

KG  
11366  
v.891

Vol. XIV

Plates

No.

1166

1257

Howard Sumner Plates  
Mary Fowler.





Harvard Lunar Plates.

Measures and Reductions

Mary Fowler.

Volume XIV

Plate No.	Date.	Page
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1A

K<sub>a</sub>

K

Me

P<sub>n</sub>

X(1)

A

f -

sin

log

... 0

... 2

...

...

...

...

...

...

...

...

S, C

L

me

P<sub>n</sub>

S(1)

D

s -

tan

log

...

...

...

...

...

...

...

...

...

...

...

...

...



MIC 1166			Comp. Stars - Stand. Coords.			1913 Apr 22		
Vol.	date	mag	Vol.	date	mag	Vol.	date	mag
KO	14 <sup>h</sup>	14 <sup>m</sup>	37.05	16	19	24.39		
L			.07					
Mean	16	14	37.06					
Proc			+ 39.60			+ 39.48		
S(1911)	16	15	16.66	16	20	03.87		
A	16	19	41	16	19	41		
S-A	-	4	24.34			+ 0	22.87	
sin(x-d)	-		26432			+ 22.87		
log "			2.42213m			1.35927		
-cos δ			9.96088			9.96320		
" 30			0.89025m			9.82971		
30	-		7.7670			+ 0.6756		
31	-		19			+ 2		
3			10.2311			18.6758		
2			10.8661			19.3638		
2-3			+ 6350			+ 6880		
S-C	-23	55	42.0	-23	13	46.2		
L			1					
Mean	-23	55	42.1					
Proc	-	1	37.9			- 1	33.9	
S(1911)	-23	57	20.0	-23	15	20.1		
D	-24	46	27	-24	46	27		
S-D	+ 49		07.0	+ 1	31	06.9		
tan(S-D)			+ 2947.2			+ 5468.2		
log "			3.46941			3.73785		
-m <sub>0</sub>			0.80056			1.06900		
-tan δ			9.6477m			9.6332m		
32			1.7805			9.6594		
m <sub>1</sub>			8.4816m			6.3460m		
m <sub>0</sub>			+ 6.3177			+ 11.7219		
m <sub>1</sub>	-		303	-		2		
m			28.2874			33.7217		
4			28.5732			33.9197		
4-7			+ 2858			+ 1980		





MC1166

Comp Stars - Stand Corrolo.

1913 Apr. 22.

Vol. 2229 49  
 X 0 16 14 37.05  
 L .07

2239 6.6  
 16 19 24.39

Mean 16 14 37.06

Proc + 39.60

+ 39.48

X(1911) 16 15 16.66

16 20 03.87

A 16 19 41

16 19 41

S-A: - 4 24.34

+ 0 22.87

sin(X-A) - 264.32

+ 22.87

wg. 2.42213m

1.35927

w38 7.96088

9.96320

30 0.89025m

9.82971

E<sub>0</sub> -7.7670

+0.6756

S<sub>1</sub> - 19

+ 2

S 10.2311

18.6758

X 10.8661

19.3638

X-S + 6350

+ 6880

S-C -23 55 42.0

-23 13 46.2

L 1

mean -23 55 42.1

Proc - 1 37.9

- 1 33.9

S(1911) -23 57 20.0

-23 15 20.1

D -24 46 27

-24 46 27

S-D + 49 07.0

+1 31 06.9

tan(S-D) + 2947.2

+ 5468.2

wg. 3.46941

3.73785

m<sub>0</sub> 0.80056

1.06900

tan δ 9.6477m

9.6332m

δ<sub>2</sub> 1.7805

9.6594

η<sub>1</sub> 8.4816m

6.3460m

m<sub>0</sub> +6.3177

+ 11.7219

η<sub>1</sub> - 303

- 2

m 28.2874

33.7217

η 28.5732

33.9197

η-3 + 2858

+ 1000





MNC 116 G

Comp. Stars - Stand. Coordn. 1913 Apr. 22.

2.

		<sup>Cake</sup> 2254	<sup>mag</sup> 6.2
X C	16	25	14.47
L			.44
mean	16	25	14.46
Prec		+	40.42
X (1911)	16	25	54.88
A	16	19	41
X-A		+ 6	13.88
sin(X-A)		+ 37	3.83
log "		2.57	268
-cos δ		9.95	238
" $\delta_0$		1.03	230
$\delta_0$		+ 10.77	20
$\delta_1$		+	70
$\delta$		28.77	90
$\delta$		29.23	74
X- $\delta$		+	4584

SC	-26	19	11.7
L			12.3
mean	-26	19	12.0
Prec		- 1	28.5
S(1911)	-26	20	40.5
D	-24	46	27
S-D	-	1 34	13.5
tan(S-D)		- 56	54.9
log "		3.75	242 m
" $\eta_0$		1.08	357 m
-tan δ		9.69	48 m
" $\delta^2$		206	46
" $\eta_1$		8.81	28 m
" $\eta_0$		- 12.12	20
" $\eta_1$		-	650
" $\eta$		9.81	30
" $\eta$		99	430
Y- $\eta$		+	1300





MAC 116 G

Comp. Star Stand. Coordn.

1913 Apr. 22.

2.

$\alpha$  22 54 6.2  
 $\times C. 16 \quad 25 \quad 14.47$   
 $L \quad .44$   
 $\text{mean } 16 \quad 25 \quad 14.46$   
 $\text{P.M.C.} \quad + \quad 40.42$   
 $\alpha(1911) 16 \quad 25 \quad 54.88$   
 $A \quad 16 \quad 19 \quad 41$   
 $\alpha - A \quad + \quad 6 \quad 13.88$   
 $\sin(\alpha - A) \quad + \quad 373.83$   
 $\log \dots \quad 2.57268$   
 $\cos \delta \quad 9.95238$   
 $\dots \quad 1.03230$   
 $\dots \quad + 10.7720$   
 $\dots \quad + \quad 70$   
 $\dots \quad 28.7790$   
 $\dots \quad 29.2374$   
 $2-3 \quad + \quad .4584$

$SC. -26 \quad 19 \quad 11.7$   
 $L \quad 12.3$   
 $\text{mean } -26 \quad 19 \quad 12.0$   
 $\text{P.M.C.} \quad - \quad 1 \quad 26.5$   
 $S(1911) -26 \quad 20 \quad 40.5$   
 $D \quad -24 \quad 46 \quad 27$   
 $S-D = - \quad 1 \quad 34 \quad 13.5$   
 $\tan(\alpha - D) \quad - \quad 5654.9$   
 $\log \dots \quad 3.75242m$   
 $\dots \quad 1.08357m$   
 $\dots \quad 9.6948m$   
 $\dots \quad 20646$   
 $\dots \quad 8.8128m$   
 $\dots \quad -12.1220$   
 $\dots \quad - \quad 650$   
 $\dots \quad 9.8130$   
 $\dots \quad 99430$   
 $4-7 \quad + \quad 1300$





MC1166

1913-Jan. 28.

3.

## Comparison Stars - measures.

4

72

	d		N		d		N
1	17905		15493		17721		17920
10.8	12160	70	11216	21	16380	82	9254
28.6	71		23		80		46
mag	95		83		20		10
4.9							

28.5732.573110.8660.86622 out of reach.

17.3

5.5

mag

7.3

3

19.3	16510		18480		15851		17852
33.9	7302	05	17674	79	9479	85	14210
mag	03		71		80		10
6.6	00		73		41		43

339198.919619.3636.36414

29.2	9453	50	11189		14730		15324
9.9	53		10620	24	7093		12941
mag	88	82	16		96	96	40
6.2					26		20

9.9430.943129.23682380





MC1166

1913 Jan 28.

3

## Comparison Stars - Unnamed.

4

76

	d.	N	d.	N
1	17905	15493	17721	17920
10.8	12160	11216	16380	925442
28.6	71	28	80	46
mag	95	83	20	10
49				

28573257311086608662

2 out of each.

