary Fowler.

Volume XXV

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1407	1911 Nov. 12	1
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1
1
9.
12.
m
8.
2
13.
26
m
6
3
2
2
2
4
27
15
m
8.

MC 1407 Stars - Measures.

1913 June 13.

1

	d	v	d	v
1	15537	15777	17349	16278
9.7	10800 00	10510 08	15038 36	8491 04
12.5	91 95	10 08	35 36	01 04
mag	49	70	51	02
8.2	<u>12.4746</u>	<u>4736</u>	<u>9.7667</u>	<u>7706</u>
2	14011	14840	14890	14260
13.9	11894 00	6968 62	13529 34	5570 87
mag	00	71	39	90 87
6.5	23	50	08	54
	<u>26.2116</u>	<u>2119</u>	<u>13.8642</u>	<u>8666</u>
3	19128	17418	18080	18460
25.6	11588 90	14941 50	13130 26	13396 00
29.7	87	40	24	01
mag	28	18	80	70
6.3	<u>29.7540</u>	<u>7530</u>	<u>25.5047</u>	<u>5066</u>
4	17558	16136	12440	9360 58
27.0	12240	11460 65	12238	58 58
15.5	45 48	60 65	40 38	9168
mag	70	44		
8.2	<u>15.5320</u>	<u>5322</u>	<u>26.9799</u>	<u>1809</u>

Additional Stars 1913 Oct. 8.

18970	15716	19640	18758
73488 90	11190 90	11535	16246
88	90 90	41 40	42 48
60	10	30	48
<u>14.5476</u>	<u>5477</u>	<u>27.2507</u>	<u>2511</u>

MC 1407 Stars - Measures.

1913 June 13.

	d	y	d	y	d	y	d	y
1	15537		15777		17349		16228	
9.7	1080000		1051008		1503836		849104	
12.5	9195		1008		35		0104	
mg	49		70		51		02	
8.2	124746		4736		97687		7706	
2								
13.9	14011		14840		14890		14260	
26.3	1189400		696862		1352934		557087	
mg	00		71		39		9087	
6.5	23		50		08		54	
	262116		2119		138642		8666	
3								
25.6	19128		17412		18080		18460	
29.7	1158890		1494150		1313026		1339600	
mg	87		40		24		01	
8.5	28		18		80		70	
	297540		7530		255047		5066	
4								
27.0	17558		16136		12440		9360	
15.5	12240		1146065		12238		58	
mg	45-48		60		4038		9168	
8.2	70		44					
	155320		5322		269799		1809	

Additional Stars 1913 Oct 8.

18970	15716	19040	18758
1348890	1119090	11535	16240
88	90	4140	4348
60	10	30	44
145476	5477	272507	2511

KIC 1907 Moon-Measures.

1913 June 13.

2

$\frac{d}{\sqrt{}}$	$\frac{d}{\sqrt{}}$	$\frac{d}{\sqrt{}}$	$\frac{d}{\sqrt{}}$
18.8 16717	13970	15618	15570
19.3 13720	6955	13269	7920
2226	5864	60	22
20	64	10	80
<u>192995</u>	<u>2993</u>	<u>187648</u>	<u>7654</u>

20.0 13973	19429
19.5 9415	14005
0913	9595
73	35
<u>19.4561</u>	<u>4566</u>

3
20.6
20.0

18521	18783
15645	1166040
5649	5065
40	80
<u>20.7123</u>	<u>7.127</u>

4	15902
21.0	1156240
20.5	0550
	04
<u>20.4364</u>	

bad point

4 15440	16725	15898	16670
21.1 9196	12960	6666	1590910
20.6 0095	5861	60	00
	35	00	60
47			
<u>20.6247</u>	<u>6231</u>	<u>21.0762</u>	<u>0763</u>

5
21.2
21.0

14865	15701
662120	1393630
10	38
65	09
<u>21.1752</u>	<u>1768</u>

NIC 1407 Moon-Measures

1913 June 13

2

 $\frac{1}{2}$ scratch
$$\begin{array}{r} 18.8 \quad 16717 \\ 19.3 \quad 13720 \\ \hline 2226 \\ 20 \end{array}$$
192995

$$\begin{array}{r} 1 \quad 13970 \\ 6955 \\ \hline 5864 \\ 64 \end{array}$$
2993

$$\begin{array}{r} 15618 \\ 13269 \\ \hline 6060 \\ 10 \end{array}$$
187648

$$\begin{array}{r} 15570 \\ 7920 \\ \hline 2229 \\ 80 \end{array}$$
7654

$$\begin{array}{r} 200 \quad 13973 \\ 195 \quad 9415 \\ \hline 0913 \\ 73 \end{array}$$
194561

$$\begin{array}{r} 19429 \\ 14005 \\ \hline 9595 \\ 35 \end{array}$$
4566

$$\begin{array}{r} 3 \\ 20.6 \\ 200 \end{array}$$

$$\begin{array}{r} 18521 \\ 15641 \\ \hline 5649 \\ 40 \end{array}$$
207123

$$\begin{array}{r} 18783 \\ 1166040 \\ \hline 5065 \\ 80 \end{array}$$
7127

$$\begin{array}{r} 21.0 \quad 15902 \\ 205 \quad 1156240 \\ \hline 0350 \\ 04 \end{array}$$
204364

bad point

$$\begin{array}{r} 21.1 \quad 15440 \\ 20.6 \quad 9196 \\ \hline 0095 \\ 47 \end{array}$$
206247

$$\begin{array}{r} 16725 \\ 12960 \\ \hline 5861 \\ 35 \end{array}$$
6231

$$\begin{array}{r} 15898 \\ 6666 \\ \hline 6060 \\ 00 \end{array}$$
210762

$$\begin{array}{r} 16670 \\ 1590910 \\ \hline 0010 \\ 60 \end{array}$$
0763

$$\begin{array}{r} 21.2 \\ 21.0 \end{array}$$

$$\begin{array}{r} 14865 \\ 662120 \\ \hline 1065 \end{array}$$
211752

$$\begin{array}{r} 15701 \\ 1393630 \\ \hline 3830 \\ 09 \end{array}$$
1768

1407 Moon Measures

1913 June 13. 3

6
21.2
21.3
max
56
7
21.1
23.0

8
20.4
23.0

9
20.0 16412
23.3 13963 60
60
22
23 2453

16984
9389 11
90
84
2413

15997
806874
64
07
21.2064

15140
615258
46
49
21.1004

18846
1283850
40
50
20.3995

14728
1265540
4840
20
2078

14790
1376878
6678
90
1019

14691
1070120
97
00
3989

y = min at approximately 19.2600

1407 Moon Measures

 α γ ν

6
 21.2
 21.3
 max
 21.1
 22.0

8
 20.4
 23.0

9
 20.0 16412
 23.3 13963 60
 60
 22
23 2413

16984
 9389 11
 90
 84
2413

γ - min at approximately 19.2600

1913 June 13 3

 α γ ν

15997
 806874
 6474
 07
21.2064

15140
 615258
 4658
 49
21.1004

18846
 1283850
 4050
20.3995

14728
 12655
 4840
 20
2078

14790
 1376878
 6678
 90
1019

14691
 1070120
 9720
 00
3989

MC1407 *Standarda Corvado* 1913 June 13 4

Cape No. 1332 mag 8.2

Cape No. 1336 mag 6.5

C	9	36	47.67 ^v
L			69
E			64
mean	9	36	47.67 ^v
Prac			+36.50 ^v
δ	9	37	24.17
A	9	41	53
$\delta - A$	-	4	28.83 ^v
$\sin(\delta - A)$			-268.81 ^v
$\log \dots$			2.42945 ^m
$\dots \cos \delta$			9.97945 ^v
$\dots \sin \delta$			0.91614 ^m
$\dots$			-8.2440 ^v
$\dots$			33 ^v
$\dots$			9.7527 ^v
$\dots$			97696 ^v

 $\gamma - \delta$ +169^v

C	+17°	32'	14.1 ^v
L			15.8
E			14.9
mean	+17	32	14.9 ^v
Prac		-2	59.0 ^v
δ	+17	29	15.9 ^v
D	+18	43	45 ^v
$\delta - D$	-	1	14 29.1 ^v
$\tan(\delta - D)$			-4469.8 ^v
$\log \dots$			3.65029 ^m
$\dots \gamma_0$			0.98144 ^m
$\dots \tan \delta$			9.4984 ^v
$\dots \sin \delta$			1.8323 ^v
$\dots \gamma_1$			8.3841 ^v
γ_0			-9.5816 ^v
γ_1			+242 ^v
γ			12.4426 ^v
γ			124741 ^v

9 ⁿ	38 ^m	56.45 ^v
		39
		44
9	38	56.43 ^v
		+36.76 ^v
9	39	33.19
9	41	53
-	2	19.81 ^v
		-139.81 ^v
		2.14554 ^m
		9.97495 ^v
		0.62773 ^m
		-4.2435 ^v
		4 ^v
		13.7561 ^v
		13.8654 ^v

 $\gamma - \delta$ +1093^v

+19°	19'	24.8 ^v
		247
		23.6
+19	19	24.4 ^v
	-3	00.2 ^v
+19	16	24.2 ^v
+18	43	45 ^v
+	32	3.92 ^v
		+1959.3 ^v
		3.29210 ^m
		0.62325 ^v
		9.5437 ^v
		1.2555 ^v
		7.8526 ^v
		+4.2000 ^v
		+71 ^v
		26.2071 ^v
		262118 ^v

Q.S. 3955 mag. 9.1

Q.S. 9 44 54.86
 Prec. +1 59.17
 δ 9 46 54.03
 A 9 41 53
 $\alpha - A$ + 5 01.03
 $\sin(\alpha - A)$ + 301.01
 $\log$ 2.47858
 $\cos \delta$ 9.97877
 $\sin$ 0.96459
 Σ + 921.70
 Σ_1 + 31
 Σ 2822.01
 Σ_1 2725.09
 $\Sigma - \Sigma_1$ 4
 $\Sigma - \Sigma_1$ + 308

Q.S. +17.56 14.8
 Prec. - 10 01.8
 δ +17.46 13.0
 D +18.43 45
 $\delta - D$ - 57 32.0
 $\tan(\alpha - \delta)$ - 3452.3
 $\log$ 3.53811m
 $\log$ 0.86926m
 $\tan \delta$ 9.5058
 Σ 1929.2
 Σ_1 8.4884
 Σ_0 - 7400.5
 Σ_1 + 308
 Σ 14.6303
 Σ_1 14.5476
 $\Sigma - \Sigma_1$ 0.0827