17.5

5.5

1.4

7.8

3				
143	16510	18480	15851	17852
339	7302	17674	9479	14210
21	03	71	80	10
6.6	00	73	41	43

33919891961936363641

4				
292	9453	11189	14730	15324
99	53	10620	7093	12941
mag	8882	16	96	40
6.2			26	20

9943094312923682380





MC 1166

1913 Jan. 28

known measures.

y

x

1  
17.5  
20.3

a

16030  
12760 61  
70  
20

18347  
11582 80  
85  
34

w

17900  
13100 90  
94  
00

d

14801  
9611 14  
19  
80

v

20.3263.323917.5195.5175

2  
17.0  
20.6

16052  
10310 03  
09  
46

18317  
14035 30  
50  
07

20.5742.5725

3  
16.6  
21.0

16300  
11790 94  
85  
97

18520  
13004 19  
11  
10

16.5491.5504

4  
16.2  
22.0

15178  
6886 73  
79  
70

17581  
15860 20  
59  
73

16.1708.1717

5  
16.2  
22.1  
min  
in  
x

15152  
6794 90  
88  
50

16590  
14950 58  
51  
88

16.1641.1637





MC 1166

1913 Jan 28.

known measured

y

70

	a	v	d	N
1/10	16030	18347	17900	14801
175	12740	11582	13100	96114
203	70	85	94	19
	20	34	00	80

203203323917.519551752

170	16052	18317
206	10310	1403530
	09	50
	46	07

20.5742177253

166	16300	18520
21.0	1179094	1300419
	85	11
	97	10

16.549155044

162	15178	17581
22.0	688673	11786070
	79	59
	70	73

16.170817175

162	15152	16590
22.1	679490	1495058
	88	51
	50	88

16.16411637





MIC 1166

1913 Jan. 28.

5.

moon-measures.

y

x

$$\begin{array}{r} \underline{6} \\ 16.4 \\ 23.0 \end{array}$$

$$\begin{array}{r} \underline{a} \\ 18070 \\ 1167267 \\ 58 \\ 67 \end{array}$$

$$\begin{array}{r} \underline{a} \\ 18231 \\ 1460109 \\ 19 \\ 15 \end{array}$$
16.3598.3515

$$\begin{array}{r} \underline{2} \\ 17.0 \\ 23.7 \end{array} \quad \begin{array}{r} 16805 \\ 944550 \\ 44 \\ 95 \end{array} \quad \begin{array}{r} 16914 \\ 1425454 \\ 56 \\ 09 \end{array}$$

$$\begin{array}{r} \underline{237352} \\ \underline{8} \text{ scratch} \\ 17.5 \\ 24.0 \end{array} \quad \begin{array}{r} 1022020 \\ 06 \\ 9978 \end{array}$$

$$\begin{array}{r} \underline{7342} \\ 12640 \\ 1237681 \\ 94 \end{array}$$

$$\begin{array}{r} 15731 \\ 1086069 \\ 67 \\ 21 \end{array}$$

$$\begin{array}{r} 16738 \\ 1157886 \\ 78 \\ 20 \end{array}$$

$$\begin{array}{r} \underline{23.9763} \\ \underline{9} \\ 18.0 \\ 24.1 \end{array} \quad \begin{array}{r} 8950 \\ 837551 \\ 69 \end{array}$$

$$\begin{array}{r} \underline{.9744} \\ 1110812 \\ 06 \\ 10541 \end{array}$$
17.5139.5148

$$\begin{array}{r} \underline{24.0585} \\ \underline{10} \\ 18.1 \\ 24.1 \\ \text{max} \\ \text{in} \\ \text{y} \end{array} \quad \begin{array}{r} 8935 \\ 835950 \\ 55 \end{array}$$

$$\begin{array}{r} \underline{0568} \\ 1012224 \\ 20 \\ 9553 \\ \underline{.0569} \end{array}$$





M 1164

1913 Jan 28.

5.

M 1164 - M 1164

4

x

$$\begin{array}{r} 6 \\ 164 \\ 2310 \end{array}$$

$$\begin{array}{r} 18070 \\ 1167267 \\ 58 \\ 67 \end{array}$$

$$\begin{array}{r} 18231 \\ 1460109 \\ 19 \\ 15 \end{array}$$
16.35983615

$$\begin{array}{r} 2 \\ 17.0 \\ 23.7 \end{array} \begin{array}{r} 16805 \\ 944550 \\ 44 \\ 95 \end{array} \begin{array}{r} 16914 \\ 1425954 \\ 56 \\ 09 \end{array}$$
2373527342

$$\begin{array}{r} 8 \\ 17.5 \\ 14.0 \end{array} \begin{array}{r} 1022020 \\ 06 \\ 9978 \end{array}$$

$$\begin{array}{r} 12640 \\ 1237681 \\ 94 \end{array} \begin{array}{r} 15731 \\ 1086069 \\ 67 \\ 21 \end{array}$$

$$\begin{array}{r} 16738 \\ 1157886 \\ 78 \\ 20 \end{array}$$
23.9763974417.51395148

$$\begin{array}{r} 9 \\ 14.0 \\ 14.1 \end{array} \begin{array}{r} 8950 \\ 837551 \\ 69 \end{array}$$

$$\begin{array}{r} 1110612 \\ 06 \\ 10541 \end{array}$$
2405850568

$$\begin{array}{r} 10 \\ 14.1 \\ 14.2 \end{array} \begin{array}{r} 8935 \\ 835950 \\ 55 \end{array}$$

$$\begin{array}{r} 1012224 \\ 20 \\ 9533 \end{array}$$
24.05300569

Tables  $a = +0.7$   $e = -15.3$   $a - e = +16.0$   $b + a = -0.5$   
cls  $a = +1.9$   $e = -11.2$   $a - e = +13.1$   $b + a = +0.4$



MC 1166	Times etc.							6
Exp. to stars 1911 Jan'y 7	16 <sup>h</sup> 24 <sup>m</sup>			-16 <sup>h</sup> 33 <sup>m</sup>				
moon	16 28	56.6	-16 28	56.7				
clock fast		3	40.2					
H Sid T.	16 25	16.45						
H Long	4 44	31.05						
G Sid T.	21 09	47.50						
Sid T. w. h.	6 57	20.55						
Interval	14 12	26.95						
Reduction		2	19.65					
G. M. T.	14 10	07.30						
Thorn 14 <sup>h</sup>	16 <sup>h</sup> 19 <sup>m</sup>	08.71	-23 56	17.6				
motion in $\mu = 2.0927$			7.244					
10.122		+ 21.18	- 1	13.3				
Tabular place	16 19	29.89	-23 57	30.9				

Moon's age 11 days

Moon's parallel 54 03.5

semidiameter 14 45.5

Platner Constants 3

$x$ 10.8661	19.3638	29.2374
$z$ 10.2311	18.6758	28.7790
$S - S = +6350$	+6880	+4584
$y$ 28.5732	33.9197	9.9430
$\eta$ 28.2874	33.7217	9.8130
$y - \eta + 2858$	+1980	+1300

$$\begin{aligned}
 x - 3 - 974 & \quad -2x & \quad +0.5x + 0.13x & \quad -3571 \\
 +6350 - 2772 & = +3578 - 22 = +3556 + 14 + 1 = +3571 = 0 \\
 +6880 - 3290 & = +3590 - 39 = +3551 + 17 + 3 = +3571 = 0 \\
 +4584 & \quad 964 = +3620 - 58 = +3562 + 5 + 9 = +3571 = 0 \\
 18.0745 - 2149 & \quad -36 & \quad +11 + 2 = & \quad -17.5002
 \end{aligned}$$

$$\begin{aligned}
 y - \eta + 96x & \quad +114 & \quad +0.204 + 0.13x & \quad -4222 \\
 +2858 + 1043 & = +3901 + 314 = +4215 + 6 + 1 = +4222 = 0 \\
 +1980 + 1859 & = +3839 + 373 = +4212 + 7 + 3 = +4222 = 0 \\
 +1300 + 2807 & = +4107 + 109 = +4216 + 2 + 4 = +4222 = 0 \\
 22.1519 + 11735 & \quad +244 & \quad +4 + 2 = & \quad = 21.9282
 \end{aligned}$$





MC1166

Times etc.

6

Exp. to stars 1911 Jan 7  $16^h 24^m$   $-16^h 33^m$   
 ~ noon  $16 28$   $56.6 - 16 28$   $56.7$   
 clock fast  $3$   $40.2$

H Sid T.  $16 25$   $16.45$   
 H long  $4 44$   $31.05$   
 G Sid T.  $21 09$   $47.50$   
 Sid T. h. h.  $6 57$   $20.55$   
 Interval  $14 12$   $26.95$   
 Reduction  $2$   $19.65$   
 G. h. T.  $14 10$   $07.30^v$

Thibon  $19^h$   $16^h 19^m$   $08.71^v$   $-23 56$   $17.6$   
 modulus  $1^m = 2.0927^v$   $7.244^v$   
 $10.122$   $+ 21.18$   $- 1$   $13.3$   
 Tabular place  $16 19$   $29.89$   $-23 57$   $30.9$

Moon parallel  $54' 03.5$   
 semidiam  $14 45.5$

Plate Constant  $3$

$\pi$   $10.8661$   $19.3638$   $29.2374$   
 $\delta$   $10.2311$   $18.6758$   $28.7790$   
 $\alpha - \delta = +6350$   $+6880$   $+4584$

$\gamma$   $28.5732$   $33.9197$   $9.9430$   
 $\eta$   $28.7874$   $33.7217$   $9.8130$   
 $\gamma - \eta$   $+2858$   $+1980$   $+1300$

$\alpha - \delta = 974$   $-2x$   $+0.54x + 0.13x$   $-35.71$   
 $+6350 - 2772 = +3578 - 22 = +3556 + 14 + 1 = +3571 = 0$   
 $+6880 - 3290 = +3590 - 39 = +3551 + 17 + 3 = +3571 = 0$   
 $+4584 - 964 = +3620 - 58 = +3562 + 5 + 9 = +3571 = 0$   
 $10.0745 - 2149$   $-36$   $+11 + 2 =$   $-17.5002$

$\gamma - \eta$   $+962$   $+114$   $+0.204 + 0.13x$   $-42.22$   
 $+2858 + 1043 = +3901 + 314 = +4215 - 4 + 1 = +4222 = 0$   
 $+1980 + 1859 = +3839 + 373 = +4212 + 7 + 3 = +4222 = 0$   
 $+1300 + 1280 = +4105 + 109 = +4216 + 2 + 4 = +4222 = 0$   
 $22.1519 + 1735$   $+244$   $+4 + 2 =$   $-219282$