MC1447

Stardome Corvus

1913 June 13 4

Cape No 1332 mag 8.2

Cape No. 1336 mag 6.5

C 9 36 47.67

9 38 56.45

L 69

39

E 64

44

Mean 9 36 47.67

9 38 56.43

Procc + 36.50

+ 36.76

x 9 37 24.17

9 39 33.19

A 9 41 53

9 41 53

x-A - 4 28.83

- 2 19.81

sin(A-A) - 268.81

- 139.81

log. 2.42945m

2.14554m

cos 9.97945

9.97495

- 50 0.91619m

0.62773m

30 - 8.2440

- 4.2435

31 - 33

- 4

3 9.7527

13.7561

x 9.7696

13.8654

x-S - 169

+ 1093

C + 17° 32' 19.1

+ 19° 19' 24.8

L 15.8

24.7

E 14.9

23.6

Mean + 17 32 14.9

+ 19 19 24.4

Procc - 2 59.0

- 3 00.2

S + 17 29 15.9

+ 19 16 24.2

D + 18 43 45

+ 18 43 45

S-D - 1 14 29.1

+ 32 39.2

Tan(d-A) - 44.698

+ 19.593

log. 3.65029m

3.29210

y0 0.98144m

0.62325

tan S 9.4984

9.5437

S2 1.8323

1.2555

y1 8.3841

7.8526

y0 - 9.5816

+ 4.2000

y1 + 24.2

+ 71

y 12.4426

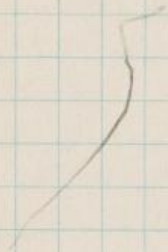
26.2171

y 12.4741

26.2118

y - 31.5

+ 47



Standard Coordinates. 1913 June 13.				1913 June 13.			
Cape W. 1347 mag 8.5				a 5. (Berlin) 20.39.54 mag 8.2			
C	9 ^m	45 ^m	19.89 ^v	9 ^m	44 ^m	45.88 ^v	
L			95				
E			1989				
Mean	9	45	1991 ^v				
Procr			+36.72 ^v			+1 59.25 ^v	
K	9	45	56.63	9	46	45.13	
A	9	41	53 ^v	7	41	53 ^v	
K-A		4	03.63		4	52.13 ^v	
sin(K-A)			+243.62 ^v			+292.11 ^v	
log ..			238672 ^v			246554 ^v	
cos ..			9.97370 ^v			9.97845 ^v	
30			086766 ^v			0.95123 ^v	
30			+7.3733 ^v			+8.9378 ^v	
31			+21 ^v			+26 ^v	
3			25.3754 ^v			26.9404 ^v	
2			25.5056 ^v			26.9804 ^v	
2-3			+1302 ^v			+400 ^v	
L			+19° 47' 26.7 ^v			+18° 03' 59.4 ^v	
L			26.8				
E			26.7				
Mean			+19 47 26.7 ^v				
Procr			-3 03.7			-10 01.6 ^v	
B			+19 44 23.0 ^v			+17 53 57.8 ^v	
D			+18 43 45 ^v			+18 43 45 ^v	
B-D			+1 00 38.0 ^v			- 49 47.2 ^v	
tan(B-D)			+3638.4			-2987.4 ^v	
log ..			3.56091 ^v			3.47530 ^v	
70			0.89206 ^v			0.80645 ^v	
tan 5			9.5549 ^v			9.5092 ^v	
3 ²			17353 ^v			19025 ^v	
71			8.3436			8.4651 ^v	
70			+77994 ^v			-64040 ^v	
71			+221 ^v			+292 ^v	
72			29.8215 ^v			15.6252 ^v	
73			29.7535 ^v			15.5321 ^v	
74			-680 ^v			-931 ^v	

1911phae 14073 Standard candles

1913 June 13

5

Cape No. 1347 mag 8.5

A 5. (Berlin) No. 39.5-4 mag 8.2

C 9 45 19.89

9 44 45.88

L 9.5

E 19.89

Mean 9 45 19.91

P.M. +36.72

d. 9 45 56.63

A 9 41 53

d-A 9 4 03.63

Sum (d-A) +243.62

log 238672

log 997370

log 086766

log 086766

log +7.3733

log 1 2-1

log 25.3754

log 25.5056

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

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log 2-5 +1302

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log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

log 2-5 +1302

+1 5925

9 46 45.13

9 41 53

+4 52.13

+292.11

2.46554

9.97845

0.95123

0.95123

+8.9378

1 26

26.9404

26.9804

+400

+400

+400

+400

+400

+400

+400

+400

+400

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+400

+400

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+400

+400

+400

+400

+400

+400

1407 1 June 1911
 Exp. Titan 1911 Nov. 14 $8^h 38^m - 8^h 50^m$
 moon $8 43 35.4 - 8 43 35.6$
 clock slow $0 44.3$

H. Sid. i. $8 44 19.8$
 H. Long $4 44 31.05$
 G. Sid. i. $13 28 50.85$
 Sid. i. the moon $15 21 59.62$
 Interval $22 06 51.23$
 Reduction $3 37.37$
 G. m. T. $22 03 13.86$

From Hart Alm R. G. H. C.
 Moon 22nd $9^h 41^m 35.87 + 19 03 14.1$
 sidereal $22 27 35 124.21$
 $3^h 23.1 + 7.35 - 40.1$
 tabular place $9 41 43.22 + 19 02 34.0$

Moon's place $5^h 5' 33.8$
 sidereal $15' 59.0$

MC1407

1913 June 13 6

Center of Photo etc.

Star	α	δ	R.A.	Decl.
1	9.7696	12.4741	9 ^h 37 24	+17 29 16
2	13.8654	26.2118	39 33	+19 16 24
3	25.5056	29.7535	45 57	+19 44 23
4	26.9804	15.5321	46 45	+17 53 58
4	176.12	83.97	169 39	124 01
	19.03	20.99	9 42 25	+18 36 00
	-18	-22	-32	+7 45
	1.03	1.00	9 ^h 41 ^m 53 ^s	+18 43 45
	31	46.5		
	32	46.5		

use stars (5) instead of 4

Center { A = 9^h 41^m 53^s
D = +18° 43' 45"

2 = 27 25 09 in = 14.5476

Preliminary Reduction

20-3	-674	+672
+169	-836	-667 = +5
+1093	-1756	-663 = +9
+1302	-1993	-691 = -19
+308	-975	-667 = +5
19.1168	-1430	= 19.0410
4 = 2	+657	-24 -913
+315	+635	+950 -25 = +925 = +12
+474	901	+948 -52 = +896 = -17
-680	+1658	+978 -60 = +918 = +5
-827	+1771	+944 -29 = +915 = +2
21.3497	+1243	-43 = 21.3784

From Tables	H + a = + 0.0	a = -0.9	e = -1.5	a - e
Obs.	+ 2.0	a = -0.8	+0.9	-1.9
C = 0	- 2.0			+2.5

1407 Trines Cte

Exp to stars 1911 Nov. 12 8^h 38^m - 8^h 50^mmoon 8 43 35.4^s - 8 43 35.6^sclock slow 0 44.3^sH. Sid T. 8 44 19.8^sH. Long. 4 44 31.0^sG. Sid T. 13 28 50.8^sSid T. the Moon 15 21 59.6^sDifferential 22 06 51.2^sReduction 3 37.3^sG. m. T. 22 03 13.8^s 6-11-0^s 57^s 23^s

From Naut. Alman. R. A. Decl

Nixon 22^h 19^m 41^s 35.87 + 19 03 14.1Mothorn 1^h 22 27 35^s + 12 40 2^s3^h 23 1^s + 7.3^s - 40.1^s

Tabular place 9 41 43.22 + 19 02 34.0

Moon's parallax 58' 33.7^sRefraction 15' 59.0^s

Moon's age 22 days

M61407

1913 June 13. 6

Center of Plate etc

star	α	δ	R.A.	Decl.
1	9.7696	12.4741	9 ^h 37.29	+17 29 16
2	13.8654	26.2118	39 33	+19 16 24
3	25.5056	29.7535	45 57	+19 44 23
4	26.9804	15.5321	46 45	+17 53 58
4	17612	8397	169 39	144 01
	1903	20.99	9 42 25	+18 36 00
	-18	-2	-32	+ 7 45
	103	100	9 ^h 41 ^m 53 ^s	+18 43 45
	31	465		
	32	465		

$$\text{Center } \begin{cases} A = 9^h 41^m 53^s \\ D = +18^\circ 43' 45'' \end{cases}$$

Preliminary Reduction

$\alpha - 3$	-674	+672
+169	-836	-667
+1093	-1756	-663
+1302	-1993	-691
+308	-975	-667
19.1168	-1430	19.0410
$\alpha - 2$	+652	-27
+315	-635	+950
+47	901	+948
-680	+1658	+978
-827	+1771	+944
21.3497	+1243	-43
		-913
		-25
		+925
		+896
		+918
		+915
		-21.3784

Iron Tables	$\mu + \alpha$	+ 0.0	$\alpha = -0.9$	$\alpha = -1.5$	+0.6
Obs		+ 2.0	$\alpha = -0.8$	+0.4	-1.9
C=0		- 2.0			+2.5

Formation of Normals

	ab	ac	bc
2	-1.67 -	0.9 +	1.9
3	-21.5 +	41.5 -	35.1
4	-14.2 +	3.9 -	1.4
5	-0.72 -	70.0 +	11.9
6	+0.00 +	66.9 +	0.0
7	+1.29 -	107.0 -	35.1
8	+21.2 +	30.8 +	39.8
9	+1.67 +	2.6 +	5.7
	-4.22 -	37.4 -	12.3
	-0.88 -	32.2	

$$[ac] = +10.97 \quad [aa] = +22.13$$

$$[bc] = -0.23 \quad [bb] = +12.79 \quad cm = -2$$

pt.	pos. L	residual
1	189.7	reject
2	155.0	-1.4
3	130.2	+2.6
4	110.3	+9
5	99.7	-2.6
6	90.0	+4.2
7	71.8	-4.5
8	37.8	+2.4
9	25.0	-3

MC1407 Morris Center.

1913 June 17.

7

	x	y	$x - X_0$	$(x - X_0)^2$	R^2	$y - C$
1	18.7651	-0.3520	0.1239	4.3284	reject	
2	20.0000	+0.8829	0.7795	4.3648	-1	
3	20.7125	+1.5954	2.5453	4.3675	+26	
4	21.0762	+1.9591	3.8381	4.3651	+2	
5	21.1760	+2.0589	4.2391	4.3615	-34	
6	21.2071	+2.0900	4.3681	4.3681	+32	
7	21.1012	+1.9841	3.9367	4.3595	-54	
8	20.3992	+1.2821	1.6438	4.3673	+24	
9	20.0000	+0.8829	0.7795	4.3652	+3	
			Mean =	4.3649	-2	

	y	$y - Y_0$	Δy	$(y - Y_0)^2$
1	19.2994	-2.0504	-1	4.2045
2	19.4564	-1.8934	-1	3.5853
3	20.0000	-1.3498	-1	1.8222
4	20.6239	-0.7259	0	0.5270
5	21.0000	-0.3498	0	0.1224
6	21.3498	0.0000	0	0.0000
7	22.0000	+0.6502	0	0.4228
8	23.0000	+1.6502	+1	2.7235
9	23.2433	+1.8935	+1	3.5857

Approximate Center

$$x = 20.0 \quad y = 19.4564$$

$$23.2433$$

$$42.6997$$

$$\text{mean } y = 21.3498$$

$$y_{\text{min}} = 19.2600$$

$$R = 2.0900$$

$$x_{\text{max}} = 21.2071$$

$$\text{mean } x = 19.1171$$

$$\text{Center } \begin{cases} X_0 = 19.1171 \\ Y_0 = 21.3498 \end{cases}$$

MC1907 Morris Center

19135 ma 17.

7

	x	$-x$	$(-x)^2$	R	$-L$
1	187651-03520	0.1239	43284		
2	200000+08829	0.7795	43648		-1
3	207125+15959	2.5453	43675		+26
4	210762+19591	3.8381	43651		+2
5	211760+20589	4.2391	43615		-39
6	212071+20900	43681	43681		+33
7	211012+19841	3.9367	43595		-54
8	205992+12421	1.6438	43673		+24
9	200000-08829	0.7795	43652		+3
			43649		-2

	y	$y - Y_0$	Δy	$(y - Y_0)^2$
1	19.2994-20504	-1	42045	
2	19.4564-18934	-1	35853	
3	20.0000-13498	-1	18222	
4	20.6239-07259	0	05270	
5	21.0000-03498	0	01224	
6	21.3498 00000	0	00000	
7	22.0000+06502	0	04228	
8	23.0000+1.6502	+1	27235	
9	23.2433+1.8935	+1	35857	

Approximate Center

$$x = 200 \quad y = 19.4564$$

$$\underline{23.2433}$$

$$+2.6997$$

$$\text{mean } y = 21.3498$$

$$y - \text{mean} = 19.2600$$

$$R = 2.0900$$

$$x - \text{mean} = 21.2071$$

$$\text{mean } x = 19.1171$$

$$\text{Center } \begin{cases} x = 19.1171 \\ y = 21.3498 \end{cases}$$

	c	0-c
1 - 14 + 3 + 24 = +13		-14
2 - 26 + 2 + 24 = 0		+26
3 - 32 + 1 + 24 = -7		+9
4 - 33 + 1 + 24 = -8		-26
5 - 38 - 0 + 24 = -10		+42
6 - 32 - 1 + 24 = -9		45
7 - 21 - 3 + 24 = 0		+24
8 - 14 - 3 + 24 = +7		-3

$$-88 + 101$$

$$\text{Average} = 24$$

Corrected Results

a	b	c
+ 22.13 -	0.88 +	12.73 = -32
- 0.88 +	12.79 -	0.23 = -12
+ 12.73 -	0.23 +	8.00 = -2

+ 0.88 -	0.09 +	0.51 = -1
- 12.73 +	0.51 -	7.33 = +18

$$+ 12.75 + 0.28 = -13$$

$$+ 0.28 + 0.67 = +16$$

$$- 0.28 - 0.01 = +0$$

$$+ 0.66 = +16$$

$$c = +24.2$$

$$- 0.12 - 0.28 = -7$$

$$+ 12.63 = -20$$

$$b = -2$$

$$- 48.90 + 0.88 - 30.60 = +8$$

$$+ 711.80 - 12.79 + 449.60 = -111$$

$$- 26.77 - 17.87 = -24$$

$$+ 710.92 + 444.37 = -123$$

$$+ 28.56 + 17.87 = 5$$

$$+ 1.99 = -29$$

$$a = -16.2$$

MC 1407

1913 June 18.

Conditional Equations

	a	b	c						0-c
1	+0.88	-1.89	+12	-1	-	6	+6	+8	-9
3	+1.60	-1.35	+12	+26	-	11	+4	+8	+25
4	+1.96	-0.73	+12	+2	-	13	+2	+8	+5
5	+2.06	-0.35	+12	-34	-	14	+1	+8	-29
6	+2.09	+0.00	+12	+32	-	14	-0	+8	+38
7	+1.98	+0.65	+12	-54	-	13	-2	+8	-47
8	+1.28	+1.65	+12	+24	-	9	-5	+8	+30
9	+0.88	+1.89	+12	+3	+	6	-6	+8	-5

Normal Equations

 $\frac{1}{2} 90 + 18$
 Average = 23

$$+22.13 - 4.22 + 10.97 = -37$$

$$- 4.22 + 12.79 - 0.23 = -12$$

$$+10.97 - 0.23 + 8.00 = -2$$

$$\frac{\Delta x}{\Delta z} = -1.10$$

$$+ 4.22 - 0.80 + 2.09 = -7$$

$$-10.97 + 2.09 - 5.44 = +18$$

$$+ 11.99 + 1.86 = -19$$

$$+ 1.86 + 2.56 = +16$$

$$\frac{\Delta y}{\Delta z} = -0.32$$

$$- 1.86 - 0.29 = +3$$

$$+ 2.27 = +19$$

$$c = +8$$

$$- 1.35 - 1.86 = -12$$

$$+ 10.64 = -31$$

$$b = -3$$

$$-201.00 + 4.22 - 146.85 = +37$$

$$+609.00 - 12.79 + 444.60 = -111$$

$$-178.87 - 135.88 = 0$$

$$+604.78 + 444.37 = -123$$

$$+184.47 + 135.88 = -38$$

$$+ 5.60 = -38$$

$$a = -7$$

	C	0	0-C
- 8 - 8 + 29 = + 13	+ 5	- 8	
- 12 - 16 + 29 = + 1	+ 9	+ 8	
- 21 - 19 + 29 = - 11	- 19	- 8	
- 23 - 9 + 29 = - 3	+ 5	+ 8	

+ 6 - 12 + 9 = + 3	+ 12	+ 9
+ 8 - 25 + 9 = - 8	- 17	- 9
+ 15 - 28 + 9 = - 4	+ 5	+ 9
+ 16 - 14 + 9 = + 11	+ 2	- 9

- 1 + 9 - 13 = - 5	- 4	+ 1
- 2 + 19 - 13 = + 4	+ 3	- 1
- 3 + 22 - 13 = + 6	+ 7	+ 1
- 3 + 11 - 13 = - 5	- 7	- 2

+ 6 + 7 - 23 = - 10	- 8	+ 2
+ 8 + 14 - 23 = - 1	- 3	- 2
+ 16 + 16 - 23 = + 9	+ 11	+ 2
+ 17 + 8 - 23 = + 2	- 1	- 3

MC1407 + 1408

9

Plate constants

1408

		~~507~~		1408	
		$x-3$	$y-2$	$x-3$	$y-2$
-	975 + 12.44 + 1 =	+5	+12	-4	-6
+	13.76 + 26.21 + 1 =	+9	-17	+3	-3
+	25.38 + 29.82 + 1 =	-19	+5	+7	+11
+	27.22 + 14.63 + 1 =	+5	+2	-7	-1
+	11.76 + 19.32 + 1 =	+7.00	-2.50	-0.50	-5.50
+	26.30 + 22.22 + 1 =	-7.00	+3.50	0.00	+5.00
+	18.48 + 13.54 + 1 =	+5.00	+7.00	-5.50	-4.50
+	19.57 + 28.02 + 1 =	-5.00	-6.00	+5.00	+4.00
-	14.54 - 2.90 =	+14.00	-6.00	+0.50	-10.50
-	1.09 - 14.48 =	+10.00	+13.00	-10.50	-8.50
+	1.09 + 0.22 =	1.05	+0.45	+0.04	+0.79
	- 14.26 =	+8.95	+13.45	-10.46	-7.71
	b =	-0.62	-0.94	+0.73	+0.54
	a =	0.89	+0.60	-0.11	+0.61

+7.0	-7.0	+5.0	-5.0	-2.5	+3.5	+7.0	-6.0
498	422.0	+15.5	+16.4	-7.1	-15.8	-11.1	-11.7
+12.1	+13.8	+8.4	+17.5	+18.2	+21.0	+12.8	+26.5
+28.9	+28.8	+28.9	+28.9	+8.6	+8.7	+8.7	+8.8
-0.5	0.0	-5.5	+5.0	-5.5	+5.0	-4.5	+4.0
+11.3	+2.9	+2.1	+2.2	-7.2	-16.1	-11.3	-12.0
-14.2	-16.3	-10.0	-20.6	-10.5	-12.0	-7.3	-15.2
-13.9	-13.4	-13.4	-13.4	-23.2	-23.1	-23.1	-23.2

MC1407 + 1408

9

Plate constants

1408

		1407		1408	
		x-3	y-7	x-3	y-7
+ 9.75	+ 12.44 + 1 =	+ 5	+ 12	- 4	- 6
+ 13.76	+ 26.21 + 1 =	+ 9	- 17	+ 3	- 3
+ 25.38	+ 29.82 + 1 =	- 19	+ 1	+ 7	+ 11
+ 27.22	+ 14.63 + 1 =	+ 5	+ 2	- 7	- 1
+ 11.76	+ 19.32 + 1 =	+ 7.00	- 2.50	- 0.50	- 5.50
+ 26.30	+ 22.22 + 1 =	- 7.00	+ 3.50	0.00	+ 5.00
+ 18.48	+ 13.54 + 1 =	+ 5.00	+ 7.00	- 5.50	- 4.50
+ 19.57	+ 28.02 + 1 =	- 5.00	- 6.00	+ 5.00	+ 4.00
- 14.54	- 2.90 =	+ 14.00	- 6.00	- 0.50	- 10.50
- 1.09	- 14.48 =	+ 10.00	+ 13.00	- 10.50	- 8.50
+ 1.09	+ 0.22 =	- 1.05	+ 0.95	+ 0.04	+ 0.79
	- 14.26 =	+ 8.95	+ 13.45	- 10.46	- 7.71
	b =	- 0.62	- 0.94	+ 0.73	+ 0.54
	a =	- 0.89	+ 0.60	- 0.11	+ 0.61

+ 7.0	- 7.0	+ 5.0	- 5.0	- 2.5	+ 3.5	+ 7.0	- 6.0
+ 9.8	+ 22.0	+ 15.5	+ 16.4	- 7.1	- 15.8	- 11.1	- 11.7
+ 12.1	+ 13.8	+ 8.4	+ 17.5	+ 18.2	+ 21.0	+ 12.8	+ 26.5
+ 28.9	+ 28.8	+ 28.9	+ 28.9	+ 8.6	+ 8.7	+ 8.7	+ 8.8
- 0.5	+ 0.0	- 5.5	+ 5.0	- 5.5	+ 5.0	- 4.5	+ 4.0
+ 11.3	+ 2.9	+ 2.1	+ 2.2	- 7.2	- 16.1	- 11.3	- 12.0
- 14.2	- 16.3	- 10.0	- 20.6	- 10.5	- 12.0	- 7.3	- 15.2
- 1.39	- 13.4	- 13.4	- 13.4	- 23.2	- 23.1	- 23.1	- 23.2

M21407

10

Moon's Mean Position (1911.0)

$$\begin{array}{rcl}
 X_0 = 19.1171^\circ & Y_0 = 21.3498^\circ & \\
 \frac{1}{2}a = \frac{-8^\circ}{19.1163^\circ} & \frac{1}{2}b = \frac{-1^\circ}{21.3497^\circ} &
 \end{array}$$

From Preliminary Reduction $X = 19.0405^\circ$ $Y = 21.3784^\circ$
 ... Relative Constants $a_x = -16$ $+11$
 $b_y = -13$ -20
 $c = +29$ $+9$

$$\begin{array}{rcl}
 \bar{z} = +1.0405^\circ & & \\
 \log \bar{z} = 0.01744^\circ & & \\
 \log \cos \delta = 9.97657 & & \\
 \log \cos \delta = 8.50729 & & \\
 \log (\alpha - A) = 1.53343^\circ & &
 \end{array}$$

$$\alpha - A = +34.15^\circ$$

$$A = 9^\circ 41' 53''$$

$$X_0 = 9^\circ 42' 27.15''$$

$$\text{Red} = +232$$

$$\alpha' = 9^\circ 42' 29.47''$$

$$\eta = -0.6216^\circ$$

$$\begin{array}{rcl}
 \log \tan \delta = 9.5299^\circ & & \\
 \log \frac{z}{z_0} = 0.0349^\circ & & \\
 \log \eta_1 = 6.6182^\circ & & \\
 \eta_1 = +4^\circ & &
 \end{array}$$

$$\eta_0 = -0.6220^\circ$$

$$\log \eta = 9.79379^\circ$$

$$\log \cos \delta = 7.33115^\circ$$

$$\log (\alpha - D) = 2.46264^\circ$$

$$S - D = -4.502^\circ$$

$$D = +18.43.45^\circ$$

$$S_0 = +18.38.54.8^\circ$$

$$\text{Red} = -8.1$$

$$S' = +18.38.46.7^\circ$$

M61407

Moon's Mean Position (1911.0)

$$\begin{array}{r}
 X_0 = 191171 \quad Y_0 = 213498 \\
 \frac{1}{2}a = \frac{-8}{191163} \quad \frac{1}{2}b = \frac{-1}{213497}
 \end{array}$$

From Preliminary Reduction $\gamma = 190405$ $\gamma = 213784$

Plate Constants

$$\begin{array}{r}
 a_x = -16 \quad +11 \\
 b_y = -13 \quad -20 \\
 c = +29 \quad +9
 \end{array}$$

$$\begin{array}{r}
 z = +1.0405 \\
 \log z = 0.01794 \\
 \log S = 9.97657 \\
 \log w = 8.50724 \\
 (x-A) = 1.53348
 \end{array}$$

$$x - A = +3415$$

$$A = 9^h 41^m 53^s$$

$$\begin{array}{r}
 X_0 = 9^h 42^m 27.15^s \\
 + 2.32
 \end{array}$$

$$9^h 42^m 29.47^s$$

$$\gamma = -0.6216$$

$$\begin{array}{r}
 \log \tan \delta = 9.5299 \\
 \log \frac{1}{\sin \delta} = 0.349 \\
 \gamma_1 = 6.6182 \\
 \gamma_2 = +9
 \end{array}$$

$$\gamma_0 = -0.6220$$

$$\begin{array}{r}
 \log = 9.79379 \\
 \log w = 7.33115
 \end{array}$$

$$(x-D) = 2.46264$$

$$S-D = -4502$$

$$D = +184345$$

$$S_0 = +1838548$$

1407 Red. ad. C. app.

$$H + \alpha \quad 12^h \quad 13^m = 183^\circ 15'$$

$$H \quad 2 \quad 31$$

$$\alpha_0 \quad 9 \quad 42$$

$$G \quad 22 \quad 00$$

$$G + \alpha \quad 7 \quad 42 = 115^\circ 30'$$

$$\delta_0 = +18^\circ 38'$$

$$l \cos S = 9.9766$$

$$l \quad \underline{0.7193}$$

$$l(l) \quad 0.6959$$

$$l \cos(G + \alpha) \quad 9.6340 m$$

$$s \quad 1.1955$$

$$\sin \quad 9.9555$$

$$\tan S \quad 9.5279$$

$$8.8239$$

$$l(g') \quad 0.8295 m$$

$$l(g) \quad 9.5028$$

$$l \sin S \quad 9.5045$$

$$l \cos(H + \alpha) \quad 9.9993 m$$

$$h \quad 1.2958$$

$$\sin \quad 8.7535 m$$

$$\sec S \quad 0.0234$$

$$8.8239$$

$$l(h') \quad 0.7996 m$$

$$h \quad 8.8966 m$$

$$\begin{array}{r} f \quad +2.08 \\ s \quad +0.32 \\ h \quad -0.08 \\ \hline +2.32 \end{array}$$

$$\begin{array}{r} g' \quad -6.75 \\ h' \quad -6.30 \\ l \quad +4.96 \\ \hline -8.09 \end{array}$$