## Formation of Normals

$W_0$	$ab$	$ac$	$bc$
1	+1.00 -	107.8 -	360.0
2	+1.69 -	92.8 -	137.8
3	+17.5 -	28.8 -	21.9
4	+0.29 +	339.0 +	27.6
5	-0.00 +	264.8 -	0.0
6	-1.44 +	102.2 -	50.8
7	-1.69 -	91.7 +	136.0
8	-1.00 +	18.8 -	6.20
9	-0.13 -	1.3 +	38.0
10	+0.47 +	402.4 -	430.9

$$[aa] = +15.33$$

$$[af] = +17.41$$

$$[ac] = -10.33$$

$$[bc] = +1.44$$

$$[ca] = -3$$

pt.	pt. 4	residual
1	196.8	+27
2	214.1	+1
3	232.6	+24
4	265.4	-88
5	270.0	-41
6	296.4	+47
7	325.9	+134
8	343.1	-48
9	2.1	-58



MC1166

Moon's Center

1913 Apr 26.

7

	$x$	$x - X_0$	$\Delta x$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$u - c$
1	17.5185	-0.5490	-1	0.3015	3.6573	+197
2	17.0000	-1.0675	-1	1.1398	3.6463	+87
3	16.5498	-1.5177	-0	2.3034	3.6395	+19
4	16.1712	-1.8963	-0	3.5959	3.6197	-179
5	16.1639	-1.9036	+0	3.6237	3.6237	-139
6	16.3606	-1.7069	+0	2.9135	3.6316	-60
7	17.0000	-1.0675	+1	1.1393	3.6462	+86
8	17.5144	-0.5531	+1	0.3058	3.6342	-34
9	18.0000	-0.0675	+1	0.0045	3.6396	+20
mean					3.6376	-3

	$y$	$y - Y_0$	$\Delta y$	$(y - Y_0)^2$
1	20.3251	-1.8289	-30	3.3558
2	20.5734	-1.5806	-26	2.5065
3	21.0000	-1.1540	-19	1.3361
4	22.0000	-0.1540	-3	0.0238
5	22.1540	0.0000	0	0.0000
6	23.0000	+0.8460	+14	0.7181
7	23.7347	+1.5807	+26	2.5069
8	23.9759	+1.8214	+30	3.3284
9	24.0576	+1.9036	+32	3.6351

Approximate Center

 $x = 17.0$   $y = 20.5734$  $23.7347$  $44.3081$ mean  $y = 22.1540$  $y - \text{max} = 24.0576$  $R = 1.9036$  $x - \text{min} = 16.1639$  $X_0 = 18.0675$  $X_1 = 18.0675$  $Y_0 = 22.1540$





MC1168		Moon's Center			1913 Apr. 26.		
	$x$	$x - X_0$	$\Delta x$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$u - c$	
1	17.5185	-0.5490	-1	0.3015	3.6573	+197	
2	17.6000	-1.0675	-1	1.1398	3.6463	+87	
3	16.5498	-1.5177	-0	2.3034	3.6395	+19	
4	16.1712	-1.8963	-0	3.5959	3.6197	-179	
5	16.1639	-1.9036	+0	3.6237	3.6237	-139	
6	16.3606	-1.7069	+0	2.9135	3.6316	-60	
7	17.0000	-1.0675	+1	1.1393	3.6462	+86	
8	17.5144	-0.5531	+1	0.3058	3.6342	-34	
9	18.0000	-0.0675	+1	0.0045	3.6396	+20	
Mean					3.6376	-3	

	$y$	$y - Y_0$	$\Delta y$	$(y - Y_0)^2$
1	20.3251	-1.8299	-30	3.3558
2	20.5734	-1.5806	-26	2.5065
3	21.0000	-1.1540	-19	1.3361
4	22.0000	-0.1540	-3	0.0238
5	22.1540	0.0000	0	0.0000
6	23.0000	+0.8460	+14	0.7181
7	23.7347	+1.5807	+26	2.5069
8	23.9754	+1.8214	+30	3.3284
9	24.0576	+1.9036	+32	3.6351

### Approximate Center

$$x = 17.0 \quad y = 20.5734$$

$$23.7347$$

$$44.3081$$

$$\text{mean } y = 22.1540$$

$$y - \text{max} = 24.0576$$

$$R = 1.9036$$

$$x - \text{min} = 16.1639$$

$$X_0 = 18.0675$$

$$X_0 = 18.0675$$

$$Y_0 = 22.1540$$





MCG 1166

1913 April 28

8

## Moon's Center - Conditional Equations

	a	b	c	0	c	0-c
1	-0.55	-1.83	+1	+197	-77+78+169=+170	+27
2	-1.07	-1.58	+1	+87	-150+67+169=+86	+1
3	-1.52	-1.16	+1	+19	-223+49+169=-5	+24
4	-1.90	-0.15	+1	-179	-267+6+169=-91	-88
5	-1.90	+0.00	+1	-139	-267-0+169=-98	-41
6	-1.71	+0.85	+1	-60	-240-36+169=-107	+47
7	-1.07	+1.58	+1	+86	-150-67+169=-48	+134
8	-0.55	+1.82	+1	-34	-77-78+169=+14	-48
9	-0.07	-1.90	+1	+20	-10-81+169=+78	-58

## Normal Equations

-235+233

Average (0-c) = 52

$$+15.33 + 0.47 - 10.33 = +4.02$$

$$+ 0.47 + 17.41 - 1.44 = -4.31$$

$$- 10.33 + 1.44 + 9.00 = -3$$

$$- 0.47 - 0.01 + 0.32 = -1.2$$

$$+ 10.33 + 0.32 - 6.97 = +2.71$$

$$+ 17.40 + 1.76 = -4.43$$

$$+ 1.76 + 2.03 = +2.68$$

$$- 1.76 - 0.18 = +4.5$$

$$+ 1.85 = +3.13$$

$$- 1.53 - 1.76 = -2.32$$

$$+ 15.87 = -6.75$$

$$\frac{\Delta a}{\Delta c} = +0.677$$

$$\frac{\Delta b}{\Delta c} = -0.101$$

$$c = +169$$

$$b = -43$$

$$+ 3.38 - 0.47 - 2.94 = +1$$

$$+ 124.89 - 17.41 - 108.81 = +3.6$$

$$+ 18.71 - 13.27 = +4.03$$

$$+ 125.36 - 107.37 = -39.5$$

$$- 15.49 + 13.27 = +4.9$$

$$+ 3.22 = +4.52$$

$$a = +140$$





NGC 1166

1913 April 28.

8

Moon's Center - Conditional Equations:

	$a$	$b$	$c$	$d$	$e$	$f$	$g$	$h$	$i$	$j$	$k$	$l$	$m$	$n$	$o$	$p$	$q$	$r$	$s$	$t$	$u$	$v$	$w$	$x$	$y$	$z$	$\Sigma$
1	-0.55	-1.43	+1	=	+197	-77	+78	+169	=	+170																	+27
2	-1.07	-1.58	+1	=	+87	-150	+67	+169	=	+86																	+1
3	-1.52	-1.16	+1	=	+19	-223	+49	+169	=	-5																	+24
4	-1.90	-0.15	+1	=	-179	-267	+6	+169	=	-91																	-88
5	-1.90	+0.00	+1	=	-139	-267	+0	+169	=	-98																	-41
6	-1.71	+0.45	+1	=	-60	-240	+36	+169	=	-107																	+47
7	-1.07	+1.58	+1	=	+86	-150	+67	+169	=	-48																	+139
8	-0.15	+1.82	+1	=	-34	-77	+78	+169	=	+14																	-48
9	-0.07	+1.94	+1	=	+20	-10	+81	+169	=	+78																	-58

Normal Equations

-235 + 232

Average (0-6) = 5.2

$$+15.33 + 0.47 - 1.033 = +4.02$$

$$+ 0.47 + 17.41 - 1.44 = -4.31$$

$$- 10.33 + 1.44 + 9.00 = -3$$

$$- 0.47 - 0.01 + 0.32 = -1.2$$

$$+ 10.33 + 0.32 - 6.97 = +2.71$$

$$+ 17.40 + 1.76 = -4.43$$

$$- 1.76 + 2.03 = +2.68$$

$$- 1.76 - 0.18 = +4.5$$

$$+ 1.85 = +3.13$$

$$- 1.53 - 1.76 = -2.32$$

$$+ 1.587 = -6.75$$

$$\frac{\Delta a}{\Delta c} = +0.677$$

$$\frac{\Delta b}{\Delta c} = -0.101$$

$$c = +1.69$$

$$b = -4.3$$

$$+ 3.38 - 0.47 - 2.94 = +$$

$$+ 12.489 - 1.741 - 10.881 = + 3.6$$

$$+ 18.71 - 13.27 = + 4.03$$

$$+ 12.536 - 10.737 = - 3.95$$

$$- 15.44 + 13.27 = + 4.9$$

$$+ 3.22 = + 4.52$$

$$a = +1.40$$





MC 1166

1913 Apr. 28

9

Moon's Mean position (1911.0)