1407

Lunar Parallax.

$$\begin{array}{r} \alpha' = 9^{\text{h}} 42^{\text{m}} 29.47^{\text{s}} \\ \delta = 8^{\circ} 44' 19.8'' \\ - 0^{\circ} 58' 09.7'' \\ - 14^{\circ} 32' 26'' \end{array}$$

$$- 5' 45''$$

$$- 14' 26.41''$$

$$9.95727$$

$$0.00000$$

$$0.01395$$

$$997122$$

$$\delta = 43^{\circ} 06' 10''$$

$$S = 18^{\circ} 38' 47''$$

$$24' 27.23''$$

$$9.82640$$

$$8.23132$$

$$9.61700$$

$$0.16539$$

$$784011$$

$$S - S' = +23' 47.4''$$

$$\delta = +19^{\circ} 02' 34.1''$$

$$\alpha = 9^{\text{h}} 41^{\text{m}} 43.44^{\text{s}}$$

$$\text{Am Eph } S = +19^{\circ} 02' 34.0''$$

$$\alpha = 9^{\text{h}} 41^{\text{m}} 43.22^{\text{s}}$$

o-c

+ 0.1

+ 0.22

cor for Irradiation

+ 0.5

+ 0.12

+ 0.6

+ 0.34

8
17

3
17
21

2
2
3

4
2
1

2
14

MC 1408 Stars Measures

1913 June 14, 12

	d	v	d	v
1	14352	15940	15667	16080
8.4	1029080	13989	882834	1288080
2.8	9289	9095	4034	8680
	42	25	58	65
	<u>12.8056</u>	<u>.8054</u>	<u>8.3173</u>	<u>.3193</u>
2	17509	17630	16290	19020
12.5	1216060	1295050	1082020	1447073
26.5	7170	48	18	70
	90	20	76	20
	<u>26.5328</u>	<u>.5324</u>	<u>12.4536</u>	<u>.4549</u>
3	10358	1207070	16080	16454
24.1	997780	70	7075	1537064
30.0	75-80	11690	80	6060
			10	38
	<u>30.0381</u>	<u>.0380</u>	<u>24.1065</u>	<u>.1088</u>
4	16570	14259	16985	15260
25.6	844855	1238884	1235033	988682
15.8	55	7880	48	8082
	70	69	80	54
	<u>15.8117</u>	<u>.8121</u>	<u>25.5363</u>	<u>.5374</u>

Additional Stars

1913 Oct. 8.

27.8	17182	18690	16068	16620
14.8	891410	1697170	1410110	857068
	10	74	00	72
	92	98	70	29
	<u>14.8279</u>	<u>.8280</u>	<u>25.8039</u>	<u>.8057</u>

1461408 Star measures

1913 June 14 12

	α	δ	α	δ	α	δ
1	14352	15940	15667	16080		
8.4	1029080	1398995	882834	1268080		
12.8	9289	90	4034	8680		
	42	25	58	65		
	<u>12.8056</u>	<u>8054</u>	<u>8.3173</u>	<u>3193</u>		
2	17509	17630	16290	19020		
12.5	1216060	1295050	1082020	1447073		
26.5	7170	48	18	70		
	90	20	76	20		
	<u>26.5328</u>	<u>5324</u>	<u>12.4536</u>	<u>4549</u>		
3	10358	1207070	16080	16454		
24.1	997780	70	707575	1537064		
30.0	75	11690	80	6060		
			10	38		
	<u>30.0381</u>	<u>0380</u>	<u>24.1065</u>	<u>1088</u>		
4	16570	14259	16985	15260		
25.6	844855	1238884	1235033	988682		
15.8	55	7880	48	80		
	70	69	80	54		
	<u>15.8117</u>	<u>8121</u>	<u>25.5363</u>	<u>5374</u>		

Additional Star

1913 Oct 8

25.8	17182	18690	16068	16620		
14.8	891910	1697170	1410110	857068		
	10	74	00	72		
	92	98	70	29		
	<u>14.8279</u>	<u>8280</u>	<u>25.8039</u>	<u>8057</u>		

18.
19. $\frac{1}{19}$
19 $\frac{2}{19}$
19 $\frac{3}{20}$
20 $\frac{4}{20}$
21 $\frac{5}{20}$
21
22
23

1913 June 14 13

MC 1408 Moon Measures

$\begin{array}{r} d \\ \downarrow \end{array}$ scratch possibly in a valley
 $\begin{array}{r} 18.2 \\ 19.2 \end{array} \begin{array}{r} 18768 \\ 16730 \end{array} \begin{array}{r} 18498 \end{array}$

$\begin{array}{r} 34 \\ 82 \\ \hline 192036 \end{array}$

y = min at approx monthly 19.1950

$\begin{array}{r} 1 \\ 19.0 \\ 19.3 \end{array} \begin{array}{r} 17850 \\ 14840 \\ 45-46 \\ 70 \\ \hline 193012 \end{array}$

$\begin{array}{r} 17868 \\ 1089078 \\ 80 \\ 65 \\ \hline 3017 \end{array}$

$\begin{array}{r} 2 \\ 19.5 \\ 19.5 \end{array} \begin{array}{r} 16860 \\ 1152425- \\ 25 \\ 60 \\ \hline 195335 \end{array}$

$\begin{array}{r} 16890 \\ 1223030 \\ 21 \\ 78 \\ \hline 5343 \end{array}$

$\begin{array}{r} 17136 \\ 1207085- \\ 8070 \\ 28 \\ \hline 194944 \end{array}$

$\begin{array}{r} 16746 \\ 1181096 \\ 00 \\ 36 \\ \hline 4939 \end{array}$

$\begin{array}{r} 3 \\ 20.0 \\ 20.0 \end{array}$

$\begin{array}{r} 12070 \\ 1206564 \\ 59 \end{array}$

$\begin{array}{r} 1083038 \\ 20 \\ 10802 \end{array}$

$\begin{array}{r} 4 \\ 20.4 \\ 21.0 \end{array}$

$\begin{array}{r} 19.9995 \end{array}$

$\begin{array}{r} 9973 \end{array}$

$\begin{array}{r} 14930 \\ 906665 \\ 70 \\ 16 \end{array}$

$\begin{array}{r} 17250 \\ 1307070 \\ 60 \\ 36 \end{array}$

$\begin{array}{r} 20.4145 \end{array}$

$\begin{array}{r} 4177 \end{array}$

$\begin{array}{r} 5 \\ 20.5 \\ 21.2 \\ 21.2 \\ 21.2 \end{array}$

$\begin{array}{r} 18848 \\ 1320000 \\ 00 \\ 40 \end{array}$

$\begin{array}{r} 16240 \\ 1186562 \\ 6862 \\ 30 \end{array}$

$\begin{array}{r} 20.4356 \end{array}$

$\begin{array}{r} 4371 \end{array}$

1913 June 14 13

MC 1408 known measures

$\downarrow$ scratch. possibly in a valley.
 $\downarrow$ scratch. possibly in a valley.

18768

16730

34

82

192036

y = min at approximately 19.1900

17850

14840

45

70

193012

17868

1089078

80

65

3017

16860

11529

25

60

195335

16890

1223030

21

78

5343

17136

1207085

8070

28

194944

16746

1181096

00

36

4939

3

100

100

12070

1206564

59

199993

1083038

20

10802

9973

4

104

110

14930

906665

70

16

204145

17250

1307070

60

36

4177

5

105

112

112

112

18848

1320000

00

40

204356

16240

1186562

68

30

4321

MC 1408 moon-measures.

1915 June 14.

14

d	4	N
---	---	---

$$\begin{array}{r} 6 \\ 20.4 \\ 220 \end{array}$$

$$\begin{array}{r} 17800 \\ 1085055 \\ 56 \\ 84 \end{array}$$

$$\underline{20.3065}$$

$$\begin{array}{r} 15270 \\ 1217070 \\ 7570 \\ 50 \end{array}$$

$$\underline{3092}$$

$$\begin{array}{r} 7 \\ 200 \\ 225 \\ 16147 \\ 1050900 \\ 06 \\ 37 \\ \underline{22.5636} \end{array}$$

$$\begin{array}{r} 17800 \\ 1341824 \\ 14 \\ 96 \\ \underline{5621} \end{array}$$

$$\begin{array}{r} 8 \\ 19.5 \\ 23.0 \end{array}$$

$$\begin{array}{r} 17545 \\ 1290028 \\ 0000 \\ 30 \end{array}$$

$$\underline{19.5369}$$

$$\begin{array}{r} 15070 \\ 967570 \\ 0090 \\ 70 \\ \underline{5386} \end{array}$$

1161408 Moon-measures

d 4 v

$$\begin{array}{r} 1 \\ 20.4 \\ 22.0 \end{array}$$

$$\begin{array}{r} 2 \\ 20.0 \\ 22.5 \end{array} \begin{array}{r} 16147 \\ 1050900 \\ 06 \\ 37 \\ \hline 225636 \end{array}$$

$$\begin{array}{r} 5 \\ 19.5 \\ 23.0 \end{array}$$

$$\begin{array}{r} 17800 \\ 1341824 \\ 14 \\ 96 \\ \hline 5621 \end{array}$$

1913 June 14

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d 22 v

$$\begin{array}{r} 17800 \\ 1085055 \\ 56 \\ 84 \\ \hline 20.3065 \end{array}$$

$$\begin{array}{r} 15270 \\ 1217070 \\ 7570 \\ 50 \\ \hline 3092 \end{array}$$

$$\begin{array}{r} 17545 \\ 1290028 \\ 0000 \\ 30 \\ \hline 19.5369 \end{array}$$

$$\begin{array}{r} 15070 \\ 967570 \\ 0090 \\ 70 \\ \hline 5386 \end{array}$$

Times etc

exp. taken 1911 Nov 12	8 ^m 52 ^m	- 9 ^m 0 ^m 5 ^m
moon	8 ^m 57 ^m	547 - 8 57 549
clock slow	0	443
1 - 2nd T	38	58 398
3rd T	74	44 3105
4th T	13	43 1015
5th T	15	21 5962
6th T	22	21 1053
7th T	3	3972
8th T	22	17 3084 6-12-0 43 37

Time from clock	R.A.	Decl.
Moon 32 ^m	9 ^m 41 ^m	35 ^m 87 + 19 ^m 03' 14"
Moon 17.6773	2.2727	12.414
Tabular place	9 42	1605 - 3 394
Moon parallax		
Scundrum	15' 58.9	18 59 347

MC1408

1913 June 16 15

	1	2	3	4
x	8.3183	12.4542	24.1076	25.5368
z	9.7527	13.7561	25.3754	26.9404
$x-z$	-1.4344 ^v	-1.3019 ^v	-1.2678 ^v	-1.4036 ^v
y	12.8055	26.5326	30.0380	15.8119
η	12.4426 ^v	26.2071 ^v	29.8215 ^v	15.6252
$y-\eta$	+3629 ^v	+3255 ^v	+2165 ^v	+1867 ^v

Preliminary Reduction.

	(4)
x	25.8048
z	27.2201
$x-z$	-1.4153
y	14.8280
η	14.6303
$y-\eta$	+1.977

Preliminary Reduction

$x - z$	- 964		+ 1.55569
- 1.4344	- 1229	+ 1.5573	= - 4
- 1.3019	- 2547	- 1.5566	= + 3
- 1.2678	- 2884	- 1.5562	= + 7
- 1.4153	- 1423	- 1.5576	= - 7
18.3462 [✓]	2043 [✓]		= 19.6988 [✓]

$y - \eta$	+952	-4	-4414
+3629	+790	+4419 - 13	= +4406 = -8
+3255	+1183	+4438 - 27	= +4411 = -3
+2165	+2290	+4455 - 30	= +4425 = +11
+1977	+2451	+4428 - 15	= +4413 = -1
21.2818	+1743 ^v	-21 ^v	= 21.0126 ^v

Tables	$a = -1.0$	$z = -1.7$	$a - z = +0.7$	$b + a = 0.0$
Obs	$a = -0.1$	+1.5	$a - z = -1.6$	= +2.3
C-O			$a - z = +2.3$	-2.3

Times at

Exp. Oct. 1911 Nov. 12	8 ^h 52 ^m	- 9 ^h 04 ^m
moon	8 57	54.7 ^s - 8 57 54.9 ^s
clock slow	0	44.3 ^s
H. Sid T.	8 58	39.5 ^s
H. comp.	4 44	31.05 ^s
G. Sid T.	13 43	10.15 ^s
Sid T. moon	15 21	59.62 ^s
Interval	22 21	10.53 ^s
Reduction	3	39.72 ^s
G. M. T.	22 17	30.81 ^s 6-8 = -0 43 37

From hant alm	R.A.	Local
Moon 22 ^h	9 ^h 41 ^m 35.87	+19° 03' 14.1
Motion in 1 ^m = 2.2727		12.414
17.6773	+40.18	- 3 39.4
Tabular place	9 42 16.05	18 59 34.7
Moon's parallax	58' 33.4	
Semidiameter	15' 58.9	

From hant alm	R.A.	Local
Moon 22 ^h	9 41 35.87	+19 03 14.1
Motion in 1 ^m = 2.2726		12.414
17.50135	+39.77	- 3 37.3
Tabular place	9 42 15.64	+18 59 36.8

M161408

1913 June 16 15

	1	2	3	4
x	8.5183	12.4542	24.1076	25.5368
y	9.7527	13.7561	25.3754	26.9404
$x-y$	-1.4344	-1.3019	-1.2678	-1.4036
y	12.8055	26.5326	30.0380	15.8119
y	12.4426	26.2071	29.8215	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857

~~Preliminary Reduction.~~

	(4)
x	25.8048
y	27.2201
$x-y$	-1.4153
y	14.8280
y	14.6303
$y-y$	+1.977

~~Preliminary Reduction.~~

$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	
$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	

$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	
$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	

$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	
$x-y$	-1.4344	-1.3019	-1.2678	-1.4153	-1.4036
y	12.8055	26.5326	30.0380	15.8119	15.6252
$y-y$	+3.629	+3.255	+2.165	+1.857	

Formation of Normals.

4 wt	ab	an	un
1	- 0.08 -	9.4 +	28.2
2	- 201 +	26.4 -	42.0
3	- 212 +	46.3 -	35.9
4	- 0.58 -	52.7 +	11.2
5	+ 0.00 +	29.3 +	0.0
6	+ 1.41 -	70.6 -	25.8
7	+ 212 +	142.1 +	110.0
8	+ 205 +	44.1 +	63.5
	+ 0.79 +	125.5 +	109.2

$$[ac] = +11.94$$

$$[aa] = +20.84$$

$$[bc] = -0.09$$

$$[bb] = +10.87$$

$$un = +55$$

pt	pos. h	resid.
1	161.7	-49
2	146.6	+40
3	127.8	+29
4	97.7	-57
5	90.0	-6
6	70.0	-59
7	52.2	+67
8	34.6	+25

1913 June 18.

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MC1408 Moving Center.

	x_c	y_c	$x_c - x_0$	$(x_c - x_0)^2$	K^2	$0 - c$
1	19.0000	+0.6550	0.4290	0.1840	4.3498	-57
2	19.4942	+1.1492	1.3207	1.7442	4.3749	+23
3	19.9983	+1.6533	2.7334	7.4724	4.3754	+28
4	20.4161	+2.0911	4.2894	18.4044	4.3686	-40
5	20.4364	+2.0914	4.3740	19.1412	4.3740	+14
6	20.3078	+1.9628	3.8526	14.8424	4.3690	-36
7	20.0000	+1.6550	2.7390	7.4822	4.3812	+86
8	19.5376	+1.1926	1.4223	2.0230	4.3763	+37
			mean		4.3726	+55

	y	$(y - y_0)$	Δy	$(y - y_0)^2$	$(y - y_0)$	$(y - y_0)^2$
1	19.3014	-1.9500	-1	3.8025	-1.9800	3.9204
2	19.5339	-1.7175	-1	2.9501	-1.7475	3.0542
3	20.0000	-1.2514	-1	1.5662	-1.2814	1.6420
4	21.0000	+0.2514	0	0.0632	+0.2814	0.0792
5	21.2814	0.0000	0	0.0000	0.0000	0.0000
6	22.0000	+0.7486	0	0.5604	+0.7186	0.5164
7	22.5628	+1.3114	+1	1.7200	+1.2814	1.6422
8	23.0000	+1.7486	+1	3.0580	+1.7186	2.9540

Approximate Center.

$$x = 20.0 \quad y = 20.0000$$

$$22.5628$$

$$\text{mean } y = 21.2814$$

$$y = \text{min} \quad 19.1900$$

$$R = 2.0614$$

$$K = \text{mean} = 20.4364$$

$$\text{mean } x = 19.3750$$

$$21.2814$$

$$19.1900$$

$$2.0914$$

$$20.4364$$

$$19.3450$$

$$\text{Center } \begin{cases} x_c = 19.3750 \\ y_0 = 21.2514 \end{cases}$$

$$19.3450$$

$$21.2814$$

1913 June 18

	x	y	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
1	19 3000	46.55	0.439	0.193	4.349	18.92
2	19 4942	71.14	1.320	1.732	4.374	19.14
3	19 9983	16.53	2.733	7.473	4.375	19.15
4	20 4161	20.91	4.269	18.226	4.368	19.08
5	20 4364	20.91	4.374	19.14	4.374	19.14
6	20 3072	19.62	3.852	14.841	4.369	19.09
7	20 0000	16.55	2.739	7.473	4.381	19.19
8	19 5376	11.92	1.422	2.022	4.376	19.16
			mean	4.372	6	

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$
1	19 3014	-1.95	3.80	46.55	-1.94	3.77
2	19 5339	-1.71	2.91	71.14	1.74	3.03
3	20 0000	-1.25	1.56	16.53	-1.28	1.64
4	21 0000	0.25	0.06	20.91	0.28	0.07
5	21 2814	0.00	0.00	20.91	0.00	0.00
6	22 0000	0.74	0.55	19.62	-0.71	0.51
7	22 5624	1.31	1.72	16.55	-1.28	1.64
8	23 0000	1.74	3.05	11.92	-1.71	2.91

Approximate Center

$$x = 20.0, y = 20.0000$$

$$22.5624$$

$$\text{mean } y = 21.2814$$

$$y = \text{mean} = 19.1500$$

$$R = 20.614$$

$$G = \text{mean} = 20.4364$$

$$\text{mean } x = 19.3750$$

$$21.2814$$

$$19.1500$$

$$20.914$$

$$20.4364$$

$$19.3450$$

$$\text{Center } \{ x = 18.3950$$

$$y = 21.2814$$

$$18.3450$$

$$21.2814$$

M1408

Moons Center

1913 June 18

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Conditional Equations

	a	b	c	0		c	0-c
1	+0.16	-0.50	+1/4	= -57	+4 - 4 - 8	= -8	-49
2	+1.15	-1.75	+1	= +23	+29 - 14 - 32	= +17	+40
3	+1.65	-1.28	+1	= +28	+45 - 10 - 32	= +1	+29
4	+2.07	-0.28	+1	= -40	+56 - 2 - 32	= +19	-57
5	+2.09	+0.00	+1	= +14	+52 + 0 - 32	= +20	-6
6	+1.96	+0.72	+1	= -36	+49 + 6 - 32	= +23	-59
7	+1.66	+1.28	+1	= +86	+45 + 10 - 32	= +19	+67
8	+1.19	+1.72	+1	= +37	+30 + 14 - 32	= +12	+25

-171 + 161

Average = 45

Normal Equations

$$\begin{aligned}
 +20.84 + 0.79 + 11.94 &= +126 \\
 +0.79 + 10.87 - 0.09 &= +109 \\
 +11.94 - 0.09 + -7.25 &= +55 \\
 -0.79 - 0.03 - 0.45 &= -5 \\
 -11.94 - 0.45 - 6.85 &= -72
 \end{aligned}$$

$$\frac{\Delta x}{\Delta a} = -1.20$$

$$\begin{aligned}
 +10.84 - 0.54 &= +10.4 \\
 -0.54 + 0.40 &= -17 \\
 +0.54 - 0.03 &= +5 \\
 +0.37 &= -12
 \end{aligned}$$

$$\frac{\Delta y}{\Delta a} = +0.10$$

$$c = -32$$

$$\begin{aligned}
 -0.73 + 0.54 &= -23 \\
 +10.11 &= +81
 \end{aligned}$$

$$b = +8$$

$$\begin{aligned}
 +104.84 - 0.79 + 63.66 &= +483 \\
 +1442.09 - 10.87 + 875.64 &= +6645
 \end{aligned}$$

$$\begin{aligned}
 +125.63 \\
 +1442.09
 \end{aligned}$$

$$\begin{aligned}
 +75.60 &= +609 \\
 +875.55 &= +6752
 \end{aligned}$$

$$-124.89$$

$$-75.54 = -58.7 \frac{1}{2}$$

$$+1.24$$

$$= +26 \frac{1}{2}$$

$$a = +21$$

$$+1.54$$

$$= +28$$

$$a = +28 + 25$$

$$+1.6$$

$$107$$

M 1408

known center

1913 June 18

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Conditional Equation

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
1	+016	-050	+1	-57	+4	-4	-8	-8	-49																	
2	+115	-175	+1	+23	-29	-19	-32	-17	-40																	
3	+165	-128	+1	+28	+48	-10	-32	-7	+29																	
4	+207	-028	+1	-40	+52	-2	-32	+17	-57																	
5	+209	+000	+1	-14	+52	-0	-32	+20	-6																	
6	+196	+072	+1	-36	+49	-6	-32	+23	-59																	
7	+166	-128	+1	+86	+48	-10	-32	+19	+67																	
8	+119	-172	+1	-37	+30	+14	-32	+12	+25																	

-1717161

Average = 4.5

Normal Equation

$$\begin{aligned}
 +2084 + 079 + 1194 &= +126 \\
 +079 + 1087 &= +109 \\
 +1194 - 009 + -725 &= +55
 \end{aligned}$$

$$\begin{aligned}
 -079 - 003 - 045 &= 5 \\
 -1194 - 045 - 685 &= 72
 \end{aligned}$$

$$\begin{aligned}
 +1084 - 054 &= +104 \\
 -054 + 040 &= -17
 \end{aligned}$$

$$\begin{aligned}
 +054 - 003 &= +5 \\
 +037 &= -12
 \end{aligned}$$

C = -32

$$\begin{aligned}
 -073 + 054 &= -23 \\
 +1011 &= 81
 \end{aligned}$$

$$\begin{aligned}
 -104.84 - 079 + 6366 &= +483 \\
 +1442.69 - 1087 + 175.64 &= +664.5
 \end{aligned}$$

$$\begin{aligned}
 +125.65 \\
 +1442.69
 \end{aligned}$$

$$\begin{aligned}
 +75.60 &= +609 \\
 +875.55 &= +6752
 \end{aligned}$$

$$\begin{aligned}
 -124.89 \\
 +1.64 \\
 +1.54 \\
 +1.6 \\
 \hline
 107
 \end{aligned}$$

$$\begin{aligned}
 -75.54 &= 552 \\
 +26 &= +28
 \end{aligned}$$

a = +21

a = +22 + 25

1408

Mean Position (1911.0)