$$\begin{array}{r} X_0 = 18.0675 \\ + 70 \\ \hline 18.0745 \end{array}$$

$$\begin{array}{r} Y_0 = 22.1540 \\ - 21 \\ \hline 22.1519 \end{array}$$

Journ Plate Constants  $X = 17.5002$   $Y = 21.9282$ 

$$\xi = -0.4998$$

$$\log \gamma = 9.69880^m$$

$$\log \delta = 9.95804^m$$

$$\text{const} = 8.50724$$

$$(V-A) = 1.23352^m$$

$$d-A = -17.12$$

$$A = 16 \quad 19 \quad 41$$

$$d_0 = 16 \quad 19 \quad 23.88$$

$$\text{Red} = +224$$

$$X' = 16 \quad 19 \quad 26.12$$

$$\eta = -0.0718$$

$$\log \tan \delta = 9.6654^m$$

$$\xi = 9.3976^m$$

$$\eta_1 = 6.1164^m$$

$$\eta_2 = -1$$

$$\eta_0 = -0.0717$$

$$\log \eta_0 = 8.85552^m$$

$$\text{const} = 7.33115$$

$$(J-D) = 15243.7^m$$

$$S-D = -33.4$$

$$D = -24 \quad 46 \quad 27$$

$$S_0 = -24 \quad 47 \quad 00.4$$

$$\text{Red} = -12.4$$

$$d' = -24 \quad 47 \quad 12.8$$

1160 red aa locum apt

$$S = -29^{\circ} 47'$$

$$\begin{array}{rcl} H + \alpha & 3 & 24 - 51^{\circ} \\ H & 11 & 05 \\ \alpha & 16 & 19 \\ G & 20 & 54 \\ G + \alpha & 13 & 13 - 198^{\circ} 15' \end{array}$$

$$\begin{array}{rcl} \cos(G + \alpha) & 9.9776 \\ f & 0.9750 \\ \sin \dots & 9.4958 \\ \tan S & 9.6644 \\ & 6.8739 \end{array}$$

$$\begin{array}{rcl} (g') & 0.9526 \\ (g) & 8.9591 \end{array}$$

$$\begin{array}{rcl} f & +0.99 \\ g & +0.09 \\ h & +9.16 \\ \hline & +2.24 \end{array}$$

$$\begin{array}{rcl} \cos S & 9.9580 \\ & 0.3186 \\ (L) & 02.766 \end{array}$$

$$\begin{array}{rcl} \sin S & 9.6224 \\ \cos(H + \alpha) & 9.7989 \\ f & 1.3053 \\ \sin \dots & 9.8905 \\ \sec S & 0.0420 \\ \frac{1}{\sin} & 8.8239 \end{array}$$

$$\begin{array}{rcl} (h') & 0.7296 \\ h & 0.0647 \end{array}$$

$$\begin{array}{rcl} f' & -8.97 \\ h' & -5.37 \\ i & +1.89 \\ \hline & -12.45 \end{array}$$



AC 1166

1913 Apr 28

9

Brown's Mean position (1911.0)

$$\begin{array}{r}
 X_0 = 18.0675 \\
 + 70 \\
 \hline
 18.0745
 \end{array}
 \quad
 \begin{array}{r}
 Y_0 = 22.1540 \\
 - 21 \\
 \hline
 22.1519
 \end{array}$$

Journ Plate Constants  $X = 17.5002$   $Y = 21.9282$ 

$$\begin{aligned}
 \xi &= -0.4998 \\
 \log \xi &= 9.69880 m \\
 \omega \xi &= 9.95867 \\
 \text{const} &= 8.50724 \\
 (N-A) &= 1.23352 m
 \end{aligned}$$

$$X-A = -17.12$$

$$A = 16 \quad 19 \quad 41$$

$$A_0 = 16 \quad 19 \quad 23.88$$

$$\text{Red} = +224$$

$$X = 16 \quad 19 \quad 2612$$

$$\eta = -0.0718$$

$$\begin{aligned}
 \log |\eta| &= 9.6654 m \\
 \eta^2 &= 9.3976 \\
 \eta_1 &= 6.1164 m \\
 \eta_2 &= -1
 \end{aligned}$$

$$\eta_0 = -0.0717$$

$$\begin{aligned}
 \log \eta_0 &= 8.85552 m \\
 \text{const} &= 7.33115
 \end{aligned}$$

$$(A-D) = 152437 m$$

$$B-D = -334$$

$$D = -24 \quad 46 \quad 27$$

$$S_0 = -24 \quad 47 \quad 00.4$$

$$\text{Red} = -124$$

$$S = -24 \quad 47 \quad 12.8$$



1166 Red aa locum apt

$$S = -24^{\circ} 47'$$

$$\begin{array}{rcl}
 H + \alpha & 3^m & 24^m = 51^{\circ} \\
 H & 11 & 05 \\
 \alpha & 16 & 19 \\
 G & 20 & 54 \\
 G + \alpha & 13 & 13 = 198^{\circ} 15'
 \end{array}$$

$$\begin{array}{rcl}
 \log S & & 9.9580 \\
 \log & & 0.3186 \\
 \hline
 (G) & & 0.2766
 \end{array}$$

$$\begin{array}{rcl}
 \log(G + \alpha) & & 9.9776m \\
 \log & & 0.9750 \\
 \sin & & 9.4958m \\
 \tan S & & 9.6644m \\
 & & 6.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin S & & 9.6224m \\
 \log(G + \alpha) & & 9.7189 \\
 \log & & 1.3083 \\
 \sin(\dots) & & 9.8905 \\
 \sec S & & 0.0420 \\
 \frac{1}{\sin} & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 (G') & & 0.9526m \\
 (G) & & 8.9591
 \end{array}$$

$$\begin{array}{rcl}
 (h') & & 0.7296m \\
 (h) & & 0.0647
 \end{array}$$

$$\begin{array}{rcl}
 f & + & 0.99 \\
 g & + & 0.09 \\
 h & + & 1.16 \\
 \hline
 & & +2.24
 \end{array}$$

$$\begin{array}{rcl}
 g' & - & 8.97 \\
 h' & - & 5.37 \\
 l & + & 1.89 \\
 \hline
 & & -12.45
 \end{array}$$

$$\begin{array}{rcl}
 \eta & & \\
 + & 5.29 & \\
 + & 1.172 & \\
 - & 1.219 & \\
 \hline
 & & 
 \end{array}$$

$$\begin{array}{rcl}
 \eta & & \\
 27.98 & & \\
 137.36 & & \\
 148.60 & & \\
 \hline
 3 \overline{) 313.94} & & \\
 \underline{104.65} & & \\
 61 & & \\
 \times & +0.32 + 0.5 & 
 \end{array}$$



1166 Lunar Parallax.

$$\begin{aligned} \alpha' &= 16^{\circ} 19' 26.12'' \\ \theta &= 16^{\circ} 25' 16.45'' \\ \theta - \alpha' &= +5' 50.33'' \\ &= +1^{\circ} 27' 35.11'' \end{aligned}$$

$$\begin{aligned} &+ 33'' \\ &+ 1' 27' 02'' \end{aligned}$$

$$\begin{array}{r} 9.95727 \\ 000000 \\ 0.00014 \\ \hline 9.95741 \end{array}$$

$$\gamma = 42^{\circ} 11' 43''$$

$$-24^{\circ} 47' 13''$$

$$66^{\circ} 58' 56''$$

$$\begin{array}{r} 9.82640 \\ 8.19657 \\ 9.96397 \\ \hline 017285 \\ 815979 \end{array}$$

$$S - S' = +49' 40.1''$$

$$S = -23^{\circ} 57' 32.7''$$

$$\text{Nautilium } S = -23^{\circ} 57' 30.9''$$

$$O - C = -1.8''$$

$$\text{Red to slow. r.} = +0.2''$$

$$O - C = -1.6''$$

Correction to S due to  
second order refr.

$$+0.5''$$

$$S' = -24^{\circ} 47' 12.8''$$

$$\Pi = 54' 03.5''$$

$$\begin{array}{r} 9.86913 \\ 8.19657 \\ 8.40610 \\ \hline 0.03913 \\ 651093 \end{array}$$

$$\alpha - \alpha' = +1' 06.89''$$

$$= +0.446''$$

$$\alpha = 16^{\circ} 19' 30.58''$$

$$\alpha = 16^{\circ} 19' 29.89''$$

$$+0.69''$$

$$-0.10''$$

$$+0.59''$$





## Lunar Parallax

$$\begin{array}{r}
 1166 \\
 \alpha' = 16 \quad 19 \quad 26.12 \\
 \theta = 16 \quad 25 \quad 16.45 \\
 \theta - \alpha' = \quad \quad \quad 50.33 \\
 \quad \quad \quad + 1^\circ \quad 27' \quad 35''
 \end{array}$$

$$+ \quad \quad \quad 33$$

$$+ 1 \quad 27 \quad 02$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 000014 \\
 \hline
 995741
 \end{array}$$

$$\gamma = 42 \quad 11 \quad 43$$

$$- 24 \quad 47 \quad 13$$

$$66 \quad 58 \quad 56$$

$$\begin{array}{r}
 982640 \\
 819657 \\
 996397 \\
 \hline
 017285 \\
 815979
 \end{array}$$

$$S - S' = \quad \quad \quad + 49 \quad 40.1$$

$$S = -23 \quad 57 \quad 32.7$$

$$\text{Hemisphere } S = -23 \quad 57 \quad 30.9$$

$$O - C \quad \quad \quad - \quad 1.8$$

$$\text{Red. to star. v.} \quad \quad \quad - \quad 0.2$$

$$O - C \quad \quad \quad - \quad 1.6$$

$$S = -24^\circ \quad 47' \quad 12''8$$

$$IT = \quad 54' \quad 03''5$$

$$986913$$

$$819657$$

$$840610$$

$$003913$$

$$\hline 651093$$

$$\alpha - \alpha' = +1' \quad 06.89$$

$$= + \quad 04.46$$

$$\alpha = 16 \quad 19 \quad 30.58$$

$$\alpha = 16 \quad 19 \quad 29.89$$

$$+ 0.69$$

$$- 0.10$$

$$+ 0.59$$





MC1257 Comp Stars - Star. Counts

1913 Feb. 20.

11

1.      no.      mag.