18

$$X_0 = 18.3450^\circ$$

$$\frac{1}{2}a = \frac{\quad + 12^\circ}{18.3462^\circ}$$

$$Y_0 = 21.2814^\circ$$

$$\frac{1}{2}b = \frac{\quad + 4^\circ}{21.2818^\circ}$$

From Prelim. Reduction $X = 19.6988^\circ$ $Y = 21.0126^\circ$

$$ax = \quad - 2 \quad + 11$$

$$by = \quad + 15 \quad + 11$$

$$c = \quad - 13 \quad - 23$$

$$S = +1.6988^\circ$$

$$\log S = 0.23014^\circ$$

$$\text{mean } S = 9.97670^\circ$$

$$8.50729$$

$$\eta = -0.9875^\circ$$

$$\log \tan S = 9.5283^\circ$$

$$\log \eta = 0.4602^\circ$$

$$\eta_0 = 7.0419^\circ$$

$$(\alpha - A) = 174620^\circ$$

$$\eta_p = + 11$$

$$\alpha - A = + 5574^\circ$$

$$\eta_0 = -0.9886^\circ$$

$$A = 94153^\circ$$

$$\log \eta_0 = 9.99502^\circ$$

$$X_0 = 94248.74^\circ$$

$$\text{const } 733115^\circ$$

$$(\alpha - D) = 2.66387^\circ$$

$$\text{Red. } + 232^\circ$$

$$S - D = - 741.2^\circ$$

$$\alpha' = 94251.06^\circ$$

$$D = +184345^\circ$$

$$S_0 = H 8^\circ 36' 03.8^\circ$$

$$- 8.1^\circ$$

$$S_1 = +183555.7^\circ$$

1408

mean Position (1911.0)

18

$$\begin{array}{r}
 X_0 = 183450 \\
 \frac{1}{2}a = \quad +12 \\
 \hline
 183462
 \end{array}$$

$$\begin{array}{r}
 Y_0 = 212814 \\
 \frac{1}{2}b = \quad +4 \\
 \hline
 212818
 \end{array}$$

From Prelim. Reduction $X = 19.6988$ $Y = 21.0126$

$\alpha =$	- 2	+ 11
$\log =$	+ 15	+ 11
c	- 13	- 23

$$\begin{array}{r}
 \bar{z} = +1.6988 \\
 \log \bar{z} = 0.23014 \\
 -\cos \delta = 997670 \\
 \quad \quad 850729
 \end{array}$$

$$-(a-A) = 174620$$

$$Q-A = + 5574$$

$$A = 94153$$

$$k_0 = 9424874$$

$$\eta = -0.9875$$

$$\begin{array}{r}
 \log \tan \delta = 95283 \\
 \quad \quad 04602
 \end{array}$$

$$\eta_0 = 70419$$

$$\eta_p = + 11$$

$$\eta_0 = -0.9886$$

$$\begin{array}{r}
 \log \eta_0 = 999502 \\
 \cos \eta_0 = 733115 \\
 (d-D) = 2.66387
 \end{array}$$

$$S-D = - 741.2$$

$$D = +184345$$

$$S_0 = H8^{\circ} 36' 03.8$$

1408 Lunar parallax.

$$\begin{array}{r}
 \alpha' - 9^h 42^m 51^s 06'' \checkmark \\
 \delta - 8 \quad 58 \quad 39.1 \checkmark \\
 \alpha - \quad \quad 44 \quad 12.0 \checkmark \\
 \quad \quad \quad - 11^\circ 03' 00'' \\
 \quad \quad \quad \quad \quad 4 \quad 23 \checkmark \\
 \quad \quad \quad - 10 \quad 58 \quad 37 \checkmark
 \end{array}$$

$$\begin{array}{r}
 9.95727 \checkmark \\
 0.00000 \checkmark \\
 0.00802 \checkmark \\
 \hline
 9.96529 \checkmark
 \end{array}$$

$$\begin{array}{r}
 \gamma - 42 \quad 42 \quad 45.5 \checkmark \\
 \quad \quad 18 \quad 35 \quad 58.7 \\
 \quad \quad 24 \quad 06 \quad 50 \checkmark
 \end{array}$$

$$\begin{array}{r}
 9.82640 \checkmark \\
 823128 \checkmark \\
 961124 \checkmark \\
 016856 \checkmark \\
 \hline
 783748 \checkmark
 \end{array}$$

$$S - 8' - \quad \quad 723 \quad 38.8 \checkmark$$

$$S + 18 \quad 59 \quad 34.5 \checkmark$$

$$\text{Am Eph } S = +18 \quad 59 \quad 36.8 \checkmark$$

$$O - C \quad \quad \quad - 2.3 \checkmark$$

$$\text{Cor for Irradiation} \quad \quad - 0.2 \checkmark$$

$$- 2.5 \checkmark$$

$$S' = +18^\circ 35' 55.7'' \checkmark$$

$$\Pi = 58' 33.4'' \checkmark$$

$$\begin{array}{r}
 9.86913 \checkmark \\
 823128 \checkmark \\
 928254 \checkmark \\
 0.02431 \checkmark \\
 \hline
 740726 \checkmark
 \end{array}$$

$$\alpha - \alpha' - \quad \quad 8' 46.84'' \checkmark$$

$$= -35.12'' \checkmark$$

$$\alpha = 9 \quad 42 \quad 15.94'' \checkmark$$

$$\alpha = 9 \quad 42 \quad 15.64'' \checkmark$$

$$+ 0.30 \checkmark$$

$$+ 1.7 \checkmark$$

$$+ 0.47 \checkmark$$

NIC 1412 Stars - Measures.

1913 June 16.

20

	d	v	d	v
1				
12.0	10589	10606	8894	10430
27.0	10350	1009	9295	9815
mg	42	10356	8297	1016
7.5				
	<u>23.0244</u>	<u>.0252</u>	<u>12.0597</u>	<u>.0618</u>
2				
21.6	18329	18930	19522	14920
27.6	12110	15140	1550	8920
mg	16	45-48	0611	22
89	23	20	28	02
	<u>27.6212</u>	<u>.6218</u>	<u>21.5981</u>	<u>.5988</u>
3				
30.0				
14.0	11444	13604	10815	14480
mg	40	13304	1611	13688
8.5	11130	0000	10032	9294
	<u>9.9688</u>	<u>.9697</u>	<u>30.0782</u>	<u>.0789</u>

NIC1412 Stars - Keenan.

1913 June 16.

20

	d	v	d	v
1				
120	10589	10606	8894	10430
270	10350	1009	9295	9845
my	42	10356	8297	1016
7.1				
2	<u>230244</u>	<u>0252</u>	<u>120597</u>	<u>0618</u>
216	18329	18930	19522	14920
276	12110	15140	15501	8920
my	16	45	06	22
89	23	20	28	02
	<u>276212</u>	<u>6218</u>	<u>215951</u>	<u>5988</u>
3				
300				
100	11444	13604	10811	14480
my	40	13304	16	13688
8.1	11130	00	10032	92
	<u>99688</u>	<u>9697</u>	<u>300782</u>	<u>0789</u>

1
1
18
2
2
19
2
3
19
21
4
2
1
1
1
1
2

11C1412 Ugon's Measures.

1913 June 16.

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	d	N
1	18788	16967
18.0	1801615	776564
20.4	10	6064
	80	70
	<u>20.0773</u>	<u>.0793</u>

19.0	17750	16048
20.9	1424045	957970
	48	68
	40	40
	<u>20.3502</u>	<u>.3529</u>

19.6	16456	15990
21.0	1330816	909590
	17	8890
	40	68
	<u>19.6863</u>	<u>.6884</u>

20.0	1032008	10497
	10	10208
	10028	0307

20.0285 .0291

max in π = approximately 20 0300

5	scratched			
19.9	15145	16910	1530.9	18375
22.8	752015	1453030	1466060	9010
	19	2830	60	1108
	30	10	00	70
	<u>22.7616</u>	<u>7620</u>	<u>19.9352</u>	<u>.9360</u>

19.7	19037	17235
23.0	1747780	875565
	85	5465
	30	22
	<u>19.8445</u>	<u>.8467</u>

VIC 1412 *Lyons Measures.*

1913 June 16.

21

	<i>d</i>	<i>N</i>
1	18788	16967
19.0	14016.5	776564
W. 4	10	6064
W. 4	80	70
	<u>20.0773</u>	<u>0793</u>

19.0	17750	16048
W. 4	14240.45	957970
	48	68
	40	40
	<u>203502</u>	<u>3529</u>

3	16456	15990
19.6	13308.16	909590
21.0	17	88
	40	68
	<u>19.6863</u>	<u>6884</u>

4	10320.08	10497
W. 0	10	1020807
22.0	10021	0307

20.0285 0291

max in π = approx. max. 20.0300

<i>S</i>	<i>Seraph</i>				
19.9	15145	16910	15309	18375	
22.8	7520.15	14530.30	14660.60	9010	
	19	28	60	1108	
	30	10	00	70	
	<u>22.7616</u>	<u>7620</u>	<u>29.9352</u>	<u>9360</u>	

6	19037	17235
19.7	17477.80	875565
23.0	85	54
	30	22
	<u>19.8445</u>	<u>8467</u>

MC 1412

Moon Measures

1913 June 16.

22

d	u	N	d	u	N
2.5	15385	15481	17780	16270	
23.6	960806	1129002	1229000	11750	55
	98	0002	90	54	
	79	81	74	60	
	<u>235778</u>	<u>.5816</u>	<u>19.4516</u>	<u>.4512</u>	
19.0	15576	15460			
23.9	626860	1477066			
	68	62			
	70	53			
	<u>23.9305</u>	<u>.9307</u>			

1913 June 16

1913 June 16

22

d		N		d		N	
2.5728		1.5481		1.7780		1.6270	
19.5	15385	1129002	1229000	11750	54	60	55
23.6	960806	0002	90	54	60	55	55
	98	81	74	54	60	55	55
	79	5816	194516	4512			
<u>23.5728</u>		<u>5816</u>		<u>194516</u>		<u>4512</u>	
19.0	15576	15460					
23.9	626860	1477066					
	60	62					
	70	53					
<u>23.9305</u>		<u>9307</u>					

1912 Standard Atmos.				1913 June 16, 23							
Cape No 1449 mg 7.5				Cape No 1459 mg 8.9				Cape No 1469 mg 8.5			
L	10	31	43.12	10	36	46.87	10	41	20.67		
L			135			85			.83		
E			09			88			.71		
Mean	10	31	43.11	10	36	46.87	10	41	20.74		
Pres			+35.10			+35.09			+34.77		
Q	10	32	18.21	10	37	21.96	10	41	55.51		
A	10	35	31	10	35	31	10	35	31		
k-A	-	3	12.79	+	1	50.96	+	6	24.51		
log(R-A)			-192.78			+110.96	+		384.46		
log...	2.28	50.6		2.04	51.6		2.58	48.5			
cos δ	9.98	81.4		9.98	70.2		9.99	09.5			
z ₀	0.78	04.4		0.53	94.2		1.08	30.4			
z ₀	-6.03	17		+3.46	28		+12.10	71			
z	-	6		+	4		+	85			
z	11.96	77		28.46	32		30.11	56			
z	12.06	08		21.59	84		30.07	86			
z-3	+	931		+	1352		-	370			
L	+13	23	06.8	+13	59	39.9	+11	42	51.2		
L			07.3			40.1			50.8		
E			06.7			39.5			50.9		
Mean	+13	23	06.9	+13	59	39.8	+11	42	50.0		
Pres		-3	24.5		-3	26.2		-3	29.2		
δ	+13	19	42.4	+13	56	13.6	+11	39	20.8		
D	+13	12	18	+13	12	18	+13	12	18		
δ-D	+	7	24.4	+	43	55.6	-	1	32	57.2	
log(R-D)			+444.4			+2635.7			-5578.6		
log...	2.64	777		3.42	090		3.74	653			
log...	9.97	892		0.75	205		1.07	768			
tan δ	9.37	46		9.39	47		9.31	45			
tan δ	1.56	09		1.07	88		2.16	61			
tan δ	7.98	89		7.52	69		8.53	40			
η ₁	+0.95	26		+5.65	00		-11.95	86			
η ₀	+	97		+	34		+	342			
η	22.96	23		27.65	34		10.07	56			
η	23.02	48		27.62	15		9.96	92			
η-η	+	625		-319			-1064				

1912				Standard Error				1913				
Cape No 1449 mag 7.5				Cape No 1449 mag 8.7				Cape No 1449 mag 8.5				
L	10	31	43.12	10	36	46.87	10	41	20.67			
L			135			85			83			
L			09			88			71			
Mean	10	31	43.11	10	36	46.87	10	41	20.74			
Proc			+35.10			+35.09			+34.77			
q	10	32	18.21	10	37	21.96	10	41	55.51			
A	10	35	31	10	35	31	10	35	31			
d-4	-	3	12.79	+	1	50.96	+	6	24.51			
log(d-4)			-19.278			+110.96			38.446			
log	2	28	50.6	2	04	51.6	2	58	48.5			
cosd	9	98	81.4	9	98	70.2	9	99	09.5			
S ₀	0	78	04.4	0	53	94.2	1	08	30.4			
T ₁	-	6	03.17	+	3	46.28	+	12	10.71			
T ₂	-		6	+		4	+		8.5			
T ₃	1	1	96.77	2	4	46.32	3	0	11.56			
T ₄	1	2	06.08	2	1	59.84	3	0	07.86			
2-3	+		9.31	+		13.52	-		3.70			
L	+1	3	23	06.8	+1	3	59	39.9	+1	1	42	51.2
L				07.3				40.1				50.8
L				06.7				39.5				50.9
Mean	+1	3	23	06.9	+1	3	59	39.8	+1	1	42	50.0
Proc			-3	24.5	-		3	26.2	-		3	24.2
S	+1	3	19	42.4	+1	3	56	13.6	+1	1	39	20.8
D	+1	3	12	18	+1	3	12	18	+1	3	12	18
S-D	+		7	24.4	+	4	3	55.6	-	1	32	57.2
tan(S-D)				+49.4.4				+26.35.7				-55.78.6
log	2	6	97.77		3	42	09.0		3	74	65.3	
log	9	97	89.2		0	75	20.5		1	07	76.8	
tan S	9	37	46		9	39	47		9	31	45	
T ₁	1	56	09		1	07	88		2	16	61	
T ₂	7	98	89		7	52	69		8	53	40	
T ₃	+	0	95.26		+	5	65.00		-	1	19	58.6
T ₄	+		9.7		+		3.4		+		3.2	
T ₅	2	2	96.23		2	7	65.34		1	0	07.56	
T ₆	2	2	02.48		2	7	62.15		9	96	92	
T ₇	+		6.25		-		3.19		-	1	06.4	

1AC1912

Center of Plate

1913 June 16.

24

α	δ	R.A.	Decl.
120606	230248	10 32 18	+13 19 42
215984	276215	37 22	+13 56 14
300786	99692	41 56	+11 39 21
6374	6062	111 36	7 18 5 17
2125	2021	10 37 12	+12 58 26
-18	-22	- 1 41	+13 52
325	179	10 35 31	+12 71 78
31	465		
101	832		

$$\left. \begin{aligned} A &= 10^h 35^m 31^s \\ D &= +13^\circ 12' 18'' \end{aligned} \right\}$$

Plate Constants

$$\begin{aligned} \alpha - \xi &= 96.54 & + 2.3326 & + 1.263 \\ + 931 - 2222 &= -1291 + 28 &= -1263 &= 0 \\ + 1352 - 2665 &= -1313 + 50 &= -1263 &= 0 \\ - 370 - 962 &= -1332 + 70 &= -1262 &= +1 \\ 179678 - 12137 & & + 42 &= 178846 \end{aligned}$$

$$\begin{aligned} \eta - \eta &+ 972 & + 4.54 & - 1899 \\ + 625 + 1170 &= +1795 + 104 &= +1899 &= 0 \\ - 319 + 2095 &= +1776 + 124 &= +1900 &= +1 \\ - 1064 + 2917 &= +1853 + 45 &= +1898 &= -1 \\ 221418 + 1743 & & + 100 &= 221362 \end{aligned}$$

From tables $b + d = +2.5$ $a = -1.9$ $e = -2.7$

" observations

 -0.5 -2.3 -4.5

M161912

Center of Plate

1913 June 16.

26

α	δ	R	α	δ	R	α	δ	R
120608	230248	10	32	18	+13	19	42	
215984	276215		37	22	+13	56	14	
300786	99692		41	56	+11	39	21	
6374	6062		111	36		711.5	12	
2125	2021	10	37	12	+12	58	26	
-18	22		-1	41		+13	52	
225	179	10	35	31	+12	71	78	
31	455							
101	832							

$$A = 10^{\circ} 35' 31''$$

$$D = +13^{\circ} 12' 18''$$

Plate constants

$$\begin{aligned} \alpha - 3 - 9657 & + 23326 & + 1263 \\ + 931 - 2222 & - 1291 + 28 & - 1265 & = 0 \\ + 1352 - 2665 & - 1313 + 50 & - 1263 & = 0 \\ - 370 - 962 & - 1332 + 70 & - 1262 & = +1 \\ 179678 - 2137 & + 42 & & = 178846 \end{aligned}$$

$$\begin{aligned} \eta - \eta + 972 & + 454 & - 1899 \\ + 625 + 1170 & + 1795 - 104 & + 1899 & = 0 \\ - 3197 - 2095 & + 1776 + 124 & + 1900 & = +1 \\ - 1064 + 2917 & + 1853 + 41 & + 1898 & = -1 \\ 221418 + 1743 & + 100 & & = 221362 \end{aligned}$$

From tables $b + a = +25$
aberration -05

$$a = -19$$

$$-23$$

$$e = -27$$

$$-45$$

1913 June 17 W

1412

Times etc

Ex h to stars 1911, Nov 13 $8^h 39^m$ - $8^h 51^m$
 " " moon $8 44 59.7$ - $8 44 60.2$
 clock slows $0 44.5$

H Sid T. $8 45 44.45$
 H long. $4 44 31.05$
 C. Sid T. $13 30 15.50$
 Sid T. in moon $15 25 56.17$
 Interval $22 04 19.33$
 Reduction $3 36.96$
 G. m. T. $22 00 42.37$

from Kant. Alm. R. A. Decl.
 Moon $22^h 10^m 34^s 06.19$ + $13^\circ 42' 32.2''$
 Position 2.1083 14.170
 " " 0.7062 + 1.49 - 10.0
 Tabular place $10 34 07.68$ + $13 42 22.2$

Moon's parallax $57'$ $52.8''$
 Semidiameter $15'$ $48.9''$

1912 Taurus etc.

1913 June 17. W

Exhaustion 1911 Nov 13 $8^h 39^m$ - $8^h 51^m$
 moon $8^h 44^m 59.7^s$ $8^h 44^m 60.2^s$
 local slow $0^h 44.5^m$

H Sid T $8^h 45^m 44.45^s$
 H long $4^h 44^m 31.05^s$
 G Sid T $13^h 30^m 15.50^s$
 Sid T in moon $15^h 25^m 56.17^s$
 Interval $22^h 04^m 19.33^s$
 Reduction $3^h 36.96^s$
 G. n. T. $22^h 00^m 42.37^s$

from Rand. Alm. $R. G.$ $Recl$
 moon $22^h 10^m 34^s 06.19^s$ $+1.30^s$ $42^s 32.2^s$
 Moon in T 2.1083 14.170
 ... 0.7062 $+1.49$ -10.0
 Tabular place $10^h 34^m 07.68^s$ $+1.3$ $42^s 22.2^s$

moon's parallax $57'$ $56.8'$
 ... $15'$ $48.9'$

Formation of Normals

	ab		am		bm
1	- 0.07	-	29	+	1835
2	- 1.85	+	45.5	-	786
3	- 1.96	-	58.5	+	382
4	- 0.29	+	92.9	-	63
5	+ 1.22	-	122.0	-	385
6	+ 1.61	+	56	+	26
7	+ 2.13	+	96.5	+	93.4
8	+ 1.85	+	320	+	555
	+ 2.64	+	89.1	+	249.8

$$[ac] = + 11.21$$

$$[aa] = + 18.95$$

$$[bc] = - 0.43$$

$$[bb] = + 15.18$$

$$[cm] = + 3$$

pt.	pos. C	resid.
1	179.1	- 44
2	150.0	+ 74
3	123.5	- 22
4	93.9	+ 39
5	72.5	- 78
6	65.4	- 15
7	46.0	+ 44
8	30.0	+ 11

1912 June 18

Moon's Center

1913 June 18

	$x - x_0$	Δx	$(x - x_0)^2$	R^2	$O - C$
1	18.00000 + 0.0328 + 3	0.0011	4.2567	-	89
2	19.00000 + 1.0328 + 3	1.0673	4.2700	+	44
3	19.6874 + 1.7202 + 2	2.9598	4.2622	-	34
4	20.0288 + 2.0616 + 0	4.2502	4.2701	+	45
5	19.9356 + 1.9684 - 1	3.8742	4.2594	-	62
6	19.8456 + 1.8784 - 1	3.5280	4.2659	+	3
7	19.4514 + 1.4842 - 2	2.2023	4.2721	+	65
8	19.0000 + 1.0328 - 3	1.0660	4.2687	+	31
mean			4.2656		+ 3

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	$y - Y_0$	Δy	$(y - Y_0)^2$
-1	20.0783 - 2.0628 - 1	4.2556	
2	20.3516 - 1.7895 - 1	3.2027	
3	21.0000 - 0.1411 - 1	1.3024	
4	22.0000 - 0.1411 0	0.0199	
5	22.7618 + 0.6207 0	0.3852	
6	23.0000 + 0.8589 + 1	0.7379	
7	23.5797 + 1.4386 + 1	2.0698	
8	23.9306 + 1.7895 + 1	3.2027	

Approximate Center

$$x = 19.0 \quad y = 20.3516$$

$$23.9306$$

$$44.2822$$

$$\text{Mean } y = 22.1411$$

$$y = \text{min} = 20.0783$$

$$R = 2.0628$$

$$x = \text{max} = 20.0300$$

$$\text{mean } x = 17.9672$$

$$\text{Center } \begin{cases} X_0 = 17.9672 \\ Y_0 = 22.1411 \end{cases}$$

1911phae.proj.18

Moving Center

1913Junc18

	x	y	z	$(x-x_c)^2$	$(y-y_c)^2$	R^2	$0-L$
1	180000	200328	+3	00011	42567	-	89
2	190000	203287	+3	10673	42700	+	44
3	196874	202022	+2	29598	42622	-	34
4	200288	206160	+0	42502	42701	+	45
5	199356	196849	-1	38742	42594	-	62
6	198456	187849	-1	35280	42659	+	3
7	194514	198422	-2	22023	42721	+	65
8	190000	203287	-3	10660	42687	+	31
				mean	42656		+3

	x	y	z	$(x-x_c)^2$	$(y-y_c)^2$
-1	200783	206287	-1	42556	
2	203516	17895	-1	32027	
3	210000	1911	-1	13024	
4	220000	01411	0	00199	
5	227618	06207	0	03852	
6	230000	08589	+1	07379	
7	235797	19386	+1	20698	
8	239306	17895	+1	32027	

Approximate Center

$$x = 190 \quad y = 203516$$

$$\underline{239306}$$

$$442822$$

$$\text{Mean } y = 221411$$

$$y = \text{mean} = \underline{200783}$$

$$R^2 = 20628$$

$$z = \text{mean } z = 200300$$

$$\text{Mean } x = 179672$$

$$\text{Center } \begin{cases} x = 179672 \\ y = 221411 \end{cases}$$

$$+ 68.53 - 2.64 + 49.12 = + 18$$

$$+ 395.74 - 15.18 + 282.42 = + 106$$

$$+ 87.78$$

$$+ 398.38$$

$$+ 60.33 = + 107$$

$$+ 281.99 = + 356$$

$$- 85.21$$

$$+ 2.57$$

$$- 60.33 = - 76$$

$$= + 31$$

$$a = + 12$$

NIC 1412 Moon's Center

1913 June 18

Conditional Equations

	a	b	c	0		c	0-c
1	+0.03	-2.06	+1	= -89	+	0 - 28 - 17 = -45	-44
2	+1.03	-1.79	+1	= +44	+	12 - 25 - 17 = -30	+74
3	+1.72	-1.14	+1	= -34	+	21 - 16 - 17 = -12	-22
4	+2.06	-0.14	+1	= +45	+	25 - 2 - 17 = +6	+39
5	+1.97	+0.62	+1	= -62	+	24 + 9 - 17 = +16	-78
6	+1.88	+0.86	+1	= +3	+	23 + 12 - 17 = +18	-15
7	+1.48	+1.44	+1	= +65	+	18 + 20 - 17 = +21	+44
8	+1.03	+1.79	+1	= +31	+	12 + 25 - 17 = +20	+11