Cafe      170      62

C      1<sup>h</sup> 09<sup>m</sup>      30.24

L           28

E           24

mean      1 09      30.25

Prec.      +      34.27

Q(1911)      1 10      04.52

A      1 13      26

$\delta - A =$       - 3      21.48

$\sin(\delta - A) =$       -      20.147

$\log_2 =$       2.30421<sup>m</sup>

$\cos \delta =$       9.99718

$\sin \delta_0 =$       0.80863<sup>m</sup>

$\sin \delta_1 =$       -6.4362

$\sin \delta_2 =$       -      10

$\sin \delta_3 =$       11.5628

$\eta =$       11.6771

$\alpha - \beta =$       +1143

C +6° 27' 58".5

L           .8

E           .7

mean +6      27      58.7

Prec      + 3      30.1

Q(1911) +6      31      28.8

D      +5      54      50

$\delta - D = +$       36      38.8

$\sin(\delta - D) =$       +2198.9

$\log_2 =$       3.34221

$\sin \delta_0 =$       0.67336

$\sin \delta_1 =$       9.0584

$\sin \delta_2 =$       1.6173

$\sin \delta_3 =$       7.7291

$\eta_0 =$       +4.7137

$\eta_1 =$       +      54

$\eta_2 =$       26.7191

$\eta_3 =$       26.8224

$\eta - \eta_0 =$       +1033

2.      no.      mag.

175      8.2

1<sup>h</sup> 11<sup>m</sup>      33.52

59

55

1 11      33.55

+      34.16

1 12      07.71

1 13      26

- 1      18.29

-      78.29

1.89371<sup>m</sup>

9.99861

0.39956<sup>m</sup>

-2.5094

-      7

15.4899

15.4148

-      751

+4° 31' 40.5"

.6

.7

+4 31      40.6

+ 3      29.8

+4 35      40.4

+5 54      50

-1 19      39.6

-      4.7804

3.67947<sup>m</sup>

1.01062<sup>m</sup>

9.9042

0.7991

6.7567

-10.2476

+      6

11.7530

11.8114

+      584





1757 Comp Stars - Star. Correds.

1757 no mag.

2.

170 62  
 1<sup>h</sup> 09<sup>m</sup> 30<sup>s</sup> 24  
 28  
 24

1 09 30.25

+ 34.27

(1911) 1 10 04.52

1 13 26

-A = - 3 21.48

u(A-A) = - 201.47

u<sub>g</sub> = 2.30421 m

cos δ = 9.99718

δ<sub>0</sub> = 0.80863 m

δ<sub>1</sub> = -6.4362

δ<sub>2</sub> = - 10

δ<sub>3</sub> = 11.5628

δ<sub>4</sub> = 11.6771

δ<sub>5</sub> = +11.43

C +6° 27' 58".5

L = 8

E = 7

mean +6 27 58.7

u<sub>g</sub> + 3 30.1

(1911) +6 31 28.8

12 +5 54 50

-D = + 36 38.8

(A-D) = + 2198.9

u<sub>g</sub> = 3.34221

u<sub>0</sub> = 0.67336

tans δ = 9.0584

δ<sub>2</sub> = 1.6173

δ<sub>3</sub> = 7.7291

δ<sub>4</sub> = +4.7137

δ<sub>5</sub> = + 54

δ<sub>6</sub> = 26.7191

δ<sub>7</sub> = 26.8224

δ<sub>8</sub> = + 1033

1913 + 20. 20.

11

1757 no mag.

175 8.2  
 1<sup>h</sup> 11<sup>m</sup> 33<sup>s</sup> 52  
 59  
 55

1 11 33.55

+ 34.16

1 12 07.71

1 13 26

- 1 18.29

- 78.29

1.893.71 m

9.99861

0.39956 m

-2.5094

- 7

15.4899

15.4148

- 751

+4° 31' 40.5"

6

7

+4 31 40.6

+ 3 29.8

+4 35 40.4

+5 54 50

-1 19 39.6

- 4780.4

3.67947 m

1.01062 m

0.9042

0.7991

6.7567

-10.2476

+ 6

11.7530

11.8114

+ 584





MC 1257 Comp. Stan - Stan. Courch

1913 Feb. 20

12

	3	no.	mag		4	no.	mag
C	1	188	7.61		1	190	7.2
L	1	17	32.74		1	17	43.04
E			.75				.06
			.71				.01
Mean	1	17	32.73		1	17	43.04
Prec			+ 34.15				+ 34.45
X(1911)	1	18	06.88		1	18	17.49
A =	1	13	26		1	13	26
X-A			+ 4				+ 4
sin(X-A)			+ 280.86				+ 291.47
log "			2.44849				2.46460
cos S:			9.99879				9.99680
" S <sub>0</sub>			0.95452				0.96864
S <sub>0</sub> =			+9.0058				+9.3034
S <sub>1</sub> =			+ 53				+ 35
S =			27.0111				27.3069
X =			269.048				274.612

$$X - S = -1.063$$

$$+ 1.543$$

C + 40	12	56.2		+ 6	53	24.4
L		56.8				24.2
E		55.8				25.9
Mean + 4	12	56.3		+ 6	53	24.8
Prec			+ 3			+ 3
S(1911) + 4	16	24.2		+ 6	56	55.3
D	+ 5	54	50	+ 5	54	50.
S-D	- 1	38	25.8	+ 1	02	05.3
sin(S-D)			59.074			+ 37.257
log "			3.77140m			3.57121
" S <sub>0</sub>			1.10255m			0.90236
tan S:			8.8735			9.0858
S <sub>0</sub> =			19.090			19.373
" S <sub>1</sub> =			7.8359			8.0765
S <sub>0</sub> =			- 12.6634			+ 7.9866
S <sub>1</sub> =			+ 69			+ 119
S =			9.3435			29.9985
"			22.545			29.9022
X - S			89.0			- 963





1257

Camp Stan. - Stan. Coord.

1913 Jan. 20.

12

3 no mag  
 188 7.61  
 1 17 32.74  
 75  
 71  
 an 1 17 32.73  
 + 34.15  
 (1911) 1 18 06.88  
 A = 1 13 26  
 (-A) + 4 40.88  
 sin(X-A) + 280.86  
 log " 2.44849  
 S: 9.99879  
 S<sub>0</sub> 0.95452  
 S<sub>1</sub> +9.0058  
 S<sub>2</sub> + 53  
 S<sub>3</sub> 27.0111  
 x 269048

x - S: - 1063

C + 40 12' 56.2  
 L 56.8  
 E 55.8  
 Arcan + 4 12 56.3  
 Prec. + 3 27.9  
 (1911) + 4 16 24.2  
 W + 5 54 50  
 S-D - 1 38 25.8  
 sin(X-D) = 5907.4  
 log 3.77140m  
 1.10255m  
 tan S: 8.8735  
 S<sub>2</sub> 19090  
 S<sub>3</sub> 78359  
 m<sub>0</sub> = -12.6634  
 m<sub>1</sub> = + 69  
 m = 9.3435  
 y 12545  
 890

4 no mag  
 190 7.2  
 1 17 43.04  
 06  
 01  
 1 17 43.04  
 + 34.95  
 1 18 17.49  
 1 13 26  
 + 4 51.49  
 + 291.47  
 2.46460  
 9.99680  
 0.96864  
 +9.3034  
 + 35  
 27.3069  
 274612

+ 154.3

+6 53 24.4  
 24.2  
 259  
 +6 53 24.8  
 + 3 30.5  
 +6 56 55.3  
 +5 54 50.  
 +1 02 01.3  
 + 3725.7  
 3.57121  
 0.90236  
 9.0858  
 19373  
 80765  
 +79866  
 + 119  
 29.9985  
 219022  
 - 963





MC 1257

1913 Feb. 20.

13.

## Comparison Stars Measures

1	d	$\mu$	$\nu$	d	$\mu$	$\nu$
11.7						
26.8	16178		16470	16720		15548
mag	796158		1470101	1350001		879690
6.2	62		00	00		91
	80		82	31		63
	<u>26.8220</u>		<u>.8229</u>	<u>11.6776</u>		<u>.6766</u>
2						
15.4	15540		17933	15822		18601
11.8	743135		1604852	998276		1446055
mag	39		48	79		59
8.2	46		30	32		06
	<u>1.1.8110</u>		<u>.8.117</u>	<u>15.4151</u>		<u>.4145</u>
3						
26.9	16788		17798	16910		17710
9.3	1425250		1033744	1595860		806250
mag	57		38	56		65
7.0	00		85	20		10
	<u>9.2538</u>		<u>.2552</u>	<u>26.9047</u>		<u>.9048</u>
4						
27.5	16232		18630	15458		15382
29.9	722018		1766465	1006065		1078278
mag	20		60	67		79
7.2	33		46	50		98
	<u>299014</u>		<u>.9031</u>	<u>274614</u>		<u>.4610</u>





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## Comparison Star Measures.

1	d	v	d	v
11.7	16178	16470	16720	15548
26.8	796158	1470101	1350001	979690
mg	62	00	00	91
6.2	80	82	31	63
	<u>268220</u>	<u>8229</u>	<u>11.6776</u>	<u>6766</u>
2				
15.4	15540	17933	15822	18601
11.8	743135	1604852	998276	1446055
mg	39	48	79	59
8.2	46	30	32	06
	<u>1.1.8110</u>	<u>.8.117</u>	<u>15.4151</u>	<u>.4145</u>
3				
1.9	16788	17798	16910	17710
1.3	1425250	1033744	1595860	806280
mg	57	38	56	65
1.0	00	5	20	10
	<u>9.2538</u>	<u>.2552</u>	<u>26.9047</u>	<u>9048</u>
4				
7.5	16232	18630	15450	15382
9.9	722018	1766465	1006065	1078278
mg	20	60	67	79
7.2	33	46	50	98
	<u>299014</u>	<u>.9031</u>	<u>274614</u>	<u>4610</u>





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$\frac{1}{19.0}$      $\frac{15114}{9300}$      $\frac{17322}{13135}$   
 $20.6$      $17$      $45-38$   
            $10$      $33$   
            $26$

20.5812.5813

$\frac{2}{19.4}$   
 $21.2$

$\frac{3}{19.8}$   
 $22.0$

$\frac{4}{19.9}$   
 $22.3$   
 max  
 $\frac{1}{2}$

$\frac{5}{19.7}$   
 $23.0$

$\frac{14258}{8830}$      $\frac{17330}{12750}$   
 $24$      $36$   
 $60$      $40$   
            $46$

19.4568    .4596

$\frac{18160}{17088}$      $\frac{16206}{7285}$   
 $80$      $50$   
 $77$      $65$   
 $70$      $16$

19.8921    .8937

$\frac{17155}{16250}$      $\frac{15227}{6121}$   
 $48$      $10$   
 $48$      $10$   
 $50$      $23$

19.9095    .9109

$\frac{17103}{15092}$      $\frac{14258}{6255}$   
 $99$      $62$   
 $00$      $60$   
            $65$

19.7994    .8004





1257.

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14

d

15114  
9300 17  
10  
26

n

17322  
13135 38  
45  
33

20.5812.58132

19.4

11.2

3

6

0

4

19.9

12.3

max

x

5

9.7

13.0

x

d

n

14258 17330  
8830 12750 36  
24 40  
60 46

19.45684596

18160 16206  
17088 80 7285 50  
77 65  
70 16

19.89121.8937

17155 15227  
16250 48 6121 10  
48 10  
50 23

19.9091.9107

17103 14258  
15092 99 6255 62  
99 60  
00 65

19.7994.8004





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Moon-Measures

 $\frac{6}{19.1}$   
 $\frac{24.0}{24.0}$ 

a

w

 $\frac{a}{11714}$   
 $\frac{3030}{11364}$ 
 $\frac{N}{10607}$   
 $\frac{1026050}{50}$ 
19.0361.0354

7

 $\frac{19.0}{24.1}$  9478  
 9230 20  
 21

 $\frac{696262}{51}$   
 6688
24.0254.0270
 $\frac{8}{19.0}$   
 $\frac{24.4}{24.4}$ 
 $\frac{18451}{1474157}$   
 $\frac{55}{60}$ 
 $\frac{18030}{1169314}$   
 $\frac{11}{49}$ 
24.3703.3664
 $\frac{9}{17.9}$   
 $\frac{24.4}{24.4}$   
 max  
 $\frac{w}{y}$ 
 $\frac{17463}{1372010}$   
 $\frac{16}{70}$ 
 $\frac{17020}{10830}$   
 $\frac{4840}{33}$ 
24.3751.3711

10 scratch

 $\frac{17.4}{24.3}$  17491  
 74244 22  
 20  
 01

 $\frac{16997}{1026062}$   
 $\frac{60}{13}$ 
 $\frac{17803}{1186671}$   
 $\frac{61}{21}$ 
 $\frac{16040}{1197180}$   
 $\frac{77}{49}$ 
24.3265.325317.4052

4068





191257

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Moon - Measures

a

N

a

N

11714  
3030  
11364

10607  
1026050  
50

19.0361.6354

2

19.0 9978  
24.1 9230 20  
21

696262  
51  
6688

24.0254.0270

8

18951  
1474157  
55  
60

18030  
1169314  
11  
49

24.3703.3664

9

179  
24.4 17463  
13720 10  
16  
70

17020  
10730  
4840  
33

24.3751.3711

10 scratch

17.4 17491  
14244 22  
20  
01

16997  
10260 62  
60  
13

17803  
1186671  
61  
21

16040  
1197180  
77  
49

24.3265.325317.4052

4068





MC 1257

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## Center of Plate

$x$	$y$		$R.A.$		Decl.
11.68	26.82	1	10	05	+6 31 29
15.41	11.81	1	12	08	+4 35 10
26.90	9.25	1	18	07	+4 16 24
27.46	29.90	1	18	17	+6 56 55
4181.45	77.78		58	37	22 19 58
20.36	19.44	1	14	39	+5 35 00
-18	-22		-1	13	+19 50
236	256	1	13	26	+5 54 50
31	465				
236	1280				
708	1536				
73.16	1024				
	1190.40				

## Preliminary Reduction

$x-3$	-1264	-22	+2252
+1143	-3379	-2236-12	-2248 = +4
-751	-1488	-2239-15	-2254 = -2
-1063	-1166	-2229-27	-2256 = -4
+1543	-3767	-2224-27	-2251 = +1

$y-m$	+1272	+4	-2546
+1033	+1483	+2516+27	+2543 = -3
+584	+1957	+2541+12	+2553 = +7
-890	+3416	+2526+9	+2535 = -11
-963	+3487	+2424+30	+2554 = +8





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1913 Feb 20.

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## Center of Plate

$x$	$y$	$R.A.$	Decl.
11.68	26.82	1 10 05	+6 31 29
15.41	11.81	1 12 08	+4 35 10
26.90	9.25	1 18 07	+4 16 24
27.96	29.90	1 18 17	+6 56 55
4181.45	77.78	58 37	22 19 58
20.36	19.44	1 14 39	+5 35 00
-18.	-22	-1 13	+19 50
236	256	1 13 26	+5 54 50
31	465		
236	1280		
708	1536		
73.16	1024		
	1190.40		

## Preliminary Reduction

$x - 3$	$-1264$	$-22$	$+2252$
$+1143 - 3279$	$-2236 - 12$	$-2248$	$+4$
$-751 - 1488$	$-2239 - 15$	$-2254$	$-2$
$-1063 - 1166$	$-2229 - 27$	$-2256$	$-4$
$+1543 - 2767$	$-2224 - 27$	$-2251$	$+1$

$y - 4$	$+1272$	$+4$	$-2546$
$+1033 + 1483$	$+2516 + 27$	$+2543$	$-3$
$+584 + 1957$	$+2541 + 12$	$+2553$	$+7$
$-890 + 3416$	$+2526 + 9$	$+2535$	$-11$
$-963 + 3487$	$+2424 + 30$	$+2554$	$+8$





MC 1257

1913 Feb. 25

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## Plate Constants

$a$	$b$	$c$	$x - x_0$	$y - y_0$
11.68	+26.82	+1	+4	-3
15.41	+11.81	+1	-2	+7
26.90	+9.25	+1	-4	-11
27.46	+29.90	+1	+1	+8

## Mean Equations.

$a$	$b$	$c$	
+13.54	+19.32	+1	+2.00
+27.18	+19.08	+1	-1.50
+21.16	+10.53	+1	-2.00
+19.57	+28.56	+1	+2.50
-13.64	+0.74		+3.50
+1.59	-17.83		-4.50
-1.59	+0.03		+0.41
	-17.80		-4.09
	$b = +0.29$		+0.23
-13.64	$= +2.50 - 0.07 = +2.43$		$+3.50 - 0.05 = +3.45$
	$a = -0.18$		-0.25

+1.0	-1.5	-3.0	+2.5	+2.0	-1.5	-2.0	+2.5
+2.4	+4.8	+3.8	+3.5	+3.4	+6.9	+5.3	+5.0
-5.7	-5.6	-3.1	-8.3	-4.4	-4.4	-2.4	-6.5
-2.3	-2.3	-2.3	-2.3	+1.0	+1.0	+0.9	+1.0

## Residuals.

	$0 - c$
-2 + 8 - 2 = +4	+4 = 0
-3 + 3 - 2 = -2	-2 = 0
-5 + 3 - 2 = -4	-4 = 0
-5 + 9 - 2 = +2	+1 = -1