Normal Equations

$$\begin{aligned}
 +18.95 + 2.64 + 11.21 &= +89 \\
 +2.64 + 15.18 - 0.43 &= +250 \\
 +11.21 - 0.43 + 8.00 &= +3 \\
 -2.64 - 0.37 - 1.56 &= -12 \\
 -11.21 - 1.56 - 6.65 &= -53
 \end{aligned}$$

$$-159 + 165$$

 Average = 41

$$\frac{\Delta x}{\Delta n} = -1.26$$

$$\begin{aligned}
 +14.81 - 1.99 &= +238 \\
 -1.99 + 1.35 &= -50
 \end{aligned}$$

$$\frac{\Delta y}{\Delta n} = +0.28$$

$$\begin{aligned}
 +1.99 - 0.27 &= +32 \\
 +1.08 &= -18
 \end{aligned}$$

$$c = -17$$

$$\begin{aligned}
 -2.93 + 1.99 &= -74 \\
 +11.88 &= +164
 \end{aligned}$$

$$b = +14$$

$$\begin{aligned}
 +68.90 - 2.64 + 49.05 &= +118 \\
 +396.00 - 15.18 + 282.50 &= +106
 \end{aligned}$$

$$\begin{aligned}
 +87.85 &+ 60.26 = +107 \\
 +398.64 &+ 282.07 = +356
 \end{aligned}$$

$$\begin{aligned}
 -82.60 &- 60.26 = -76 \\
 +5.25 &= +31
 \end{aligned}$$

$$\begin{aligned}
 a &= +12 \\
 a &= +6
 \end{aligned}$$

NGC 1412 Moving Center

1913 June 18

Conditional Equations

	a	b	c	0		a	b	c	0
1	+0.03	-2.06	+1.1	-89		0	-28	-1.7	-45
2	+1.03	-1.79	+1.1	+44		12	-25	-1.7	-30
3	+1.72	-1.14	+1.1	-39		21	-16	-1.7	-12
4	+2.06	-0.14	+1.1	+45		25	-2	-1.7	+6
5	+1.97	+0.62	+1.1	-62		24	9	-1.7	+16
6	+1.88	+0.86	+1.1	+3		23	12	-1.7	+18
7	+1.48	+1.44	+1.1	+65		19	20	-1.7	+21
8	+1.03	+1.79	+1.1	+31		12	25	-1.7	+20

Normal Equations

$$\begin{aligned}
 +18.95 + 264 + 1121 &= +89 \\
 +264 + 1518 &= +250 \\
 +1121 &= 043 + 800 = +3 \\
 -264 - 037 - 156 &= 12 \\
 -1121 - 156 - 665 &= 53
 \end{aligned}$$

$$\begin{aligned}
 +14.81 - 199 &= +238 \\
 -199 + 135 &= 50 \\
 +199 - 027 &= 32 \\
 +108 &= -18
 \end{aligned}$$

$$\begin{aligned}
 -293 + 199 &= 74 \\
 +1188 &= +164
 \end{aligned}$$

$$\begin{aligned}
 -159 + 165 \\
 \text{Average} &= 41
 \end{aligned}$$

$$c = -17$$

$$b = 14$$

$$\begin{aligned}
 +68.90 - 264 + 4905 &= +18 \\
 +39650 - 1518 - 26250 &= +106
 \end{aligned}$$

$$\begin{aligned}
 +8785 &+ 6026 = +107 \\
 +39864 &+ 28207 = +356
 \end{aligned}$$

$$\begin{aligned}
 -8260 &- 6026 = 76 \\
 +525 &= 31 \\
 +257 &= 31
 \end{aligned}$$

$$\begin{aligned}
 a &= +12 \\
 a &= +6
 \end{aligned}$$

MC 1412 Moon's Mean Position (1711.0)

$$\begin{array}{r} X_0 = 179672 \\ \frac{1}{2}a = \quad + 6 \\ \hline 179678 \end{array}$$

$$\begin{array}{r} Y_0 = 221411 \\ \frac{1}{2}b = \quad + 7 \\ \hline 221418 \end{array}$$

From Plate Constants $X = 178846$ $Y = 221362$

$$\begin{array}{r} \xi = -0.1154 \\ \log \xi = 9.06221m \end{array}$$

$$\cos \delta = 998833$$

$$\sin \delta = 8.50724$$

$$(A-A) = 0.56664m$$

$$X-A = \quad \quad \quad 3.69$$

$$A = 10 \quad 35 \quad 31$$

$$X_0 = 10 \quad 35 \quad 27.31$$

$$+ 1.92$$

$$X = 10 \quad 35 \quad 29.23$$

$$\eta = +0.1362$$

$$\log \tan \delta = 9.3702$$

$$\xi^2 = 8.1379$$

$$\eta_1 = 4.5615$$

$$\eta_1 = 0$$

$$\log \eta_0 = 9.13418$$

$$\sin \delta = 7.33115$$

$$(A-B) = 1.80303$$

$$B-D = \quad \quad \quad +1 \quad 03.5$$

$$D = +13 \quad 12 \quad 18$$

$$\delta_0 = +13 \quad 13 \quad 21.5$$

$$- 9.2$$

$$\delta = +13 \quad 13 \quad 12.3$$

MC 14.2 known known Position (1711.0)

$$\begin{array}{r} X_0 = 179672 \\ \frac{1}{2}a = \quad +6 \\ \hline 179678 \end{array}$$

$$\begin{array}{r} Y_0 = 221411 \\ \frac{1}{2}b = \quad +7 \\ \hline 221418 \end{array}$$

From Plate Constants $X = 178846$ $Y = 221362$

$$\begin{array}{r} \delta = -01154 \\ \log \delta = 906221 \sim \end{array}$$

$$\begin{array}{r} \cos \delta = 998833 \\ \sin \delta = 850724 \end{array}$$

$$1-A = 056664 \sim$$

$$-A = \quad \quad 3.69$$

$$A = 10 \quad 35 \quad 31$$

$$X_0 = 10 \quad 35 \quad 27.34$$

$$+ 1.92$$

$$10 \quad 35 \quad 29.23$$

$$\gamma = +01362$$

$$\log \tan \delta = 93702$$

$$\delta = 81379$$

$$\eta_1 = 4561.5$$

$$\eta_2 = 0$$

$$\log \eta_1 = 913418$$

$$\log \eta_2 = 733115$$

$$(A-D) = 180303$$

$$E-D = \quad \quad +1035$$

$$D = +13 \quad 12 \quad 18$$

$$S_0 = +13 \quad 13 \quad 215$$

$$- 9.2$$

$$+1.3 \quad 13 \quad 12.3$$

1412

Red aa. Q. app.

$$S_0 = +13 \quad 13$$

$$\begin{array}{rcl}
 H + \alpha & 13 & 02 = 195^\circ 30' \\
 H & 2 & 27 \\
 \alpha & 10 & 35 \\
 G & 22 & 00 \\
 G + \alpha & 8 & 35 = 128^\circ 45'
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos \delta & & 9.9883 \\
 \dots i & & \underline{0.7101} \\
 \dots (i) & & 0.6984
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos(G + \alpha) & & 9.7965m \\
 \dots \delta & & 1.4972 \\
 \dots \sin \dots & & 9.8920 \\
 \dots \tan \delta & & 9.3708 \\
 \dots \dots & & = 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \dots (\delta') & & 0.9937m \\
 \dots (\delta) & & 9.2839
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin S & & 9.3591 \\
 \dots \cos(H + \alpha) & & 9.9839m \\
 \dots h & & 1.2965 \\
 \dots \sin \dots & & 9.4269m \\
 \dots \sec \delta & & 0.0117 \\
 \dots \dots & & = 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log(h') & & 0.6395m \\
 \dots (h) & & 9.5590m
 \end{array}$$

$$\begin{array}{rcl}
 f & & +2.09 \\
 b & & +0.19 \\
 h & & \underline{-0.36} \\
 & & +1.92
 \end{array}$$

$$\begin{array}{rcl}
 g' & & -9.86 \\
 h' & & -4.36 \\
 i & & \underline{+4.99} \\
 & & -9.23
 \end{array}$$

1412

Red aa. 6. app.

 $S_0 = +13 \quad 13$

$$\begin{array}{rcl}
 H+X & 15^\circ & 02' - 195^\circ 30' \\
 H & 2 & 27 \\
 \alpha & 10 & 35 \\
 G & 22 & 00 \\
 G+X & 8 & 35 = 128^\circ 45'
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos \delta & & 9.9883 \\
 & & \underline{0.7101} \\
 & & 0.6984
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos(H+X) & & 9.7965m \\
 \log & & 1.1972 \\
 \sin & & 9.8920 \\
 \tan S & & 9.3708 \\
 \tan & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log & & 0.9937m \\
 (8) & & 9.2839
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin S & & 9.3591 \\
 \cos(H+X) & & 9.9839m \\
 & & 1.2965 \\
 \sin & & 9.4269m \\
 \sec S & & 0.0117 \\
 & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log(h) & & 0.6395m \\
 (h) & & 9.5590m
 \end{array}$$

$$\begin{array}{rcl}
 & +209 \\
 & +019 \\
 & \underline{-036} \\
 & +192
 \end{array}$$

$$\begin{array}{rcl}
 & -9.86 \\
 & +4.36 \\
 & \underline{+4.99} \\
 & -9.23
 \end{array}$$

1412 Lunar parallels

$$\begin{array}{r}
 \alpha' = 10^h 35^m 29.23 \\
 0 = 8 \quad 45 \quad 44.45 \\
 0 - \alpha = -1 \quad 49 \quad 44.73 \\
 \quad - \quad 27^0 \quad 26' \quad 11'' \\
 \quad - \quad \quad \quad 10 \quad 10 \\
 \quad \quad \quad 27 \quad 16 \quad 01
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.05115 \\
 \hline
 0.00842
 \end{array}$$

$$\begin{array}{r}
 \delta = 45 \quad 33 \quad 19 \\
 \quad 13 \quad 13 \quad 12 \\
 \quad 32 \quad 20 \quad 07
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.22673 \\
 9.72825 \\
 0.14635 \\
 \hline
 79.2778
 \end{array}$$

$$S - S = +29 \quad 06.5$$

$$S = +13 \quad 42 \quad 18.8$$

$$\text{Ann Ehh } S = +13 \quad 42 \quad 22.2$$

$$0 - \alpha = -3.4$$

$$-0.6$$

$$-4.0$$

$$S' = +13^0 \quad 13' \quad 12.3''$$

$$\pi \quad 57.56.8$$

$$\begin{array}{r}
 9.86913 \\
 8.22673 \\
 9.66348 \\
 0.01255 \\
 \hline
 77.7189
 \end{array}$$

$$\alpha - \alpha' = -20' \quad 19.99$$

$$= -1^h \quad 21.33$$

$$\alpha = 10 \quad 34 \quad 07.90$$

$$\alpha = 10 \quad 34 \quad 07.68$$

$$+0.22$$

$$+1.7$$

$$+0.39$$

1412 Lunar parallax

$$\begin{array}{rcl}
 \alpha & = & 10^h 35^m 29.128 \\
 \delta & = & 8 \quad 45 \quad 44.45 \\
 \alpha - \alpha' & = & -1 \quad 49 \quad 44.73 \\
 & & - \quad 27^{\circ} \quad 26' \quad 11''
 \end{array}$$

$$- \quad \quad \quad 10 \quad 10$$

$$27 \quad 16 \quad 01$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 005115 \\
 \hline
 000842
 \end{array}$$

$$\delta = 45 \quad 33 \quad 19$$

$$13 \quad 13 \quad 12$$

$$32 \quad 20 \quad 07$$

$$\begin{array}{r}
 982640 \\
 822673 \\
 972425 \\
 014635 \\
 \hline
 792773
 \end{array}$$

$$S. S. = +29 \quad 06.5$$

$$S = +13 \quad 42 \quad 18.8$$

$$\text{Ann Ehh } S = +13 \quad 42 \quad 22.2$$

$$\alpha - \alpha' = -3.4$$

$$-0.6$$

$$-4.0$$

$$S = +13^{\circ} 13' 12.3''$$

$$17 \quad 57' 56.8''$$

$$\begin{array}{r}
 986913 \\
 822673 \\
 966348 \\
 001255 \\
 \hline
 777189
 \end{array}$$

$$\alpha - \alpha' = -20' 19.99$$

$$= -1^m 21.33$$

$$\alpha = 10 \quad 34 \quad 07.90$$

$$\alpha = 10 \quad 34 \quad 07.68$$

$$+0.22$$

$$+17$$

$$103.9$$