-3 + 6 + 1 = +4	-3	-7
-4 + 3 + 1 = 0	+7	+7
-7 + 2 + 1 = -4	-11	-7
-7 + 7 + 1 = +1	+8	+7





MC 1257

1913 Feb. 25.

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## Plate Constants

$x$	$y$	$c$	$x - 3$	$y - 4$
11.68	+26.82	+1	+4	-3
15.41	+11.81	+1	-2	+7
26.90	+9.25	+1	-4	+1
27.46	+29.90	+1	+1	+8

## Mean Equations.

$x$	$y$	$c$		
+13.54	+19.32	+1	+1.00	+2.00
+27.18	+19.08	+1	-1.50	-1.50
+21.16	+10.53	+1	-3.00	-2.00
+19.57	+28.36	+1	+2.50	+2.50
-13.64	+0.24		+2.50	+3.50
+1.59	-17.83		-5.50	-4.50
-1.59	+0.03		+0.29	+0.41
	-17.80		-5.21	-4.09
		$b = +0.29$		+0.23
-13.64	+2.50	$a = -0.07$	+2.43	+3.50 - 0.05 = +3.45
		$a = -0.18$		-0.25

+1.0	-1.5	-3.0	+2.5	+2.0	-1.5	-3.0	+2.5
+2.4	+4.8	+3.8	+3.5	+3.4	+6.9	+3	+5.0
-5.7	-5.6	-3.1	-8.3	-4.4	-4.4	-2.4	-6.5
-2.3	-2.3	-2.3	-2.3	+1.0	+1.0	+0.9	+1.0

## Residuals

$x$	$y$	$c$	$x - 3$	$y - 4$
-2	+8	-2	+4	0
-3	+3	-2	-2	0
-5	+3	-2	-4	0
-5	+9	-2	+2	-1
-3	+6	+1	+4	-3
-4	+3	+1	0	+7
-7	+2	+1	-4	-7
-7	+7	+1	+1	+7





MC 1257

1913 Mar 6.

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## Moon's Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - C$
1	19.0000	+1.1592	+1	1.3440	4.3120	+112
2	19.4582	+1.6174	+1	2.6163	4.3164	+156
3	19.8929	+2.0521	+0	4.2111	4.3033	+25
+4	19.9102	+2.0694	0	4.2824	4.2824	-184
5	19.7999	+1.9591	-0	3.8381	4.3231	+223
6	19.0358	+1.1950	-1	1.4278	4.3059	+51
7	19.0000	+1.1592	-1	1.3435	4.3115	+107
8	18.0000	+0.1592	-2	0.0253	4.2895	-113
9	17.8408	0.0000	-2	0.0000	4.2837	-171
10	17.4060	-0.4348	-2	0.1892	4.2797	-211
			Mean		4.3008	-5

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$
1	20.5812	-1.7225	-3	2.9680
2	21.0000	-1.3037	-2	1.7001
3	22.0000	-0.3037	0	0.0922
4	22.3037	0.0000	0	0.0000
5	23.0000	+0.6963	+1	0.4850
6	24.0000	+1.6963	+2	2.8781
7	24.0262	+1.7225	+3	2.9680
8	24.3684	+2.0647	+3	4.2642
+9	24.3731	+2.0694	+3	4.2837
10	24.3259	+2.0222	+3	4.0905

## Approximate Center

$$x_0 = 19.0 \quad y = 20.5812$$

$$24.0262$$

$$44.6074$$

$$\text{Mean } y = 22.3037$$

$$y - \text{max} = 24.3731$$

$$R = 2.0694$$

$$x - \text{max} = 19.9102$$

$$x_0 = 17.8408$$

$$\text{Center} \begin{cases} x_0 = 17.8408 \\ y_0 = 22.3037 \end{cases}$$





MC 1257.

1913 Mar 6.

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## Moon's Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	19.0000	+1.1592	+1	1.3440	4.3120	+1.12
2	19.4582	+1.6174	+1	2.6163	4.3164	+1.56
3	19.8929	+2.0521	+0	4.2111	4.3033	+2.5
+4	19.9102	+2.0694	0	4.2824	4.2824	-1.84
5	19.7999	+1.9591	-0	3.8381	4.3231	+2.23
6	19.0358	+1.1950	-1	1.4278	4.3059	+5.1
7	19.0000	+1.1592	-1	1.3435	4.3115	+1.07
8	18.0000	+0.1592	-2	0.0253	4.2895	-1.13
9	17.8408	0.0000	-2	0.0000	4.2837	-1.71
10	17.4060	-0.4348	-2	0.1892	4.2797	-2.11
Mean					4.3008	

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$
1	20.5812	-1.7225	-3	2.9680
2	21.0000	-1.3037	-2	1.7001
3	22.0000	-0.3037	0	0.0922
4	22.3037	0.0000	0	0.0000
5	23.0000	+0.6963	+1	0.4850
6	24.0000	+1.6963	+2	2.8781
7	24.0262	+1.7225	+3	2.9680
8	24.3684	+2.0647	+3	4.2642
+9	24.3731	+2.0694	+3	4.2837
10	24.3259	+2.0222	+3	4.0905

## Approximate Center.

$$x = 19.0 \quad y = 20.5812$$

$$\underline{24.0262}$$

$$44.6074$$

$$\text{Mean } y = 22.3037$$

$$y - \text{max} = 24.3731$$

$$R = 2.0694$$

$$x - \text{max} = 19.9102$$

$$x_0 = 17.8408$$

$$\text{Center } \begin{cases} x_0 = 17.8408 \\ y_0 = 22.3037 \end{cases}$$



## Formation of Normals.

$\lambda_0$	$a$	$b$	$c$
1	- 200	+ 130.0	- 192.8
2	- 210	+ 251.8	- 203.0
3	- 0.61	+ 51.1	- 7.5
4	+ 000	- 381.0	- 0.0
5	+ 1.37	+ 436.0	+ 156.0
6	+ 204	+ 61.2	+ 86.7
7	+ 200	+ 124.0	+ 184.0
8	+ 033	- 18.1	- 232.5
9	+ 000	- 0.0	- 354.0
10	- 087	+ 90.6	- 426.0
	+ 0.16	+ 745.6	- 989.1

$$[a_a] = +19.28$$

$$[b_b] = +23.73$$

$$[a_c] = +10.95$$

$$[b_c] = +6.95$$

$$[c_w] = -5$$



Ononis Center

## Conditional Equations

a	b	c	0	C	0-C
1	+1.16	-1.72	+1 = +112	+197+33-79 = +51	+61
2	+1.62	-1.30	+1 = +156	+136+25-79 = +82	+74
3	+2.05	-0.30	+1 = +25	+172+6-79 = +99	-74
4	+2.07	+0.00	+1 = -184	+174-0-79 = +95	-279
5	+1.96	+0.70	+1 = +223	+165-33-79 = +73	+150
6	+1.30	+1.70	+1 = +51	+101-32-79 = -10	+61
7	+1.16	+1.72	+1 = +107	+97-33-79 = -15	+122
8	+0.16	+2.06	+1 = -113	+13-39-79 = -105	-8
9	0.00	+2.07	+1 = -171	+0-40-79 = -119	-52
10	-0.43	+2.02	+1 = -211	-37-39-79 = -155	-56

## Normal Equations

+468-469

Average (0-C) = 94

$$+19.28 + 0.16 + 10.95 = +746$$

$$+ 0.16 + 23.73 + 6.95 = -989$$

$$+10.95 + 6.95 + 10.00 = -5$$

$$- 0.16 - 0.00 - 0.09 = -6$$

$$-10.95 - 0.09 - 6.22 = -425$$

$$+23.73 + 6.86 = -995$$

$$+ 6.86 + 3.78 = -430$$

$$- 6.86 - 1.99 = +288$$

$$+ 1.79 = -142$$

$$-12.46 - 6.86 = +780$$

$$+ 1.127 = -215$$

$$- 0.25 - 0.16 - 0.23 = +0$$

$$-37.45 - 23.73 - 34.20 = +17$$

$$+19.03$$

$$-37.29$$

$$-14.70$$

$$+4.33$$

$$+10.72 = +746$$

$$-27.25 = -972$$

$$-10.72 = -382$$

$$= +364$$

$$a = +84$$





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Snow's Center

## Conditional Equations

	a	b	c	0		c	0-c
1	+1.16	-1.72	+1	= +112	+ 197	+ 33 - 79 = +51	+ 61
2	+1.62	-1.30	+1	= +156	+ 136	+ 25 - 79 = +82	+ 74
3	+2.05	-0.30	+1	= +25	+ 172	+ 6 - 79 = +99	- 74
4	+2.07	+0.00	+1	= -184	+ 174	+ 0 - 79 = +95	- 279
5	+1.96	+2.70	+1	= +223	+ 165	+ 33 - 79 = +73	+150
6	+1.20	+1.70	+1	= +51	+ 101	+ 33 - 79 = -10	+ 61
7	+1.16	+1.72	+1	= +107	+ 97	+ 33 - 79 = -15	+122
8	+0.16	+2.06	+1	= -113	+ 13	+ 39 - 79 = -105	- 8
9	0.00	+2.07	+1	= -171	+ 0	+ 40 - 79 = -119	- 52
10	-0.43	+2.02	+1	= -211	+ 37	+ 39 - 79 = -155	- 56

## Normal Equations

+468 - 469

Average 0-c = 94

$$+ 19.28 + 0.16 + 10.95 = +746$$

$$+ 0.16 + 23.73 + 6.95 = -989$$

$$+ 10.95 + 6.95 + 10.00 = -5$$

$$- 0.16 - 0.00 - 0.09 = -6$$

$$- 10.95 - 0.09 - 6.22 = -425$$

$$+ 23.73 + 6.86 = -995$$

$$+ 6.86 + 3.78 = -430$$

$$- 6.86 - 1.49 = +288$$

$$+ 1.79 = -142$$

$$c = -79$$

$$- 12.46 - 6.86 = +780$$

$$+ 11.27 = -215$$

$$b = -19$$

$$- 0.25 - 0.16 - 0.23 = +0$$

$$- 37.45 - 23.73 - 34.20 = +17$$

$$+ 19.03$$

$$- 37.29$$

$$+ 10.72 = +746$$

$$- 27.25 = -972$$

$$- 14.70$$

$$+ 4.33$$

$$- 10.72 = -382$$

$$= +364$$

$$a = +84$$







1257

Moon's Mean Position (1911.0)





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Mason Mean Position (1911 0)

M  
E  
C  
N  
G  
S  
L  
E  
D  
O  
H  
W  
L  
E  
W



MC1257

1913 Mar 6

Times etc.

Exp. to stars	1911 Sept 10	0 <sup>h</sup> 23 <sup>m</sup>	-0 <sup>h</sup> 32 <sup>m</sup>
" known		0 27 16.0	-0 27 16.2
clock slow		0 38.8	
H sid. T.		0 27 54.9	
H hour		4 44 31.05	
G Sid. T.		5 12 25.95	
Sid. T. known		11 13 36.69	
Interval		17 58 49.26	
Reduction		2 56.74	
G. M. T.		17 55 52.52	

From Am. Eph.

R. A.

Decl.

Moon 18 <sup>h</sup>	1 <sup>h</sup> 12 <sup>m</sup> 56.24	+6° 32' 38.8
Motion in 1 <sup>m</sup> - 20310		15.592
" - -4.125	- 8.38	- 1 04.3
Tabular Place	1 12 47.86	+6 31 34.5

Moon's parallax

57 56.9

semidiameter

15 49.0

R. = 949.0

Augmentation +12.8

Irradiation -0.3

R = 961.5

R = 20611

w = +0.8

(1+a) R = 20613

R<sup>2</sup> = 42489





MC1257

1913 Mar 6.

Times etc.

exp. to stars	1911 Sept 10	0 <sup>h</sup> 23 <sup>m</sup>	-0 <sup>h</sup> 32 <sup>m</sup>
Thoms		0 27	16.0 -0 27 16.2
close to slow		0	38.8

H sid T.	0	27	54.9
H hour	4	44	31.05
G Sid T.	5	12	25.95
Sid T. in hour	11	13	36.69
Interval	17	58	49.26
Reduction		2	56.74
G. M. T.	17	55	52.52

From Sun Eph.		R. A	Decl.
moon 18 <sup>h</sup>	1 <sup>h</sup> 12 <sup>m</sup>	56.24	+6° 32' 38.8
motion 1 <sup>m</sup>	2.0310		15.592
-4.125		- 8.38	- 1 04.3
Tabular Place	1 12	47.86	+6 31 34.5

Moon's parallax	57	56.9
semi-diameter	15	49.7
R =		949.0
Augmentation		+12.8
Irradiation		-0.3
R =		961.5
R =		20611
$\omega + 0.8$	(1 + $\omega$ ) R =	20613
	R =	9.2489

1  
1  
19  
20  
2  
19  
21  
3  
19  
2  
4  
19  
2  
5  
19  
2  
6  
19  
2



1257 Moon - Remedius

1914 January 31.

d	n
1 19662	15519
19.1 1389770	1132388
20.6 8070	30
40	17
<u>20.5768</u>	<u>5809</u>

possibly in  
laminator

2  
19.5  
21.0

18510	16035
1308798	1142730
95	3030
09	30
<u>19.4584</u>	<u>4604</u>

18465	17080
1741918	812021
10	13
60	70
<u>19.8951</u>	<u>8953</u>

18450	7960
1756168	5248
75	7070
<u>19.9118</u>	<u>9117</u>

17420	18115
1543950	1009080
39	80
20	00
<u>19.8023</u>	<u>5020</u>

6	
19.8 12900	13540
24.0 1255041	3019
30	13260
<u>24.0260</u>	<u>026.6</u>





1257 Moon - Remeasured

1914 January 31.

	d	n
1	19662	15519
10	1389770	1132388
16	8070	30
	40	17
	<u>205768</u>	<u>15809</u>

possibly u  
- terminator

2  
15  
10

18510	16035
1308798	1142730
95	3030
09	30
<u>194584</u>	<u>4604</u>

3  
99  
120

18465	17080
1741918	812021
10	13
60	70
<u>198911</u>	<u>8953</u>

4  
199  
223  
max

184150	7960
1756168	5248
75	7070

in  
2

<u>199118</u>	<u>9117</u>
---------------	-------------

5  
198  
230

17420	18115
1543950	1009080
39	80
20	00
<u>198023</u>	<u>4020</u>

6

19.0	12900	13540
24.0	1265041	3019
	30	13260
	<u>24.0260</u>	<u>0266</u>





1257 Moon - Remeasures

	d	4	n	d	20	n
2	15801		20130			
18.0	1205050		1385058			
24.4	50		68			
max	98		20			
in	24.3750		3735			
4						

8 Scratch.

17.4	14816	15-132	15810	15011
24.3	1153830	839689	985159	18958
	45	92	51	6262
	10	20	98	15
	<u>24.3276</u>	<u>3268</u>	<u>17.4052</u>	<u>4052</u>





1257 Moon - Remeasures

	d	n	d	n
2	15801	20130		
154	1205050	1385058		
244	50	68		
map	98	20		
u	193750	3735		
y				

Scratch.

174	14816	15-132	15-810	15011
243	115-3830	839689	98515-9	1095862
	45	92	51	6262
	10	20	98	15
	<u>24.3276</u>	<u>3268</u>	<u>174052</u>	<u>4052</u>





1257

Moon's Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$
1	19.0000 + 1.1570	+1	1.3388	4.3127	
2	19.4594 + 1.6164	+1	2.6131	4.3114	
3	19.8952 + 2.0522	0	4.2115	4.3033	
4	19.9118 + 2.0688	0	4.2800	4.2800	
5	19.8022 + 1.9592	-1	3.8381	4.3240	
6	19.0000 + 1.1570	-1	1.3384	4.3092	
7	17.8430 00000	-2	0.0000	4.2911	
8	17.4052 - 0.4378	-2	0.1918	4.2904	

$$\text{Avg } R^2 = 4.2489$$

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$
1	20.5788	-1.7242	-3	2.9739
2	21.0000	-1.3030	-2	1.6983
3	22.0000	-0.3030	0	0.0918
4	22.3030	0.0000	0	0.0000
5	23.0200	+0.6970	+1	0.4859
6	24.0263	+1.7233	+3	2.9708
+7	24.3742	+2.0712	+3	4.2911
8	24.3272	+2.0242	+3	4.0986
9				

Aphor. Center.

$$x = 19.0 \quad y = 20.5788$$

$$24.0263$$

$$44.6051$$

$$y_0 = 22.3026$$

$$y_{\text{max}} = 24.3742$$

$$R = 2.0716$$

$$x_{\text{max}} = 19.9118$$

$$x_0 = 17.8402$$

$$\text{Center } \begin{cases} x_0 = 17.8430 \\ y_0 = 22.3030 \end{cases}$$





1257

Moon's Center

	$x$	$x - x_0$	$\Delta x$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$
1	19 0000 + 1 1570	+1		1.3388	4.3127
2	19 4594 + 1 6164	+1		2.6131	4.3114
3	19 8952 + 2 0522	0		4.2115	4.3033
4	19 9118 + 2 0688	0		4.2800	4.2800
5	19 8022 + 1 9592	-1		3.8381	4.3240
6	19 0000 + 1 1570	-1		1.3384	4.3092
7	17 8430 0 0000	-2		0.0000	4.2911
8	17 4052 - 0 4378	-2		0.1918	4.2904

$$\text{Comp } R^2 = 4.2489$$

	$y$	$y - y_0$	$\Delta y$	$(y - y_0)^2$
1	20 5788 - 1 7242	-3		2.9739
2	21 0000 - 1 3030	-2		1.6983
3	22 0000 - 0 3030	0		0.0918
4	22 3030 0.0000	0		0.0000
5	23 0000 + 0 6970	+1		0.4859
6	24 0263 + 1 7233	+3		2.9708
7	24 3742 + 2 0712	+3		4.2911
8	24 3272 + 2 0242	+3		4.0986

After Center

$$x = 190 \quad y = 205788$$

$$\underline{240263}$$

$$446051$$

$$y_0 = 223026$$

$$y_{\text{max}} = 243742$$

$$R = 20716$$

$$x_{\text{max}} = 199118$$

$$x_0 = 178402$$

$$\text{Center } \begin{cases} x_0 = 178430 \\ y_0 = 223030 \end{cases}$$









